PROJECT MANUAL

South King Fire & Rescue Facility Improvements

Station 67

November 22, 2016

2238 S 223rd Street,
Des Moines, WA

By:

Rice Fergus Miller Inc
275 5th Street, Suite 100
Bremerton, Washington 98337

TABLE OF CONTENTS

NUMBER TITLE ..... PAGES

Cover 1
Table of Contents 3

DIVISION 0 – PROCUREMENT AND CONTRACTING REQUIREMENTS
001113 Advertisement for Bids 2
002113 Instructions to Bidders 3
003100 Information Available to Bidders 1
Attachment: Prevailing Wage Rates 9
Attachment: Benefits Code Key 9
Attachment: Limited Hazardous Materials Survey Report 61
004113 Bid Form 3
005213 Agreement Form – Stipulated Sum 1
007200 General Conditions to the Contract 1
007300 Supplemental Conditions 16

DIVISION 1 - GENERAL REQUIREMENTS
011000 Summary 4
012500 Substitution Procedures 3
012600 Contract Modification Procedures 3
012900 Payment Procedures 5
013100 Project Management and Coordination 9
013200 Construction Progress Documentation 9
013300 Submittal Procedures 7
014000 Quality Requirements 9
015000 Temporary Facilities and Controls 3
016000 Product Requirements 5
017300 Execution 8
017419 Construction Waste Management and Disposal 5
017700 Closeout Procedures 3
017823 Operation and Maintenance Data 4
017839 Project Record Documents 4

DIVISION 2 – EXISTING CONDITONS
024119 Selective Demolition 6

DIVISION 3 – CONCRETE:
033000 Cast-In-Place Concrete 7

DIVISION 4 – MASONRY: Not Used

DIVISION 5 – METALS:
051200 Structural Steel Framing 11

DIVISION 6 – WOOD PLASTICS, AND COMPOSITES
061000 Rough Carpentry 6

061800 Glued-Laminated Construction 7
064116 Plastic-Laminate Clad Architectural Cabinets 5

DIVISION 7 - THERMAL AND MOISTURE PROTECTION
075419 Thermoplastic Membrane Roofing 18
079200 Joint Sealants 9

DIVISION 8 – OPENINGS
081113 Hollow Metal Doors and Frames 8
087100 Door Hardware 6

DIVISION 9 – FINISHES
092900 Gypsum Board 5
093013 Ceramic Tiling 5
096513 Resilient Base and Accessories 4
096516 Resilient Sheet Flooring 5
099123 Interior Painting 9

DIVISION 10 – SPECIALTIES: Not Used

DIVISION 11 – EQUIPMENT: Not Used

DIVISION 12 – FURNISHINGS:
123661 Simulated Stone Countertops 3

DIVISION 13 – SPECIAL CONSTRUCTION: Not Used

DIVISION 14 - CONVEYING SYSTEMS: Not Used

DIVISION 21 – FIRE SURPRESSION: Not Used

DIVISION 22 – PLUMBING:
220000 Plumbing General Conditions 10
220500 Common Work Results for Plumbing 8
220700 Plumbing Insulation 3
221100 Facility Water Distribution 3
221300 Facility Sanitary Sewerage 2
222300 Natural Gas Systems 3
224000 Plumbing Fixtures 3

DIVISION 23 – HVAC:
230000 HVAC General Conditions 11
230500 Common Work Results for HVAC 7
230593 Testing, Adjusting, and Balancing 5
230700 HVAC Insulation 3
230900 Instrumentation and Control for HVAC 5
233100 HVAC Ducts and Casings 5
233300 Air Duct Accessories 3
233400 HVAC Fans 3

233700 Air Outlets and Inlets 2
238200 Terminal Heating Units 2

DIVISION 26 - ELECTRICAL
260000 Electrical General Conditions 12
260005 Electrical – Existing Systems 2
260010 Excavation and Backfill for Electrical Underground Utilities 5
260519 Wires and Cables 3
260526 Grounding and Bonding 2
260532 Outlet and Pull Boxes 3
260533 Raceway 4
260534 Metal Clad Cable (Type MC) and Fittings 4
260536 Basket Style Tray 2
262416 Panelboards 3
262419 Motor Controllers 3
262726 Switches and Receptacles 3
262813 Fuses 2
262816 Disconnects and Fused Switches 2
265000 Lighting 5

DIVISION 27 – COMMUNICATIONS: Not Used

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY: Not Used

DIVISION 31 - EARTHWORK: Not Used

DIVISION 32 - EXTERIOR IMPROVEMENTS: Not Used

DIVISION 33 - UTILITIES: Not Used

DIVISION 34 – TRANSPORTATION: Not Used

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTION: Not Used

DIVISIONS 40's – PROCESS EQUIPMENT SUBGROUP: Not Used

END OF SECTION

ADVERSTISEMENT FOR BIDS

PUBLIC NOTICE
ADVERTISEMENT FOR BIDS
November 22, 2016 First Publication, second publication November 29, 2016. Seattle Daily Journal of Commerce and Tacoma News Tribune
November 25, 2016 Federal Way Mirror

South King Fire and Rescue
Facility Improvements Station 67
Des Moines, WA

Sealed bids will be received by South King Fire and Rescue up to but not later than 2:00 pm, December 13, 2016, at the address listed below, for Facilities Improvements Station 67, at which time they shall be publicly opened and recorded.

The anticipated construction cost is approximately $250,000 not including sales tax.

This project is subject to meet Washington State prevailing wages rates. All work performed on the project will be subject to the approved wage determination rates in the bid documents.

Equal Opportunity/Affirmative Action: Owner is an equal opportunity and affirmative action employer. Minority-owned and women-owned businesses are encouraged to submit bids.

A non-mandatory pre-bid conference will be held at Fire Station 67, 2238 S 223rd Street, Des Moines, WA, at 10:00 am, December 1, 2016. The conference is intended to provide a general review between bidders, owner, and architect prior to bidding the project.

Contractors may obtain plans and specifications from American Reprographics Company (ARC), 632 Broadway, Tacoma, WA 98402, telephone (800) 337-8103, fax (253) 272-4064 upon the deposit of $100.00. Please make checks payable to Rice Fergus Miller Arch. Interiors Planning. Plans must be returned in good condition within seven (7) days following bid date to obtain a refund of deposit. After seven days, no refunds will be made. Bid packets and specifications will be available for viewing at www.southkingfire.org and at 31617 1st Avenue South, Federal Way. Plans and specifications may be viewed at the following plan centers: Builder's Exchange of Washington, Everett, WA.

A Bid Security must accompany each bid in accordance with the Instructions to Bidders.

Envelopes containing the sealed bids shall be marked "Bid for Facilities Improvements Station 67" and sent or delivered to:

Physical Address for Hand Delivery, Courier/Overnight Delivery and USPS:
SOUTH KING FIRE & RESCUE
31617 1st AVENUE SOUTH
FEDERAL WAY, WASHINGTON 98003.

The owner reserves the right to reject any or all bids, waive minor irregularities in the bidding process, and to accept the bid deemed best for them.

All questions must be submitted in writing to Rice Fergus Miller, Inc., 275 5th Street, Bremerton, WA 98337, Attention Ed McManamna. Phone: 360-377-8773.

Substitution Requests: Architect will consider requests for substitution received no later than ten working days prior to receipt of Bids. Requests received after that time may be considered or rejected at the discretion of the Architect.

SECTION 002113 - INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. INCORPORATE *Instructions to Bidders,* AIA Document A701-1997 BY THIS REFERENCE ONLY; it is not bound in Project Manual.

B. Copies may be obtained from American Institute of Architects, 1735 New York Avenue NW, Washington, D.C20006, or local Chapter offices.

C. Following items supplement, modify, change, and add to referenced instructions to Bidders.

1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS:

ARTICLE 3 - BIDDING DOCUMENTS

3.2.1 ADD:
"Submittal of Bid constitutes acceptance of products and procedures specified as sufficient, adequate, and satisfactory for completion of the Contract."

3.2.4 ADD new subparagraph:
"3.2.4 Interpretations: Address all questions in writing to the Architect. They will be answered by addendum addressed to all bidders. Questions received less than three working days before bid opening cannot be answered. Neither Owner nor Architect will be responsible for oral interpretations. Addenda issued during the time of bidding will be incorporated into the Contract."

3.3.2 REVISE:
“ten days prior to the date for receipt of Bids“ to read “ten working days prior to the date for receipt of bids”.

3.4.3 REVISE
“four days prior to the date from receipt of Bids” to read “72 hours prior to the time for receipt of bids”.

3.4.4 ADD:
"Bidder shall fill in the space provided on the Bid Form with the Addenda number of each Addenda received. Omission of this information may be cause for rejection of the entire bid."

ARTICLE 4 - BIDDING PROCEDURES

4.2.4 ADD new subparagraph:
"4.2.4 Each bid must be accompanied by a certified check, cashier’s check, or Bid Bond of a duly licensed bonding company, in the amount of five percent of the Base

Bid, plus alternates, made payable to South King Fire and Rescue. Unsuccessful Bidders shall have Bid Bonds returned within thirty (30) days following Bid Award. If Bid Bond is provided in lieu of a certified check or cashier's check, the required bond form is Bid Bond AIA -310."

4.3.5 ADD new subparagraph:
"4.3.5 Bid Proposal must be submitted on or before the time specified in the advertisement for the bids. Failure to properly complete Bid Proposal shall render that bid non-responsive.

"4.4.5 In the event a bidder discovers an error in its bid following the bid opening, the bidder may request to withdraw its bid under the following conditions:

1. Written notification is received by the Owner within 24 hours following bid opening.

2. The bidder provides written documentation of the claimed error to the satisfaction of the Owner within 72 hours following the bid opening.

4.4.6 ADD new subparagraph

"4.4.6 The bidder will allow 30 days from bid opening date from acceptance of its bid by the Owner.

ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

7.1.1 MODIFY Subparagraph to read:
"Provide bonds in accordance with the Supplemental Conditions"

7.1.4 ADD new subparagraph:
"7.1.4 Performance and Payment Bonds in the amount of 100 percent of the amount of the Contract including sales tax are required for this work."

7.2.1 and 7.2.2 MODIFY both Subparagraphs to read:
"Provide bonds in accordance with the Supplemental Conditions"

ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

ADD new subparagraphs:
"8.1 "Within ten (10) days following presentation of agreement, execute and return to Owner referenced AIA A101-2007 Standard Form of Agreement Between Owner and Contractor.

8.2 Retainage: See provisions of referenced Form of Agreement. Retainage: 5% of each payment throughout project.

8.3 Signatures: Each bid must be signed in ink and in longhand by the bidder with his usual signature. Bids by partnerships must be signed with the partnership name by one of the partners followed by the signature and designation of the partner signing.

Bids by corporations must be signed with the legal name of the corporation, followed by the name of the State of incorporation and by the signature of the president, secretary, or other person authorized to bind it in the matter. The name of each person signing shall be typed or printed below the signature."

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 003100 - INFORMATION AVAILABLE TO BIDDERS

PART 1 GENERAL

1.1 KING COUNTY PREVAILING WAGE RATES:

A. The following documents are bound into this project manual:

1. Washington State Prevailing Wage Rates – King County Effective 11/16/16.
2. Benefits Code Key.

Copies of these documents are for contractor reference and convenience only. It is the contractor's responsibility to follow the most current edition.

1.2 HAZARDOUS MATERIALS REPORT

A. The following document is bound into this project manual.

1. Limited Hazardous Materials Survey Report, South King County Fire & Rescue Fire Station #67 Capital Facility Improvements, EHS-International, Inc.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION 003100

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: 11/16/2016

County	Trade	Job Classification	Wage	Holiday	Overtime	Note
King	Asbestos Abatement Workers	Journey Level	$45.25	5D	1H	
King	Boilermakers	Journey Level	$64.29	5N	1C	
King	Brick Mason	Journey Level	$54.32	5A	1M	
King	Brick Mason	Pointer-Caulker-Cleaner	$54.32	5A	1M	
King	Building Service Employees	Janitor	$22.84	5S	2F	
King	Building Service Employees	Traveling Waxer/Shampooer	$23.29	5S	2F	
King	Building Service Employees	Window Cleaner (Non-Scaffold)	$23.99	5S	2F	
King	Building Service Employees	Window Cleaner (Scaffold)	$26.78	5S	2F	
King	Cabinet Makers (In Shop)	Journey Level	$22.74		1	
King	Carpenters	Acoustical Worker	$55.51	5D	4C	
King	Carpenters	Bridge, Dock And Wharf Carpenters	$55.51	5D	4C	
King	Carpenters	Carpenter	$55.51	5D	4C	
King	Carpenters	Carpenters on Stationary Tools	$55.64	5D	4C	
King	Carpenters	Creosoted Material	$55.61	5D	4C	
King	Carpenters	Floor Finisher	$55.51	5D	4C	
King	Carpenters	Floor Layer	$55.51	5D	4C	
King	Carpenters	Scaffold Erector	$55.51	5D	4C	
King	Cement Masons	Journey Level	$55.56	7A	1M	
King	Divers & Tenders	Diver	$108.77	5D	4C	8A
King	Divers & Tenders	Diver On Standby	$66.05	5D	4C	
King	Divers & Tenders	Diver Tender	$59.88	5D	4C	
King	Divers & Tenders	Surface Rcv & Rov Operator	$59.88	5D	4C	
King	Divers & Tenders	Surface Rcv & Rov Operator Tender	$55.76	5A	4C	
King	Dredge Workers	Assistant Engineer	$56.44	5D	3F	
King	Dredge Workers	Assistant Mate (Deckhand)	$56.00	5D	3F	
King	Dredge Workers	Boatmen	$56.44	5D	3F	
King	Dredge Workers	Engineer Welder	$57.51	5D	3F	
King	Dredge Workers	Leverman, Hydraulic	$58.67	5D	3F	
King	Dredge Workers	Mates	$56.44	5D	3F	
King	Dredge Workers	Oiler	$56.00	5D	3F	
King	Drywall Applicator	Journey Level	$55.51	5D	1H	
King	Drywall Tapers	Journey Level	$55.66	5P	1E	
King	Electrical Fixture Maintenance Workers	Journey Level	$27.24	5L	1E	
King	Electricians - Inside	Cable Splicer	$69.77	7C	4E	
King	Electricians - Inside	Cable Splicer (tunnel)	$74.95	7C	4E	
King	Electricians - Inside	Certified Welder	$67.41	7C	4E	
King	Electricians - Inside	Certified Welder (tunnel)	$72.37	7C	4E	
King	Electricians - Inside	Construction Stock Person	$37.94	7C	4E	
King	Electricians - Inside	Journey Level	$65.05	7C	4E	
King	Electricians - Inside	Journey Level (tunnel)	$69.77	7C	4E	
King	Electricians - Motor Shop	Craftsman	$15.37		1	
King	Electricians - Motor Shop	Journey Level	$14.69		1	
King	Electricians - Powerline Construction	Cable Splicer	$71.85	5A	4D	
King	Electricians - Powerline Construction	Certified Line Welder	$65.71	5A	4D	
King	Electricians - Powerline Construction	Groundperson	$44.12	5A	4D	
King	Electricians - Powerline Construction	Heavy Line Equipment Operator	$65.71	5A	4D	
King	Electricians - Powerline Construction	Journey Level Lineperson	$65.71	5A	4D	
King	Electricians - Powerline Construction	Line Equipment Operator	$55.34	5A	4D	
King	Electricians - Powerline Construction	Pole Sprayer	$65.71	5A	4D	
King	Electricians - Powerline Construction	Powderperson	$49.16	5A	4D	
King	Electronic Technicians	Journey Level	$31.00		1	
King	Elevator Constructors	Mechanic	$85.45	7D	4A	
King	Elevator Constructors	Mechanic In Charge	$92.35	7D	4A	
King	Fabricated Precast Concrete Products	All Classifications - In-Factory Work Only	$16.55	5B	1R	
King	Fence Erectors	Fence Erector	$15.18		1	
King	Flaggers	Journey Level	$38.36	7A	3I	
King	Glaziers	Journey Level	$58.31	7L	1Y	
King	Heat & Frost Insulators And Asbestos Workers	Journeyman	$65.43	5J	1S	
King	Heating Equipment Mechanics	Journey Level	$75.46	7F	1E	
King	Hod Carriers & Mason Tenders	Journey Level	$46.66	7A	3I	
King	Industrial Power Vacuum Cleaner	Journey Level	$9.47		1	

King	Inland Boatmen	Boat Operator	$56.78	5B	1K	
King	Inland Boatmen	Cook	$53.30	5B	1K	
King	Inland Boatmen	Deckhand	$53.30	5B	1K	
King	Inland Boatmen	Deckhand Engineer	$54.32	5B	1K	
King	Inland Boatmen	Launch Operator	$55.57	5B	1K	
King	Inland Boatmen	Mate	$55.57	5B	1K	
King	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Cleaner Operator, Foamer Operator	$31.49		1	
King	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Grout Truck Operator	$11.48		1	
King	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Head Operator	$24.91		1	
King	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Technician	$19.33		1	
King	Inspection/Cleaning/Sealing Of Sewer & Water Systems By Remote Control	Tv Truck Operator	$20.45		1	
King	Insulation Applicators	Journey Level	$55.51	5D	4C	
King	Ironworkers	Journeyman	$65.53	7N	1O	
King	Laborers	Air, Gas Or Electric Vibrating Screed	$45.25	7A	3I	
King	Laborers	Airtrac Drill Operator	$46.66	7A	3I	
King	Laborers	Ballast Regular Machine	$45.25	7A	3I	
King	Laborers	Batch Weighman	$38.36	7A	3I	
King	Laborers	Brick Pavers	$45.25	7A	3I	
King	Laborers	Brush Cutter	$45.25	7A	3I	
King	Laborers	Brush Hog Feeder	$45.25	7A	3I	
King	Laborers	Burner	$45.25	7A	3I	
King	Laborers	Caisson Worker	$46.66	7A	3I	
King	Laborers	Carpenter Tender	$45.25	7A	3I	
King	Laborers	Caulker	$45.25	7A	3I	
King	Laborers	Cement Dumper-paving	$46.09	7A	3I	
King	Laborers	Cement Finisher Tender	$45.25	7A	3I	
King	Laborers	Change House Or Dry Shack	$45.25	7A	3I	
King	Laborers	Chipping Gun (under 30 Lbs.)	$45.25	7A	3I	
King	Laborers	Chipping Gun(30 Lbs. And Over)	$46.09	7A	3I	
King	Laborers	Choker Setter	$45.25	7A	3I	
King	Laborers	Chuck Tender	$45.25	7A	3I	
King	Laborers	Clary Power Spreader	$46.09	7A	3I	
King	Laborers	Clean-up Laborer	$45.25	7A	3I	
King	Laborers	Concrete Dumper/chute Operator	$46.09	7A	3I	
King	Laborers	Concrete Form Stripper	$45.25	7A	3I	
King	Laborers	Concrete Placement Crew	$46.09	7A	3I	
King	Laborers	Concrete Saw Operator/core Driller	$46.09	7A	3I	
King	Laborers	Crusher Feeder	$38.36	7A	3I	
King	Laborers	Curing Laborer	$45.25	7A	3I	
King	Laborers	Demolition: Wrecking & Moving (incl. Charred Material)	$45.25	7A	3I	
King	Laborers	Ditch Digger	$45.25	7A	3I	
King	Laborers	Diver	$46.66	7A	3I	
King	Laborers	Drill Operator (hydraulic,diamond)	$46.09	7A	3I	
King	Laborers	Dry Stack Walls	$45.25	7A	3I	
King	Laborers	Dump Person	$45.25	7A	3I	
King	Laborers	Epoxy Technician	$45.25	7A	3I	
King	Laborers	Erosion Control Worker	$45.25	7A	3I	
King	Laborers	Faller & Bucker Chain Saw	$46.09	7A	3I	
King	Laborers	Fine Graders	$45.25	7A	3I	
King	Laborers	Firewatch	$38.36	7A	3I	
King	Laborers	Form Setter	$45.25	7A	3I	
King	Laborers	Gabian Basket Builders	$45.25	7A	3I	
King	Laborers	General Laborer	$45.25	7A	3I	
King	Laborers	Grade Checker & Transit Person	$46.66	7A	3I	
King	Laborers	Grinders	$45.25	7A	3I	
King	Laborers	Grout Machine Tender	$45.25	7A	3I	
King	Laborers	Groutmen (pressure)including Post Tension Beams	$46.09	7A	3I	
King	Laborers	Guardrail Erector	$45.25	7A	3I	
King	Laborers	Hazardous Waste Worker (level A)	$46.66	7A	3I	
King	Laborers	Hazardous Waste Worker (level B)	$46.09	7A	3I	
King	Laborers	Hazardous Waste Worker (level C)	$45.25	7A	3I	
King	Laborers	High Scaler	$46.66	7A	3I	
King	Laborers	Jackhammer	$46.09	7A	3I	
King	Laborers	Laserbeam Operator	$46.09	7A	3I	
King	Laborers	Maintenance Person	$45.25	7A	3I	
King	Laborers	Manhole Builder-mudman	$46.09	7A	3I	
King	Laborers	Material Yard Person	$45.25	7A	3I	

King	Laborers	Motorman-dinky Locomotive	$46.09	7A	3I	
King	Laborers	Nozzleman (concrete Pump, Green Cutter When Using Combination Of High Pressure Air & Water On Concrete & Rock, Sandblast, Gunite, Shotcrete, Water Bla	$46.09	7A	3I	
King	Laborers	Pavement Breaker	$46.09	7A	3I	
King	Laborers	Pilot Car	$38.36	7A	3I	
King	Laborers	Pipe Layer Lead	$46.66	7A	3I	
King	Laborers	Pipe Layer/tailor	$46.09	7A	3I	
King	Laborers	Pipe Pot Tender	$46.09	7A	3I	
King	Laborers	Pipe Reliner	$46.09	7A	3I	
King	Laborers	Pipe Wrapper	$46.09	7A	3I	
King	Laborers	Pot Tender	$45.25	7A	3I	
King	Laborers	Powderman	$46.66	7A	3I	
King	Laborers	Powderman's Helper	$45.25	7A	3I	
King	Laborers	Power Jacks	$46.09	7A	3I	
King	Laborers	Railroad Spike Puller - Power	$46.09	7A	3I	
King	Laborers	Raker - Asphalt	$46.66	7A	3I	
King	Laborers	Re-timberman	$46.66	7A	3I	
King	Laborers	Remote Equipment Operator	$46.09	7A	3I	
King	Laborers	Rigger/signal Person	$46.09	7A	3I	
King	Laborers	Rip Rap Person	$45.25	7A	3I	
King	Laborers	Rivet Buster	$46.09	7A	3I	
King	Laborers	Rodder	$46.09	7A	3I	
King	Laborers	Scaffold Erector	$45.25	7A	3I	
King	Laborers	Scale Person	$45.25	7A	3I	
King	Laborers	Sloper (over 20")	$46.09	7A	3I	
King	Laborers	Sloper Sprayer	$45.25	7A	3I	
King	Laborers	Spreader (concrete)	$46.09	7A	3I	
King	Laborers	Stake Hopper	$45.25	7A	3I	
King	Laborers	Stock Piler	$45.25	7A	3I	
King	Laborers	Tamper & Similar Electric, Air & Gas Operated Tools	$46.09	7A	3I	
King	Laborers	Tamper (multiple & Self-propelled)	$46.09	7A	3I	
King	Laborers	Timber Person - Sewer (lagger, Shorer & Cribber)	$46.09	7A	3I	
King	Laborers	Toolroom Person (at Jobsite)	$45.25	7A	3I	
King	Laborers	Topper	$45.25	7A	3I	
King	Laborers	Track Laborer	$45.25	7A	3I	
King	Laborers	Track Liner (power)	$46.09	7A	3I	
King	Laborers	Traffic Control Laborer	$41.02	7A	3I	8R
King	Laborers	Traffic Control Supervisor	$41.02	7A	3I	8R
King	Laborers	Truck Spotter	$45.25	7A	3I	
King	Laborers	Tugger Operator	$46.09	7A	3I	
King	Laborers	Tunnel Work-Compressed Air Worker 0-30 psi	$83.12	7A	3I	8Q
King	Laborers	Tunnel Work-Compressed Air Worker 30.01-44.00 psi	$88.15	7A	3I	8Q
King	Laborers	Tunnel Work-Compressed Air Worker 44.01-54.00 psi	$91.83	7A	3I	8Q
King	Laborers	Tunnel Work-Compressed Air Worker 54.01-60.00 psi	$97.53	7A	3I	8Q
King	Laborers	Tunnel Work-Compressed Air Worker 60.01-64.00 psi	$99.65	7A	3I	8Q
King	Laborers	Tunnel Work-Compressed Air Worker 64.01-68.00 psi	$104.75	7A	3I	8Q
King	Laborers	Tunnel Work-Compressed Air Worker 68.01-70.00 psi	$106.65	7A	3I	8Q
King	Laborers	Tunnel Work-Compressed Air Worker 70.01-72.00 psi	$108.65	7A	3I	8Q
King	Laborers	Tunnel Work-Compressed Air Worker 72.01-74.00 psi	$110.65	7A	3I	8Q
King	Laborers	Tunnel Work-Guage and Lock Tender	$46.76	7A	3I	8Q
King	Laborers	Tunnel Work-Miner	$46.76	7A	3I	8Q
King	Laborers	Vibrator	$46.09	7A	3I	
King	Laborers	Vinyl Seamer	$45.25	7A	3I	
King	Laborers	Watchman	$34.86	7A	3I	
King	Laborers	Welder	$46.09	7A	3I	
King	Laborers	Well Point Laborer	$46.09	7A	3I	
King	Laborers	Window Washer/cleaner	$34.86	7A	3I	
King	Laborers - Underground Sewer & Water	General Laborer & Topman	$45.25	7A	3I	
King	Laborers - Underground Sewer & Water	Pipe Layer	$46.09	7A	3I	
King	Landscape Construction	Irrigation Or Lawn Sprinkler Installers	$13.56		1	
King	Landscape Construction	Landscape Equipment Operators Or Truck Drivers	$28.17		1	
King	Landscape Construction	Landscaping or Planting Laborers	$17.87		1	
King	Lathers	Journey Level	$55.51	5D	1H	

King	Marble Setters	Journey Level	$54.32	5A	1M	
King	Metal Fabrication (In Shop)	Fitter	$15.86		1	
King	Metal Fabrication (In Shop)	Laborer	$9.78		1	
King	Metal Fabrication (In Shop)	Machine Operator	$13.04		1	
King	Metal Fabrication (In Shop)	Painter	$11.10		1	
King	Metal Fabrication (In Shop)	Welder	$15.48		1	
King	Millwright	Journey Level	$57.01	5D	4C	
King	Modular Buildings	Cabinet Assembly	$11.56		1	
King	Modular Buildings	Electrician	$11.56		1	
King	Modular Buildings	Equipment Maintenance	$11.56		1	
King	Modular Buildings	Plumber	$11.56		1	
King	Modular Buildings	Production Worker	$9.47		1	
King	Modular Buildings	Tool Maintenance	$11.56		1	
King	Modular Buildings	Utility Person	$11.56		1	
King	Modular Buildings	Welder	$11.56		1	
King	Painters	Journey Level	$40.60	6Z	2B	
King	Pile Driver	Journey Level	$55.76	5D	4C	
King	Plasterers	Journey Level	$53.20	7Q	1R	
King	Playground & Park Equipment Installers	Journey Level	$9.47		1	
King	Plumbers & Pipefitters	Journey Level	$75.06	6Z	1G	
King	Power Equipment Operators	Asphalt Plant Operators	$58.69	7A	3C	8P
King	Power Equipment Operators	Assistant Engineer	$55.21	7A	3C	8P
King	Power Equipment Operators	Barrier Machine (zipper)	$58.17	7A	3C	8P
King	Power Equipment Operators	Batch Plant Operator, Concrete	$58.17	7A	3C	8P
King	Power Equipment Operators	Bobcat	$55.21	7A	3C	8P
King	Power Equipment Operators	Brokk - Remote Demolition Equipment	$55.21	7A	3C	8P
King	Power Equipment Operators	Brooms	$55.21	7A	3C	8P
King	Power Equipment Operators	Bump Cutter	$58.17	7A	3C	8P
King	Power Equipment Operators	Cableways	$58.69	7A	3C	8P
King	Power Equipment Operators	Chipper	$58.17	7A	3C	8P
King	Power Equipment Operators	Compressor	$55.21	7A	3C	8P
King	Power Equipment Operators	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	$58.69	7A	3C	8P
King	Power Equipment Operators	Concrete Finish Machine -laser Screed	$55.21	7A	3C	8P
King	Power Equipment Operators	Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure.	$57.72	7A	3C	8P
King	Power Equipment Operators	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	$58.17	7A	3C	8P
King	Power Equipment Operators	Conveyors	$57.72	7A	3C	8P
King	Power Equipment Operators	Cranes Friction: 200 tons and over	$60.47	7A	3C	8P
King	Power Equipment Operators	Cranes: 20 Tons Through 44 Tons With Attachments	$58.17	7A	3C	8P
King	Power Equipment Operators	Cranes: 100 Tons Through 199 Tons, Or 150' Of Boom (Including Jib With Attachments)	$59.28	7A	3C	8P
King	Power Equipment Operators	Cranes: 200 tons- 299 tons, or 250’ of boom including jib with attachments	$59.88	7A	3C	8P
King	Power Equipment Operators	Cranes: 300 tons and over or 300’ of boom including jib with attachments	$60.47	7A	3C	8P
King	Power Equipment Operators	Cranes: 45 Tons Through 99 Tons, Under 150' Of Boom (including Jib With Attachments)	$58.69	7A	3C	8P
King	Power Equipment Operators	Cranes: A-frame - 10 Tons And Under	$55.21	7A	3C	8P
King	Power Equipment Operators	Cranes: Friction cranes through 199 tons	$59.88	7A	3C	8P
King	Power Equipment Operators	Cranes: Through 19 Tons With Attachments A-frame Over 10 Tons	$57.72	7A	3C	8P
King	Power Equipment Operators	Crusher	$58.17	7A	3C	8P
King	Power Equipment Operators	Deck Engineer/deck Winches (power)	$58.17	7A	3C	8P
King	Power Equipment Operators	Derricks, On Building Work	$58.69	7A	3C	8P
King	Power Equipment Operators	Dozers D-9 & Under	$57.72	7A	3C	8P
King	Power Equipment Operators	Drill Oilers: Auger Type, Truck Or Crane Mount	$57.72	7A	3C	8P
King	Power Equipment Operators	Drilling Machine	$59.28	7A	3C	8P
King	Power Equipment Operators	Elevator And Man-lift: Permanent And Shaft Type	$55.21	7A	3C	8P
King	Power Equipment Operators	Finishing Machine, Bidwell And Gamaco & Similar Equipment	$58.17	7A	3C	8P
King	Power Equipment Operators	Forklift: 3000 Lbs And Over With Attachments	$57.72	7A	3C	8P
King	Power Equipment Operators	Forklifts: Under 3000 Lbs. With Attachments	$55.21	7A	3C	8P
King	Power Equipment Operators	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	$58.17	7A	3C	8P
King	Power Equipment Operators	Gradechecker/stakeman	$55.21	7A	3C	8P
King	Power Equipment Operators	Guardrail Punch	$58.17	7A	3C	8P
King	Power Equipment Operators	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	$58.69	7A	3C	8P
King	Power Equipment Operators	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	$58.17	7A	3C	8P
King	Power Equipment Operators	Horizontal/directional Drill Locator	$57.72	7A	3C	8P

King	Power Equipment Operators	Horizontal/directional Drill Operator	$58.17	7A	3C	8P
King	Power Equipment Operators	Hydralifts/boom Trucks Over 10 Tons	$57.72	7A	3C	8P
King	Power Equipment Operators	Hydralifts/boom Trucks, 10 Tons And Under	$55.21	7A	3C	8P
King	Power Equipment Operators	Loader, Overhead 8 Yards. & Over	$59.28	7A	3C	8P
King	Power Equipment Operators	Loader, Overhead, 6 Yards. But Not Including 8 Yards	$58.69	7A	3C	8P
King	Power Equipment Operators	Loaders, Overhead Under 6 Yards	$58.17	7A	3C	8P
King	Power Equipment Operators	Loaders, Plant Feed	$58.17	7A	3C	8P
King	Power Equipment Operators	Loaders: Elevating Type Belt	$57.72	7A	3C	8P
King	Power Equipment Operators	Locomotives, All	$58.17	7A	3C	8P
King	Power Equipment Operators	Material Transfer Device	$58.17	7A	3C	8P
King	Power Equipment Operators	Mechanics, All (leadmen - $0.50 Per Hour Over Mechanic)	$59.28	7A	3C	8P
King	Power Equipment Operators	Motor Patrol Graders	$58.69	7A	3C	8P
King	Power Equipment Operators	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	$58.69	7A	3C	8P
King	Power Equipment Operators	Oil Distributors, Blower Distribution & Mulch Seeding Operator	$55.21	7A	3C	8P
King	Power Equipment Operators	Outside Hoists (elevators And Manlifts), Air Tuggers,strato	$57.72	7A	3C	8P
King	Power Equipment Operators	Overhead, Bridge Type Crane: 20 Tons Through 44 Tons	$58.17	7A	3C	8P
King	Power Equipment Operators	Overhead, Bridge Type: 100 Tons And Over	$59.28	7A	3C	8P
King	Power Equipment Operators	Overhead, Bridge Type: 45 Tons Through 99 Tons	$58.69	7A	3C	8P
King	Power Equipment Operators	Pavement Breaker	$55.21	7A	3C	8P
King	Power Equipment Operators	Pile Driver (other Than Crane Mount)	$58.17	7A	3C	8P
King	Power Equipment Operators	Plant Oiler - Asphalt, Crusher	$57.72	7A	3C	8P
King	Power Equipment Operators	Posthole Digger, Mechanical	$55.21	7A	3C	8P
King	Power Equipment Operators	Power Plant	$55.21	7A	3C	8P
King	Power Equipment Operators	Pumps - Water	$55.21	7A	3C	8P
King	Power Equipment Operators	Quad 9, Hd 41, D10 And Over	$58.69	7A	3C	8P
King	Power Equipment Operators	Quick Tower - No Cab, Under 100 Feet In Height Based To Boom	$55.21	7A	3C	8P
King	Power Equipment Operators	Remote Control Operator On Rubber Tired Earth Moving Equipment	$58.69	7A	3C	8P
King	Power Equipment Operators	Rigger And Bellman	$55.21	7A	3C	8P
King	Power Equipment Operators	Rigger/Signal Person, Bellman (Certified)	$57.72	7A	3C	8P
King	Power Equipment Operators	Rollagon	$58.69	7A	3C	8P
King	Power Equipment Operators	Roller, Other Than Plant Mix	$55.21	7A	3C	8P
King	Power Equipment Operators	Roller, Plant Mix Or Multi-lift Materials	$57.72	7A	3C	8P
King	Power Equipment Operators	Roto-mill, Roto-grinder	$58.17	7A	3C	8P
King	Power Equipment Operators	Saws - Concrete	$57.72	7A	3C	8P
King	Power Equipment Operators	Scraper, Self Propelled Under 45 Yards	$58.17	7A	3C	8P
King	Power Equipment Operators	Scrapers - Concrete & Carry All	$57.72	7A	3C	8P
King	Power Equipment Operators	Scrapers, Self-propelled: 45 Yards And Over	$58.69	7A	3C	8P
King	Power Equipment Operators	Service Engineers - Equipment	$57.72	7A	3C	8P
King	Power Equipment Operators	Shotcrete/gunite Equipment	$55.21	7A	3C	8P
King	Power Equipment Operators	Shovel , Excavator, Backhoe, Tractors Under 15 Metric Tons.	$57.72	7A	3C	8P
King	Power Equipment Operators	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	$58.69	7A	3C	8P
King	Power Equipment Operators	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	$58.17	7A	3C	8P
King	Power Equipment Operators	Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons	$59.28	7A	3C	8P
King	Power Equipment Operators	Shovel, Excavator, Backhoes: Over 90 Metric Tons	$59.88	7A	3C	8P
King	Power Equipment Operators	Slipform Pavers	$58.69	7A	3C	8P
King	Power Equipment Operators	Spreader, Topsider & Screedman	$58.69	7A	3C	8P
King	Power Equipment Operators	Subgrader Trimmer	$58.17	7A	3C	8P
King	Power Equipment Operators	Tower Bucket Elevators	$57.72	7A	3C	8P
King	Power Equipment Operators	Tower Crane Up To 175' In Height Base To Boom	$59.28	7A	3C	8P
King	Power Equipment Operators	Tower Crane: over 175’ through 250’ in height, base to boom	$59.88	7A	3C	8P
King	Power Equipment Operators	Tower Cranes: over 250’ in height from base to boom	$60.47	7A	3C	8P
King	Power Equipment Operators	Transporters, All Track Or Truck Type	$58.69	7A	3C	8P
King	Power Equipment Operators	Trenching Machines	$57.72	7A	3C	8P
King	Power Equipment Operators	Truck Crane Oiler/driver - 100 Tons And Over	$58.17	7A	3C	8P
King	Power Equipment Operators	Truck Crane Oiler/driver Under 100 Tons	$57.72	7A	3C	8P
King	Power Equipment Operators	Truck Mount Portable Conveyor	$58.17	7A	3C	8P
King	Power Equipment Operators	Welder	$58.69	7A	3C	8P
King	Power Equipment Operators	Wheel Tractors, Farmall Type	$55.21	7A	3C	8P
King	Power Equipment Operators	Yo Yo Pay Dozer	$58.17	7A	3C	8P

King	Power Equipment Operators- Underground Sewer & Water	Asphalt Plant Operators	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Assistant Engineer	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Barrier Machine (zipper)	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Batch Plant Operator, Concrete	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Bobcat	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Brokk - Remote Demolition Equipment	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Brooms	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Bump Cutter	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cableways	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Chipper	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Compressor	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Concrete Pump: Truck Mount With Boom Attachment Over 42 M	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Concrete Finish Machine -laser Screed	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure.	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Concrete Pump: Truck Mount With Boom Attachment Up To 42m	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Conveyors	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes Friction: 200 tons and over	$60.47	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes: 20 Tons Through 44 Tons With Attachments	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes: 100 Tons Through 199 Tons, Or 150' Of Boom (Including Jib With Attachments)	$59.28	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes: 200 tons- 299 tons, or 250’ of boom including jib with attachments	$59.88	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes: 300 tons and over or 300’ of boom including jib with attachments	$60.47	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes: 45 Tons Through 99 Tons, Under 150' Of Boom (including Jib With Attachments)	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes: A-frame - 10 Tons And Under	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes: Friction cranes through 199 tons	$59.88	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Cranes: Through 19 Tons With Attachments A-frame Over 10 Tons	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Crusher	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Deck Engineer/deck Winches (power)	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Derricks, On Building Work	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Dozers D-9 & Under	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Drill Oilers: Auger Type, Truck Or Crane Mount	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Drilling Machine	$59.28	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Elevator And Man-lift: Permanent And Shaft Type	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Finishing Machine, Bidwell And Gamaco & Similar Equipment	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Forklift: 3000 Lbs And Over With Attachments	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Forklifts: Under 3000 Lbs. With Attachments	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Grade Engineer: Using Blue Prints, Cut Sheets, Etc	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Gradechecker/stakeman	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Guardrail Punch	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. & Over	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Horizontal/directional Drill Locator	$57.72	7A	3C	8P

King	Power Equipment Operators- Underground Sewer & Water	Horizontal/directional Drill Operator	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Hydralifts/boom Trucks Over 10 Tons	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Hydralifts/boom Trucks, 10 Tons And Under	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Loader, Overhead 8 Yards. & Over	$59.28	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Loader, Overhead, 6 Yards. But Not Including 8 Yards	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Loaders, Overhead Under 6 Yards	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Loaders, Plant Feed	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Loaders: Elevating Type Belt	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Locomotives, All	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Material Transfer Device	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Mechanics, All (leadmen - $0.50 Per Hour Over Mechanic)	$59.28	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Motor Patrol Graders	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Oil Distributors, Blower Distribution & Mulch Seeding Operator	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Outside Hoists (elevators And Manlifts), Air Tuggers,strato	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Overhead, Bridge Type Crane: 20 Tons Through 44 Tons	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Overhead, Bridge Type: 100 Tons And Over	$59.28	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Overhead, Bridge Type: 45 Tons Through 99 Tons	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Pavement Breaker	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Pile Driver (other Than Crane Mount)	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Plant Oiler - Asphalt, Crusher	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Posthole Digger, Mechanical	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Power Plant	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Pumps - Water	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Quad 9, Hd 41, D10 And Over	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Quick Tower - No Cab, Under 100 Feet In Height Based To Boom	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Remote Control Operator On Rubber Tired Earth Moving Equipment	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Rigger And Bellman	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Rigger/Signal Person, Bellman (Certified)	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Rollagon	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Roller, Other Than Plant Mix	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Roller, Plant Mix Or Multi-lift Materials	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Roto-mill, Roto-grinder	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Saws - Concrete	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Scraper, Self Propelled Under 45 Yards	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Scrapers - Concrete & Carry All	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Scrapers, Self-propelled: 45 Yards And Over	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Service Engineers - Equipment	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Shotcrete/gunite Equipment	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Shovel , Excavator, Backhoe, Tractors Under 15 Metric Tons.	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons	$58.69	7A	3C	8P

King	Power Equipment Operators- Underground Sewer & Water	Shovel, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons	$59.28	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Shovel, Excavator, Backhoes: Over 90 Metric Tons	$59.88	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Slipform Pavers	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Spreader, Topsider & Screedman	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Subgrader Trimmer	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Tower Bucket Elevators	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Tower Crane Up To 175' In Height Base To Boom	$59.28	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Tower Crane: over 175’ through 250’ in height, base to boom	$59.88	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Tower Cranes: over 250’ in height from base to boom	$60.47	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Transporters, All Track Or Truck Type	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Trenching Machines	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Truck Crane Oiler/driver - 100 Tons And Over	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Truck Crane Oiler/driver Under 100 Tons	$57.72	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Truck Mount Portable Conveyor	$58.17	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Welder	$58.69	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Wheel Tractors, Farmall Type	$55.21	7A	3C	8P
King	Power Equipment Operators- Underground Sewer & Water	Yo Yo Pay Dozer	$58.17	7A	3C	8P
King	Power Line Clearance Tree Trimmers	Journey Level In Charge	$47.08	5A	4A	
King	Power Line Clearance Tree Trimmers	Spray Person	$44.64	5A	4A	
King	Power Line Clearance Tree Trimmers	Tree Equipment Operator	$47.08	5A	4A	
King	Power Line Clearance Tree Trimmers	Tree Trimmer	$42.01	5A	4A	
King	Power Line Clearance Tree Trimmers	Tree Trimmer Groundperson	$31.65	5A	4A	
King	Refrigeration & Air Conditioning Mechanics	Journey Level	$74.66	6Z	1G	
King	Residential Brick Mason	Journey Level	$54.32	5A	1M	
King	Residential Carpenters	Journey Level	$28.20		1	
King	Residential Cement Masons	Journey Level	$22.64		1	
King	Residential Drywall Applicators	Journey Level	$41.69	5D	4C	
King	Residential Drywall Tapers	Journey Level	$55.66	5P	1E	
King	Residential Electricians	Journey Level	$30.44		1	
King	Residential Glaziers	Journey Level	$38.40	7L	1H	
King	Residential Insulation Applicators	Journey Level	$26.28		1	
King	Residential Laborers	Journey Level	$23.03		1	
King	Residential Marble Setters	Journey Level	$24.09		1	
King	Residential Painters	Journey Level	$24.46		1	
King	Residential Plumbers & Pipefitters	Journey Level	$34.69		1	
King	Residential Refrigeration & Air Conditioning Mechanics	Journey Level	$74.66	6Z	1G	
King	Residential Sheet Metal Workers	Journey Level (Field or Shop)	$45.99	7F	1R	
King	Residential Soft Floor Layers	Journey Level	$45.86	5A	3D	
King	Residential Sprinkler Fitters (Fire Protection)	Journey Level	$42.73	5C	2R	
King	Residential Stone Masons	Journey Level	$54.32	5A	1M	
King	Residential Terrazzo Workers	Journey Level	$48.86	5A	1M	
King	Residential Terrazzo/Tile Finishers	Journey Level	$21.46		1	
King	Residential Tile Setters	Journey Level	$25.17		1	
King	Roofers	Journey Level	$46.46	5A	3H	
King	Roofers	Using Irritable Bituminous Materials	$49.46	5A	3H	
King	Sheet Metal Workers	Journey Level (Field or Shop)	$75.46	7F	1E	
King	Shipbuilding & Ship Repair	Boilermaker	$41.72	7M	1H	
King	Shipbuilding & Ship Repair	Carpenter	$41.06	7T	2B	
King	Shipbuilding & Ship Repair	Electrician	$41.09	7T	4B	
King	Shipbuilding & Ship Repair	Heat & Frost Insulator	$65.43	5J	1S	
King	Shipbuilding & Ship Repair	Laborer	$41.08	7T	4B	
King	Shipbuilding & Ship Repair	Machinist	$41.32	7T	4B	
King	Shipbuilding & Ship Repair	Operator	$41.03	7T	4B	
King	Shipbuilding & Ship Repair	Painter	$41.05	7T	4B	
King	Shipbuilding & Ship Repair	Pipefitter	$41.05	7T	4B	
King	Shipbuilding & Ship Repair	Rigger	$41.12	7T	4B	
King	Shipbuilding & Ship Repair	Sheet Metal	$41.04	7T	4B	

King	Shipbuilding & Ship Repair	Shipfitter	$41.12	7T	4B	
King	Shipbuilding & Ship Repair	Trucker	$41.01	7T	4B	
King	Shipbuilding & Ship Repair	Warehouse	$41.02	7T	4B	
King	Shipbuilding & Ship Repair	Welder/Burner	$41.12	7T	4B	
King	Sign Makers & Installers (Electrical)	Sign Installer	$22.92		1	
King	Sign Makers & Installers (Electrical)	Sign Maker	$21.36		1	
King	Sign Makers & Installers (Non-Electrical)	Sign Installer	$27.28		1	
King	Sign Makers & Installers (Non-Electrical)	Sign Maker	$33.25		1	
King	Soft Floor Layers	Journey Level	$45.86	5A	3D	
King	Solar Controls For Windows	Journey Level	$12.44		1	
King	Sprinkler Fitters (Fire Protection)	Journey Level	$72.49	5C	1X	
King	Stage Rigging Mechanics (Non Structural)	Journey Level	$13.23		1	
King	Stone Masons	Journey Level	$54.32	5A	1M	
King	Street And Parking Lot Sweeper Workers	Journey Level	$19.09		1	
King	Surveyors	Assistant Construction Site Surveyor	$57.72	7A	3C	8P
King	Surveyors	Chainman	$57.17	7A	3C	8P
King	Surveyors	Construction Site Surveyor	$58.69	7A	3C	8P
King	Telecommunication Technicians	Journey Level	$22.76		1	
King	Telephone Line Construction - Outside	Cable Splicer	$37.60	5A	2B	
King	Telephone Line Construction - Outside	Hole Digger/Ground Person	$20.79	5A	2B	
King	Telephone Line Construction - Outside	Installer (Repairer)	$36.02	5A	2B	
King	Telephone Line Construction - Outside	Special Aparatus Installer I	$37.60	5A	2B	
King	Telephone Line Construction - Outside	Special Apparatus Installer II	$36.82	5A	2B	
King	Telephone Line Construction - Outside	Telephone Equipment Operator (Heavy)	$37.60	5A	2B	
King	Telephone Line Construction - Outside	Telephone Equipment Operator (Light)	$34.94	5A	2B	
King	Telephone Line Construction - Outside	Telephone Lineperson	$34.93	5A	2B	
King	Telephone Line Construction - Outside	Television Groundperson	$19.73	5A	2B	
King	Telephone Line Construction - Outside	Television Lineperson/Installer	$26.31	5A	2B	
King	Telephone Line Construction - Outside	Television System Technician	$31.50	5A	2B	
King	Telephone Line Construction - Outside	Television Technician	$28.23	5A	2B	
King	Telephone Line Construction - Outside	Tree Trimmer	$34.93	5A	2B	
King	Terrazzo Workers	Journey Level	$48.86	5A	1M	
King	Tile Setters	Journey Level	$21.65		1	
King	Tile, Marble & Terrazzo Finishers	Finisher	$39.69	5A	1B	
King	Traffic Control Stripers	Journey Level	$44.35	7A	1K	
King	Truck Drivers	Asphalt Mix Over 16 Yards (W. WA-Joint Council 28)	$51.25	5D	3A	8L
King	Truck Drivers	Asphalt Mix To 16 Yards (W. WA-Joint Council 28)	$50.41	5D	3A	8L
King	Truck Drivers	Dump Truck & Trailer	$51.25	5D	3A	8L
King	Truck Drivers	Dump Truck (W. WA-Joint Council 28)	$50.41	5D	3A	8L
King	Truck Drivers	Other Trucks (W. WA-Joint Council 28)	$51.25	5D	3A	8L
King	Truck Drivers	Transit Mixer	$43.23		1	
King	Well Drillers & Irrigation Pump Installers	Irrigation Pump Installer	$17.71		1	
King	Well Drillers & Irrigation Pump Installers	Oiler	$12.97		1	
King	Well Drillers & Irrigation Pump Installers	Well Driller	$18.00		1	

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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.

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.

Overtime Codes Continued

1. 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.

S. 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 hours worked on holidays and 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.

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.

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.

   C. All hours worked on Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at two 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.

   G. 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 hours worked on Sunday shall be paid at two 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.

   O. All hours worked on Sundays and holidays shall be paid at one and one-half times 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.

   W. 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 first eight (8) hours worked on the fifth day shall be paid at one and one-half times the hourly rate of wage. All other hours worked on the fifth, sixth, and seventh days and on 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.

   A. 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 shift, and all work on Saturdays shall be paid at time and one-half the straight time rate. Hours worked over twelve hours (12) in a single shift and all work performed after 6:00 pm Saturday to 6:00 am Monday and holidays shall be paid at double the straight time rate of pay. Any shift starting between the hours of 6:00 pm and midnight shall receive an additional one dollar ($1.00) per hour for all hours worked that shift. The employer shall have the sole discretion to assign overtime work to employees. Primary consideration for overtime work shall be given to employees regularly assigned to the work to be performed on overtime situations. 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.

   C. 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 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 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.

Overtime Codes Continued

3. D. 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 15% over the hourly rate of wage. All other hours worked after 6:00 am 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.

   E. All hours worked Sundays and holidays shall be paid at double the hourly rate of wage. Each week, once 40 hours of straight time work is achieved, then any hours worked over 10 hours per day Monday through Saturday shall be paid at double the hourly wage rate.

   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.

   I. All 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 during a five day work week (Monday through Friday,) or a four day-ten hour work week (Tuesday through Friday,) 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 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.

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.

   B. All hours worked over twelve (12) hours per day and all hours worked on 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.

Overtime Codes Continued

4. 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.

F. 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 20% over the hourly rate of wage. All hours worked on 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.

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.

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).

Holiday Codes Continued

5. I. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day (6).

J. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Eve Day, And Christmas Day (7).

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).

T. Paid Holidays: New Year's Day, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, Christmas Day, And The Day Before Or After Christmas (9).

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).

6. A. Paid Holidays: New Year's Day, Presidents' Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, And Christmas Day (8).

E. Paid 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 a Half-Day On Christmas Eve Day. (9 1/2).

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).

I. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, And Christmas Day (7).

Holiday Codes Continued

6. 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.

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.

   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.

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.

M. Paid Holidays: New Year's Day, The Day after or before New Year's Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, And the Day after or before Christmas Day (10). 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.

R. Paid Holidays: New Year's Day, the day after or before New Year's Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day after or before Christmas Day (10). If any of the listed holidays fall on Saturday, the preceding Friday shall be observed as the holiday. If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

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.

T. Paid Holidays: New Year's Day, the Day after or before New Year's Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and The Day after or before Christmas Day. (10). If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

Note Codes

8. A. In addition to the hourly wage and fringe benefits, the following 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 100' To 150' -$3.00 per Foot for Each Foot Over 100 Feet
Over 150' To 220' -$4.00 per Foot for Each Foot Over 150 Feet
Over 220' -$5.00 per Foot for Each Foot Over 220 Feet

Note Codes Continued

8. C. In addition to the hourly wage and fringe benefits, the following depth premiums apply to depths of fifty feet or more:
Over 50’ To 100' -$1.00 per Foot for Each Foot Over 50 Feet
Over 100' To 150' -$1.50 per Foot for Each Foot Over 100 Feet
Over 150' To 200' -$2.00 per Foot for Each Foot Over 150 Feet
Over 200' -Divers May Name Their Own Price

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.

P. 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.

Q. 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.

R. 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.

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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.

EHS–International, Inc.

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LIMITED HAZARDOUS MATERIALS SURVEY REPORT

SOUTH KING COUNTY FIRE & RESCUE FIRE STATION #67 CAPITAL FACILITY IMPROVEMENTS

2238 S. 223rd Street
Des Moines, Washington



Original Report: May 4th, 2016
Revised Report: October 10th, 2016

Prepared For:

Howard Struve
Rice Fergus Miller Architecture & Planning
275 Fifth Street, Suite 100
Bremerton, WA

- Environmental Consulting
- Hazardous Materials Management
- Industrial Hygiene Services
- Construction Management
- Indoor Air Quality

EHS–International, Inc.

Limited Hazardous Materials Survey Report

South King County Fire & Rescue
Fire Station #67 Capital Facility Improvements
2238 S. 223rd Street
Des Moines, Washington

EHSI Project No.: # 10854

The material and data in this report were prepared under the supervision and direction of the undersigned.

Report Approved By:



Herb Brod, CIH
Technical Director

TABLE OF CONTENTS

Acronym List iv

1.0 EXECUTIVE SUMMARY 1
1.1 BACKGROUND 1
1.2 EXTENT OF CURRENT SURVEY 1
1.3 MATERIALS FOUND 1
1.4 OPINIONS AND RECOMMENDATIONS 1
1.5 LIMITATIONS/DISCLAIMER 2

2.0 LIMITED HAZARDOUS MATERIALS SURVEY REPORT 3
2.1 BACKGROUND 3
2.2 BUILDING DESCRIPTION 3
2.3 SAMPLING METHODOLOGY 3
2.3.1 Asbestos-Containing Materials *3*
2.3.2 Lead-Containing Paint/Lead-Containing Materials *4*
2.3.3 Arsenic-Containing Materials *4*
2.4 SAMPLING RESULTS 5
2.4.1 Asbestos-Containing Materials *5*
2.4.2 Lead-Containing Paint and Building Materials *11*
2.4.3 Arsenic-Containing Building Materials *15*
2.4.4 Toxicity Characteristic Leaching Procedure Sampling *16*
2.4.5 Polychlorinated Biphenyls *16*
2.4.6 Mercury-Containing Fluorescent Light Tubes *16*

3.0 LIMITATIONS 17

4.0 STANDARD OF CARE 17

5.0 CERTIFIED AHERA BUILDING INSPECTORS 18

APPENDICES

A ..... Asbestos Analytical Laboratory Report and Field Data Forms
B ..... Lead and Arsenic Laboratory Reports and Field Data Forms
C ..... Certified AHERA Building Inspector Certificates
D ..... Laboratory Certifications for Asbestos, and Lead Analysis
E ..... Sample Location Drawings for Asbestos, Lead, and Arsenic

ACRONYM LIST

ACM.....Asbestos-Containing Material
AHERA .....Asbestos Hazard Emergency Response Act
AHU.....Air Handling Unit
AIHA.....American Industrial Hygiene Association
As.....Arsenic
BMU.....Brick Masonry Unit
CAB .....Cement Asbestos Board
CFR .....Code of Federal Regulations
DOSH.....Washington State Department of Labor and Industries, Division of Occupational Safety and Health
EA .....Each
Ecology .....Washington State Department of Ecology
EFIS.....Exterior Finishing Insulation System
EHSI .....EHS-International, Inc.
ELLAP.....Environmental Lead Laboratory Accreditation Program
GWB .....Gypsum Wall Board
Hg .....Mercury
JC.....Joint Compound
LCM .....Lead-Containing Material
LCP.....Lead-Containing Paint
L&I .....Washington State Department of Labor and Industries
mg/L.....Milligrams Per Liter
mg/m^3.....Milligrams Per Cubic Meter
N/A.....Not Applicable
ND.....None Detected
NVL .....NVL Laboratories, Inc.
NVLAP.....National Voluntary Laboratory Accreditation Program
OSHA.....US Occupational Safety and Health Administration
Pb .....Lead
PCBs.....Polychlorinated Biphenyls
PLM .....Polarized Light Microscopy
ppm.....Parts per Million
PSCAA.....Puget Sound Clean Air Agency
QA.....Quality Assurance
RCW .....Revised Code of Washington
SACT.....Suspended Acoustical Ceiling Tiles
SAT .....Seattle Asbestos Test, LLC
SF .....Square Feet
SVF.....Sheet Vinyl Flooring
TCLP .....Toxic Characteristic Leachate Procedure
TSI .....Thermal System Insulation
VAT .....Vinyl Asbestos Tile
VCT .....Vinyl Composite Tile
WAC .....Washington Administrative Code
WT .....Weight
w/ .....With
XRF .....x-ray fluorescence

1.0 EXECUTIVE SUMMARY

1.1 BACKGROUND

The South King County Fire & Rescue (SKC F&R) has contracted Rice Fergus Miller Architecture & Planning (RFMA) to design the Fire Station #67 (FS #67) renovation and re-roof projects located at 2238 S. 223rd Street in Des Moines, WA. In conjunction with that project, RFMA contracted EHS-International, Inc. (EHSI), a hazardous materials and industrial hygiene consulting firm, to conduct a Limited Hazardous Materials Survey. The intent of the survey is to specifically identify and quantify asbestos-containing building materials (ACM), lead-containing paint (LCP), other lead-containing building materials (LCM), arsenic-containing brick mortar, polychlorinated biphenyl (PCB)-containing light ballasts, and mercury (Hg)-containing light tubes and lamps that may be impacted by the project.

1.2 EXTENT OF CURRENT SURVEY

EHSI only inspected accessible interior and exterior materials potentially impacted by the proposed project and identified by RFMA. Accessible suspect materials were sampled including, but not limited to: interior wall systems, ceiling and floor systems, stair treads and risers, duct sealant, thermal system insulation (TSI) on piping, sink undercoating, interior and exterior caulking, window glazing putty, brick mortar, and roofing materials and sealants. EHSI accomplished representative destructive inspection; however, in areas inaccessible for inspection (e.g., fire door cores, wall cabinet mastics, enclosed plaster wall chases, electrical panel components and materials above hard lid ceilings) suspect materials were assumed to be ACM.

1.3 MATERIALS FOUND

SUMMARY OF ASBESTOS-CONTAINING MATERIALS FIRE STATION #67	
ASBESTOS MATERIAL DESCRIPTION	**LOCATION**
3' tall upper and lower casework with assumed ACM mastic	Workroom 110 and Kitchen 162

Key: ACM = asbestos-containing material

1.4 OPINIONS AND RECOMMENDATIONS

This will be a renovation project, therefore, EHSI recommends that all impacted ACM and assumed ACM identified in paragraph 1.3 be removed and disposed prior to demolition/renovation.

Any suspect materials not identified as having been surveyed in this report must be treated as an ACM until determined otherwise by a Certified Asbestos Building Inspector and NVLAP certified laboratory.

Washington State Department of Labor and Industries (L&I) Division of Occupational Safety and Health (DOSH) and the US Occupational Safety and Health Administration (OSHA) require employers to conduct a hazard assessment and take appropriate worker protection precautions whenever building materials are disturbed that have detectable quantities of lead. Since the type of work planned (e.g., sawing, grinding, demolition) will **not** disturb the lead-containing paint, the contractor is not required perform an initial exposure.

Electronic fluorescent light ballasts were observed. Electronic fluorescent light ballasts that will be disturbed during the project can be disposed of as general construction debris. In addition, all fluorescent tubes and lamps contain mercury. Any fluorescent lamps/tubes to be disturbed during the project must be recycled as Washington Department of Ecology (Ecology) Universal Waste.

1.5 LIMITATIONS/DISCLAIMER

This report does **not** represent a comprehensive hazardous materials investigation for the subject property. This investigation has been conducted by EHSI under a specific scope of work authorized by RFMA for a specific purpose. Due to continued occupancy, fire door cores, cabinet mastics, electrical panel components and materials above hard lid ceilings were not sampled and are assumed to be ACMs. This report and accompanying appendices include the supporting information for this executive summary.

2.0 LIMITED HAZARDOUS MATERIALS SURVEY REPORT

2.1 BACKGROUND

The SKC F&R has contracted RFMA to design the FS #67 renovation project located at 2238 S. 223rd Street in Des Moines, WA. In conjunction with that project, RFMA, Inc. contracted EHSI, a hazardous materials and environmental consulting firm, to accomplish a renovation limited hazardous materials survey of the existing FS #67 Building. For the limited hazardous materials survey, EHSI was tasked to use applicable federal, state and local guidelines in the accomplishment of its survey. EHSI was further tasked to provide a written survey report including: identification of all suspect materials; a determination of whether suspect materials were: asbestos-containing materials (ACM), lead-containing paint (LCP), lead-containing materials (LCM), Arsenic (As)-containing brick mortar, polychlorinated biphenyl (PCB)-containing light ballasts and Mercury (Hg)-containing light tubes/lamps; and to provide analytical reports indicating the presence and quantity of the hazardous materials.

This Limited Hazardous Materials Survey Report meets the Washington State "Good Faith Survey" requirements as cited in Revised Code of Washington (RCW) 49.26.016 and implemented by Department of Labor and Industries Division of Occupational Safety and Health (L&I DOSH) regulation, Washington Administrative Code (WAC) 296-62-07721, and Regulation III, Article 4 of the Puget Sound Clean Air Agency (PSCAA).

On April 18th, 2016 EHSI conducted a Limited Hazardous Materials (ACM, LCP, LCM, As-containing brick mortar and PCB-ballasts and Hg-containing light tubes) Survey of FS #67.

2.2 BUILDING DESCRIPTION

FS #67 is located at 2238 S. 223rd Street, Des Moines, Washington. The facility is comprised of a single-story brick and concrete building connected to a single story CMU building addition. Both buildings have mechanical mezzanines. The main building houses a dormitory area, offices, an apparatus bay and a kitchen. The addition houses conference rooms, offices, storage, and additional restrooms. The building has a metal sloped roof system. Windows are metal-framed and partially operable. Interior finishes include: painted gypsum wallboard (GWB) walls and ceilings and 2'x4' suspended acoustical ceiling tiles (SACT) throughout the building with flush-mounted and recessed fluorescent light fixtures. Flooring includes: Sheet vinyl flooring (SVF), 12"x12" VCT, ceramic wall and floor tiles, carpet flooring on concrete, and bare concrete floors. Hot water heaters located in the mechanical mezzanines provides hot water to the building. Heat is provided by forced air systems located in the mechanical mezzanines in both buildings.

2.3 SAMPLING METHODOLOGY

2.3.1 Asbestos-Containing Materials

The EHSI field inspectors are asbestos Building Inspectors, certified under the requirements of the United States Environmental Protection Agency (USEPA) AHERA regulation 40 Code of

Federal Regulations (CFR) 763, Subpart E. Copies of their certificates are provided in Appendix C. The number of bulk samples collected and their locations are based on the AHERA regulation and the guidelines provided by the USEPA Document 560/5-85-030a, October 1985, *Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials*.

EHSI collected samples and obtained analytical data for suspect ACM identified in the facility. Once collected, each bulk sample was sealed in an unadulterated plastic bag to eliminate the possibility of cross-contamination. "Chain-of-Custody" tracking was followed to Maintain sample integrity during handling and data reporting at EHSI and the analytical laboratory. As specified in 40 CFR Chapter 1 (1-1-87 edition) Part 763, Subpart F, and Appendix A, each sample was analyzed using polarized light microscopy (PLM) / dispersion staining techniques, in accordance with USEPA Method 600/R-93/116. Samples were analyzed for asbestos content by Seattle Asbestos Test, LLC (SAT) located in Seattle, Washington. SAT participates in the NVLAP. Only materials containing more than 1% total asbestos were classified as "asbestos-containing" based on USEPA, state, and local regulations.

Samples in the report labeled as ##QA are quality assurance (QA) samples. Split samples were taken from the same location and they were sent to separate laboratories. QA samples were submitted to, NVL Laboratories, Inc. (NVL) in Seattle, WA, another NVLAP laboratory. Copies of both laboratories' NVLAP certifications are included in Appendix D.

2.3.2 Lead-Containing Paint/Lead-Containing Materials

EHSI used a Niton Model XLp x-ray fluorescence (XRF) Spectrum Analyzer to measure lead content on interior and exterior paint coatings and other suspect LCM. Measurements were representative of all layers of paint and/or LCM. A summary of Lead Paint XRF results is provided in Table 3. Bulk quality assurance samples were taken for a representative number of LBP and LCM and were brought to NVL located in Seattle, Washington, an accredited laboratory for Atomic Absorption Spectroscopy (USEPA Method-7000B) by the American Industrial Hygiene Association (AIHA) under the Environmental Lead Laboratory Accreditation Program (ELLAP). Copies of laboratory reports and field data forms for lead are in Appendix B.

2.3.3 Arsenic-Containing Materials

EHSI collected samples and obtained analytical data for brick mortar and concrete masonry unit (CMU) mortar from the building walls. Once collected, each bulk sample was sealed in an unadulterated plastic bag to eliminate the possibility of cross-contamination. "Chain-of-Custody" tracking was followed to Maintain sample integrity during handling and data reporting at EHSI and the analytical laboratory. A summary of Arsenic laboratory results is provided in Table 4. Samples were brought to NVL, an accredited laboratory for Inductively Coupled Plasma Spectroscopy (USEPA Method-6010) by the Washington State Department of Ecology. Copies of laboratory reports and field data forms for Arsenic are in Appendix B

2.4 SAMPLING RESULTS

2.4.1 Asbestos-Containing Materials

Fifty-six (56) bulk samples of suspect ACM were collected as part of the survey. Three (3) of those samples were split for quality assurance analyses. Limited destructive inspection was conducted to identify hidden and/or concealed materials. Copies of the asbestos analytical laboratory results are included in Appendix A. Asbestos and lead sample location drawings are provided in Appendix E. Asbestos sampling information including: sample number, material description, sample location, and analytical results are summarized in Table 1. The ACM and assumed ACM identified during this survey, including the quantity and location, is summarized in Table 2. Suspect materials not sampled due to continued occupancy were assumed to be ACM.

TABLE 1
SUMMARY OF ASBESTOS BULK SAMPLING AND ANALYTICAL RESULTS
FIRE STATION #67

SAMPLE NUMBER	SAMPLE LOCATION	MATERIAL DESCRIPTION	ASBESTOS %	TYPE OF ASBESTOS
10854-67-01	Server 113	Layer 1: JC w/ paint and paper Layer 2: GWB w/ paper (corner wall)	L1: ND L2: ND	N/A N/A
10854-67-02	Server 113	Layer 1: JC skim coat w/ paint Layer 2: GWB w/ paper (mid wall)	L1: ND L2: ND	N/A N/A
10854-67-03	Storage 104	Layer 1: Black SVF Layer 2: Gray paper backing Layer 3: Yellow mastic Layer 4: Gray leveling compound (on concrete)	L1: ND L2: ND L3: ND L4: ND	N/A N/A N/A N/A
10854-67-04	Storage 104	Layer 1: 4” Black cove base Layer 2: White mastic Layer 3: JC	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-05	Storage 123	Layer 1: 12”x12” Light gray VCT (w/ gray streaks) Layer 2: Yellow mastic (on concrete)	L1: ND L2: ND	N/A N/A
10854-67-06	Conference/Training 118	Layer 1: Tan carpet Layer 2: White mesh backing Layer 3: Off-white/tan mastic (on concrete)	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-07	Workroom 110	Layer 1: Black Formica™ countertop Layer 2: Clear mastic (on wood)	L1: ND L2: ND	N/A N/A

TABLE 1 SUMMARY OF ASBESTOS BULK SAMPLING AND ANALYTICAL RESULTS FIRE STATION #67				
SAMPLE NUMBER	**SAMPLE LOCATION**	**MATERIAL DESCRIPTION**	**ASBESTOS %**	**TYPE OF ASBESTOS**
10854-67-08	Storage 122	Layer 1: JC skim coat w/ paint and paper Layer 2: GWB w/ paper (corner wall)	L1: ND L2: ND	N/A N/A
10854-67-09	Storage 122	Layer 1: JC skim coat w/ paint Layer 2: GWB w/ paper (mid wall)	L1: ND L2: ND	N/A N/A
10854-67-10	Workroom 110	Gray sink undercoat (on single stainless steel sink)	ND	N/A
10854-67-11	Workroom 110	Layer 1: Black rubber sink drain gasket Layer 2: Tan paper gasket (on single stainless steel sink)	L1: ND L2: ND	N/A N/A
10854-67-12	Storage 148	Gray concrete floor seam caulking	ND	N/A
10854-67-13	SR1 143	Layer 1: Beige carpet Layer 2: White mesh backing Layer 3: Yellow mastic (on concrete)	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-14	Corridor 152	Layer 1: Beige/gray rubber SVF Layer 2: Beige mastic (on concrete)	L1: ND L2: ND	N/A N/A
10854-67-15	Watch Office 159	Layer 1: 2'x2' Black carpet square Layer 2: Black rubber backing Layer 3: Green mastic (on concrete)	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-16	Storage 148	Layer 1: JC w/ textured paint Layer 2: GWB w/ paper (corner wall)	L1: ND L2: ND	N/A N/A
10854-67-17	Storage 148	GWB w/ textured paint and paper (mid wall)	ND	N/A
10854-67-18	Men's 150	GWB w/ textured paint and paper (mid wall)	ND	N/A
10854-67-19	Kitchen 162	Off-white sink undercoat (on triple stainless steel sink)	ND	N/A

TABLE 1 SUMMARY OF ASBESTOS BULK SAMPLING AND ANALYTICAL RESULTS FIRE STATION #67				
SAMPLE NUMBER	**SAMPLE LOCATION**	**MATERIAL DESCRIPTION**	**ASBESTOS %**	**TYPE OF ASBESTOS**
10854-67-20	Kitchen 162	Layer 1: Black rubber sink drain gasket Layer 2: White putty (on side 2 sink drains of triple sink)	L1: ND L2: ND	N/A N/A
10854-67-21QA	Kitchen 162	Tan sink drain putty (on center disposal unit of triple sink)	ND	N/A
10854-67-22	Kitchen 162	Layer 1: Black Formica™ countertop Layer 2: Yellow/tan mastic Layer 3: Brown wood countertop	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-23	Kitchen 162	White countertop caulking	ND	N/A
10854-67-24	Kitchen 162	Layer 1: 4” Tan ceramic cove base Layer 2: Tan grout Layer 3: Tan mastic (on wood)	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-25	Apparatus Bay 133	Layer 1: Red brick Layer 2: Gray mortar	L1: ND L2: ND	N/A N/A
10854-67-26	Facilities Maintenance 131	Painted gray CMU w/ gray mortar	ND	N/A
10854-67-27	Mechanical Mezzanine/ Attic	Yellow pipe dope (on natural gas line fitting)	ND	N/A
10854-67-28	Mechanical Mezzanine/ Attic	Gray duct sealant	ND	N/A
10854-67-29QA	Mechanical Mezzanine/ Attic	Layer 1: Old remnant hard gray caulking Layer 2: Trace brown brittle material (on brick wall)	L1: ND L2: ND	N/A N/A
10854-67-30	Mechanical Mezzanine/ Attic	Old remnant black asphaltic tar/sealant (on brick wall, 1” thick vertically)	ND	N/A
10854-67-31	Mechanical Mezzanine/ Attic	Layer 1: Purple/maroon marblecrete wall paneling Layer 2: Gray concrete material (on old exterior wall)	L1: ND L2: ND	N/A N/A

TABLE 1
SUMMARY OF ASBESTOS BULK SAMPLING AND ANALYTICAL RESULTS
FIRE STATION #67

SAMPLE NUMBER	SAMPLE LOCATION	MATERIAL DESCRIPTION	ASBESTOS %	TYPE OF ASBESTOS
10854-67-32	Mechanical Mezzanine/ Attic	Layer 1: Purple/maroon marblecrete wall paneling Layer 2: Gray concrete material (on old exterior wall)	L1: ND L2: ND	N/A N/A
10854-67-33	Mechanical Mezzanine/ Attic	Layer 1: Purple/maroon marblecrete wall paneling Layer 2: Gray concrete material (on old exterior wall)	L1: ND L2: ND	N/A N/A
10854-67-34	Mechanical Mezzanine/ Attic	Layer 1: Black coating Layer 2: Trace gray CMU wall (behind marblecrete)	L1: ND L2: ND	N/A N/A
10854-67-35	Mechanical Mezzanine/ Attic	Layer 1: Black coating Layer 2: Trace gray CMU wall (behind marblecrete)	L1: ND L2: ND	N/A N/A
10854-67-36	Mechanical Mezzanine/ Attic	Layer 1: Black coating Layer 2: Trace gray CMU wall (behind marblecrete)	L1: ND L2: ND	N/A N/A
10854-67-37	Mechanical Mezzanine/ Attic	Layer 1: Old brown paper vapor barrier w/ black mastic Layer 2: Yellow fiberglass batt insulation	L1: ND L2: ND	N/A N/A
10854-67-38	Mechanical Mezzanine/ Attic	Layer 1: Beige pipe dope Layer 2: Trace brown pipe dope (on sprinkler line fittings)	L1: ND L2: ND	N/A N/A
10854-67-39	Mechanical Mezzanine/ Attic	Layer 1: Silver foil Layer 2: Brown paper vapor barrier w/ mastic and woven material Layer 3: Newer pink fiberglass batt insulation	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-40	Mechanical Mezzanine/ Attic	Layer 1: Red fire stop pipe penetration putty Layer 2: Trace white fibrous material	L1: ND L2: ND	N/A N/A
10854-67-41	Mechanical Mezzanine/ Attic	Layer 1: Black flex duct Layer 2: Clear mastic	L1: ND L2: ND	N/A N/A

TABLE 1 SUMMARY OF ASBESTOS BULK SAMPLING AND ANALYTICAL RESULTS FIRE STATION #67				
SAMPLE NUMBER	**SAMPLE LOCATION**	**MATERIAL DESCRIPTION**	**ASBESTOS %**	**TYPE OF ASBESTOS**
10854-67-42QA	Roof	Layer 1: Black asphaltic felt vapor barrier Layer 2: Black asphaltic tar (under metal roofing on wood decking)	L1: ND L2: ND	N/A N/A
10854-67-43	Roof	Layer 1: Black asphaltic felt vapor barrier Layer 2: Black asphaltic tar (under metal roofing on wood decking)	L1: ND L2: ND	N/A N/A
10854-67-44	Restroom 127	Layer 1: 2" White ceramic floor tiles Layer 2: Gray grout Layer 3: Off-white mastic (on concrete)	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-45	Men's 124	Layer 1: Black rubber sink drain gasket Layer 2: Brown putty (on ceramic restroom sinks)	L1: ND L2: ND	N/A N/A
10854-67-46	Roof	Layer 1: Green paint Layer 2: Silver foil Layer 3: Black asphaltic tar (on 3'x3' roof hatch)	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-47	Roof	Green/gray flashing caulking (on 3'x3' roof hatch)	ND	N/A
10854-67-48	Roof	Light gray/white seam & flashing caulking w/ paint (1'x1' roof attachments)	ND	N/A
10854-67-49	Roof	White seam/edge caulking w/ green paint (6" circular roof attachments)	ND	N/A
10854-67-50	Roof	Dark brown/gray seam/edge sealant (1'x1'-3'x3' square based vents w/ circular hoods)	ND	N/A
10854-67-51	Roof	Layer 1: Dark brown/gray seam/edge sealant Layer 2: Light gray seam/edge caulking Layer 3: Yellow mastic (6"-12" OD pipe vents and 6" plastic vent pipes)	L1: ND L2: ND L3: ND	N/A N/A N/A

TABLE 1 SUMMARY OF ASBESTOS BULK SAMPLING AND ANALYTICAL RESULTS FIRE STATION #67				
SAMPLE NUMBER	**SAMPLE LOCATION**	**MATERIAL DESCRIPTION**	**ASBESTOS %**	**TYPE OF ASBESTOS**
10854-67-52	Roof	White caulking w/ black paint (6"-12" circular pipe vents and 6" plastic vent pipes)	ND	N/A
10854-67-53	Roof	Layer 1: Dark brown/gray seam/edge sealant Layer 2: Black asphaltic sealant (2'x2' square based vents w/ 8" pipe vents)	L1: ND L2: ND	N/A N/A
10854-67-54	Roof	Light gray/white seam/edge caulking (2'x2' square based vents w/ plastic pipe vent)	ND	N/A
10854-67-55	Mechanical Mezzanine/ Attic	Layer 1: Silver foil Layer 2: Brown paper w/ black mastic Layer 3: Yellow fiberglass batt insulation	L1: ND L2: ND L3: ND	N/A N/A N/A
10854-67-56	Mechanical Mezzanine/ Attic	Layer 1: JC w/ green GWB paper Layer 2: GWB w/ paper (wall has no skim coat and is unpainted)	L1: ND L2: ND	N/A N/A

Key: CMU = concrete masonry unit, **GWB** = gypsum wall board, **JC**= joint compound; **ND** = none detected; **N/A** = not applicable; **SVF** = Sheet Vinyl Flooring; **VCT** = Vinyl Composite Tile; **w/** =with.

Table 2 summarizes materials identified by EHSI as containing greater than 1% asbestos fibers during its survey, and un-sampled materials assumed to be ACM. **The Table 2 Summary of Asbestos Containing Materials is for engineering cost estimating purposes and is not intended for bid quantifications.**

TABLE 2 SUMMARY OF ASBESTOS-CONTAINING MATERIALS FIRE STATION #67		
ASBESTOS MATERIAL DESCRIPTION	**LOCATION**	**QUANTITY EXPECTED TO BE IMPACTED**
3' tall upper and lower casework with assumed ACM mastic	Workroom 110 and Kitchen 162	550 SF
3' tall upper and lower casework with assumed ACM mastic	Laundry 156 and Decon. 155	NIS (250 SF)

Key: ACM = asbestos-containing material; **TSI** = thermal system insulation; **EA** = each, **LF** = linear feet.

ACM identified in this survey should not be disturbed unless handled by personnel who are properly trained and certified in asbestos work. Demolition and/or renovation activities by contractors may expose concealed suspect ACM. Contractors should be aware of the

potential for concealed suspect ACM and have preplanned contingencies for the handling of suspect ACM discovered during renovation and/or demolition work. Any concealed suspect ACM material that was not sampled or was assumed to be ACM and included in this report, must be treated as ACM until proven otherwise by a Certified AHERA Building Inspector and a certified laboratory. Contingency plans should include stopping work on identification of concealed suspect ACM, evacuation of the area, and sampling by a Certified AHERA Building Inspector. Concealed suspect material may include, but is not limited to: non-fiberglass pipe or roof drain insulation; spray-applied coatings; cementitious board; asphalt or paper vapor barriers; vinyl floorings and mastics.

2.4.2 Lead-Containing Paint and Building Materials

Ninety-One (91) samples were analyzed for lead using the X-Ray fluorescence (XRF) analyzer. Results marked with "≤LOD" are less than the limit of detection. XRF paint sample results ranged from 1.5 milligrams of lead per square centimeter (mg Pb/cm^2) to less than the LOD. The results are provided in Table 3 of this report. The results indicate that one (1) of the materials were found to contain ≥1.0 mg/cm^2 lead using the XRF instrument and three (3) of the surfaces were found to contain detectable levels of lead using the XRF. **Bolded results indicate materials coated with "lead-based paint" (e.g., >1.0 mg/cm^2) as defined by USEPA regulation 40CFR745 and Washington State Department of Commerce (Commerce) regulation WAC 365-230.** XRF readings for other lead-containing materials were < LOD.

Table 3 summarizes XRF lead samples, including sample number, material description, substrate, color, location and analytical results.

TABLE 3
XRF SAMPLING
SUMMARY OF PAINTED COMPONENTS AND MATERIALS
FIRE STATION #67

Read. #	Component	Substrate	Color	Room	Building	Lead Conc. (mg/cm^2)
1	SELF-CALIBRATION	N/A	N/A	N/A	N/A	3.73
2	CALIBRATION	N/A	RED	N/A	N/A	0.9
3	CALIBRATION	N/A	RED	N/A	N/A	1
4	CALIBRATION	N/A	RED	N/A	N/A	1
5	WALL	DRYWALL	OFF-WHITE	CONFERENCE 118	MAIN	< LOD
6	WALL	DRYWALL	GRAY	CONFERENCE 118	MAIN	< LOD
7	DOORFRAME	METAL	GRAY	CONFERENCE 118	MAIN	< LOD
8	WINDOW FRAME	METAL	GRAY	CONFERENCE 118	MAIN	< LOD
9	COLUMN	DRYWALL	OFF-WHITE	LOBBY 101	MAIN	< LOD
10	WALL	DRYWALL	LIGHT YELLOW	RECEPTION 102	MAIN	< LOD
11	WALL	DRYWALL	GRAY	RECEPTION 102	MAIN	< LOD
12	WALL	WOOD	WHITE	SERVER 113	MAIN	< LOD
13	WALL	WOOD	WHITE	SERVER 113	MAIN	< LOD

TABLE 3 XRF SAMPLING SUMMARY OF PAINTED COMPONENTS AND MATERIALS FIRE STATION #67						
Read. #	**Component**	**Substrate**	**Color**	**Room**	**Building**	**Lead Conc. (mg/cm^2)**
14	FLOOR	CONCRETE	LIGHT GRAY	SERVER 113	MAIN	< LOD
15	WALL	DRYWALL	WHITE	SERVER 113	MAIN	< LOD
16	WALL	CERAMIC	OFF-WHITE	RR 112	MAIN	< LOD
17	WALL	CERAMIC	YELLOW	RR 112	MAIN	< LOD
18	SINK	CERAMIC	WHITE	RR 112	MAIN	< LOD
19	SINK	CERAMIC	WHITE	STORAGE 104	MAIN	< LOD
20	WALL	DRYWALL	GRAY	STORAGE 104	MAIN	< LOD
21	WALL	DRYWALL	GRAY	STORAGE 104	MAIN	< LOD
22	COVE BASE	DRYWALL	BLACK	STORAGE 104	MAIN	< LOD
23	BRICK	BRICK	RED	APPARATUS BAY 133	MAIN	< LOD
24	BRICK	BRICK	RED	APPARATUS BAY 133	MAIN	< LOD
25	BRICK MORTAR	BRICK	GRAY	APPARATUS BAY 133	MAIN	< LOD
26	COLUMN	METAL	BROWN	APPARATUS BAY 133	MAIN	< LOD
27	ROLL UP DOORFRAME	METAL	BLACK	APPARATUS BAY 133	MAIN	< LOD
28	ROLL UP DOOR	METAL	WHITE	APPARATUS BAY 133	MAIN	< LOD
29	FLOOR PAINT STRIPE	CERAMIC	RED	APPARATUS BAY 133	MAIN	0.3
30	WALL	CMU MORTAR	WHITE	FAC. MAINT. 131	MAIN	0.14
31	WALL	BRICK MORTAR	WHITE	FAC. MAINT. 131	MAIN	< LOD
32	WALL	BRICK MORTAR	WHITE	FAC. MAINT. 131	MAIN	0.06
33	ROLL UP DOORFRAME	WOOD	WHITE	FAC. MAINT. 131	MAIN	< LOD
34	PIPE	METAL	WHITE	FAC. MAINT. 131	MAIN	0.14
35	CABINET	WOOD	BLUE	KITCHEN 162	MAIN	< LOD
36	CABINET	WOOD	ORANGE	KITCHEN 162	MAIN	< LOD
37	COUNTER	WOOD	BLACK	KITCHEN 162	MAIN	< LOD
38	WALL	DRYWALL	WHITE	KITCHEN 162	MAIN	< LOD
39	SINK	CERAMIC	WHITE	LAUNDRY 156	MAIN	< LOD
40	SINK	CERAMIC	WHITE	LAUNDRY 156	MAIN	< LOD
41	WALL	DRYWALL	WHITE	LAUNDRY 156	MAIN	< LOD
42	COUNTER	WOOD	BLACK	LAUNDRY 156	MAIN	< LOD

TABLE 3 XRF SAMPLING SUMMARY OF PAINTED COMPONENTS AND MATERIALS FIRE STATION #67						
Read. #	**Component**	**Substrate**	**Color**	**Room**	**Building**	**Lead Conc. (mg/cm^2)**
43	COUNTER	WOOD	BLACK	LAUNDRY 156	MAIN	< LOD
44	CABINET	WOOD	OFF-WHITE	LAUNDRY 156	MAIN	< LOD
45	HATCH	METAL	WHITE	STORAGE 151	MAIN	< LOD
46	SINK	CERAMIC	WHITE	STORAGE 151	MAIN	< LOD
47	WALL	DRYWALL	WHITE	STORAGE 151	MAIN	< LOD
48	RAILING	METAL	GRAY	STORAGE 151	MAIN	< LOD
49	LOCKERS	METAL	GRAY	MEN'S 150	MAIN	< LOD
50	WALL	WOOD	RED	SCBA 121	MAIN	< LOD
51	WALL	WOOD	BLUE	SCBA 121	MAIN	< LOD
52	WALL	WOOD	WHITE	SCBA 121	MAIN	< LOD
53	COUNTER	WOOD	GRAY	SCBA 121	MAIN	< LOD
54	CEILING	DRYWALL	WHITE	FAC. MAINT. 131	MAIN	< LOD
55	CEILING BEAM	WOOD	BROWN	FAC. MAINT. 131	MAIN	< LOD
56	CEILING BEAM	WOOD	BROWN	FAC. MAINT. 131	MAIN	< LOD
57	CEILING BEAM	WOOD	BROWN	FAC. MAINT. 131	MAIN	< LOD
58	GATE	METAL	BROWN	FAC. MAINT. 131	MAIN	< LOD
59	CEILING BEAM BRACKET	METAL	BROWN	FAC. MAINT. 131	MAIN	< LOD
60	CEILING BEAM BRACKET	METAL	BROWN	FAC. MAINT. 131	MAIN	< LOD
61	CEILING BEAM BRACKET	METAL	BROWN	FAC. MAINT. 131	MAIN	< LOD
62	CEILING BEAM BRACKET	METAL	BROWN	FAC. MAINT. 131	MAIN	< LOD
63	CEILING BEAM SUPPORT	METAL	BROWN	FAC. MAINT. 131	MAIN	< LOD
64	**FLOOR**	**WOOD**	**YELLOW**	**FAC. MAINT. 131 MECHANICAL**	**MAIN**	**1.5**
65	WALL	CMU	BLACK	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
66	WALL	CMU MORTAR	BLACK	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
67	WALL	CMU MORTAR	BLACK	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
68	LADDER	METAL	MAROON	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
69	PIPE GUARD	WOOD	ORANGE	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
70	STAIRS	CONCRETE	GRAY	FAC. MAINT. 131	MAIN	< LOD
71	STAIRS	METAL	BROWN	FAC. MAINT. 131	MAIN	< LOD
72	STAIRS	METAL	BROWN	FAC. MAINT. 131	MAIN	< LOD

TABLE 3
XRF SAMPLING
SUMMARY OF PAINTED COMPONENTS AND MATERIALS
FIRE STATION #67

Read. #	Component	Substrate	Color	Room	Building	Lead Conc. (mg/cm^2)
73	ELECTRICAL PANEL	METAL	GRAY	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
74	WALL	CMU	PURPLE	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
75	WALL	CMU	PURPLE	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
76	PIPE	METAL	BLACK	FAC. MAINT. 131 MECHANICAL	MAIN	< LOD
77	LADDER ENTRY	METAL	BROWN	ROOF	MAIN	< LOD
78	LADDER ENTRY	METAL	BROWN	ROOF	MAIN	< LOD
79	LADDER ENTRY HATCH	METAL	GREEN	ROOF	MAIN	< LOD
80	LADDER ENTRY FLASHING	METAL	GREEN	ROOF	MAIN	< LOD
81	LADDER ENTRY FLASHING	METAL	GREEN	ROOF	MAIN	< LOD
82	VENT FLASHING	METAL	GREEN	ROOF	MAIN	< LOD
83	VENT	METAL	BLACK	ROOF	MAIN	< LOD
84	VENT	METAL	GREEN	ROOF	MAIN	< LOD
85	ROOF	METAL	GREEN	ROOF	MAIN	< LOD
86	WALL	CMU	GRAY	EXTERIOR	MAIN	< LOD
87	WALL	CONCRETE	GRAY	EXTERIOR	MAIN	< LOD
88	BEAM	METAL	GRAY	EXTERIOR	MAIN	< LOD
89	BEAM	METAL	GRAY	EXTERIOR	MAIN	< LOD
90	WALL	METAL	GREEN	EXTERIOR	MAIN	< LOD
91	TRIM	METAL	GREEN	EXTERIOR	MAIN	< LOD
92	ROLL UP DOOR	METAL	SILVER	EXTERIOR	MAIN	< LOD
93	ELECTRICAL SWITCHBOX	METAL	SILVER	EXTERIOR	MAIN	< LOD
94	AWNING	METAL	GRAY	EXTERIOR	MAIN	< LOD
95	CALIBRATION	N/A	RED	N/A	N/A	1
96	CALIBRATION	N/A	RED	N/A	N/A	1
97	CALIBRATION	N/A	RED	N/A	N/A	0.9

Key: GWB = Gypsum Wallboard, **LOD**=limit of detection; **N/A** = Non-Applicable.

In addition to the XRF samples, EHSI collected four (4) bulk QA samples for laboratory analysis. Results marked with the "<" symbol are less than the detectable level. Both bulk sample results were < LOD. Building materials and paint containing detectable levels of lead are considered regulated by DOSH.

Table 4 summarizes bulk QA lead samples, including sample number, material description, substrate, color, location, and analytical results.

Copies of the analytical laboratory report and field data forms for lead paint are included in Appendix B of this report.

TABLE 4
SUMMARY OF LEAD BULK QA SAMPLING AND ANALYTICAL RESULTS
FS #67

SAMPLE NUMBER	LOCATION	COMPONENT	SUBSTRATE	COLOR	RESULTS % Pb by WT
10854-67-Pb01	1st Floor/Apparatus Bay 133	Wall	Brick and Mortar	Red and Gray	<0.0036
10854-67-Pb02	1st Floor/Facilities Maintenance 131	Wall	CMU and Mortar	Gray and Gray	0.0730
10854-67-Pb03	1st Floor/Storage 123	Wall	GWB	White	<0.0052
10854-67-Pb04	1st Floor/Apparatus Bay 133	Support Beam	Metal	Brown and Red	0.3800

Key: < =Less than the Limit of Detection for Lead for that Sample

DOSH requires employers to conduct a hazard assessment and take appropriate worker protection precautions whenever paint is disturbed that has detectable quantities of lead. Since the type of work planned (e.g., sawing, grinding, demolition) will disturb the lead-containing paint, the contractor should perform an initial exposure assessment to determine if personal protective measures and work practices are required.

2.4.3 Arsenic-Containing Building Materials

EHSI collected two (2) Arsenic bulk mortar samples for laboratory analysis. The results of those analyses are reported in Table 6.

Arsenic results for this inspection are reported in Appendix B. Table 5 summarizes Arsenic samples, including sample number, material description, substrate, color and analytical results.

TABLE 5
SUMMARY OF ARSENIC BULK SAMPLING AND ANALYTICAL RESULTS
FS #67

SAMPLE NUMBER	SAMPLE LOCATION	COMPONENT/ SUBSTRATE	COLOR	RESULTS IN PPM
10854-67-As01	1st Floor, Apparatus Bay 133	Wall/Brick and Mortar	Red and Gray	<19.0
10854-67-As02	1st Floor, Facilities Maintenance 131	Wall/CMU and Mortar	Gray and Gray	38.0

DOSH requires employers to conduct a hazard assessment and take appropriate worker protection precautions whenever arsenic-containing materials are disturbed. Since the type of

work planned (e.g., drilling, sawing, grinding) will disturb the arsenic-containing materials, the contractor should perform an initial exposure assessment to determine if personal protective measures and work practices are required. DOSH permissible exposure limit for arsenic is 0.2 mg/m^3 within an 8-hour time period.

2.4.4 Toxicity Characteristic Leaching Procedure Sampling

Ecology requires testing using the "toxicity characteristic leaching procedure" (TCLP) and segregation of construction debris if it is potentially contaminated with dangerous waste (e.g., lead-containing paint/lead-containing materials). Washington State Department of Ecology (Ecology) has set a dangerous waste threshold for both leachable arsenic and lead at 5.0 milligrams per liter (mg/L).

Because the potential waste streams will be determined by the contractor, a TCLP was not conducted as part of the Limited Hazardous Materials Survey; however, based on the relatively low levels of lead and arsenic in the sample results, EHSI does not anticipate TCLP to fail for either lead or arsenic.

2.4.5 Polychlorinated Biphenyls

Ballasts

Electronic and magnetic fluorescent light ballasts were observed. Magnetic fluorescent light ballasts that will be disturbed during the project are assumed to contain greater than two parts per million (> 2 ppm) PCB-dielectric oil and must be disposed or recycled as Washington Department of Ecology (Ecology) Dangerous Waste. In addition, all fluorescent tubes and lamps contain mercury. Any fluorescent lamps/tubes to be disturbed during the project must be recycled as Washington Department of Ecology (Ecology) Universal Waste. A Summary of ballasts and Hg-containing light tubes is provided in Table 6.

Transformers

EHSI did not observe any liquid filled transformers that will be impacted by the planned work in the FS #67 Building.

2.4.6 Mercury-Containing Fluorescent Light Tubes

All fluorescent light tubes quantified in Table 6 are assumed to contain Hg. Hg wastes are regulated as "universal wastes" under Ecology's regulation WAC 173-303. Hg-containing building materials must be recycled or disposed of as hazardous waste. Hg-containing fluorescent light tubes are quantified in Table 6.

TABLE 6
SUMMARY OF LIGHT FIXTURE INSPECTION RESULTS
FIRE STATION #67

LIGHT TYPE	NUMBER OF FIXTURES	NUMBER OF TUBES	APPROXIMATE NUMBER OF MAGNETIC BALLASTS
2'x4' Mounted fixture, 4 bulbs, 1 ballast	(1)	(4)	0

TABLE 6 SUMMARY OF LIGHT FIXTURE INSPECTION RESULTS FIRE STATION #67			
LIGHT TYPE	**NUMBER OF FIXTURES**	**NUMBER OF TUBES**	**APPROXIMATE NUMBER OF MAGNETIC BALLASTS**
2'x4' Mounted fixture, 3 bulbs, 1 ballast	(9)	(27)	0
1'x4' Hanging fixture, 3 bulbs, 1 ballast	(26)	(78)	0
1'x4' Mounted fixture, 2 bulbs, 1 ballast	(8)	(16)	0
6"x4' Mounted fixture, 2 bulbs, 1 ballast	8 (76)	16 (152)	0
6"x4' Mounted fixture, 1 bulb, 1 ballast	(29)	(29)	0
Compact fluorescent light fixtures	(55)	(55)	0
Total	**8 EA (212 NIS)**	**16 EA (369 NIS)**	**0**

3.0 LIMITATIONS

This survey was limited to those materials accessible using standard survey methods. Limited representative destructive inspection was accomplished; however, in areas inaccessible for inspection, (e.g., fire door cores, wall cabinet mastics, electrical and materials above hard lid ceilings) suspect materials were assumed to be ACM.

This survey was limited to the chemicals and materials identified herein. No effort was made to identify hazardous materials in soil, water, or air, other than those listed herein. Any survey regardless of how extensive can miss concealed materials. Contractors should be aware of the potential that demolition activities may expose concealed suspect ACM and should have preplanned contingencies for handling these materials when discovered during demolition work. Any concealed, suspect ACM material that was not sampled or that was assumed to be ACM by this survey report when encountered must be treated as ACM until sampled by a Certified AHERA Building Inspector and analyzed by a certified laboratory.

4.0 STANDARD OF CARE

The recommendations and conclusions contained in this report represent the professional opinions of EHSI. These opinions are derived in accordance with federal, state, and local environmental and health and safety laws and regulations. This survey was accomplished in accordance with applicable federal, state, and local regulations and industry standards in effect at the time. Other than this, no other warranty is implied or intended.

5.0 CERTIFIED AHERA BUILDING INSPECTORS

The Certified AHERA Building Inspectors listed below surveyed FS #67 on April 18th, 2016 in accordance with federal, state, and local requirements.

Rory Peterson
Certified AHERA Building Inspector
Certificate Number: 2015-07-28-02
Expiration Date: July 28, 2016

Blaine Nesbit
Certified AHERA Building Inspector
Certificate Number: 153688
Expiration Date: November 3, 2016

APPENDIX A

Asbestos Analytical Laboratory Report and Field Data Forms

SEATTLE ASBESTOS TEST

Seattle Laboratory: 4500 9th Ave. NE, Suite 300, Seattle, WA 98105, Tel: 206.633.1111, Fax: 206.633.4747, NVLAP Lab Code: 201057-0

ANALYTICAL LABORATORY REPORT

PLM by Method EPA/600/R-93/116

Attn.: Mr. Rory Peterson/Ms. Derica Escamilla
Client: EHS International, Inc.
Address: 1011 SW Klickitat Way, Suite 104, Seattle, WA 98134
Job#: 10854-01D
Batch#: 201610497
Date Received: 4/19/2016
Samples Rec'd: 56
Date Analyzed: 4/20/2016
Samples Analyzed: 56
Project Loc.: South King Fire & Rescue - Fire Station 67
Analyzed by: Cassie Huang/Cici Xu
Reviewed by: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
1	10854-67-01	1	White powdery material with paint and paper		None detected	Binder/filler, Paint	34	Cellulose
		2	White chalky material with paper		None detected	Binder/filler, Gypsum/binder	23	Cellulose, Glass fibers
2	10854-67-02	1	White powdery material with paint		None detected	Binder/filler, Paint	5	Cellulose
		2	White chalky material with paper		None detected	Binder/filler, Gypsum/binder	21	Cellulose, Glass fibers
3	10854-67-03	1	Black sheet vinyl		None detected	Vinyl/binder		None detected
		2	Gray fibrous material		None detected	Binder/filler	63	Cellulose
		3	Yellow mastic		None detected	Mastic/binder	2	Cellulose
		4	Gray sandy/brittle material		None detected	Sand, Filler, Binder	3	Cellulose
4	10854-67-04	1	Black rubbery material		None detected	Rubber/binder	2	Cellulose
		2	White mastic		None detected	Mastic/binder	2	Cellulose
		3	White powdery material		None detected	Filler, Binder	3	Cellulose
5	10854-67-05	1	Light gray tile		None detected	Vinyl/binder, Mineral grains	2	Cellulose
		2	Yellow mastic		None detected	Mastic/binder	4	Cellulose
6	10854-67-06	1	Tan woven fibrous material		None detected	Filler, Binder	84	Synthetic fibers
		2	White woven fibrous material		None detected	Filler, Binder	80	Cellulose
		3	Off-white/tan mastic		None detected	Mastic/binder	5	Synthetic fibers, Cellulose
7	10854-67-07	1	Black brittle/rigid material		None detected	Filler, Binder, Fine particles	64	Cellulose
		2	Clear mastic		None detected	Mastic/binder	4	Cellulose
8	10854-67-08	1	White powdery material with paint and paper		None detected	Binder/filler, Paint	33	Cellulose
		2	White chalky material with paper		None detected	Binder/filler, Gypsum/binder	23	Cellulose, Glass fibers
9	10854-67-09	1	White powdery material with paint		None detected	Binder/filler, Paint	5	Cellulose
		2	White chalky material with paper		None detected	Binder/filler, Gypsum/binder	24	Cellulose, Glass fibers
10	10854-67-10	1	Gray soft/loose material		None detected	Filler, Fine particles	7	Cellulose

SEATTLE ASBESTOS TEST

Seattle Laboratory: 4500 9th Ave. NE, Suite 300, Seattle, WA 98105, Tel: 206.633.1111, Fax: 206.633.4747, NVLAP Lab Code: 201057-0

ANALYTICAL LABORATORY REPORT

PLM by Method EPA/600/R-93/116

Attn.:	Mr. Rory Peterson/Ms. Derica Escamilla	**Client:**	EHS International, Inc.	**Address:**	1011 SW Klickitat Way, Suite 104, Seattle, WA 98134
Job#:	10854-01D	**Batch#:**	201610497	**Date Received:**	4/19/2016
Samples Rec'd:	56	**Date Analyzed:**	4/20/2016	**Samples Analyzed:**	56
Project Loc.:	South King Fire & Rescue - Fire Station 67				

Analyzed by: Cassie Huang/Cici Xu

Reviewed by: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
11	10854-67-11	1	Black rubbery material		**None detected**	Rubber/binder	2	Cellulose
		2	Tan paper		**None detected**	Filler	73	Cellulose
12	10854-67-12	1	Gray soft/elastic material		**None detected**	Binder, Filler	4	Cellulose
13	10854-67-13	1	Beige woven fibrous material		**None detected**	Filler, Binder	83	Synthetic fibers
		2	White woven fibrous material		**None detected**	Filler, Binder	81	Cellulose
		3	Yellow mastic		**None detected**	Mastic/binder	5	Synthetic fibers, Cellulose
14	10854-67-14	1	Beige/gray rubbery material		**None detected**	Rubber/binder	3	Cellulose
		2	Beige mastic		**None detected**	Mastic/binder	3	Cellulose
15	10854-67-15	1	Black woven fibrous material		**None detected**	Filler, Binder	83	Synthetic fibers
		2	Black rubbery material		**None detected**	Rubber/binder	2	Cellulose
		3	Green mastic		**None detected**	Mastic/binder	5	Synthetic fibers, Cellulose
16	10854-67-16	1	White powdery material with paint		**None detected**	Binder/filler, Paint	4	Cellulose
		2	White chalky material with paper		**None detected**	Binder/filler, Gypsum/binder	22	Cellulose, Glass fibers
17	10854-67-17	1	White chalky material with paint and paper		**None detected**	Binder/filler, Gypsum/binder, Paint	35	Cellulose, Glass fibers
18	10854-67-18	1	White chalky material with paint and paper		**None detected**	Binder/filler, Gypsum/binder, Paint	33	Cellulose, Glass fibers
19	10854-67-19	1	Off-white soft/loose material		**None detected**	Filler, Fine particles	4	Cellulose
20	10854-67-20	1	Black rubbery material		**None detected**	Rubber/binder	3	Cellulose
		2	White soft material		**None detected**	Filler, Binder	2	Cellulose
21	10854-67-21	1	Tan soft material		**None detected**	Filler, Binder	3	Cellulose
22	10854-67-22	1	Black brittle/rigid material		**None detected**	Filler, Binder, Fine particles	65	Cellulose
		2	Yellow/tan mastic		**None detected**	Mastic/binder	4	Cellulose
		3	Brown wood block		**None detected**	Wood aggregates	5	Cellulose
23	10854-67-23	1	White soft/elastic material		**None detected**	Binder, Filler	4	Cellulose

SEATTLE ASBESTOS TEST

Seattle Laboratory: 4500 9th Ave. NE, Suite 300, Seattle, WA 98105, Tel: 206.633.1111, Fax: 206.633.4747, NVLAP Lab Code: 201057-0

ANALYTICAL LABORATORY REPORT

PLM by Method EPA/600/R-93/116

Attn.: Mr. Rory Peterson/Ms. Derica Escamilla **Client:** EHS International, Inc. **Address:** 1011 SW Klickitat Way, Suite 104, Seattle, WA 98134

Job#: 10854-01D **Batch#:** 201610497 **Date Received:** 4/19/2016

Samples Rec'd: 56 **Date Analyzed:** 4/20/2016 **Samples Analyzed:** 56

Project Loc.: South King Fire & Rescue - Fire Station 67

Analyzed by: Cassie Huang/Cici Xu Reviewed by: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
24	10854-67-24	1	Tan ceramic		None detected	Ceramic/binder		None detected
		2	Tan brittle/sandy material		None detected	Binder, Sand	2	Cellulose
		3	Tan mastic		None detected	Mastic/binder	2	Cellulose
25	10854-67-25	1	Red hard sandy/brittle material		None detected	Sand, Filler, Binder	3	Cellulose
		2	Gray sandy/brittle material		None detected	Sand, Filler, Binder	2	Cellulose
26	10854-67-26	1	Gray hard sandy/brittle material with paint		None detected	Sand, Filler, Binder, Paint	4	Cellulose
27	10854-67-27	1	Yellow soft material		None detected	Filler, Binder	5	Cellulose
28	10854-67-28	1	Gray soft/elastic material		None detected	Binder, Filler	3	Cellulose
29	10854-67-29	1	Gray soft/elastic material with sand		None detected	Binder, Filler, Sand	4	Cellulose
30	10854-67-30	1	Black asphaltic material		None detected	Asphalt/binder	2	Cellulose
31	10854-67-31	1	Light purple hard sandy/brittle material		None detected	Sand, Filler, Cement/binder	3	Cellulose
		2	Gray hard sandy/brittle material		None detected	Sand, Filler, Cement/binder	2	Cellulose
32	10854-67-32	1	Light purple hard sandy/brittle material		None detected	Sand, Filler, Cement/binder	2	Cellulose
		2	Gray hard sandy/brittle material		None detected	Sand, Filler, Cement/binder	3	Cellulose
33	10854-67-33	1	Light purple hard sandy/brittle material		None detected	Sand, Filler, Cement/binder	2	Cellulose
		2	Gray hard sandy/brittle material		None detected	Sand, Filler, Cement/binder	4	Cellulose
34	10854-67-34	1	Black soft material		None detected	Filler, Asphalt/binder	3	Cellulose
		2	Trace gray sandy/brittle material		None detected	Sand, Filler, Binder	2	Cellulose
35	10854-67-35	1	Black soft material		None detected	Filler, Asphalt/binder	2	Cellulose
		2	Trace gray sandy/brittle material		None detected	Sand, Filler, Binder	2	Cellulose

SEATTLE ASBESTOS TEST

Seattle Laboratory: 4500 9th Ave. NE, Suite 300, Seattle, WA 98105, Tel: 206.633.1111, Fax: 206.633.4747, NVLAP Lab Code: 201057-0

ANALYTICAL LABORATORY REPORT

PLM by Method EPA/600/R-93/116

Attn.: Mr. Rory Peterson/Ms. Derica Escamilla **Client:** EHS International, Inc. **Address:** 1011 SW Klickitat Way, Suite 104, Seattle, WA 98134

Job#: 10854-01D **Batch#:** 201610497 **Date Received:** 4/19/2016

Samples Rec'd: 56 **Date Analyzed:** 4/20/2016 **Samples Analyzed:** 56

Project Loc.: South King Fire & Rescue - Fire Station 67

Analyzed by: Cassie Huang/Cici Xu Reviewed by: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
36	10854-67-36	1	Black soft material		None detected	Filler, Asphalt/binder	4	Cellulose
		2	Trace gray sandy/brittle material		None detected	Sand, Filler, Binder	2	Cellulose
37	10854-67-37	1	Brown paper with black mastic		None detected	Filler, Asphalt/binder	68	Cellulose
		2	Yellow fibrous material		None detected	Filler	90	Glass fibers
38	10854-67-38	1	Beige soft material		None detected	Filler, Binder	3	Cellulose
		2	Trace brown mastic		None detected	Mastic/binder	2	Cellulose
39	10854-67-39	1	Silver foil		None detected	Foil/binder		None detected
		2	Brown paper with mastic and woven fibrous material		None detected	Filler, Mastic/binder	69	Cellulose, Glass fibers
		3	Pink fibrous material		None detected	Filler	91	Glass fibers
40	10854-67-40	1	Red soft/elastic material with fibrous material		None detected	Binder, Filler	12	Cellulose, Glass fibers
		2	Trace white fibrous material		None detected	Binder/filler	56	Cellulose
41	10854-67-41	1	Black soft/elastic material with woven fibrous material		None detected	Binder, Filler	20	Glass fibers
		2	Clear mastic		None detected	Mastic/binder	3	Cellulose
42	10854-67-42	1	Black asphaltic material with fibrous material		None detected	Asphalt/binder, Binder/filler	23	Cellulose
		2	Black asphaltic material		None detected	Asphalt/binder	3	Cellulose
43	10854-67-43	1	Black asphaltic material with fibrous material		None detected	Asphalt/binder, Binder/filler	22	Cellulose
		2	Black asphaltic material		None detected	Asphalt/binder	4	Cellulose
44	10854-67-44	1	White ceramic		None detected	Ceramic/binder		None detected
		2	Gray brittle/sandy material		None detected	Binder, Sand	2	Cellulose
		3	Off white mastic		None detected	Mastic/binder	2	Cellulose
45	10854-67-45	1	Black soft/elastic material		None detected	Binder, Filler	4	Cellulose

SEATTLE ASBESTOS TEST

Seattle Laboratory: 4500 9th Ave. NE, Suite 300, Seattle, WA 98105, Tel: 206.633.1111, Fax: 206.633.4747, NVLAP Lab Code: 201057-0

ANALYTICAL LABORATORY REPORT

PLM by Method EPA/600/R-93/116

Attn.: Mr. Rory Peterson/Ms. Derica Escamilla **Client:** EHS International, Inc. **Address:** 1011 SW Klickitat Way, Suite 104, Seattle, WA 98134

Job#: 10854-01D **Batch#:** 201610497 **Date Received:** 4/19/2016

Samples Rec'd: 56 **Date Analyzed:** 4/20/2016 **Samples Analyzed:** 56

Project Loc.: South King Fire & Rescue - Fire Station 67

Analyzed by: Cassie Huang/Cici Xu Reviewed by: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
		2	Brown/clear soft/elastic material		None detected	Binder, Filler	3	Cellulose
46	10854-67-46	1	Green paint		None detected	Paint	2	Cellulose
		2	Silver foil		None detected	Foil/binder		None detected
		3	Black asphaltic material		None detected	Asphalt/binder	4	Cellulose
47	10854-67-47	1	Green/gray soft/elastic material		None detected	Binder, Filler	3	Cellulose
48	10854-67-48	1	Light gray/white soft/elastic material with paint		None detected	Binder, Filler, Paint	3	Cellulose
49	10854-67-49	1	White soft/elastic material with green paint		None detected	Binder, Filler, Paint	2	Cellulose
50	10854-67-50	1	Dark brown soft/elastic material		None detected	Binder, Filler	3	Cellulose
51	10854-67-51	1	Dark brown/gray soft/elastic material		None detected	Binder, Filler	4	Cellulose
		2	Light gray soft/elastic material		None detected	Binder, Filler	3	Cellulose
		3	Trace yellow mastic		None detected	Mastic/binder	2	Cellulose
52	10854-67-52	1	White soft/elastic material with black paint		None detected	Binder, Filler, Paint	3	Cellulose
53	10854-67-53	1	Dark brown/gray soft/elastic material		None detected	Binder, Filler	2	Cellulose
		2	Black asphaltic material		None detected	Asphalt/binder	3	Cellulose
54	10854-67-54	1	Light gray/white soft/elastic material		None detected	Binder, Filler	3	Cellulose
55	10854-67-55	1	Silver foil		None detected	Foil/binder		None detected
		2	Brown paper with black mastic		None detected	Filler, Asphalt/binder	71	Cellulose
		3	Yellow fibrous material		None detected	Filler	89	Glass fibers
56	10854-67-56	1	White powdery material with green paper		None detected	Binder/filler	35	Cellulose
		2	White chalky material with paper		None detected	Binder/filler, Gypsum/binder	25	Cellulose, Glass fibers

20161049?

Space Survey (Asbestos)

Project Number: 10854-01D

Project Name: South King Fire & Rescue - Fire Station 67

Location / Building: FS 67

Inspectors: Rory Peterson & Blaine Nesbit

EHS-INTERNATIONAL, INC.
1011 SW Klickitat Way, Suite 104
Seattl, WA 98134
(206) 381-1128 Fax:(206)254-4279

Date 4/18/16

Sample No.	Location	Material Description (color, size, use, substrate & layers)	Quantity
10854-67-01	Server 113	JC w/ Paint on GWB Wall (corner)	
" 02	" "	JC Skimcoat w/ Paint on GWB Wall (mid wall)	
" 03	Stor. 104	Black SVF w/ Gray Paper Backing w/ Yellow Mastic on Gray Leveling Compound (on Concrete)	
" 04	" "	4" Black Cove Base w/ White Mastic on JC	
" 05	Stor. 123	12"x12" Light Gray VCT (w/ Gray Streaks) w/ Yellow Mastic (on concrete)	
" 06	Conf./Trng. 118	Tan Carpet w/ White Mesh Backing w/ off-White & Tan Mastic (on concrete)	
" 07	Workroom 110	Black Formica Countertops w/ Clear Mastic (on wood)	
" 08	Stor. 122	JC Skimcoat w/ Paint on GWB Wall (corner)	
" 09	" "	" " " " " " " (mid wall)	
" 10	Workroom 110	Gray Sink Undercoat (on Single Stainless Steel Sink)	
" 11	" "	Black Rubber Sink Drain Gasket w/ Tan Paper Gasket (")	
" 12	Stor. 148	Gray Concrete Floor Seam Caulking	
" 13	SR1 143	Beige Carpet w/ White Mesh Backing w/ Yellow Mastic (on concrete)	
" 14	Corridor 152	Beige/Gray Rubber SVF w/ Beige Mastic (on concrete)	
" 15	Watch Office 159	2'x2' Black Carpet Squares w/ Black Rubber Backing w/ Green Mastic (on concrete)	
" 16	Stor. 148	JC Skimcoat w/ Paint on GWB Wall (corner)	
" 17	" "	" " " " " " " (mid wall)	
" 18	Mens 150	" " " " " " " (" ")	
" 19	Kitchen 162	Off-White Sink Undercoat (on triple stainless steel sink)	
" 20	" "	Black Rubber Sink Drain Gasket w/ White Putty (on Side 2 sink drains of triple sink)	

20161 0497

Space Survey F (Asbestos)
Proj mber: 10854-01D
Project Name: SK FAR - FS 67
Location / Building: FS 67
Inspectors: R.P. & B.N.

EHS-INTERNATIONAL, INC.
1011 SW Klickitat Way, Suite 104
Seattl, WA 98134
(206) 381-1128 Fax:(206)254-4279

ate 4/18/16
Page 2

Sample No.	Location	Material Description (color, size, use, substrate & layers)	Quantity
10854-67-21	Kitchen 162	Tan Sink Drain Putty (on center disposal unit of triple sink)	
" 22	" "	Black Formica Countertop w/ Yellow Mastic w/ Tan Mastic (on wood)	
" 23	" "	White Countertop Caulking	
" 24	" "	4" Tan Ceramic Cove Base w/ Tan Grout w/ Tan Mastic (on wood)	
" 25	Apparatus Bay 133	Red Brick w/ Gray Mortar	
" 26	Facilities Maintenance 131	Painted Gray CMU w/ Gray Mortar	
" 27	Mech. Mezzanine/Attic Area	Yellow Pipe Rope (on Natural Gas Line Fittings)	
" 28	" " "	Gray Duct Seam Sealant	
" 29	" " "	Old Remnant Hard Gray Caulking (on flashing caulking on brick wall)	
" 30	" " "	Old Remnant Black Asphaltic Tar/Sealant (on brick wall 1' thick vertically)	
" 31	" " "	Maroon Shotcrete Wall Paneling on Gray Concrete Material (Cold ext. wall)	
" 32	" " "	" " " " " " " " "	
" 33	" " "	" " " " " " " " "	
" 34	" " "	Black Coating on Gray CMU Walls (on behind shotcrete)	
" 35	" " "	" " " " " " " " "	
" 36	" " "	" " " " " " " " "	
" 37	" " "	Old (original) Brown Paper Vapor Barrier w/ Black Mastic on Fiberglass Batt Insulation	
" 38	" " "	Beige Pipe Rope (on sprinkler line fittings)	
" 39	" " "	Silver Foil on Brown Paper Vapor Barrier on Newer Pink Fiberglass Batt Insulation	
" 40	" " "	Red Fire Stop Pipe Penetration Putty	

Space Survey (Asbestos) 2016 [0491]

Project Number: 10854-010
Project Name: SK F&R - FS67
Location / Building: FS 67
Inspectors: R.P. & B.N.

EHS-INTERNATIONAL, INC.
1011 SW Klickitat Way, Suite 104
Seattle, WA 98134
(206) 381-1128 Fax:(206)254-4279

Date 4/18/16

Sample No.	Location	Material Description (color, size, use, substrate & layers)	Quantity
10854-67-41	Mech. Mezzanine / Attic Area	Black Flex Duct	
" 42	Roof	Black Asphaltic Felt Vapor Barrier w/ Black Asphaltic Tar (under metal roofing on wood decking)	
" 43	"	" " " " " " " " " " (")	
" 44	Restroom 127	2" White Ceramic Floor Tiles w/ Gray Grout w/ Off-White Mastic (on conc.)	
" 45	Mens 124	Black Rubber Sink Drain Gasket w/ Brown Putty (on ceramic restroom sinks)	
" 46	Roof	Green Paint on Silver Foil on Black Asphaltic Tar (on 3'x3' Roof Hatch)	1 EA
" 47	"	Green/Gray Flashing Caulking (" " " ")	↑
" 48	"	Light Gray/White Sealant Flashing Caulking (1'x1' Roof Fasteners Attachment)	10 EA
" 49	"	Dark Coating on White Seam/Edge Caulking (6" circular pen for roof attachment)	7 EA
" 50	"	Dark Brown/Gray Seam/Edge Sealant (1'x1' - 2'x3' square base Circular hood vents)	15 EA
" 51	"	Dark Brown/Gray Seam/Edge Sealant on Light Gray Seam/Edge Caulking (6"-12" circular pipe vents & 6" plastic pipes)	EA
" 52	"	White Caulking w/ Black Paint (")	↑
" 53	"	Dark Brown/Gray Seam/Edge Sealant w/ Black Asphaltic Sealant (2'x2' square base w/ 2"-8" pipe vent)	EA
" 54	"	Light Gray/White Seam/Edge Caulking (2'x2' " " w/ Plastic Pipe vent)	1 EA
" 55	Mech. Mezzanine / Attic Area	Silver Foil w/ Black Mastic w/ Brown Paper Vapor Barrier on Fiberglass Batt Insulation (Between Aggregate Base & Concrete Slab)	
" 56	" " "	5/8 on Green GWB Paper on GWB Wall (No Sheen/Unpainted)	
~~" 57~~			
~~" 58~~			
~~" 59~~			
~~" 60~~			

20161049

SEATTLE ASBESTOS TEST, LLC

Lynnwood Lab: 19711 Scriber Lake Road, Suite D, WA 98036, Tel:425.673.9850, Fax:425.673.9810
Bellevue Lab: 12727 Northup Way, Suite 1, Bellevue, WA 98005, Tel:425.861.1111, Fax:425.861.1118
Email: admin@seattleasbestostest.com, Website: www.seattleasbestostest.com

Analyzing Quality

CHAIN OF CUSTODY

- [x] Bulk Asbestos
- [ ] 1 Hour
- [ ] Point Count 400
- [ ] 2 Hours
- [ ] Point Count 1000
- [ ] Same day (4 to 6 Hrs.)
- [ ] Point Count Gravimetric
- [ ] 1 Day
- [x] Other (Specify) 5 Days

EHS International, Inc.

1011 SW Klickitat Way, Suite 104, Seattle, WA 98134 Tel: (206) 381-1128 Fax: (206) 254-4279

Number of Samples 56 PO# 10854-01D Project Location South King Fire & Rescue - Fire Station 67

Project Manager (Check one or more):

[ ]	Brett Racine	206.940.2236	brettr@ehsintl.com	[ ]	Cameron Peacock	206.818.4168	cameronp@ehsintl.com
[ ]	Clinton Holzhauer	425.766.5697	clintonh@ehsintl.com	[x]	Derica Escamilla	425.638.3757	dericae@ehsintl.com
[ ]	Herb Brod	425.766.1546	herbb@ehsintl.com	[ ]	Kurt Easthouse	425.922.9230	kurte@ehsintl.com
[ ]	Lisa Kollasch	425.999.7886	lisak@ehsintl.com	[ ]	Nadir Khan	425.471.2166	nadirk@ehsintl.com
[x]	Rory Peterson	425.766.8342	roryp@ehsintl.com	[ ]			

SEQ#	CLIENT SAMPLE #	SAMPLE DESCRIPTION	LOCATION	NOTES
1	10854-67-01			
2				
3				
4				
5				
6		See		
7				
8				
9		Data		
10				
11				
12		Sheets		
13				
14				
15				
16				
17				
18				
19				
20	10854-67-56			

	Print Name	Signature	Company	Date	Time
Sampled:	Rory Peterson		EHS International, Inc.	4/18/16	7:30 - 15:00
Relinquished:	Blaine Nesbit		EHS International, Inc.	4/19/16	4:40 pm
Delivered:			EHS International, Inc.		
Received:	Cassie H		Seattle Asbestos Test	4/19/16	16:40
Analyzed:	Cassie Hwang		Seattle Asbestos Test	4/20/16	15:03
Reported:			Seattle Asbestos Test		

Seattle Asbestos Test warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted and disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. Seattle Asbestos Test accepts no legal responsibility for the purpose for which the client uses the test results. By signing on this form, the clients agree to relieve Seattle Asbestos Test of any liability that may arise from the test results. It is the client's responsibility to make sure the samples are appropriately taken according to federal and local regulations. Invoices paid late may be charged of interest, and invoices go to collection may be charged 17% to 25% of collection fee. NSF checks will be charged of $50.

Results reporting method: [ ] Phone [ ] Fax [x] Email [ ] Pick-up

[x] Composite all wallboard samples [ ] Text result to phone [ ] Point count ..... % or less asbestos

April 22, 2016

Rory Peterson
EHS International
1011 SW Klickitat Way. Suite 104
Seattle, WA 98134

RE: Bulk Asbestos Fiber Analysis; NVL Batch # 1608214.00

Client Project: 10854-01D
Location: South King Fire and Rescue Fire Station 67

Dear Mr. Peterson,

Enclosed please find test results for the 3 sample(s) submitted to our laboratory for analysis on 4/18/2016.

Examination of these samples was conducted for the presence of identifiable asbestos fibers using polarized light microscopy (PLM) with dispersion staining in accordance with both **EPA 600/M4-82-020**, Interim Method for the Determination of Asbestos in Bulk Insulation Samples and **EPA 600/R-93/116** Method for the Determination of Asbestos in Bulk Building Materials.

For samples containing more than one separable layer of materials, the report will include findings for each layer (labeled Layer 1 and Layer 2, etc. for each individual layer). The asbestos concentration in the sample is determined by calibrated visual estimation.

For those samples with asbestos concentrations between 1 and 10 percent based on visual estimation, the EPA recommends a procedure known as point counting (NESHAPS, 40 CFR Part 61). Point counting is a statistically more accurate means of quantification for samples with low concentrations of asbestos.

The detection limit for the calibrated visual estimation is <1%, 400 point counts is 0.25% and 1000 point counts is 0.1%

Samples are archived for two weeks following analysis. Samples that are not retrieved by the client are discarded after two weeks.

Thank you for using our laboratory services. Please do not hesitate to call if there is anything further we can assist you with.

Sincerely,



Nick Ly, Technical Director

Enc.: Sample Results

Lab Code: 102063-0

1.888.NVL.LABS
1.888.(685.5227)
www.nvllabs.com

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
p 206.547.0100 | f 206.634.1936

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
p 206.547.0100 | f 206.634.1936 | www.nvllabs.com

Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: EHS International
Address: 1011 SW Klickitat Way. Suite 104
Seattle, WA 98134

Attention: Mr. Rory Peterson
Project Location: South King Fire and Rescue Fire Station 67

Batch #: 1608214.00
Client Project #: 10854-01D
Date Received: 4/18/2016
Samples Received: 3
Samples Analyzed: 3
Method: EPA/600/R-93/116 & EPA/600/M4-82-020

Lab ID: 16205740 **Client Sample #: 10854-67-21QA**
Location: South King Fire and Rescue Fire Station 67

Layer 1 of 1 **Description:** Tan soft putty material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Putty Compound, Calcareous particles	Glass fibers 4%	**None Detected ND**

Lab ID: 16205741 **Client Sample #: 10854-67-29QA**
Location: South King Fire and Rescue Fire Station 67

Layer 1 of 2 **Description:** Gray hard caulking material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Caulking compound	Talc fibers 2%	**None Detected ND**
	Cellulose 1%	

Layer 2 of 2 **Description:** Trace brown brittle material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Ceramic/Binder, Binder/Filler	None Detected ND	**None Detected ND**

Lab ID: 16205742 **Client Sample #: 10854-67-42QA**
Location: South King Fire and Rescue Fire Station 67

Layer 1 of 1 **Description:** Black asphaltic fibrous felt with asphaltic tar

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Asphalt/Binder, Binder/Filler	Cellulose 70%	**None Detected ND**
	Synthetic fibers 3%	

Sampled by: Client
Analyzed by: Lori Tseng **Date:** 04/21/2016
Reviewed by: Nick Ly **Date:** 04/22/2016



Nick Ly, Technical Director

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and 600/M4-82-020 Methods with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
p 206.547.0100 | f 206.634.1936 | www.nvllabs.com

ASBESTOS LABORATORY SERVICES

Company EHS International
Address 1011 SW Klickitat Way. Suite 104
Seattle, WA 98134
Project Manager Mr. Rory Peterson
Phone (206) 381-1128
Cell (425) 766-8342

NVL Batch Number **1608214.00**
TAT 5 Days **AH** No
Rush TAT
Due Date 4/25/2016 **Time** 4:30 PM
Email roryp@ehsintl.com
Fax (206) 254-4279

Project Name/Number: 10854-01D **Project Location:** South King Fire and Rescue Fire Station 67

Subcategory PLM Bulk
Item Code ASB-02 EPA 600/R-93-116 Asbestos by PLM <bulk>

Total Number of Samples 3 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	16205740	10854-67-21QA		A
2	16205741	10854-67-29QA		A
3	16205742	10854-67-42QA		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Justin Shearer		NVL	4/18/16	1630
Analyzed by	Lori Tseng		NVL	4/21/16	11:19 AM
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 4/18/2016
Time: 4:55 PM
Entered By: Fatima Khan

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
Tel: 206.547.0100 Emerg.Pager: 206.344.1878
Fax: 206.634.1936 1.888.NVL.LABS (685.5227)

CHAIN of CUSTODY SAMPLE LOG

1608214

Client EHS International, Inc.
Street 1011 SW Klickitat Way
Suite 104
Seattle, WA 98134
Project Manager Rory Peterson
Project Location South King Fire & Rescue – Fire Station 67

NVL Batch Number
Client Job Number 10854-01D
Total Samples 3
Turn Around Time ☐ 1-Hr ☐ 24-Hrs ☐ 4 Days ☐ 2-Hrs ☐ 2 Days ■ 5 Days ☐ 4-Hrs ☐ 3 Days ☐ 6 to 10 Days
Please call for TAT less than 24 Hrs
Email address rory.p@ehsintl.com

Phone: (206) 381-1128 **Fax:** (206) 254-4279

☐ **Asbestos Air**	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II)	☐ Other
■ **Asbestos Bulk**	■ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM Bulk	
☐ **Mold/Fungus**	☐ Mold Air	☐ Mold Bulk	☐ **Rotometer Calibration**		

METALS	**Inst./Det Limit**	**Matrix**		**RCRA Metals** ☐ All 8		**Other Metals** ☐ **All 3**
☐ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in cm	☐ Arsenic (As)	☐ Mercury (Hg)	☐ Copper (Cu)
☐ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Waste Water	☐ Barium (Ba)	☐ Selenium (Se)	☐ Nickel (Ni)
	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Other	☐ Cadmium (Cd)	☐ Silver (Ag)	☐ Zinc (Zn)
		☐ Soil		☐ Chromium (Cr)		
		☐ Paint Chips in %		☐ Lead (Pb)		

☐ **Other Types of Analysis**	☐ Fiberglass ☐ Silica	☐ Nuisance Dust ☐ Respirable Dust	☐ Other (Specify)	

Condition of Package: ■ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample area, Sample Volume, etc)	A/R
1		10854-67-21 QA	Tan Sink Drain Putty	
2		10854-67-29 QA	Hard Gray Caulking	
3		10854-67-42 QA	Black Asphaltic Felt Vapor Barrier w/ Black Asphaltic Tar	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Rory Peterson		EHSI	4/18/16	7:30 - 15:00
Relinquished by	Blaine Nesbit		EHSI	4/18/16	9:30pm
Received by	S. Shearer		NVL	4-18-16	1630
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

Please e-mail results.

APPENDIX B

Lead and Arsenic Laboratory Reports and Field Data Forms

April 21, 2016

Rory Peterson
EHS International
1011 SW Klickitat Way. Suite 104
Seattle, WA 98134

NVL LABS
INDUSTRIAL HYGIENE SERVICES
Laboratory | Management | Training

RE: Metals Analysis; NVL Batch # 1608216.00

Dear Mr. Peterson,

Enclosed please find the test results for samples submitted to our laboratory for analysis. Preparation of these samples was conducted following protocol outlined in EPA Method SW 846 -3051 unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with U.S. EPA, NIOSH, OSHA and other ASTM methods.

For matrix materials submitted as paint, dust wipe, soil or TCLP samples, analysis for the presence of total metals is conducted using published U.S. EPA Methods. Paint and soil results are usually expressed in mg/Kg which is equivalent to parts per million (ppm). Lead (Pb) in paint is usually expressed in mg/Kg (ppm) , Percent (%) or mg/cm^2 by area. Dust wipe sample results are usually expressed in ug/wipe and ug/ft^2. TCLP samples are reported in mg/L (ppm). For air filter samples, analyses are conducted using NIOSH and OSHA Methods. Results are expressed in ug/filter and ug/m^3. Other matrix materials are analyzed accordingly using published methods or specified by client. The reported test results pertain only to items tested and are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more details.

This report is considered highly confidential and will not be released without your approval. Samples are archived for two weeks following analysis. Samples that are not retrieved by the client are discarded after two weeks.

Thank you for using our laboratory services. if you need further assistance please feel free to call us at 206-547-0100 or 1-888-NVLLABS.

Sincerely,

Nick Ly, Technical Director

ilac-MRA
AIHA LAP, LLC
ACCREDITED LABORATORY
INDUSTRIAL HYGIENE & ENVIRONMENTAL LEAD
ISO/IEC 17025:2005
LAB # 101861

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
p 206.547.0100 | f 206.634.1936 | www.nvllabs.com

Analysis Report

Total Lead (Pb)

Client: EHS International
Address: 1011 SW Klickitat Way. Suite 104
Seattle, WA 98134

Attention: **Mr. Rory Peterson**
Project Location: South King Fire and Rescue Fire Station 67

Batch #: 1608216.00
Matrix: Paint
Method: EPA 3051/7000B
Client Project #: 10854-01D
Date Received: 4/18/2016
Samples Received: 4
Samples Analyzed: 4

Lab ID	Client Sample #	Sample Weight (g)	RL in mg/Kg	Results in mg/Kg	Results in percent
16205743	10854-67-Pb01	0.2789	36.0	< 36.0	<0.0036
16205744	10854-67-Pb02	0.2732	37.0	730.0	0.0730
16205745	10854-67-Pb03	0.1923	52.0	< 52.0	<0.0052
16205746	10854-67-Pb04	0.1439	69.0	3800.0	0.3800

Sampled by: Client
Analyzed by: Yasuyuki Hida
Reviewed by: Nick Ly

Date Analyzed: 04/21/2016
Date Issued: 04/21/2016

Nick Ly, Technical Director

mg/ Kg =Milligrams per kilogram
Percent = Milligrams per kilogram / 10000
Note : Method QC results are acceptable unless stated otherwise.
Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

RL = Reporting Limit
'<' = Below the reporting Limit

Bench Run No: 2016-0421-01

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
p 206.547.0100 | f 206.634.1936 | www.nvllabs.com

LEAD LABORATORY SERVICES

Company EHS International
Address 1011 SW Klickitat Way. Suite 104
Seattle, WA 98134
Project Manager Mr. Rory Peterson
Phone (206) 381-1128
Cell (425) 766-8342

NVL Batch Number **1608216.00**
TAT 5 Days **AH** No
Rush TAT
Due Date 4/25/2016 **Time** 4:30 PM
Email roryp@ehsintl.com
Fax (206) 254-4279

Project Name/Number: 10854-01D **Project Location:** South King Fire and Rescue Fire Station 67

Subcategory Flame AA (FAA)
Item Code FAA-02 EPA 7000B Lead by FAA <paint>

Total Number of Samples 4 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	16205743	10854-67-Pb01		A
2	16205744	10854-67-Pb02		A
3	16205745	10854-67-Pb03		A
4	16205746	10854-67-Pb04		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Justin Shearer		NVL	4/18/16	1630
Analyzed by	Yasuyuki Hida		NVL	4/21/16	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 4/18/2016
Time: 4:57 PM
Entered By: Fatima Khan

1608216

Lead/[redacted] Survey Form

Project Number: 10854-01D
Project Name: South King Fire & Rescue - Fire Station 67
Location/Building: FS 67
Inspectors: Rory Peterson & Blaine Nesbit

Date: 4/18/16
Page: 1 of 1

EHS-INTERNATIONAL, INC.
1011 SW Klickitat Way, Suite 104
Seattle, WA 98134
(206) 381-1128 Fax:(206)254-4279

Sample #	Building	Floor / Space Name	Componant	Substrate	Color	Quantity (if applicable)	Condition/Comments
10854-67-PB01	FS 67	1st Floor / Apparatus Bay 133	Wall	Brick & Mortar	Red & Gray		Fair
10854-67-PB02	" "	" " / Facilities Maintenance 131	Wall	CMU & Mortar	Gray & Gray		Fair
10854-67-PB03	" "	" " / Stor. 123	Wall	GWB	White		Fair
10854-67-PB04	" "	" " / Apparatus Bay 133	Support Beam	Metal	Brown on Red		Fair

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
Tel: 206.547.0100 Emerg.Pager: 206.344.1878
Fax: 206.634.1936 1.888.NVL.LABS (685.5227)

CHAIN of CUSTODY SAMPLE LOG

1608216

Client EHS International, Inc.
Street 1011 SW Klickitat Way
Suite 104
Seattle, WA 98134
Project Manager Rory Peterson
Project Location South King Fire + Rescue - Fire Station 67

NVL Batch Number
Client Job Number 10854-01D
Total Samples 4
Turn Around Time ☐ 1-Hr ☐ 24-Hrs ☐ 4 Days ☒ 5 Days ☐ 2-Hrs ☐ 2 Days ☐ 3 Days ☐ 6 to 10 Days ☐ 4-Hrs
Please call for TAT less than 24 Hrs
Email address RoryP @ehsintl.com

Phone: (206) 381-1128 **Fax:** (206) 254-4279

☐ **Asbestos Air**	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II)	☐ Other
☐ **Asbestos Bulk**	☐ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM Bulk	
☐ **Mold/Fungus**	☐ Mold Air	☐ Mold Bulk	☐ **Rotometer Calibration**		

METALS	**Inst./Det Limit**	**Matrix**		**RCRA Metals** ☐ All 8		**Other Metals**
☒ Total Metals ☐ TCLP	☒ FAA (ppm) ☐ ICP (ppm) ☐ GFAA (ppb)	☐ Air Filter ☐ Drinking water ☐ Dust/wipe (Area) ☐ Soil ☐ Paint Chips in %	☐ Paint Chips in cm ☐ Waste Water ☒ Other Bulk	☐ Arsenic (As) ☐ Barium (Ba) ☐ Cadmium (Cd) ☐ Chromium (Cr) ☒ Lead (Pb)	☐ Mercury (Hg) ☐ Selenium (Se) ☐ Silver (Ag)	☐ All 3 ☐ Copper (Cu) ☐ Nickel (Ni) ☐ Zinc (Zn)

☐ **Other Types of Analysis**	☐ Fiberglass ☐ Silica	☐ Nuisance Dust ☐ Respirable Dust	☐ Other (Specify)	

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample area, Sample Volume, etc)	A/R
1		10854-67-Pb01		
2		↓	Please See Data Sheet	
3				
4		" - " -Pb04		
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Rory Peterson		EHSI	4/18/16	7:30 - 1500
Relinquished by	Blaine Nesbit		EHSI	4/18/16	4:30pm
Received by	E. Sheever		NVL	4-18-16	1630
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

Please e-mail results.

April 21, 2016

Rory Peterson
EHS International
1011 SW Klickitat Way. Suite 104
Seattle, WA 98134

NVL LABS
INDUSTRIAL HYGIENE SERVICES
Laboratory | Management | Training

RE: Metals Analysis; NVL Batch # 1608213.00

Dear Mr. Peterson,

Enclosed please find the test results for samples submitted to our laboratory for analysis. Preparation of these samples was conducted following protocol outlined in EPA Method SW 846 -3051 unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with U.S. EPA, NIOSH, OSHA and other ASTM methods.

For matrix materials submitted as paint, dust wipe, soil or TCLP samples, analysis for the presence of total metals is conducted using published U.S. EPA Methods. Paint and soil results are usually expressed in mg/Kg which is equivalent to parts per million (ppm). Lead (Pb) in paint is usually expressed in mg/Kg (ppm) , Percent (%) or mg/cm^2 by area. Dust wipe sample results are usually expressed in ug/wipe and ug/ft^2. TCLP samples are reported in mg/L (ppm). For air filter samples, analyses are conducted using NIOSH and OSHA Methods. Results are expressed in ug/filter and ug/m^3. Other matrix materials are analyzed accordingly using published methods or specified by client. The reported test results pertain only to items tested and are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more details.

This report is considered highly confidential and will not be released without your approval. Samples are archived for two weeks following analysis. Samples that are not retrieved by the client are discarded after two weeks.

Thank you for using our laboratory services. if you need further assistance please feel free to call us at 206-547-0100 or 1-888-NVLLABS.

Sincerely,

Nick Ly, Technical Director

ilac-MRA
AIHA LAP, LLC
ACCREDITED LABORATORY
INDUSTRIAL HYGIENE & ENVIRONMENTAL LEAD
ISO/IEC 17025:2005
LAB # 101861

1.888.NVL.LABS
1.888.(685.5227)
www.nvllabs.com

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
p 206.547.0100 | f 206.634.1936

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
p 206.547.0100 | f 206.634.1936 | www.nvllabs.com

Analysis Report

Total Metals

Client: EHS International
Address: 1011 SW Klickitat Way. Suite 104
Seattle, WA 98134

Attention: **Mr. Rory Peterson**
Project Location: South King Fire and Rescue Fire Station 67

Batch #: 1608213.00
Matrix: Bulk
Method: EPA 3051/6010C
Client Project #: 10854-01D
Date Received: 4/18/2016
Samples Received: 2
Samples Analyzed: 2

Lab ID	Client Sample #	Elements	Sample wt (g)	RL mg / kg	Results in mg / kg	Results in ppm
16205738	10854-67-As01	Arsenic (As)	0.2094	19.0	< 19.0	< 19.0
16205739	10854-67-As02	Arsenic (As)	0.2008	20.0	38.0	38.0

Sampled by: Client
Analyzed by: Shalini Patel
Reviewed by: Nick Ly

Date Analyzed: 04/20/2016
Date Issued: 04/21/2016

Nick Ly, Technical Director

mg/ kg = Milligrams per kilogram
ppm = Parts per million

RL = Reporting Limit
'<' = Below the reporting Limit

Note : Method QC results are acceptable unless stated otherwise.
Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

Bench Run No: 2016-0420-02

NVL Laboratories, Inc.
4708 Aurora Ave N, Seattle, WA 98103
p 206.547.0100 | f 206.634.1936 | www.nvllabs.com

METAL LABORATORY SERVICES

Company EHS International
Address 1011 SW Klickitat Way. Suite 104
Seattle, WA 98134
Project Manager Mr. Rory Peterson
Phone (206) 381-1128
Cell (425) 766-8342

NVL Batch Number **1608213.00**
TAT 5 Days **AH** No
Rush TAT
Due Date 4/25/2016 **Time** 4:30 PM
Email roryp@ehsintl.com
Fax (206) 254-4279

Project Name/Number: 10854-01D **Project Location:** South King Fire and Rescue Fire Station 67

Subcategory Inductively Coupled Plasma (ICP) - Group Tests
Item Code ICP-M2 EPA 6010B (price per analyte) <paint>
Metals Arsenic (As)

Total Number of Samples 2 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	16205738	10854-67-As01		A
2	16205739	10854-67-As02		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Justin Shearer		NVL	4/18/16	1630
Analyzed by	Shalini Patel		NVL	4/20/16	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 4/18/2016
Time: 4:51 PM
Entered By: Fatima Khan

1608213

[redacted]/Arsenic Survey Form

Project Number: 10854-01D

Project Name: South King Fire & Rescue - Fire Station 67

Location/Building FS 67

Inspectors: Rory. Peterson & Blaine Nesbit

Date: 4/18/16

Page: 1 of 1

EHS-INTERNATIONAL, INC.

1011 SW Klickitat Way, Suite 104

Seattle, WA 98134

(206) 381-1128 Fax:(206)254-4279

Sample #	Building	Floor / Space Name	Componant	Substrate	Color	Quantity (If applicable)	Condition/Comments
10854-67-AS01	FS 67	1st Floor / Apparatus Bay 133	Brick & Mortar	Wall	Red & Gray		Fair
10854-67-AS02	" "	" " / Facilities Maintenance 131	CMU & Mortar	"	Gray & Gray		Fair

NVL Laboratories, Inc.

4708 Aurora Ave N, Seattle, WA 98103
Tel: 206.547.0100 Emerg.Pager: 206.344.1878
Fax: 206.634.1936 1.888.NVL.LABS (685.5227)

CHAIN of CUSTODY SAMPLE LOG

1608213

Client EHS International, Inc.
Street 1011 SW Klickitat Way
Suite 104
Seattle, WA 98134
Project Manager Rory Peterson
Project Location South King Fire + Rescue - Firestation 67

NVL Batch Number
Client Job Number 10854-01D
Total Samples 2
Turn Around Time ☐ 1-Hr ☐ 24-Hrs ☐ 4 Days ☐ 2-Hrs ☐ 2 Days ☒ 5 Days ☐ 4-Hrs ☐ 3 Days ☐ 6 to 10 Days
Please call for TAT less than 24 Hrs

Email address RoryP @ehsintl.com

Phone: (206) 381-1128 **Fax:** (206) 254-4279

☐ **Asbestos Air**	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II)	☐ Other	
☐ **Asbestos Bulk**	☐ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM Bulk		
☐ **Mold/Fungus**	☐ Mold Air	☐ Mold Bulk	☐ **Rotometer Calibration**			

METALS	**Inst./Det Limit**	**Matrix**		**RCRA Metals** ☐ All 8		**Other Metals**
☒ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in cm	☒ Arsenic (As)	☐ Mercury (Hg)	☐ All 3
☐ TCLP	☒ ICP (ppm)	☐ Drinking water	☐ Waste Water	☐ Barium (Ba)	☐ Selenium (Se)	☐ Copper (Cu)
	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Other	☐ Cadmium (Cd)	☐ Silver (Ag)	☐ Nickel (Ni)
		☐ Soil		☐ Chromium (Cr)		☐ Zinc (Zn)
		☐ Paint Chips in %		☐ Lead (Pb)		

☐ **Other Types of Analysis** ☐ Fiberglass ☐ Nuisance Dust ☐ Other (Specify) _____
☐ Silica ☐ Respirable Dust

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample area, Sample Volume, etc)	A/R
1		10854-67-Aso1	Please See Data Sheet	
2		" " Aso2		
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Rory Peterson		EHSI	4/18/16	7:30-1500
Relinquished by	Blaine Nesbit		EHSI	4/18/16	9:30pm
Received by	S-Stewart		NVL	4-18-16	1630
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

Please e-mail results.

APPENDIX C

Certified AHERA Building Inspector Certificates

Certificate of Training

EHS - International, Inc. certifies that

Rory Peterson

has successfully completed the
4-Hour AHERA Building Inspector Refresher Training
in accordance with
40 CFR 763, Subpart E, Appendix C
on this 28th day of July August in Seattle, WA
Expires July 28, 2016

Training Administrator Derica Escamilla

July 28, 2015
Class Date

2015-07-28-02
Student Number

EHS–International, Inc.

1011 SW Klickitat Way, Suite 104 □ Seattle, Washington 98134
(206) 381-1128 Phone □ (206) 254-4279 Fax

Certificate of Completion

This is to certify that

Blaine O. Nesbit

has satisfactorily completed
24 hours of training as an

Asbestos Building Inspector

to comply with the training requirements of
TSCA Title II / 40 CFR 763 (AHERA)

153688
Certificate #

Instructor
EPA Provider Certificate #1085

ARGUS PACIFIC
TRAINING • CONSULTING
A Terracon COMPANY

Nov 2 - 4, 2015
Date(s) of Training
Exam Score: 88%
Expiration Date: Nov 3, 2016

ARGUS PACIFIC, INC. • 1900 W NICKERSON ST, SUITE 315 • SEATTLE, WASHINGTON • 98119 • 206.285.3373 • WWW.ARGUSPACIFIC.COM

APPENDIX D

Laboratory Certifications for Asbestos, Lead, and Arsenic Analysis

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

NVL Laboratories, Inc.

4708 Aurora Avenue N., Seattle, WA 98103

Laboratory ID: 101861

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

✓	**INDUSTRIAL HYGIENE**	Accreditation Expires: 05/01/2017
✓	**ENVIRONMENTAL LEAD**	Accreditation Expires: 05/01/2017
✓	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: 05/01/2017
☐	**FOOD**	Accreditation Expires:
✓	**UNIQUE SCOPES**	Accreditation Expires: 05/01/2017

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Gerald R Schultz

Gerald Schultz, CIH
Chairperson, Analytical Accreditation Board

Cheryl O. Morton

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision 14: 03/26/2014

Date Issued: 04/30/2015

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 102063-0

NVL Laboratories, Inc.

Seattle, WA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2015-09-25 through 2016-09-30

Effective Dates

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

For the National Voluntary Laboratory Accreditation Program

NVLAP® National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

NVL Laboratories, Inc.
4708 Aurora Avenue N.
Seattle, WA 98103
Mr. Nghiep Vi Ly
Phone: 206-547-0100 Fax: 206-634-1936
Email: nick.l@nvllabs.com
http://www.nvllabs.com

ASBESTOS FIBER ANALYSIS

NVLAP LAB CODE 102063-0

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA 600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

For the National Voluntary Laboratory Accreditation Program

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 201057-0

Seattle Asbestos Test Seattle
Seattle, WA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2015-06-30 through 2016-06-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

The State of Washington Department of Ecology

NVL Laboratories, Inc.
Seattle, WA

has complied with provisions set forth in Chapter 173-50 WAC and is hereby recognized by the Department of Ecology as an ACCREDITED LABORATORY for the analytical parameters listed on the accompanying Scope of Accreditation. This certificate is effective July 18, 2015 and shall expire July 17, 2016.

Witnessed under my hand on June 30, 2015

Alan D. Rue
Lab Accreditation Unit Supervisor

Laboratory ID
C797

WASHINGTON STATE DEPARTMENT OF ECOLOGY

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

SCOPE OF ACCREDITATION

NVL Laboratories, Inc.

Seattle, WA

is accredited for the analytes listed below using the methods indicated. Full accreditation is granted unless stated otherwise in a note. Accreditation for U.S. Environmental Protection Agency (EPA) "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) is for the latest version of the method. SM refers to EPA approved editions of "Standard Methods for the Examination of Water and Wastewater." ASTM is the American Society for Testing and Materials. Other references are described in notes.

Matrix/Analyte	Method	Notes
Drinking Water		
Copper	EPA 200.9 Rev 2.2 (1994)	
Lead	EPA 200.9 Rev 2.2 (1994)	
Solid and Chemical Materials		
Arsenic	EPA 6010C_(2/07)	
Barium	EPA 6010C_(2/07)	
Cadmium	EPA 6010C_(2/07)	
Chromium	EPA 6010C_(2/07)	
Copper	EPA 6010C_(2/07)	
Lead	EPA 6010C_(2/07)	
Nickel	EPA 6010C_(2/07)	
Selenium	EPA 6010C_(2/07)	
Silver	EPA 6010C_(2/07)	
Zinc	EPA 6010C_(2/07)	
Mercury	EPA 7471B_(1/98)	
Aroclor-1016 (PCB-1016)	EPA 8082A_(2/07)	1
Aroclor-1221 (PCB-1221)	EPA 8082A_(2/07)	1
Aroclor-1232 (PCB-1232)	EPA 8082A_(2/07)	1
Aroclor-1242 (PCB-1242)	EPA 8082A_(2/07)	1
Aroclor-1248 (PCB-1248)	EPA 8082A_(2/07)	1
Aroclor-1254 (PCB-1254)	EPA 8082A_(2/07)	1

Matrix/Analyte	Method	Notes
Aroclor-1260 (PCB-1260)	EPA 8082A_(2/07)	1

Accredited Parameter Note Detail

(1) Interim accreditation pending the successful completion of an on-site audit to verify method capabilities (WAC 173-50-100).



06/30/2015

Authentication Signature
Alan D. Rue, Lab Accreditation Unit Supervisor

Date

APPENDIX E

Sample Location Drawings for Asbestos, Lead, and Arsenic

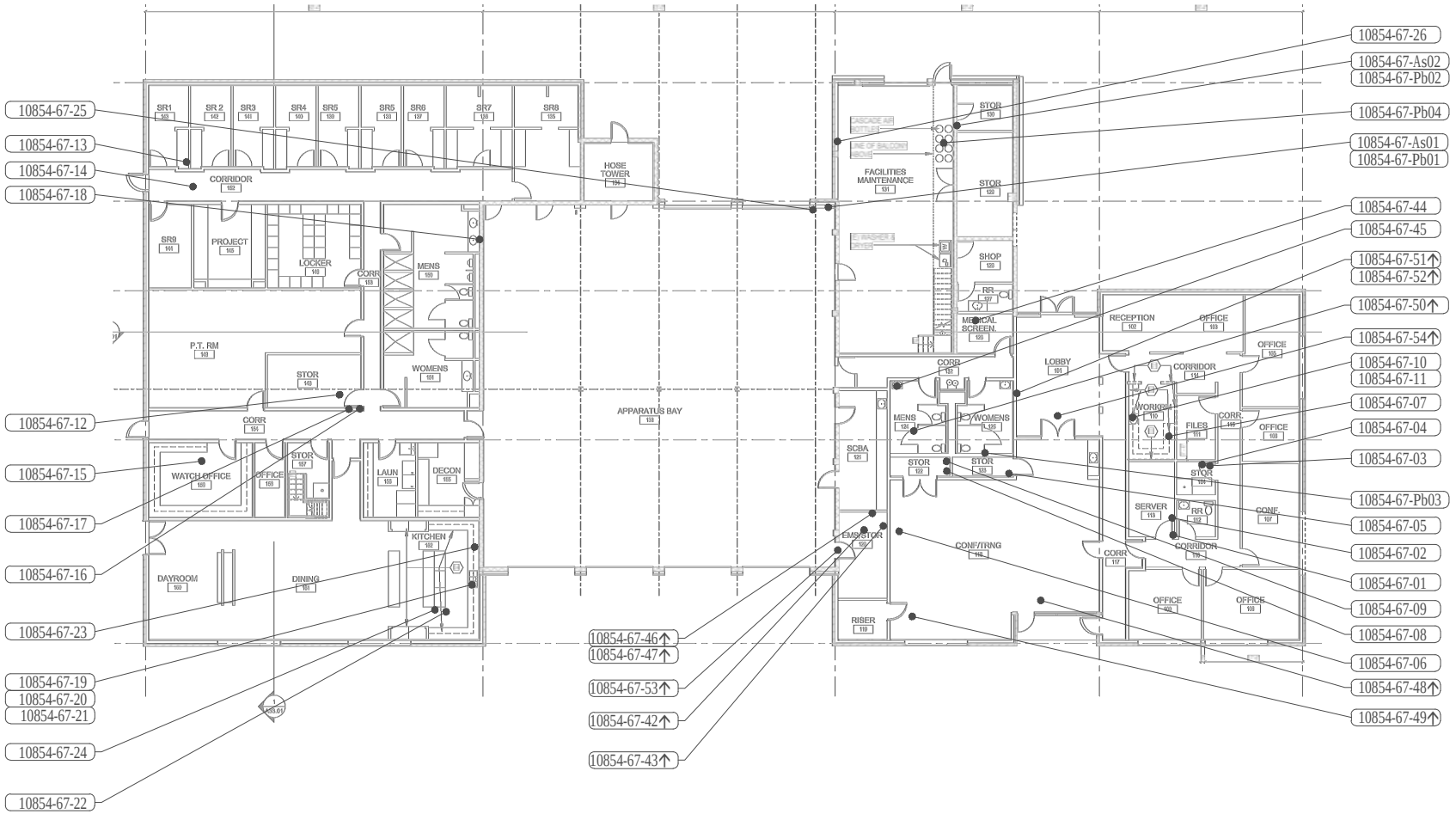
GENERAL NOTES

1. DRAWING IS SCHEMATIC AND SAMPLE LOCATIONS ARE APPROXIMATE.
2. REFER TO REPORT FOR MORE INFORMATION ABOUT THE SAMPLED MATERIALS.

SAMPLE LEGEND

10854-67-XX↑	SAMPLE TAKEN AT ROOF
10854-67-XX	BULK ASBESTOS SAMPLE LOCATIONS
10854-67-AsXX	BULK ARSENIC SAMPLE LOCATIONS
10854-67-PbXX	BULK LEAD SAMPLE LOCATIONS

SAMPLE NUMBER
JOB NUMBER



MAIN FLOOR PLAN

NOT TO SCALE

PROJECT NORTH

ehsi
EHS–International, Inc.
1011 SW Klickitat Way, Suite 104
Seattle, Washington 98134
Ph: 206.381.1128
Fax: 206.254.4279

SOUTH KING COUNTY FIRE DEPARTMENT

STATION 67 ASSESSMENT
2238 S 223rd ST
DES MOINES, WA

PROJECT MANAGER: R PETERSON
INSPECTORS: R PETERSON, B NESBIT
SURVEY DATES: 4/18/16
EHSI PROJECT #: 10854–67–01
DRAWN BY: DIMALANTA
SCALE: NTS
ISSUE DATE: 5/5/16

MAIN FLOOR PLAN

SL-1

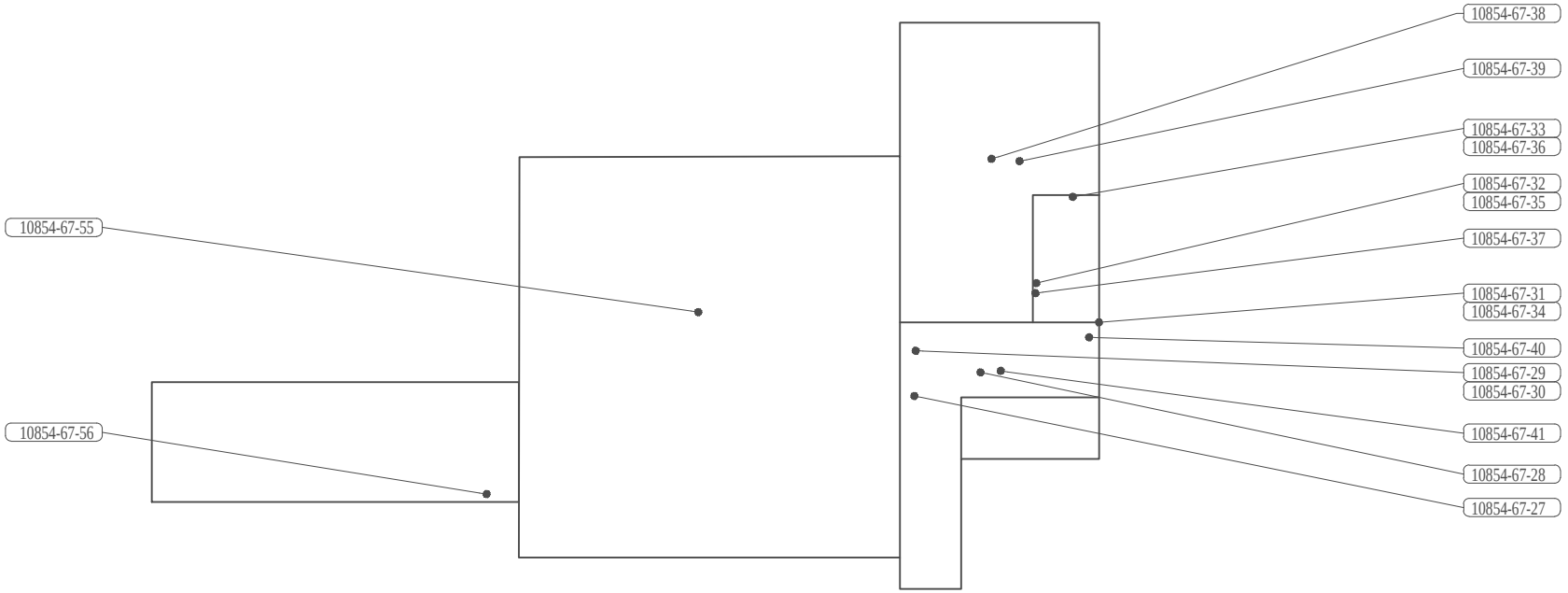
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SAMPLE NUMBER
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MECHANICAL/ATTIC AREAS (MEZZANINE)

NOT TO SCALE

PROJECT NORTH

ehsi
EHS-International, Inc.
1011 SW Klickitat Way, Suite 104
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MECHANICAL/ATTIC AREAS (MEZZANINE)

SL-2

SECTION 004113 BID FORM

TO: **South King Fire and Rescue**

ADDRESS: 2238 S 223rd Street, Des Moines, WA 98198

I have received Bid Documents titled "**Facility Improvements Station 67**", dated **November 22, 2016**.

I have received Addenda Nos._____ and have included their provisions in my Bid.

I have examined both Documents and the site/job conditions, and submit the following Bid.

In submitting this Bid, I agree:

1. To hold my bid open in accordance with referenced Instruction to Bidders, as modified and supplemented.

2. To enter into and execute referenced Contract, if awarded, on basis of this bid and to furnish bonds and insurance required by Bidding Documents.

3. To accomplish the work in accordance with the Contract Documents.

4. To complete the work by the time stipulated in the Project Manual.

OVERHEAD, PROFIT, AND THE LIKE

All bid prices listed in this form include overhead, profit, bonds, and all other expenses involved.

SALES TAX

All bid prices listed in this Bid Form **DO NOT INCLUDE** applicable local and Washington State Sales Tax.

BID AMOUNT

I WILL CONSTRUCT THIS PROJECT FOR THE FOLLOWING PRICE:

Base Bid Price (Lump sum):

_____ DOLLARS

$_____

PRINCIPAL SUBCONTRACTORS
For any subcontract amount that exceeds 10% of the contractors base bid price, contractor shall list such subcontractor and subcontract amount below (affix addition sheets as necessary):

1) _____$_____

2) _____$_____

3) _____$_____

Provide the name of Subcontractor used for the following:

1) Heating_____

2) Ventilating & Air Conditioning _____

3) Plumbing _____

4) Electrical _____

CONTRACT TIME
The Owner anticipates Notice of Award of this contract on or about 30 days of bid receipt. Owner shall execute contract and issue Notice to Proceed upon satisfactory receipt of Certificate of Insurance, Bonds, and related documents as required by the Instructions to Bidders, the General Conditions of the Contract, and Supplemental Conditions.

If this Bid is accepted, we will Substantially Complete the work within **120** calendar days from Notice to Proceed.

THIS BID PROPOSAL SUBMITTED BY:

NAME OF FIRM_____

SIGNED BY_____TITLE_____

PRINTED NAME_____

ADDRESS_____

CITY/STATE/ZIP_____

TELEPHONE_____

DATE_____

NOTE:
If Bidder is a corporation write State of Incorporation, and if partnership, give full names and address of all partners below.

_____

_____

END OF SECTION

SECTION 005213 AGREEMENT FORM

PART 1 - GENERAL

1.1 FORM OF CONTRACT

The Standard *Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum*, AIA Document A101-2007, is included BY THIS REFERENCE ONLY; it is not bound in project manual. The Contractor and all subcontractors shall read and be governed by them.

1.2 AVAILABILITY

Copies may be obtained from American Institute of Architects, 1735 New York Avenue NW, Washington, D.C. 20006, or local Chapter offices.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 005213

SECTION 007213 – GENERAL CONDITIONS OF THE CONTRACT

PART 1 - GENERAL

1.1 STANDARD FORM

The General *Conditions of the Contract for Construction*, AIA Document A201-2007, is included as part of the Contract BY THIS REFERENCE ONLY; it is not bound in project manual. The Contractor and all subcontractors shall read and be governed by them.

1.2 AVAILABILITY

Copies may be obtained from American Institute of Architects, 1735 New York Avenue NW, Washington, D.C. 20006, or local Chapter offices.

1.3 CONFLICTS

In event of conflicts in the Contract Documents, including conflicts between referenced General Conditions and other parts of the Project Manual and Drawings, the Architect reserves the right to determine which governs, and in what order or precedence. See Article 3 of General Conditions and Division 00 Section “Supplemental Conditions”.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 007213

SECTION 007300 - SUPPLEMENTAL CONDITIONS

The following supplements modify, change, delete from, or add to the referenced "General Conditions of the Contract for Construction." Where any article of the General Conditions is Modified or any Paragraph, Subparagraph, or Clause is modified or deleted by Section 007300, the unaltered provisions of that Article, Paragraph, Subparagraph, or Clause remain in effect.
Modification to the General Conditions:

ARTICLE 1
CONTRACT DOCUMENTS

1.1.1 THE CONTRACT DOCUMENTS

Add the following new subparagraphs 1.1.1.1 and 1.1.1.2:

1.1.1.1 In the event of a conflict or discrepancy among or in the Contract Documents, interpretation shall be governed in the following priority:

1. Agreement (A-101)
2. Supplemental Conditions
3. General Conditions (A-201)
4. Addenda
5. Schedules
6. Drawings
7. Specifications
8. Instructions to Bidders and Accepted Bid

1.1.1.2 In the event of any inconsistencies, conflicts or ambiguities between the Contract Documents, or within an individual document not clarified by addendum, the resolution of such inconsistencies, conflict or ambiguity shall be provided in accordance with the Architect's interpretation. All conflicts are to be referred to the Architect for resolution and incorporation into a Contract Modification, if appropriate.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following new subparagraphs 1.2.1.1 and 1.2.1.2:

1.2.1.1 Such execution of the Contract also constitutes a representation by the Contractor that it can fully perform the Contract and deal with all issues arising out of the Contract Documents or conditions of the site of the Work for the Contract Amount. The failure of the Contractor fully to acquaint itself with any applicable condition or matter shall not in any way relieve the Contractor from the responsibility for performing the Work in accordance with the Contract Documents and within the Contract Time and the Contract Sum.

1.2.1.2 Contractor to make the following representation to Owner:

A. Contractor is financially solvent, able to pay its debts as they mature, and possesses sufficient working capital to complete the Work and perform Contractor's obligations required by the Contract Documents; and

B. Contractor is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform the obligations required by the Contract Documents and has sufficient experience and competence to do so.

ARTICLE 2
OWNER

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Delete subparagraph 2.2.5 and substitute the following:

2.2.5 The Contractor will be furnished free of charge 5 copies of Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

Add the following new subparagraphs 2.5 through 2.5.1:

2.5 OWNER'S RIGHT AND RESPONSIBILITES

2.5.1 The Owner will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility as provided in Paragraph 3.3. The Owner will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Owner will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons performing portion of the Work.

ARTICLE 3
CONTRACTOR

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following to subparagraph 3.3.1:

3.3.1 If the Contractor has any concerns, objections or reservations concerning such specific instructions, the Contractor must raise and resolve such issues with the Architect and the Owner prior to performing such specific instructions.

3.4 LABOR AND MATERIALS

Add the following to subparagraph 3.4.3:

3.4.3 At no change to the Contract Sum or Contract Time, the Owner may provide written notice requiring the Contractor to remove from the Work any employee, subcontractor employee, or other person carrying out the Contract whom the Owner reasonably considers objectionable.

Add the following subparagraph 3.4.4 through 3.4.4.6:

3.4.4 PREVAILING WAGES

3.4.4.1 The Washington State Department of Labor and Industries Prevailing Wage Rates are part of the Contract.

3.4.4.2 Copies of the Washington State Department of Labor and Industries Prevailing Wage Rates are bound in the Project Manual for reference and convenience only. It is the Contractor's responsibility to follow the most current edition.

3.4.4.3 No worker may be paid less than the prevailing minimum hourly wage rate established by the State Department of Labor and Industries. Statements of Intent to Pay Prevailing Wages and Affidavits of Wages Paid are required. The Contractor shall fully comply with all current applicable labor laws and regulations, including without limitation

RWC Chapters 39.12 (Prevailing Wages); 49.28 (Hours of labor); and 49.70 (Worker Right to Know).

3.4.4.4 Any fabricator or manufacturer that produces nonstandard items and is considered by the Department of Labor and Industries as a contractor must comply with all of the requirements of RCW 39.12, including but not limited to the filing of the "Statement of Intent to Pay Prevailing Wages" and "Affidavit of Wages Paid" with the Department of Labor and Industries Industrial Statistician.

3.4.4.5 The Owner reserves the right to perform wage rate interviews and/or require Contractor submission of certified payrolls for all Contractor and Subcontractor personnel.

3.4.4.6 Contractor shall provide Owner with copies of the Intent to Pay Prevailing Wage forms as filed with the State of Washington for the contractor's forces and for all subcontractors.

3.6 TAXES

Change subparagraph 3.6 to read:

3.6 The Contractor shall pay all applicable State and Local Sales, Consumer, Use and other similar taxes for Work or portions thereof provided by the Contractor. The Owner shall include these taxes in his payments to the Contractor who shall pay the taxes to the proper authorities in accordance with the applicable laws and regulations governing this project. Sales tax will not be included in bid amount.

3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

Delete subparagraph 3.7.1 and substitute the following:

3.7.1 The **Owner** shall secure and pay for the **Plan Review Fees**, **Building Permit**, **and (where applicable) L&I Electrical Plan Review Fees.** The Contractor shall secure and pay for all other permits and governmental fees, licenses and inspections necessary for proper execution of and completion of the Contract which are legally required when bids are received.

3.9 SUPERINTENDENT

Add the following to subparagraphs 3.9.3:

During the construction period should the initial superintendent fall ill, retire, be laid off or terminated employment, the Owner reserves the right to review and accept the replacement as stated above.

Add the following subparagraph 3.9.4:

3.9.4 The Superintendent shall remain on the Project whenever Subcontractors are present unless the job is closed down due to a legal holiday, a general strike, conditions beyond the control of the Contractor, termination of the Contract in accordance with the Contract Documents, or Final Completion is attained.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULE

Change this entire paragraph 3.10 to read:

3.10.1 Within (**5)** calendar days following Notice to Proceed, the Contractor shall submit to the Owner and the Architect for review and comment, three copies of a CPM Schedule in form satisfactory to the Owner for Contractor's construction/erection of the Work. The initial and any

revisions of the Project Schedule shall be prepared and submitted in paper form. With each approved monthly payment request, provide an updated Progress Schedule. Not less than 5% (in retention) of Progress Payments to the Contractor may be withheld by the Owner until such initial and updated Progress Schedules have been timely submitted for review by the Owner and the Architect.

3.10.2 The Project Schedule shall consist of a network diagram with activity descriptions and durations and supporting data which will explain the Contractor's planning of the work. Contractor shall provide, if requested by Owner, cost allocation and resource estimates for each activity.

3.10.2.1 The CPM Schedule diagram shall include:

(a) The order and interdependence of the Contractor's activities and the major points of the interface or interrelation with the activities of others, including Specific Dates for completion.
(b) Conformance with and identification of the Specific Dates specified in the Contract Documents.
(c) The descriptions of work by activity.
(d) The time required for preparation, and review of shop drawings, mock-ups, manufacturing, and delivery of Contractor-furnished permanent plant materials, especially long lead items.
(e) Critical Path (or Paths).
(f) Testing of equipment and materials. The CPM Schedule shall provide a complete and detailed sequence of operations of the Work within the time limits specified in the Contract.

3.10.2.2 The identity and duration of all activities to be included in this CPM Schedule shall meet the following criteria:

(a) Activity descriptions shall be clear and concise. The beginning and end of each activity shall be readily verifiable.
(b) Responsibility for each activity shall be identified with a single performing organization.
(c) The identity of any potential problems or constraints related to the implementation of the overall construction plan.

3.10.2.3 A schedule for the purchase of items required for performance of the Work, showing lead items between purchase order placement and delivery dates, shall be integrated with the Progress Schedule upon request of the Owner. The Contractor shall furnish the Architect with copies of all purchase orders and acknowledgements and fabrication, production, and shipping schedules for all major items on the critical path within 10 days of Contractor's receipt of each purchase order, acknowledgment or schedule. Neither the Architect nor the Owner shall be deemed to have approved or accepted any such material, or its schedule, nor deemed to have waived this requirement if some or all of the material is not received.

3.10.3 The CPM Schedule shall indicate an early completion date for the project that is not later than the project's required completion date. All activity durations shall be given in calendar days. The CPM Schedule shall also indicate each of the following:

(a) Interfaces with the work of outside contractors, e.g., utilities, power, and with any separate contractor.
(b) Descriptions of activity including activity numbers.
(c) Estimated duration time for each activity.
(d) Early start date for each activity.
(e) Late start date for each activity.
(f) Early finish date for each activity.
(g) Late finish date for each activity.

(h) Float available for each batch of activities containing float.
(i) Actual start date for each activity begun.
(j) Actual finish date for each activity completed.
(k) Identification of all Critical Path activities in the mathematical analysis.
(l) The Critical Path for the project, with said path of activities being clearly and easily recognizable on the time-scaled CPM Schedule Diagram. The relationship between all non-critical activities and activities on the Critical Path shall be clearly shown on the CPM Schedule Diagram.

3.10.4 It is to be expressly understood and agreed by the Contractor that the schedule is an estimate to be revised from time-to-time as progress proceeds, and that the Owner does not guarantee that Contractor can start work activities on the "early start" or "late start" dates or complete work activities on the "early finish' or "late finish" date shown in the Schedule, or as same may be upgraded or revised; nor does the Owner guarantee that Contractor can proceed at all times in the sequence established by said Schedule. If Contractor's schedule indicates that Owner or separate contractor is to perform an activity by a specific date, or within a certain duration, Owner or any separate contractor under contract with the Owner shall not be bound to said date or duration unless Owner expressly and specifically agrees in writing to same; the Owner's or the Architect's overall review and approval or acceptance of the Schedule does not constitute an agreement to specific dates, durations or sequences for activities of the Owner of any separate contractor.

3.10.5 Should any of the conditions exist such that certain activities shown on the Contractor's CPM Schedule fall behind schedule to the extent that any of the specific dates are in jeopardy, the Contractor shall be required to, at no extra cost to the Owner, prepare and submit to the Owner a supplemental Recovery Schedule, in a form and detail appropriate to the need, to explain and display how he intends to reschedule those activities to regain compliance with the CPM Schedule during the immediately subsequent pay period.

3.10.6 The Contractor shall do the following after determination of the requirement for a Recovery Schedule:

(a) Within three (3) calendar days, the Contractor shall submit a Recovery Schedule to the Owner for review. The Recovery Schedule shall be prepared to a similar level of detail as the CPM Schedule and shall have a maximum duration of one (1) month.
(b) Any revisions necessary as a result of this review shall be resubmitted by the Contractor with any necessary revisions for acceptance within two (2) calendar days of the review. The approved Recovery Schedule shall then be the Schedule which the Contractor shall use in planning, organizing, directing, coordinating, performing and executing the Work (including all activities of subcontractors, equipment vendors, and suppliers) for its one (1) month duration, to regain compliance with the CPM Schedule.

3.10.7 Should the Contractor, after approval of the initial CPM Schedule desire to change his plan of construction, he shall submit his requested revisions to the Owner including a description of the logic for rescheduling the work, methods of maintaining adherence to Intermediate Milestones and Specific Dates. The Contractor shall revise his Schedule to include the effect of changes, acts of God or other conditions or events which have affected the CPM Schedule, If the requested changes are acceptable to the Owner, they will be incorporated by the Contractor into the CPM Schedule in the next reporting period. The resultant cost to the Owner for significant changes or a significant number of changes to the CPM Schedule shall be paid for by the Contractor.

3.10.8 When the Owner orders changes by Change Order which have the potential to impact the Contract Milestones or Specific Dates stipulated, a Network will be prepared by the

Contractor and provided to the Project Manager. After the Network has been accepted by the Owner, it will be incorporated into the CPM Schedule by the Contractor.

3.10.9 Failure of the Contractor to substantially comply with any of the scheduling requirements of this Contract at no cost to the Owner shall constitute cause that the Contractor is failing to prosecute the Work with such diligence as will insure its completion within the Contract times and shall be considered cause for termination by the Owner, pursuant to Article 14 of the General Conditions; and may also result in the Owner's withholding of Progress Payment(s) until the Contractor complies.

3.10.10 Float time is defined as the amount of time between earliest start date and the latest start date or between the earliest finish date or the latest finish date of a chain of activities on the CPM Schedule. Float time is not for the exclusive use or benefit of either the Contractor of the Owner. Contractor's work shall proceed according to start dates, and the Owner shall have the right to reserve and apportion float time according to the needs of the project. The Contractor acknowledges and agrees that actual delays, affecting paths of activities containing float time, will not have any effect upon Contract Completion times, providing that the actual delay does not exceed the float time associated with those activities. Extensions of time for performance as described in the Contract Documents will be granted only to the extent that time adjustments for the activity or activities affected by any condition or event which entitles the Contractor to a time extension exceeds the total float or slack time along the actual critical path of activities affected at the time of Notice to Proceed of a Change Order or the commencement of any delay, claim or condition for which an adjustment is claimed or warranted under the Contract Documents.

3.10.11 The Schedule Duration shall be based on the Contract Time of Completion listed on the Bid Form. The Owner shall not be obligated to accept any Early Completion Schedule suggested by the Contractor. The Contract Time for Completion shall establish the Schedule Completion Date. If the Contractor feels that the work can be completed in less than the Specified Contract Time, then the Surplus Time shall be considered Project Float. This Float time shall be shown on the Project Schedule. It shall be available to accommodate changes in the work and unforeseen conditions. Neither the Contractor nor the Owner have exclusive right to this Float Time. It belongs to the project.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following new subparagraphs 3.11.1 and 3.11.2:

3.11.1 In addition, the Contractor shall keep the approved permit set of plans at the jobsite during construction, in good condition. Prior to final acceptance, the Contractor shall deliver this permit set to the Architect.

3.11.2 Satisfactory maintenance of up-to-date record drawings will be a requirement for approval of monthly Progress Payments.

ARTICLE 5
SUBCONTRACTORS

5.3 SUBCONTRACTUAL RELATIONS

Add the following new subparagraph:

5.3.1 The Contractor shall schedule, supervise and coordinate the operations of all Subcontractors. No subcontracting of any of the Work shall relieve the Contractor from its responsibility for the performance of the Work in accordance with the Contract Documents or from its responsibility for the performance of any other of its obligations under the Contract Documents.

ARTICLE 6
CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.2 MUTUAL RESPONSIBILITY

Add the following to paragraph:

6.2.1 If the Contractor receives items from a separate contractor or from the Owner for storage, erection or installation, the Contractor shall acknowledge receipt for items delivered, and thereafter will be held responsible for care, storage and any necessary replacement of item or items received.

At subparagraph 6.2.4, delete the word "wrongfully."

ARTICLE 7
CHANGES IN THE WORK

7.2 CHANGE ORDERS

Add the following paragraphs 7.2.2 through 7.2.5:

7.2.2 Change proposal disagreements shall be submitted by the Contractor to the Architect in a form satisfactory to the Owner for such submittals. The total cost of any change, including a claim shall be limited to the reasonable value thereof, to be determined in the following manner:

7.2.3 ADDITIVE CHANGES:

1a. Direct Labor Costs: This is defined as the estimated labor costs determined by either the estimated number of craft hours and the hourly costs necessary to perform the change in work; or the unit labor costs necessary to perform the change in work; or the unit labor costs applied to the material quantities, provided said unit labor costs are developed from the above craft man hour cost; whichever is applicable, according to industry practice. The hourly cost shall be based on the following:

1. Basic Wages: Current minimum prevailing hourly wage rates, including vacation pay, for all labor, crew foreman, and general foreman performing and/or directly supervising the work on site. These rates, whichever are applicable, are established by the State of Washington, Department of Labor and Industries.
2. Fringe Benefits: Fringe benefits established by the State of Washington, Department of Labor and Industries or contributed to labor trust funds as itemized fringe benefits, whichever is applicable.
3. Worker's Insurance: Direct contributions to the State of Washington as Industrial Insurance; Medical Aid; and Supplemental Pension, by the class and rates established by the State of Washington, Department of Labor and Industries.
4. Federal Insurance's: Direct contributions required by the Federal Insurance Compensation Act (FICA); Federal Unemployment Tax Act (FUTA); and the State Unemployment Compensation Act (SUCA).
5. Costs incurred by the Washington Industrial Safety and Health Act (WISHA); established as 2% of 1, 2, 3, and 4 above.
6. Travel allowances and/or subsistence if applicable not to exceed those established by Regional Labor Union Agreements shall be itemized and identified separately.

1b. Direct Material Costs: This is defined as an itemization of the estimated quantity of materials necessary to perform the change in the work and the cost thereof. These costs shall be by the unit cost applied to the quantity and extended. The unit costs shall be based on the following:
   1. The net costs after all offered or available discounts or rebates.
   2. Freight costs; express charges; or special delivery costs when applicable.

   No lump sum costs will be allowed except when approved in advance by the Architect

1c. Construction Equipment Usage Costs:
   1. Rental Equipment: This is defined as an itemization of and the estimated length of time construction equipment will be used on change order work at the site. The rental costs applied thereof will be the rates established by the following whichever is applicable:
      a) The current hourly rental rates established by agreement between the Associated General Contractors (AGC) and Washington State Department of Highways.
      b) The current rental rates established by the State of Washington, utilities and Transportation Commission for trucks used on highways.
      c) The current rental rates established by the National Electrical Contractor's Association (NECA) for equipment used on electrical work.
      d) The current rental rates established by the mechanical Contractor's Association for equipment used on mechanical work.
      e) If equipment is required for which a rental rate is not established in any of the above, an agreed rental rate shall be established for that equipment. Such rates and the use of the equipment on the work must be approved by the Architect prior to performing the work.
      f) The rates in effect at the time of performance of the work are the maximum rates allowable for equipment of modern design and in good working condition and include full compensation for furnishing all fuel, oil, lubrication, repairs, maintenance, and insurance.
   2. Small Tools, Expendable and Consumable Supplies:
      a) These are general in nature and are defined as tools for which the initial purchase price is under $250 and are normally furnished by the performing contractor.
      b) The allowable rate for small tools will be:
         - General Contractors, 3% direct labor costs
         - Specialty Contractors, 5% direct labor costs
      c) Expendable and consumable supplies directly associated with the change in work to be itemized.

1d. Subcontractor Proposals: Subcontractors' proposals are to be itemized as in 1a, 1b, and 1c above.

1e. Overhead and Profit by the Contractor Actually Performing the Work: A total amount, not to exceed 10% of items 1a, 1b, and 1c above will be allowed. This is to compensate such contractor for all personnel not defined in 1a above; temporary construction facilities; home office costs; office architecting and estimating costs; profit, and any other cost incidental to the performance of the change in work.

1f. Overhead and Profit by the Contractor and Subcontractor when Subcontractor actually performs the Work:
   1. A total amount not to exceed 8% of the total amount of subcontractors proposal as defined in 1d above will be allowed to the Contractor for all overhead and profit to

supervise and administer the subcontractors actually performing the change in the work. The Subcontractor doing the work will be allowed no more than 10%. Lower tier sub-subcontractors will be allowed no more than 7%.

2. No direct costs of the Contractor will be allowed to be added to a subcontractor's proposal. Contractor's direct cost, if required, must be submitted as outlined in 1a, 1b, 1c and 1g.

1g. Cost of Any Increase or Decrease in Premium for Insurance and Bond Caused by the Change:

1. Contractor's Liability Insurance: To the above, the costs of the Contractor's Liability Insurance may be increased or decreased.
2. Bond: To the above, the cost of the Contractor's Bond may be increased or decreased.

7.2.4 DEDUCTIVE CHANGES

2a. Items 1a (labor), 1b (material), 1c (equipment), 1d (subcontractor), 1e (overhead and profit, Contractor), 1f (overhead and profit, subcontractor), 1g (insurance and bond) will be itemized for deleted changes in the work.

7.2.5 ADDITIVE CHANGES AND DEDUCTIVE CHANGES TOGETHER

3a. If a change in the work involves both additive and deductive changes, the appropriate overhead and profit amount allowed will be added to the net difference of items 1a, 1b, 1c, and 1d.

3b. If other additive unrelated changed items are included in the same change proposal, the appropriate overhead and profit allowed is to be applied to these individual change items.

ARTICLE 8
TIME

8.2 PROGRESS AND COMPLETION

Add the following new subparagraphs 8.2.4 and 8.2.5:

8.2.4 The Contractor shall furnish such manpower, materials, facilities, and equipment and shall work such hours, including night shifts, overtime operations and Sundays and holidays, as may be necessary to insure the progress and completion of the Work in accordance with the approved and currently updated Progress Schedule. If work actually in place falls behind the currently updated and approved Progress Schedule and it becomes apparent from the current schedule that the Work will not be completed within the Contract Time, the Contractor agrees that he will, as necessary, take some or all of the following actions at no additional cost to the Owner, as required to substantially eliminate tardiness of Work:

1. Increase the manpower in such quantities and crafts as will substantially eliminate, in the opinion of the Owner, the backlog of Work.
2. 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 sufficiently to substantially eliminate, in the opinion of the Owner, the backlog of Work; and
3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities.

8.2.5 The Contractor and Owner acknowledge and contemplate that delay in substantial completion and final completion will cause the Owner substantial damages which are difficult to determine precisely. To the extent the Owner is unable to beneficially occupy each of the facilities which are the subject of this Contract, the Owner is expected to experience damages and costs including but not limited to the following: Loss of use of the facility; the costs of

delayed move-in and the disruption of Owner activities and schedule; and rescheduling and shift changes to paid personnel. The parties therefore agree that the following sums of liquidated damages shall be paid to the Owner (or the Owner may withhold payments otherwise due to the Contractor) in liquidation of these difficult to measure damages and/or delay costs reasonably anticipated as a result of delays beyond the dates as established in the Contract, as they may be extended by agreement of the parties by change order during the course of the project:

SUBSTANTIAL COMPLETION: For each calendar day after the date fixed for Substantial Completion and until Substantial Completion of the facilities, the Contractor shall pay the Owner the sum of **One hundred dollars ($100)**. The Owner shall not be required to accept Substantial Completion of anything less than the entirety of the project but shall have the option to do so. This sum is to be fixed, agreed, liquidated damages and not to be construed as in any sense a penalty.
FINAL COMPLETION: Actual damages will be assessed for failure to achieve Final Completion within **(30)** days after Substantial Completion. Actual damages will be calculated on the basis of direct architectural, administrative, and other related costs attributed to the Project from the date when Final Completion should have been achieved, to the date Final Completion is actually achieved. Owner may offset these costs against any payment due to the Contractor by reduction in retainage.

8.3 DELAYS AND EXTENSIONS OF TIME

Change subparagraph 8.3.3 to read:
8.3.3 Except as provided in this subparagraph, the Contractor's sole remedy for delays shall be an extension of time. Except for unreasonable delays in performance caused by the acts or omissions of the Owner, the Contractor shall not be entitled to damages, extra compensation or equitable adjustment for direct, indirect or impact damages for delay, including but not limited to cost of acceleration, home office overhead or lost profits. All claims for damages or extensions of time are subject to the requirements of Article 15. In the event the Contractor is entitled to damages from the Owner for delay, it is agreed that the Contractor's sole damages for each day of delay shall be limited to the daily liquidated damage rate provided for the Owner in subparagraph 8.2.5 above.

ARTICLE 9
PAYMENT AND COMPLETION

9.3 APPLICATIONS FOR PAYMENT

Add the following new subparagraph:
9.3.1.3 Until Substantial Completion, the Owner shall pay 95 percent of the amount due the Contractor on account of progress payments.
Add the following new subparagraph:
9.3.4 If authorized by the Owner, the Application for Payment may include request for payment for material delivered to the Project site and suitably stored, or for completed preparatory work. Payment may similarly be requested, subject to Owner's approval, for material stored off the Project site, provided the Contractor complies with or furnishes satisfactory evidence of the following:

1. The material will be placed in a warehouse that is structurally sound, dry, lighted and suitable for the materials to be stored;

2. The warehouse is located within a 25-mile radius of the project. Other locations may be utilized, if approved in writing, by Owner;
3. Only materials for the Project are stored within the warehouse (or a secure portion of a warehouse set aside for the Project);
4. Contractor furnishes Owner a certificate of insurance extending Contractor's insurance coverage for damage, fire, and theft to cover the full value of all materials stored, or in transit;
5. The warehouse (or secure portion thereof) is continuously under lock and key, and only Contractor's authorized personnel shall have access;
6. Owner shall at all times have the right of access in company of the Contractor;
7. Contractor and its surety assume total responsibility for the stored materials; and
8. Contractor furnishes to Owner certified lists of materials stored, bills of lading, invoices, and other information as may be required, and shall also furnish notice to owner when materials are moved from storage to the Project site.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following to subparagraph 9.5.1:

The Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or part of a Certificate for Payment previously issued, or the Owner may refuse to process an application for payment to such extent as may be necessary in the Owner's or Architect's opinion to protect the Owner from loss because of:

Add the following new subparagraphs 9.5.1.8 through 9.5.1.12:

9.5.1.8 Unsatisfactory prosecution of the Work by the Contractor, including but not limited to failure to carry out the Work in accordance with the Contract Documents.

9.5.1.9 Failure or refusal of the Contractor to fully comply with requirements in the Contract Documents for preparation and submission of scheduling of the Work and updates thereof, or failure to present statements of Intents or Affidavits pertaining to prevailing wages paid as may be required by statue.

9.5.1.10 Liquidated damages.

9.5.1.11 Failure to provide adequate security measures to protect materials stored on site for which the Contractor is seeking payment for.

9.5.1.12 Failure to provide evidence that the performance and payment bonds have been increased to equal the sum of Change Orders.

9.6 PROGRESS PAYMENTS

Add the following new subparagraphs 9.6.8 through 9.6.13:

9.6.8 Upon Commencement of the Work and at the option of the Contractor, an escrow account may be established by the Contractor in a financial institution chosen by the Contractor and approved by the Owner.

9.6.9 The escrow agreement shall provide that the financial institution will act as escrow agent, will pay interest on funds deposited in such account in accordance with the provisions of the escrow agreement and will disburse funds from the account upon the direction of the Owner as set forth below. Compensation to the escrow agent for establishing and maintaining the escrow account shall be paid from interest accrued in the escrow account.

9.6.10 As each progress payment is made, the retainage with respect to that payment shall be deposited by the Owner in the escrow account.

9.6.11 The interest earned on funds in the account shall accrue for the benefit of the Contractor until the substantial completion date named in the Construction Contract or the expiration of any

authorized extension of such date. Interest earned after such date shall accrue for the benefit of the Owner. Cost of compensation to the escrow agent paid out of interest earned shall be borne by the Contractor.

9.6.12 When the Contractor has fulfilled all of the requirements of the Contract providing for reduction of retained funds, the escrow agent shall release to the Contractor one-half of the accrued funds but none of the interest thereon. When the Work has been fully completed in a satisfactory manner and the Architect has issued a final Certificate for Payment, the escrow agent shall pay to the Contractor the full amount of funds remaining in the account, including net balance of the interest paid to the account, but less any interest that may have accrued for the benefit of the Owner, which shall be paid to the Owner.

9.6.13 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor, the escrow agent shall make payment to the Contractor as provided in Subparagraph 9.10.3

9.8 SUBSTANTIAL COMPLETION

Change subparagraph 9.8.1 to read:

9.8.1 Substantial Completion is the stage in the progress of the Work (or portion thereof designated and approved by the Architect and Owner) when the construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can fully occupy under necessary permits the Work (or portion thereof designated by the Owner) for the use for which it is intended. All Work other than incidental corrective or punch list work and final cleaning shall have been completed.

Add the following new subparagraph:

9.8.6 The acceptance of Substantial Completion payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the application for payment for the Substantial Completion payment, and except for the Contract Sums due at Final Acceptance.

9.10 FINAL COMPLETION AND FINAL PAYMENT

Add the following to this subparagraph 9.10.1:

The Architect's final Certificate of Payment shall establish the date of Final Completion. If the Contractor notifies the Architect that the punch list items are completed and requests an inspection to determine compliance, and the Architect determines that some or all the punch list items are not completed, the Contractor shall be responsible to the Owner for all costs, including Architect's fees, for any future Architect's inspections after the first inspection to determine subsequent compliance with the punch list.

ARTICLE 10
PROTECTION OF PERSONS AND PROPERTY

Add the following new subparagraph10.2.8:

10.2.8 At all times until final acceptance of the Work, the Contractor shall protect from damage, weather, deterioration, theft, vandalism, and, malicious mischief all materials, equipment, tools, and other items incorporated or to be incorporated in the Work, or consumed or used in the performance of the Work, and all Work in process and completed Work.

ARTICLE 11
INSURANCE

11.1 CONTRACTOR'S LIABILITY INSURANCE

Add the following new subparagraphs 11.1.1.9 and 11.1.1.10:

11.1.1.9 Liability Insurance shall include all major divisions of coverage and be on a comprehensive basis including:

1. Premises operations (including X, C and U coverage's as applicable).
2. Independent Contractors' Protective.
3. Products and Completed Operations.
4. Personal Injury Liability with Employment Exclusion deleted.
5. Contractual, including specified provision for Contractor's obligation under Paragraph 3.18.
6. Owned, non-owned and hired motor vehicles.
7. Broad Form Property Damage including Completed Operations.

11.1.1.10 If the General Liability coverage's are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverage's required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2.

Add the following subparagraph 11.1.2.1:

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law:

1. Worker's Compensation:

(a) State:	Statutory
(b) Applicable Federal:	Statutory
(c) Employer's Liability	$100,000 per Accident

Comprehensive or Commercial General Liability (including Premises-operations; Independent Contractors' Protective; Products and Completed Operations; Broad Form Property Damage):

(a) Bodily Injury:

$1,000,000	Each Occurrence
$2,000,000	Aggregate

(b) Property Damage:

$1,000,000	Each Occurrence
$2,000,000	Aggregate

(c) Products and Completed Operations to be maintained for a minimum period of 2 years after final payment.

(d) Property Damage Liability insurance shall provide Explosion, Collapse, and Underground coverage.

(e) Broad Form Property Damage Coverage shall include Completed Operations.

3. Contractual Liability:

(a) Bodily Injury:

$1,000,000	Each Occurrence
$2,000,000	Aggregate

(b) Property Damage:

$1,000,000	Each Occurrence
$2,000,000	Aggregate

4. Personal Injury, with Employment Exclusion deleted:
   $2,000,000 Aggregate
5. Business Auto Liability (including owned, non-owned and hired vehicles):
   (a) Bodily Injury:
      $1,000,000 Each Person
      $1,000,000 Each Occurrence
   (b) Property Damage:
      $1,000,000 Each Occurrence

Add the following subparagraphs 11.1.3.1 through 1.1.3.3:

11.1.3.1 The certificate of insurance shall name the Owner as "Additional Insured." Certificate is required at time contract is signed.

11.1.3.2 The Contractor shall provide an original of the executed insurance policy Endorsement to the Owner prior to commencement of the work.

11.1.3.3 Upon request of the Owner, the Contractor shall provide complete, certified copies of all required insurance policies.

11.4 PERFORMANCE AND PAYMENT BONDS

Delete Subparagraph 11.4.1 and substitute the following:

11.4.1 The Contractor shall provide bonds covering faithful performance of the Contract and payment of obligations arising thereunder. Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal 100 percent of the Contract Sum including all change orders and sales tax.

Add the following new subparagraphs:

11.4.1.1 The Contractor shall deliver the required bonds to the Owner no later than ten days following the Notice of Award and shall also be submitted with the signed and executed contract.

11.4.1.2 Bonds shall be obtained from companies holding certificates of authority as acceptable sureties pursuant to 31 CFR part 223.

11.4.1.3 Provide bonds executed by surety company or companies authorized to transact business in State in which the project is being constructed. Required form: Performance Bond and Payment Bond AIA-A312, March 1984. Bonding company as approved by Owner.

11.4.1.4 Provide originals of the executed bonds to the Owner, complete with original ink signatures and original stamps/embossing.

11.4.1.5 Provide proof of bond rider adjustments in the bond sum for Change Orders in conjunction with requests for progress payments.

Add the following paragraph 11.5:

11.5 HOLD HARMLESS STATEMENT

11.5.1 The Contractor agrees to defend, indemnify and save harmless the Owner, Architect, and their agents, and employees against any and all loss, damage, liability, claims, demands or costs resulting from injury or harm to persons or property (including, with limitation, the Contractor's employees or property) arising out of or in any way connected with Contractor's performance hereof, excepting only such injury or harm as may have been caused solely by the fault or negligence of the Owner, Architect, and their agents, and employees, and shall be deemed to include those of subcontractors.

ARTICLE 13
MISCELLANEOUS PROVISIONS

13.5 TESTS AND INSPECTIONS

Add the following new subparagraph:

13.5.7 No acceptance by the Owner of any Work shall be construed to result from any inspection, tests or failures to inspect by the Owner, the Owner's representative, the Architect or any other person. No inspection, test, failure to inspect or test, or failure to discover any defect or non conformity by the Owner, the Owner's representative, the Architect or any other person shall relieve the Contractor of its responsibility for meeting the requirements of the Contract Documents or impair the Owner's right to reject defective or nonconforming items or right to avail itself of any other remedy to which the Owner may be entitled, notwithstanding the Owner's knowledge of the defect or nonconformity, its substantially or the ease of discovery.

Add the following new paragraphs 13.8 through 13.8.1.2:

13.8 EQUAL OPPORTUNITY

13.8.1 The Contractor shall maintain policies of employment as follows:

13.8.1.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, marital status, physical and mental disabilities, or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth policies of nondiscrimination.

13.8.1.2 The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, marital status, physical and mental disabilities, or national origin.

ARTICLE 14
TERMINATION OR SUSPENSION OF THE CONTRACT

14.2 TERMINATION BY THE OWNER FOR CAUSE

Change subparagraph 14.2.1 to read:

14.2.1 The Owner may, upon seven days' written notice to the Contractor, terminate (without prejudice to any right or remedy of the Owner) the whole or any portion of the Work for cause, including the following circumstances:

1. the Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure the Substantial Completion of the Work within the Contract Time;
2. the Contractor is in material default of any provision of the Contract;

3. the Contractor is adjudged bankrupt, makes a general assignment for the benefit of its creditors, or if a receiver is appointed on account of its insolvency;
4. the Contractor fails to supply a sufficient number of properly skilled workers or proper materials;
5. the Contractor fails to make prompt payment due to Subcontractors or for materials or labor;
6. the Contractor disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction; or
7. the Contractor materially breaches any provision of the Contract Documents.

Add the following new subparagraph:

14.2.5 If the Owner terminates in whole or part the Work pursuant to paragraph 14.2, the Owner may procure, upon such terms and in such manner as it deems appropriate, supplies or services similar to those terminated, and the Contractor shall be liable to the Owner for any excess costs for such similar supplies or services. The Contractor shall continue to perform of this Contract to the extent not terminated hereunder.

ARTICLE 15
ADMINISTRATION OF THE CONTRACT

15.1 CLAIMS AND DISPUTES

Add the following new subparagraphs 15.1.7 and 15.1.8:

15.1.7 All Claims filed against Owner shall be subject to audit at any time following the filing of the Claim. Failure of Contractor, or Subcontractor of any tier, to maintain and retain sufficient records to allow Owner to verify all or a portion of the Claim or to permit Owner access to the books and records of Contractor, or Subcontractors of any tier, shall constitute a waiver of the Claim and shall bar recovery. The audit may be performed by employees of Owner or a representative of Owner. Contractor, and its Subcontractors, shall provide adequate facilities acceptable to Owner, for the audit during normal business hours. Contractor, and all Subcontractors, shall make a good faith effort to cooperate with Owner's auditors.

15.1.8 The Contract Documents and the rights of the parties herein shall be governed by the laws of the State of Washington. Venue for all dispute resolution proceedings (including, but not limited to, mediation, arbitration, and litigation) shall be in the county in which the Owner's principal place of business is located, unless otherwise specified.

END OF SECTION 007300

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Work covered by Contract Documents.
2. Work by Owner.
3. Work under separate contracts.
4. Owner-furnished products.
5. Access to site.
6. Work restrictions.
7. Specification and drawing conventions.

B. Related Requirements:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

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

1. Interior remodeling and structural, plumbing, mechanical, and electrical improvements as shown.

B. Type of Contract:

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

1.4 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.

1. Move portions of existing occupants and equipment out of the building prior to the start of construction to provide the contractor with a reasonably unhindered access to the construction work areas.

All efforts are to be coordinated with the Contractor for mutually agreeable times and access.

C. Concurrent Work: Owner may perform construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract, the owner or the owner's separate contractor shall coordinate mutually agreeable time and access with the Contractor.

1. Door access controls installed on select existing doors.

D. Work Provided by Owner under Separate contract: the following work will be performed by Owner using Owner-provided contractors or forces, concurrently with the Work of this Contract:

1. Security and surveillance system installation: Owner will contract with Presidio for design-build work related to door security and site surveillance.

2. Installation of sectional doors, operators, and hardware.

3. Fencing and gate installation.

4. Fuel tank and pump replacement.

5. Point source vehicle exhaust system maintenance.

1.5 OWNER-FURNISHED PRODUCTS

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

B. Owner-Furnished Products:

1. None at this time.

1.6 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.7 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.

1. Hours for Utility Shutdowns: Coordinate with owner for a mutually agreeable time.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted on-site

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the schedules on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Standard AIA or CSI form.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    a. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    b. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    d. Samples, where applicable or requested.
    e. Certificates and qualification data, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
c. High Speed Rolling Door substitutions will only be approved during the bidding period.

1.5 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

    a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    b. Substitution request is fully documented and properly submitted.
    c. Requested substitution is compatible with other portions of the Work.
    d. Requested substitution has been coordinated with other portions of the Work.
    e. Requested substitution provides specified warranty.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail."

1.4 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.5 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents and specifications noted on Drawings as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Name of Architect
    c. Contractor's name and address.
    d. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor
    d. Name of manufacturer or fabricator
    e. Name of supplier
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

        1) Labor.
        2) Materials.
        3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

9. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

    1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
    2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
    3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
    4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.

11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:
1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

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

1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

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

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Division 01 Section "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
2. File Preparation Format: DWG, Version 2004 or later, operating in Microsoft Windows operating system.
3. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.

4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

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

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

B. Preconstruction Conference: Architect will schedule and conduct Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Lines of communications.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for RFIs.
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.

i. Distribution of the Contract Documents.
j. Submittal procedures.
k. Preparation of record documents.
l. Use of the premises and existing buildings.
m. Work restrictions.
n. Working hours.
o. Owner's occupancy requirements.
p. Responsibility for temporary facilities and controls.
q. Procedures for moisture and mold control.
r. Procedures for disruptions and shutdowns.
s. Construction waste management and recycling.
t. Parking availability.
u. Office, work, and storage areas.
v. Equipment deliveries and priorities.
w. First aid.
x. Security.
y. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Deliveries.
e. Submittals.
f. Possible conflicts.
g. Compatibility requirements.
h. Time schedules.
i. Weather limitations.
j. Manufacturer's written instructions.
k. Warranty requirements.
l. Space and access limitations.
m. Testing and inspecting requirements.
n. Installation procedures.
o. Coordination with other work.
p. Required performance results.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 60 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of record documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Submittal of written warranties.
    d. Requirements for preparing operations and maintenance data.
    e. Requirements for delivery of material samples, attic stock, and spare parts.
    f. Requirements for demonstration and training.
    g. Preparation of Contractor's punch list.
    h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    i. Submittal procedures.
    j. Owner's partial occupancy requirements.
    k. Installation of Owner's furniture, fixtures, and equipment.
    l. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Coordination Meetings: Conduct Project coordination meetings at bi-monthly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences. This will be required for Fire Prop installation, and others a seen fit by Architect or Owner

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    c. Review present and future needs of each contractor present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site utilization.
        8) Temporary facilities and controls.
        9) Work hours.
        10) Hazards and risks.
        11) Progress cleaning.
        12) Quality and work standards.
        13) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Daily construction reports.
3. Material location reports.
4. Site condition reports.

B. Related Requirements:

1. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
1. Three paper copies.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

E. Daily Construction Reports: Submit at weekly intervals.

F. Material Location Reports: Submit at monthly intervals.

G. Site Condition Reports: Submit at time of discovery of differing conditions.

H. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Mockups.
    e. Fabrication.
    f. Sample testing.
    g. Deliveries.
    h. Installation.
    i. Tests and inspections.
    j. Adjusting.

k. Curing.
l. Building flush-out.
m. Startup and placement into final use and operation.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

a. Structural completion.
b. Permanent space enclosure.
c. Completion of mechanical installation.
d. Completion of electrical installation.
e. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1. Use Microsoft Project or other mutually agreed program.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by Owner that may affect or be affected by Contractor's activities.
    i. Testing.
    j. Punch list and final completion.
    k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.

4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.

11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have

completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings may be provided by Architect for Contractor's use in preparing submittals if desired.

1. The following conditions apply:

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
b. Digital Drawing Software Program: The Contract Drawings are available in Revit (Architect’s current version).
c. Contractor shall execute Architects" Liability release form prior to receiving electronic files.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Identification & Information: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Name of subcontractor.
    f. Name of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

    a. Transmittal Form for Paper Submittals: Use AIA Document G810.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Provide a submittal for each product section and division. PDF File format is acceptable in lieu of paper copies.

1. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.

2. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
    a. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:

    a. Two opaque (bond) copies of each submittal. Architect will return one copy(ies).
    b. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

E. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

F. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Submit copies to Owner, Architect, and Jurisdictions Having Authority for review.

G. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."

H. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

I. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

J. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

K. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

L. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

M. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

N. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

O. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

P. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

F. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

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

C. Related Requirements:
1. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review

coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting

requirements that are different, but apparently equal, to Architect for a decision before proceeding.

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

1.5 ACTION SUBMITTALS

A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data : For Contractor's quality-control personnel.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions,

tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

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

1. Name, address, and telephone number of technical representative making report.

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

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

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

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

1.9 QUALITY ASSURANCE

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

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those

performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.

4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.

5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

A. As provided by Owner.

3.2 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.3 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

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

PART 2 - PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION

A. Water Service: Connect to Owner's existing water service facilities.

B. Heating: Existing systems may be used.

C. Ventilation and Humidity Control: Existing HVAC systems may be used.

D. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

E. Lighting: Existing systems may be used.

3.2 SUPPORT FACILITIES INSTALLATION

A. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Security Enclosure and Lockup: Maintain lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

D. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

3.4 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities to minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:
   1. Division 01 Section "Substitution Procedures" for requests for substitutions.
   2. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.

C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Requirements:

1. Division 01 Section "Summary" for limits on use of Project site.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator

present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility, or Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect.

3.3 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Division 01 Section "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

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

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.

2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

3. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Recycling nonhazardous construction waste.
2. Disposing of nonhazardous construction waste.

1.3 DEFINITIONS

A. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

B. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

A. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

B. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

C. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types of waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Division 01 Section "Temporary Facilities and Controls."

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

    a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

    a. Comply with requirements in Division 32 Section "Planting." for use of clean sawdust as organic mulch.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

    a. Comply with requirements in Division 32 Section "Planting." for use of clean ground gypsum board as inorganic soil amendment.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Requirements:

1. Division 01 Section "Execution" for progress cleaning of Project site.
2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Maintenance Material Items: Provide remaining paint in legibly marked and labeled cans.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals.

B. Related Requirements:
   1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

   1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

   1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR OPERATION AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of

equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
   b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and

major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

F. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

G. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

H. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

I. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

J. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

K. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.

B. Related Requirements:
1. Division 01 Section "Execution" for final property survey.
2. Division 01 Section "Closeout Procedures" for general closeout procedures.
3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Final Submittal:

1) Submit two paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and two set(s) of prints.
3) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy and one annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy and annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.

l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.

5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file and one.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 INFORMATIONAL SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

B. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

C. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:

a. Kitchen Dishwasher.

b. Kitchen Refrigerators

c. Shop/Storage benches and shelving.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

E. Hazardous Materials: See Division 0 Section “Information Available to Bidders” for Limited Hazardous Materials Survey Report.

1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

F. Storage or sale of removed items or materials on-site is not permitted.

G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
5. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
6. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
7. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Protect items from damage during transport and storage.
3. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

B. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

1. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Column Encasements.

B. Related Sections:

1. See General Structural Notes on structural drawings for additional information and requirements.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

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

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. 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.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete".
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, C595, Type II, gray. Supplement with the following:
   a. Fly ash: ASTM C618, Class F or C.

B. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2.5 CURING MATERIALS

A. Water: Potable.

B. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.6 RELATED MATERIALS

A. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.7 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Chamfer edges of permanently exposed concrete.

G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

H. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

I. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 REMOVING AND REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

B. 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.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.4 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. 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.

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 will be 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 to not 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.

3.5 FINISHING FORMED SURFACES

A. 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 all concrete surfaces.

B. 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.

3.6 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. 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 the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Maintain continuity of coating and repair damage during curing period.

3.7 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
2. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.

B. Related Requirements:

1. None.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the Seismic-Load-Resisting System.
6. Identify demand critical welds.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and special inspection reports.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Shop-Painting Applicators: Qualified according to to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Channels, Angles Shapes: ASTM A 36/A 36M.

B. Plate and Bar: ASTM A 36/A 36M.

C. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

D. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex or round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

D. Unheaded Anchor Rods:ASTM F 1554, Grade 55, weldable.

1. Configuration: Straight.
2. Nuts: ASTM A 563 (ASTM A 563M) heavy- hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class.

E. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

F. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Finish: Plain.

G. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

H. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

I. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.3 PRIMER

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.

5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.

H. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches (250 mm) o.c. unless otherwise indicated.

I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: As indicated on drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: As indicated on the drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1 and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Wood blocking and nailers.
   2. Plywood sheathing.
   3. Framing with dimension lumber.
   4. Framing with engineered wood products.

B. Related Requirements:

   1. See general structural notes in structural drawings for additional information and requirements.

1.3 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

   1. NLGA: National Lumber Grades Authority.
   2. WCLIB: West Coast Lumber Inspection Bureau.
   3. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat all rough carpentry unless otherwise indicated.

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and the following species unless noted otherwise in the structural notes and drawings:

1. Douglas fir-larch; WCLIB or WWPA.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades unless otherwise noted in the structural notes and drawings:

1. Douglas fir-larch; Standard or No. 3 Common grade; NLGA, WCLIB, or WWPA.

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.4 PLYWOOD SHEATHING

1. Wall Sheathing: Refer to Structural Drawings.

2.5 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 3 grade.
   1. Application: All interior partitions.
   2. Species:
      a. Douglas fir-larch; WCLIB, or WWPA.

B. Structural Framing:
   1. Application: Studs and plates for shear wall strengthening; studs and posts for holdown installation, joists for framing around new openings, blocking for diaphragm and shear wall nailing, blocking for metal strap installations.
   2. Species: Refer to structural drawings
   3. Grade: Refer to structural drawings

2.6 ENGINEERED WOOD PRODUCTS

A. Engineered Wood Products, General: Products shall contain no urea formaldehyde. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

B. Parallel-Strand, Laminated-Strand, Laminated-Veneer Lumber: Refer to structural drawings.

C. Wood I-Joists: Refer to structural drawings.

D. Rim Boards: Refer to structural drawings.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

   1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.

E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061800 - GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes framing using structural glued-laminated timber.

B. Related Requirements:

1. Section 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 ACTION 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.

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 from ICC-ES.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: An AITC- or APA-EWS-licensed firm.

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 STRUCTURAL GLUED-LAMINATED TIMBER

A. General: Provide structural glued-laminated timber that complies with AITC A190.1 and AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.

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.
5. Adhesive shall not contain urea-formaldehyde resins.
6. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Species and Grades:

1. Species and Beam Stress Classification: As indicated on the drawings.
2. Lay-up: As indicated on the drawings.
3. Species and Combination Symbol: As indicated on the drawings.

C. Appearance Grade: Architectural grade where exposed to view, Industrial grade where not exposed to view, complying with AITC 110.

1. For Architectural appearance grades, fill voids as required by AITC 110.

2.2 PRESERVATIVE TREATMENT

A. Preservative Treatment: Where preservative-treated structural glued-laminated timber is indicated, comply with AWPA 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 AWPA M4 to surfaces cut to a depth of more than 1/16 inch (1.5 mm).

2.3 TIMBER CONNECTORS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

B. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings, or ICC-ES comparable product by one of the following:

1. Simpson Strong-Tie Co., Inc.
2. USP Structural Connectors.
3. Cleveland Steel Specialty Co.

C. Fabricate beam hangers from steel with 0.179-inch (4.6-mm) stirrups and 0.239-inch (6-mm) top plates.

D. Fabricate strap ties from steel, 2-1/2 inches (63 mm) wide by 0.179 inch (4.6 mm thick, unless otherwise indicated on the drawings.

E. Provide bolts, 3/4 inch (19 mm) unless otherwise indicated, complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); nuts complying with ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

F. Materials: Unless otherwise indicated, fabricate from the following materials:

1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
2. Round steel bars complying with ASTM A 575, Grade M 1020.
3. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.

G. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil (0.05-mm) dry film thickness.

1. Primer shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

H. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

2.4 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.

C. Sealers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 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.

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 AWPA 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 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.

2.6 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 indicated by manufacturer's designations. As selected by Architect from manufacturer's full range where exposed to view.

B. Clear Finish: Manufacturer's standard, two-coat, clear varnish finish; resistant to mildew and fungus.

C. Finishing materials shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

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.

1. Predrill for fasteners using timber connectors as templates.
2. Finish exposed surfaces to remove planing 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 AWPA 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 061800

SECTION 064116 - PLASTIC LAMINATE CLAD ARCHITECTUAL CABINETS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. Plastic Laminate Clad Casework.

B. Plastic Laminate Countertops.

C. Cabinet Hardware.

1.3 REFERENCES

A. AWI (Architectural Woodwork Institute) - Quality Standards.

B. BMHA A156.9 - Cabinet Hardware.

C. FS MMM-A-130 - Adhesive, Contact.

D. NEMA (National Electric Manufacturer's Association) LD3 - High Pressure Decorative Laminates.

E. NLHA (National Hardwood Lumber Association).

F. PS 1 - Construction and Industrial Plywood.

G. PS 20 - American Softwood Lumber Standard.

1.4 SUBMITTALS FOR REVIEW

A. Submit under provisions of Division 1.

B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes.

C. Product Data: Provide data for hardware accessories.

D. Product Samples: Submit laminate for verification and edge banding options for Architects approval for each type specified. Reference the shop drawing schedule of finishes.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with AWI "Premium" quality.

1.6 ENVIRONMENTAL REQUIREMENTS

A. During and after installation of work of this section, maintain the same temperature and humidity conditions in building spaces as will occur after occupancy.

1.7 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.8 COORDINATION

A. Coordinate the work with electrical and plumbing rough-in.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Westmark, Tacoma, WA, (253)531-3470.

B. Cabinetmakers, Inc., Puyallup, WA, (253)848-3541.

C. Nick’s Special Woodcraft, Renton, WA, (425)277-1687.

D. Substitutions: Equal approved by Architect.

2.2 PLASTIC LAMINATE FACED CABINETS AND COUNTERTOPS

A. All hinged doors, drawers, and face panels to be manufactured with a "Reveal Overlay" design with 1/8" margins between doors and drawers. Margins between abutting cabinets to be 1/8". Scribes as shown on Drawings.

B. Laminate Materials
1. Plastic Laminate Countertops, NEMA LD-3, 0.050 inch general purpose quality.
2. Plastic Laminate General Use, NEMA LD-3, 0.030 inch general purpose quality.
3. Laminate Backing Sheet: NEMA LD-3, BK20 backing grade, undecorated plastic laminate.

C. Cabinets:

PLAM-1	Formica	5881-58 Chocolate Warp

D. Edgbanding at door and drawer faces: to match adjacent laminate, to be approved by Architect.

E. Countertops:
PLAM-2 Pionite AG021 Sable, suede finish

F. Edge at Plastic Laminate Countertops: Self edge to match countertop

2.3 ACCESSORIES

A. Adhesive: Type recommended by laminate manufacturer to suit application. Marine exterior grade at wet locations.

B. Fasteners: Size and type to suit application.

C. Bolts, Nuts, Washers, Lags, Pins and Screws: Of size and type to suit applications; mill finish in concealed locations and satin chrome finish in exposed locations.

E. Concealed Joint Fasteners: Threaded steel.

F. Pull out cabinet shelves and hardware at lower kitchen cabinets. Full cabinet depth extension + 3” min overextension. Heavy duty commercial quality to match application.

2.4 HARDWARE

A. Hardware items as noted below or approved equal.

B. Drawer Pulls: 4-inch wire pulls, US26D finish.

C. Drawer Slides: Accuride full extension glides #3832, Typical, and #3640 at all file drawers. Equal as approved by Architect.

D. Hinges: 5-knuckle overlay, 2 ¾” in height, 270 degree opening angle for all casework, finish: US26D.

E. Cabinet shelf supports: Knape and Vogt, #346 NP, nickel plated steel shelf support with #129 rubber cushion rest.

F. Locks: Half-mortise type with 5-pin tumbler and dead bolt, round cylinder only exposed, brass with US 26D Finish. Provide two keys per lock.

G. Locks at Pantry cabinets: Olympus lock, Inc., DCP Series, padlockable cam lock. Modify door side with steel backup plate mounted to back of door to allow for padlock to rest flat on face of steel plate. See interior elevations.

H. Grommets: Molded plastic with matching plastic caps with slot for wire passage, 2-1/2 inch diameter. Color as selected from manufacturer's full range. In addition to grommets shown on the drawings, provide additional grommets equal to 25% of those shown, to be field located by the Owner.

I. Magnetic Catches: magnet touch latches.

2.5 FABRICATION

A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

B. All cabinet box sides, bottoms, and spreaders will be 3/4 inch thick 45 pounds/cubic foot, Medium density fiberboard (MDF). All cabinet backs to be 1/2 inch thick.

C. All cabinet exteriors and all exposed surfaces of open cabinets, including shelves, to be high pressure plastic laminate.

D. Cabinet doors to be laminated both sides. Cabinet scribes and box edges to be banded with laminate to match face color. Cabinet door and drawer edges to be banded with 3 mm PVC edging, with color to match face laminate. All exposed ends of cabinets and upper cabinet bottoms to be covered with matching laminate. Use one piece for full length only.

E. Cabinet interiors and drawer interiors to be polyester faced.

F. All cabinets shelves to be adjustable by steel pins. Drill holes at both sides of cabinet, approximately 1 inch apart for the full height of the cabinet.

G. When necessary to cut and fit on site, provide materials with ample allowance for cutting.

H. Counters and Backsplashes: High pressure laminate over 3/4 inch MDF, typical. Fabricate backsplashes separately from counters. Countertops and backsplashes at wet areas to be made from plywood with waterproof glue. Countertop edge material to match countertop materials unless noted otherwise.

I. Apply laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline, flush, and smooth to the touch (no burrs); secure countertops with concealed fasteners.

J. Shelving: ¾ inch thick MDF, typical. ¾" exterior grade plywood at wet locations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

3.2 INSTALLATION

A. Set and secure casework in place; rigid, plumb, and level.

B. Use fixture attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units, and countertops.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

3.3 ADJUSTING

A. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

A. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION 064116

SECTION 075419 - THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL CONDITIONS

1.01 SECTION INCLUDES

A. Fully-adhered PVC roofing system including membrane, PVC flashings and other components for roof patching.

1.02 Related Work

The work includes but is not limited to the installation of:

1. Substrate Preparation
2. Roof Drains
3. Vapor Barrier
4. Wood Blocking
5. Insulation
6. Separation Layers
7. Roof Membrane
8. Fasteners
9. Adhesive for Flashings
10. Roof Membrane Flashings
11. Metal Flashings
12. Sealants

1.03 QUALITY ASSURANCE

A. This roofing system shall be applied only by a Roofing Applicator authorized by manufacturer prior to bid.

B. Upon completion of the installation and the delivery to manufacturer by the Applicator of certification that all work has been done in strict accordance with the contract specifications and manufacturer’s requirements, a manufacturer’s Technical Service Representative will review the installed roof system wherever a Standard or System warranty has been specified.

C. There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Owner, the Owner's Representative and manufacturer.

D. All work pertaining to the installation of Sarnafil membrane and flashings shall only be completed by Applicator personnel trained and authorized by Sika Sarnafil in those procedures.

1.04 SUBMITTALS

Submit the following:

A. Copies of Specification.

B. Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.

C. Written approval by the insulation manufacturer (as applicable) for use and performance of the product in the proposed system.

D. Sample copy of manufacturer’s warranty.

E. Sample copy of Applicator's warranty.

F. Dimensioned shop drawings which shall include:

1. Outline of roof with roof size and elevations shown.
2. Profile details of flashing methods for penetrations.
3. Technical acceptance from manufacturer.

G. Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and other industry standards or practices.

H. Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.

I. Material Safety Data Sheets (MSDS)

1.05 CODE REQUIREMENTS

The Applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.

A. System shall be designed to meet a minimum wind design requirements of the most recent version of ASCE 7.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

B. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

C. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

D. As a general rule all adhesives shall be stored at temperatures between 40 degree F and 80 degree F. Read instructions contained on adhesive canister for specific storage instructions.

E. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.

F. Any materials which the Owner's representative or manufacturer determine to be damaged are to be removed from the job site and replaced at no cost to the Owner.

1.07 JOB CONDITIONS

A. Materials may be installed under certain adverse weather conditions but only after consultation with manufacturer, as installation time and system integrity may be affected.

B. Only as much of the new roofing as can be made weather tight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat welded before leaving the job site that day.

C. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.

D. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.

E. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

F. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

G. The Applicator is cautioned that certain PVC membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with PVC membranes. The Applicator shall consult the manufacturer regarding compatibility, precautions and recommendations.

H. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.

I. Prior to and during application, all dirt, debris and dust shall be removed from surfaces by vacuuming, sweeping, blowing with compressed air or similar methods.

J. The Applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.

K. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.

L. All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.

M. The Applicator shall take precautions that storage and application of materials and equipment does not overload the roof deck or building structure.

N. Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.

O. All rooftop contamination that is anticipated or that is occurring shall be reported to manufacturer to determine the corrective steps to be taken.

P. The Applicator shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing (letter copy to manufacturer) to the Owner's Representative for corrective action prior to the installation of the roof system.

Q. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition in writing for correction.

R. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's satisfaction.

S. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.

T. The Applicator shall conduct fastener pullout tests in accordance with the latest version of the SPRI/ANSI Fastener Pullout Standard to verify condition of the deck/substrate and to confirm expected pullout values.

U. The membrane shall not be installed under the following conditions without consulting manufacturer’s Technical Dept. for precautionary steps:

1. The roof assembly permits interior air to pressurize the membrane underside.
2. Any exterior wall has 10 percent or more of the surface area comprised of opening doors or windows.
3. The wall/deck intersection permits air entry into the wall flashing area.

V. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.

W. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

X. Membranes are slippery when wet or covered with snow, frost, or ice. Working on surfaces under these conditions is hazardous. Appropriate safety measures must be implemented prior to working on such surfaces. Always follow OSHA and other relevant fall protection standards when working on roofs.

1.08 WARRANTIES

A. System Warranty

Upon successful completion of the work to manufacturer's satisfaction and receipt of final payment, the System Warranty shall be issued.

B. Owner Responsibility

Owner shall notify both manufacturer and the Applicator of any leaks as they occur during the time period when both warranties are in effect.

1.09 WARRANTY DURATIONS

A. Sika Sarnafil's warranty shall be in effect for a 20 year duration.

PART 2 - PRODUCTS

2.01 GENERAL

A. The components of the Sika Sarnafil Adhered roof system are to be products of Sika Sarnafil as indicated on the Detail Drawings and specified in the Contract Documents.

B. Components to be used that are other than those supplied or manufactured by Sika Sarnafil may be submitted for review and acceptance by Sika Sarnafil. Sika Sarnafil's acceptance of any other product is only for a determination of compatibility with Sika Sarnafil products and not for inclusion in the Sika Sarnafil warranty. The specifications, installation instructions, limitations, and restrictions of the respective manufacturers must be reviewed by the Owner's Representative for acceptability for the intended use with Sika Sarnafil products.

C. Manufacturer to have a minimum of two years experience recycling their membranes at the end of their service life back into new membrane products. Provide a minimum of five reference projects.

D. Condensation or moisture migration into the roof system must be controlled so that it does not compromise the performance of the insulation and other components of the assembly. Moisture vapor tends to migrate from warmer to cooler areas. Air/vapor

retarders are used to inhibit or block the flow of warm moist air into the roof system. To determine if an air/vapor barrier is necessary, a design professional with experience with air handling and moisture control should be consulted.

Special consideration should be given to construction related moisture. An example is the significant amount of moisture generated when concrete floor slabs are poured after the roof has been installed. Sika Sarnafil is not responsible for damage to the insulation when exposed to construction related moisture.

2.02 MEMBRANE

A. Basis of Design:
1. Manufacturer: Sika Sarnafil
2. Product/System: Sarnafil Roof System G410 Textured membrane, fully adhered.

B. Membrane shall conform to ASTM D4434 (latest version), “Standard for Polyvinyl Chloride Sheet Roofing,” Classification: Type III.

1. G410, 60 mil, thermoplastic membrane with fiberglass reinforcement and felt backing. Textured surface.

C. Certified Polymer Thickness

1. Membrane manufacturer is to certify that the polymer thickness is of the polymer thickness specified (see 2.02, C, 1). Certification is to be signed by the membrane manufacturer’s quality control manager. ASTM +/- tolerance for membrane thickness is not accepted.

D. Color of Membrane

1. At Textured Roof Locations: Standard gray color.

E. Typical Physical Properties

2.03 FLASHING MATERIALS

A. Wall/Curb Flashing

1. Sarnafil G410-15 60 mil Membrane

A fiberglass reinforced membrane adhered to approved substrate using Sarnacol adhesive.

2. Sarnaclad

A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 24 gauge, G90 galvanized metal sheet with a 20 mil unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft and 4 ft x 10 ft.

3. Sarnaclad

   A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 24 gauge, G90 galvanized metal sheet with a 20 mil unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft and 4 ft x 10 ft.

4. Non-Typical Edge

   Project-specific perimeter edge detail reviewed and accepted for one-time use by Sika Sarnafil's Technical Department. Consult Regional Technical Manager prior to job start for review and consideration for acceptance.

B. Miscellaneous Flashings and Accessories

1. Sarnastack

   A prefabricated vent pipe flashing made from 0.048 inch (48 mil) thick Sarnafil G410 membrane. Available in five different sizes.

2. Sarnadrain-RAC

   PVC-coated, heavy-duty aluminum roof drain insert that mechanically seals to the drainpipe interior. Sarnadrain-RAC is made of 0.080 inch thick 6063 aluminum with a urethane seal installed at the end of the drainpipe. The large 14 inch x 14 inch drain strainer is also made of 0.080 inch thick aluminum stock. The flange dimensions of Sarnadrain-RAC are 18 inches x 18 inches. Provide one overflow-type at each pair of existing drains. Provide custom flange sizes as needed to suit project conditions.

3. Sarnacorners - Inside

   Prefabricated inside corners made of 0.060 inch (60 mil) thick membrane that are heat-weldable to membrane or Sarnaclad base flashings.

4. Sarnacorners - Outside

   Prefabricated outside corners made of 0.060 inch (60 mil) thick membrane that are heat-weldable to membrane or Sarnaclad base flashings.

5. Open Post Flashing

   Prefabricated post flashing, 0.048 inch (48 mil) thick, with an open seam used to flash obstructed rooftop conduits and pipes 1/2 to 1-1/4 inch in diameter. Available in 2 sizes; 1/2 to 3/4 inch and 3/4 to 1-1/4 inch diameter. Open Post Flashings are heat welded in place and terminated at the top of the penetration completing the pipe penetration detail.

6. Sikaflex-1a Sealant

A proprietary sealant used at flashing terminations. Consult Product Data Sheet for additional information.

7. Sarnacol 2170 Adhesive

   A solvent-based reactivating adhesive used to attach membrane to flashing substrate.

8. Sarnacol 2170 VC Adhesive

   A solvent-based, low VOC, reactivating adhesive used to attach membrane to flashing substrate.

9. S327 Coverstrip

   9 inch wide precut flashing made from Sarnafil S327 polyester reinforced membrane. Used to coverstrip Sarnabar and Sarnadisc.

2.04 INSULATION/OVERLAYMENT/BARRIER BOARD

A. Coverboard: Georgia-Pacific DensDeck Prime roof board, ½ inch thickness, or equal approved by manufacturer.

B. Vapor Barrier: Sarnavap self-adhered vapor barrier, 32 mil thickness, suitable for use as a temporary roof membrane.

2.05 MISCELLANEOUS ACCESSORIES

A. Aluminum Tape

A 2 inch wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at Sarnaclad joints.

B. Multi-Purpose Tape

A high performance sealant tape used with metal flashings as a preventive measure against air and wind blown moisture entry.

2.06 SEALANTS AND PITCH POCKET FILLERS

A. Sarnafil Sikaflex-1a Sealant (for termination details).

B. Depending on substrates, the following sealants are options for temporary overnight tie-ins:

1. Type III hot asphalt conforming to ASTM D312 (latest version).
2. Sarnafiller.
3. Multiple layers of roofing cement and felt.
4. Spray-applied, water-resistant urethane foam.
5. Mechanical attachment with rigid bars and compressed sealant.

2.07 MISCELLANEOUS FASTENERS AND ANCHORS

A. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1-1/4 inch and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch and shall be approved for such use by the fastener manufacturer.

2.08 RELATED MATERIALS

A. Wood Nailer

Treated wood nailers shall be installed into the structural purlins at the perimeter of the entire roof and around such other roof projections and penetrations as specified on Project Drawings. Thickness of nailers must match the insulation thickness to achieve a smooth transition. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated) and be #2 quality or better lumber. Creosote or asphalt-treated wood is not acceptable. Wood nailers shall conform to Factory Mutual Loss Prevention Data Sheet 1-49. All wood shall have a maximum moisture content of 19 percent by weight on a dry-weight basis.

2.09 SHEET METAL COPINGS AND FLASHINGS

A. Sheet Metal Copings and other flashings exposed to view: 24 gage, galvanized steel with Kynar PVF2 finish. Fabricate and install with standing seam joints. Colors as selected.

B. Coping Cleats and other sheetmetal flashing not exposed to view: 22 gage, galvanized steel or stainless steel as noted on drawings. Solder watertight where indicated.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION CONFERENCE

A. The Applicator, Owner's Representative/Designer and Manufacturer(s) shall attend a pre-construction conference.

B. The meeting shall discuss all aspects of the project including but not limited to:

1. Safety
2. Set up
3. Construction schedule
4. Contract conditions
5. Coordination of the work

3.02 SUBSTRATE CONDITION

A. Applicator shall be responsible for acceptance or provision of proper substrate to receive new roofing materials.

B. Applicator shall verify that the work done under related sections meets the following conditions:

1. Roof drains, gutters and scuppers have been reconditioned or replaced and installed properly.
2. Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.
3. All surfaces are smooth and free of dirt, debris and incompatible materials.
4. All roof surfaces shall be free of water, ice and snow.

3.03 SUBSTRATE PREPARATION

The roof deck and existing roof construction must be structurally sound to provide support for the new roof system. The Owner's Representative and Applicator shall determine the condition of the roof deck. Deteriorated decking or wet or deteriorated materials are to be removed and replaced. The Applicator shall load materials on the rooftop in such a manner as to eliminate risk of deck overload due to concentrated weight. The Owner's Representative shall ensure that the roof deck is secured to the structural framing according to local building code and in such a manner as to resist all anticipated wind loads in that location. A structural evaluation by a licensed structural engineer should be performed to determine that the combined weight of the roofs, other collateral, and live loads do not exceed the load capacity of the structure.

The existing metal roof system is to be removed and recycled or otherwise legally disposed of by the applicator. Applicator is responsible for all costs associated with removing the existing roof, hauling, and dump fees.

3.04 SUBSTRATE INSPECTION

A. A dry, clean and smooth substrate shall be prepared to receive the Sika Sarnafil fully adhered roof system.

B. The Applicator shall inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.

C. The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until all defects have been corrected.

D. All roof surfaces shall be free of water, ice and snow.

E. Compressible fill material or spray, expanding urethane foam shall be used to minimize air infiltration under wood nailers for corrugated metal roof panels.

F. Sika Sarnafil shall be applied over compatible or acceptable substrates only.

3.05 VAPOR BARRIER/AIR BARRIER INSTALLATION

A. Sarnavap Self-Adhered

A. Primer Application

The substrate must be clean, dry and free of dust, grease or other contaminants. Shake well before using. Apply to clean and dry surfaces with a paint brush, roller or sprayer. Application rates will vary depending on substrate. Sarnavap Self-Adhered vapor barrier must be installed on the same day as the primer application. Acceptable substrates for primer application include wood, concrete, lightweight concrete, gypsum boards and decks. Drying time is typically 30 minutes to 3 hours.

Spraying equipment recommendations:
a) Spray tip size: between 20 and 25 mils.
b) Pressure: 1300 psi continuous

To Install:
a) Apply primer to prepared substrate.
b) Allow primer to dry completely.
c) Install Sarnavap Self-Adhered vapor barrier.

Notes:
a) Do not install when it is raining, snowing, or on wet/humid surfaces.
b) Install Sarnavap Self-Adhered Primer at temperatures 32 degree F (0 degree C) and above. Average coverage rate is 0.25 to 1.22 gallons per square (0.1 to 0.5 L per m²).
c) Install Sarnavap Self-Adhered Primer WB at temperatures 41 degree F (5 degree C) and above. Average coverage rate is 0.25 to 0.75 gallon per square (0.1 to 0.3 L per m²). KEEP FROM FREEZING.
d) Do not use Sarnavap Self-Adhered Primer WB to seal Sarnavap Self-Adhered vapor barrier membrane joints.
e) Sarnavap Self-Adhered Primer WB is not suitable for plastic surfaces.
f) Do not use Sarnavap Self-Adhered Primer WB on asphaltic boards.

1. Membrane Application Over Steel, Wood or Concrete Deck (New Construction or Reroofing with Removal of Existing Roofing):

Install Sarnavap Self-Adhered over a clean and dry substrate. In concrete deck applications concrete must be fully dry. Do not install when it is raining, snowing, or on wet/humid surfaces. Install in temperatures 14 degree F (-10 degree C) and above. The use of a primer is required on the following substrates: wood, concrete, lightweight concrete, gypsum boards and decks. On metal decks use a metal plate (6 x 42 inches - 15 x 106 cm) to support the membrane end lap between metal flutes ensuring a complete end lap seal.

a) Begin application at the bottom of the slope. Unroll Sarnavap Self-Adhered onto the substrate without adhering for alignment. Overlap each preceding sheet by 3 inches (75 mm) lengthwise following the reference line and by 6 inches (150 mm) at each end. Stagger end laps by at least 12 inches (300 mm). Do not immediately remove the silicone release sheet.

b) Once aligned, peel back a portion of the silicone release sheet and press the membrane onto the substrate for initial adherence. Hold Sarnavap Self-Adhered tight and peel back the release sheet by pulling diagonally.

c) Use a minimum 100 lb (45 kg) steel, membrane roller, by rolling in two directions to press Sarnavap Self-Adhered down into the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped under the laps. Squeeze out air bubbles by pushing the roller to the edge of the laps.

3.06 WOOD NAILER INSTALLATION

A. Install continuous wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings.

B. Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons per lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Nailer attachment shall also meet the requirements of the current Factory Mutual Loss Prevention Data Sheet 1-49.

C. Thickness shall be as required to match substrate and insulation height to allow a smooth transition.

D. Any existing nailer woodwork which is to remain shall be firmly anchored in place to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons per lineal meter) in any direction and shall be free of rot, excess moisture or deterioration. Only woodwork shown to be reused in Detail Drawings shall be left in place. All other nailer woodwork shall be removed.

E. Stainless steel, corrosion resistant, fasteners are required when mechanically attaching any Sika Sarnafil product to wood nailers and wood products treated with ACQ (Alkaline copper Quaternary). When ACQ treated wood is used on steel roof decks or with metal

edge detailing, a separation layer must be placed between the metal and ACQ treated wood.

3.07 INSULATION INSTALLATION

A. Insulation shall be installed according to insulation manufacturer's instructions.

B. Insulation shall be neatly cut to fit around penetrations and projections with gaps not exceeding 1/4 inch.

C. If applicable, install tapered insulation around drains creating a drain sump.

D. Do not install more insulation board than can be covered with Sarnafil membrane by the end of the day or the onset of inclement weather.

E. Use at least 2 layers of insulation when the total insulation thickness for the overlayment exceeds 2-1/2 inches. Stagger joints at least 12 inches between layers.

F. Mechanical Attachment

1. Insulation shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to the insulation manufacturer's and Sika Sarnafil's recommendations for fastening rates and patterns, but not less than 1 fastener per 4 square feet . The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate. Each insulation board shall be installed tightly against the adjacent boards on all sides.

2. Fasteners are to be installed consistently in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration of 1 inch through the structural deck. Do not penetrate substrate at exposed eave locations.

3. Use fastener tools with a depth locator and torque-limiting attachment as recommended or supplied by fastener manufacturer to ensure proper installation.

3.08 INSTALLATION OF MEMBRANE

The surface of the insulation or substrate shall be inspected prior to installation of the Sarnafil roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged insulation boards shall be removed and replaced.

C. Sarnacol 2170 / 2170 VC Adhesive:

1. Over the properly installed and prepared substrate surface, adhesive shall be applied using solvent-resistant 3/4 inch (19 mm) nap paint rollers. The adhesive shall be applied to the substrate at a rate according to Sika Sarnafil requirements. No

adhesive is applied to the back of the G410 feltback membrane. The adhesive shall be applied in smooth, even coats with no gaps, globs, puddles or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be coated with adhesive. The first layer of adhesive shall be allowed to dry completely prior to installing a second layer of adhesive and the membrane.

2. The G410 feltback roof membrane is unrolled immediately into a second layer of wet adhesive. Adjacent to that first installed roll of membrane, another second layer of wet adhesive is applied and the second roll of membrane is immediately unrolled into it, overlapping the first roll by 3 inches (75 mm). This process is repeated throughout the roof area. Immediately after application into adhesive, each roll shall be pressed firmly in place with a minimum 100 lb (45 kg) steel, membrane roller, by rolling in two directions. Do not allow the second application of adhesive to dry at all!

3. Weld G410 coverstrips at all G410 feltback seams that do not have a factory selvage edge.

   Notes:

   a) The Applicator shall count the amount of pails of adhesive used per area per day to verify conformance to the specified adhesive rate.
   b) No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.

3.09 HOT-AIR WELDING OF SEAM OVERLAPS

A. General

1. All seams shall be hot-air welded. Seam overlaps should be 5-1/2 inches wide for Sarnadisc and Sarnadisc-XPN, and 7 inches wide for Sarnadisc-MAXLoad when automatic machine-welding and 4 inches wide when hand-welding, except for certain details.

2. Welding equipment shall be provided by or approved by Sika Sarnafil. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Sika Sarnafil Technical Service Representative prior to welding.

3. All membrane to be welded shall be clean and dry.

B. Hand-Welding

Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.

2. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the

membrane begins to "flow", the hand roller is positioned perpendicular to the nozzle and rolled lightly. For straight seams, the 1-1/2 inch wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch wide nozzle shall be used.

C. Machine Welding

1. Machine welded seams are achieved by the use of Sika Sarnafil's automatic welding equipment. When using this equipment, Sika Sarnafil's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated simultaneously off the generator.

2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams

1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark gray material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator at locations as directed by the Owner's Representative or Sika Sarnafil's representative. One inch wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

3.10 MEMBRANE FLASHINGS

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

A. Sarnacol Adhesive for Membrane Flashings

1. Over the properly installed and prepared flashing substrate, Sarnacol adhesive shall be applied according to instructions found on the Product Data Sheet. The Sarnacol adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.

2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

B. Install Sarnastop according to the Detail Drawings with approved fasteners into the structural deck at the base of parapets, walls and curbs.

C. Sika Sarnafil's requirements and recommendations and the specifications shall be followed. All material submittals shall have been accepted by Sika Sarnafil prior to installation.

D. All flashings shall extend a minimum of 8 inches above roofing level unless otherwise accepted in writing by the Owner's Representative and the Sika Sarnafil Technical Department.

E. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the Sarnafil membrane.

F. All flashing membranes shall be mechanically fastened along the counter-flashed top edge with Sarnastop at 6-8 inches on center.

G. Sarnafil flashings shall be terminated according to Sika Sarnafil recommended details.

H. All adhered flashings that exceed 30 inches in height shall receive additional securement. Consult Sika Sarnafil Technical Department for securement methods.

I. All mechanically-attached flashings that exceed 18 inches in height shall receive additional securement. Consult Sika Sarnafil Technical Department for securement methods.

3.11 METAL FLASHINGS

A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:

1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).
2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.

B. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.

C. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.

D. Metal joints shall be watertight.

E. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch.

F. Airtight and continuous metal hook strips are required behind metal fascias. Hook strips are to be fastened 12 inches on center into the wood nailer or masonry wall.

G. Counter flashings shall overlap base flashings at least 4 inches.

H. Hook strips shall extend past wood nailers over wall surfaces by 1-1/2 inch minimum and shall be securely sealed from air entry.

3.12 SARNACLAD METAL BASE FLASHINGS/EDGE METAL

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

A. Sarnaclad metal flashings shall be formed and installed per the Detail Drawings.

1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4 inches on center staggered. Fasteners shall penetrate the nailer a minimum of 1 inch.

2. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

B. Adjacent sheets of Sarnaclad shall be spaced 1/4 inch apart. The joint shall be covered with 2 inch wide aluminum tape. A 4 inch minimum wide strip of Sarnafil flashing membrane shall be hot-air welded over the joint.

3.13 EDGE METAL

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

3.14 TEMPORARY CUT-OFF

All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary waterstops shall be constructed to provide a 100 percent watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the waterstop. Waterstop shall be sealed to the deck and substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane shall be sealed in a continuous heavy application of sealant as described in Section 2.06. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and properly disposed of off site. None of these materials shall be used in the new work.

If inclement weather occurs while a temporary waterstop is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.

If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

3.15 COMPLETION

Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Sika Sarnafil shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and Sika Sarnafil prior to demobilization.

All Warranties referenced in this Specification shall have been submitted and have been accepted at time of contract award.

END OF SECTION 075419

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Urethane joint sealants.
2. Latex joint sealants.
3. Fire-resistive joint systems.

B. Related Sections:
1. Division 09 Section "Gypsum Board" for sealing perimeter joints.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:

    a. Each kind of sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

    a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

        1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 SUBMITTALS

A. Provide in accordance with Section 013300 “Submittal Procedures”.

B. Product Data: For each joint-sealant product indicated.

C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

D. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

E. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

F. Qualification Data: For qualified Installer.

G. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

I. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

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 joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

A. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use T.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Polymeric Systems, Inc.; PSI-270.
b. Tremco Incorporated; Dymeric 240 FC.

2.3 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Building Systems; Sonolac.
b. Bostik, Inc.; Chem-Calk 600.
c. Pecora Corporation; AC-20+.
d. Tremco Incorporated; Tremflex 834.

2.4 FIRE-RESISTIVE JOINT SYSTEMS

A. Where shown on Drawings, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

1. Fire-Resistance Rating: 1 Hour.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hilti, Inc.
b. 3M Fire Protection Products.
c. Equal approved by Architect.

2.5 JOINT SEALANT BACKING

A. General: Provide sealant backings of material 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.

B. Bond-Breaker Tape: 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. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: 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.

B. Cleaners for Nonporous Surfaces: 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.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.
c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

    a. Perform 3 tests for the first 50 Feet of joint length for each kind of sealant and joint substrate.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

    a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

    a. Whether sealants filled joint cavities and are free of voids.
    b. Whether sealant dimensions and configurations comply with specified requirements.
    c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Standard hollow metal doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSVSDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Details of anchorages, joints, field splices, and connections.

C. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements. Available manufacturers offering products that may be incorporated into the work but are not limited to the following:

1. Ceco Door Products; An Assa Abloy Group Company.
2. Curries Company.
3. Equal approved by Architect.

2.2 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Hollow-Metal Doors and Frames: NAAMM-HMMA 860. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches
    c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.032 inch.
    d. Edge Construction: Continuously welded with no visible seam.
    e. Core: Steel stiffened.
    f. Minimum 18 gauge steel with both lock and hinge rail edge of intermittently welded, filled and ground smooth the full height of the door.
        1) Ceco: Regent – 18 SEM
        2) Curries: 707N-18

3. Frames:

    a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch for frames that receive hollow-metal doors; minimum thickness of 0.042 inch for frames that receive hollow-core wood doors.
    b. Construction: Welded

4. Exposed Finish: Prime.

2.3 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.4 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

2.5 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
4. Jamb Anchors: Provide number and spacing of anchors as follows:
    a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.

4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.7 ACCESSORIES

A. Louvers: Provide louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch thick, cold-rolled steel sheet set into 0.032-inch thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

C. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
b. Install door silencers in frames before grouting.
c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions. Solidly pack mineral-fiber insulation behind frames.
3. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

C. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

3.5 PAINT SCHEDULE

A. Paint all hollow metal doors and frames to match existing.

END OF SECTION 081113

SECTION 087100 – DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. This section includes the following:
1. Door hardware

B. Related Sections:
1. Section 081113 Hollow Metal Doors and Frames

1.2 QUALITY ASSURANCE

A. Product Qualification:
1. To assure a uniform high quality of materials for the project, it is intended that only specified items be furnished. Comparable products may be accepted upon prior approval of architect.
2. Hardware to be new, free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer except where specified.

C. Installer Qualifications:
1. Installer to have not less than 3-year experience specializing in installation of work in this section. Company must maintain qualified personnel trained and experienced in installing hardware.

1.3 REFERENCES

A. NFPA101 – Life Safety Code
B. ANSI A117.1 Specifications for making Buildings usable by physically handicapped people.

1.4 SUBMITTALS

A. Hardware schedule: Submit 6 copies of schedule. Organize vertically formatted schedule into Hardware Sets with index of doors and headings, indication complete designations of every item required for each door or opening. Include the following:
1. Type, style, function, size, quantity and finish of hardware items.
2. Name, part number and manufacture of each item.
3. Fastenings and other pertinent information.
4. Explanation of abbreviations, symbols and codes contained in schedule.
5. Door and frame sizes, materials and degrees of swing.

B. Product Data: Submit 4 copies for each product indicated.

C. Templates: Obtain and distribute templates for doors, frames, and other works specified, to be prepared for installing door hardware.

E. Maintenance Data: For each type of door hardware to include in maintenance manuals specified in Division 1.

G. Samples: Upon request submit material samples.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products to project site under provisions of Division 1 and as specified herein.
B. Tag each item or package separately, with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
C. Deliver keys to Owner by registered mail.

1.6 WARRANTY:

A. The finish hardware shall have a limited warranty against defects in workmanship and operation for a period of one year from date of substantial completions and the following items are as shown:

1.	Closers	Ten years mechanical, two years electrical.
2.	Exit Devices:	Three years mechanical, one year electrical
3.	Hinges	Life of the building.
4.	Locksets	Seven years

PART 2 PRODUCTS

2.1 MATERIAL AND FABRICATION

A. Provide all door hardware for complete work, in accordance with the drawings and as specified herein.

B. Provide items and quantities not specifically mentioned to ensure a proper and complete operational installation.

2.2 MANUFACTURERS:

A. Any item shown in the hardware schedule, but not listed below shall be supplied as shown unless otherwise approved by the Architect.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Hinges	(IVE) Ives	Mckinney, Bommer
Locks	(SCH) Schlage	None
Cylinders	(BES) Best	None
Exit Devices	(VON) Von Duprin	None
Closers	(LCN) LCN	None
Silencers	(IVE) Ives	Hager, Rockwood

Push & Pull Plates	(IVE) Ives	Hager, Rockwood
Kickplates	(IVE) Ives	Hager, Rockwood
Stops & Holders	(IVE) Ives	Hager, Rockwood
Overhead Stops	(GLY) Glynn-Johnson	None
Thresholds	(NGP) National Guard	Pemko, Zero
Seals & Bottoms	(NGP) National Guard	Pemko, Zero
Automatic Opener	(LCN) LCN	None
Prox Reader/Controllers	(SCE) Schlage Electonics	None
Pocket Set	(JOH) Johnson	Stanley

2.3 HANGING

A. Conventional Hinges: Hinge open width minimum, but of sufficient throw to permit maximum door swing. Steel or stainless steel pins.
1. Three hinges per leaf to 7 foot, 6 inch height. Add one for each additional 30 inches in height or any fraction thereof.
2. Provide 4 ½ x 4 ½ for 1 ¾" thick doors up to 36". Provide 5 x 4 ½ on doors over 36".
4. Pin tips, flat button, finish to match leaves

2.4 LOCKSETS, LATCHSETS, DEADBOLTS

A. Extra Heavy Duty Cylindrical Locks and Latches: as scheduled.

1. ANSI A156.2 Series 4000, Grade 1 Strength and Operational requirements.
   a. UL listed for A label and lesser class single doors up to 4ft x 8ft.
2. Meets A117.1 Accessibility Codes.
3. Latch bolts shall be steel with minimum ½" throw, deadlocking on keyed and exterior functions. ¾" throw anti-friction latch bolt on pairs of fire doors.
4. Lock case steel.
5. Lock shall incorporate one piece spring cage and spindle.
6. Locksets to be tested to exceed 3,000,000 cycles.
7. Strikes: 16 gage curved steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
8. Provide seven year warranty.
9. Lock Series and Design: Schlage ND series, "Rhodes" design.

2.4 CLOSERS

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 5,000,000 cycles.
4. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
5. Opening pressure: Exterior doors 8.5 lb., interior doors 5 lb., labeled fire doors 15 lb.

6. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
7. Non-flaming fluid will not fuel door or floor covering fires.

2.8 OTHER HARDWARE

A. Door stops: Provide stops to protect walls, casework or other hardware.
   1. Except as otherwise indicated, provide stops (wall, floor or overhead) at each leaf of every swinging door leaf.
   2. Where wall or floor stops are not appropriate, provide overhead holders.

B. Silencers
   1. Interior hollow metal frames, 3 for single doors, 4 for pairs of doors.

2.9 HARDWARE FINISH

A. Provide the following finishes unless noted differently in hardware groups.

Locks, Latches 626
Push, pulls - 630
Hinges, Exterior 630 Interior 626
Closers Alum
Exit Devices 626
Other hardware 626
Thresholds Alum
Weatherstrip/sweeps Alum

PART 3 EXECUTION

3.1 ACCEPTABLE INSTALLERS:

A. Factory trained, certified, and carries a factory-issued card certifying that person as a “Certified Installer”. Alternative: can demonstrate suitably equivalent competence and experience.

3.2 PREPARATION:

A. Ensure that walls and frames are square and plumb before hardware installation.
B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes. Notify Architect of any code conflicts before ordering materials.

3.3 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Locate floor stops not more than 4 inches from the wall. Drill pilot holes for fasteners in wood doors and/or frames.

3.4 ADJUSTING

A. Adjust and check for proper operation and function. Replace units which cannot be adjusted to operate freely and smoothly.

B. Hardware damaged by improper installation or adjustment methods to be repaired or replaced to Owner's satisfaction.

3.5 FOLLOW UP INSPECTION

A. Installer to provide letter of agreement to Owner that approximately 6 months after substantial completion, installer will visit project with representative of the manufacturers of the locking devices and door closers to accomplish the following:
1. Re-adjust locks and closers
2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.
3. Identify items that have deteriorated or failed.
4. Submit written report identifying problems and likely future problems.

3.6 DEMONSTRATION

A. Demonstrate electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures

3.7 PROTECTION/CLEANING

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
B. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.8 DOOR HARDWARE SCHEDULE

HW SET: 01

3	EA	HINGE	5BB1 4.5 X 4.5	652 IVE
1	EA	PASSAGE SET	ND10S RHO	626 SCH

1	EA	SURFACE CLOSER	1461 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	KICK PLATE	8400 4" X 1" LDW	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

END OF SECTION 087100

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Section 099123 – “Interior Painting"

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. USG Corporation.
5. Equal approved by Architect.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

C. Gypsum Ceiling Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

2.3 TRIM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. American Gypsum.
2. CertainTeed Corp.
3. Georgia-Pacific Gypsum LLC.
4. USG Corporation.
5. Equal approved by Architect.

B. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

a. Cornerbead.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board as indicated on drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

a. Match finish level of adjacent surfaces as required.

b. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093013 – CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Glazed wall tile.

B. Related Sections:
   1. Division 07 Section "Joint Sealants", for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
   2. Division 09 Section "Gypsum Board Assemblies", for cementitious backer units.

1.3 SUBMITTALS

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

B. Shop Drawings: Show locations of each type of tile and joint pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For accessories involving color selection.

D. Samples for Verification:

   1. Full-size sample for each tile type.
   2. Full-size units of each type of trim and accessory.

E. Qualification Data: For qualified Installer.

F. Maintenance Data to be included in maintenance materials.

1.4 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile from one source or producer.

   1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Pre-installation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store cladding and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS – Basis of Design

A. T-1: Daltile – Semi-Gloss, color: Arctic White 0190, 3x6. Installation pattern: brick.

2.2 MATERIALS

A. Epoxy Adhesive (ANSI A118.3)
1. Multi-component, factory prepared, 100 percent solid epoxy resin and hardener with sand or mineral filler material to be used as setting adhesive and joint filling grout for ceramic tile. Comply with ANSI A118.3 for thin-set applications for chemical resistant, water cleanable quarry tile installations.

2. Acceptable Products:
    a. a. 100% Solids Epoxy Mortar by Custom Building Products.
    b. b. Latapoxy 300 Epoxy Adhesive by Laticrete.
    c. c. Kerapoxy 410 Chemical Resistant Epoxy Mortar by Mapei.

B. Epoxy Grout
3. Multi-component, factory prepared, 100 percent epoxy resin and hardener with sand or mineral filler material.
4. Color: #185 New Taupe
5. Acceptable Products:
    a. a. 100% Solids Epoxy Grout by Custom Building Products.

C. Requests for substitutions will be considered in accordance with provisions of Section 016050..

2.3 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
1. Products:
    a. Dow Corning Corporation; Dow Corning 786.
    b. GE Silicones; Sanitary 1700.
    c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
    d. Tremco, Inc.; Tremsil 600 White.

D. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.
1. Products:
    a. Bostik; Chem-Calk 550.
    b. Mameco International, Inc.; Vulkem 245.
    c. Pecora Corporation; NR-200 Urexpan.
    d. Tremco, Inc.; THC-900.

2.4 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints that does not change color or appearance of grout.

D. Transitions: Provide appropriate Schluter transition strips where tile meets carpet. Where tiles of differing thicknesses meet up, it is acceptable to float the tiles to provide a smooth transition.

2.5 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 WATERPROOFING MEMBRANE

A. Prep walls and install pliable sheet-applied polyethylene waterproofing membrane and vapor-retarder
   1. Product:
      a. Schluter-Kerdi or approved equal

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove latex-portland cement grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
   3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

D. Provide final cleaning and sealing in accordance with section 017700.

3.5 WALL TILE INSTALLATION SCHEDULE

A. Tile Installation: Interior wall installation over waterproofing membrane and vapor-retarder, thin-set installation; TCA W244 and ANSI A108.5.
   1. Tile Type: As specified.
   2. Adhesive: Epoxy.
   3. Grout: Epoxy grout.

END OF SECTION 093013

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Thermoplastic-rubber base.

B. Related Sections:
1. 096516 Resilient Sheet Flooring

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size samples

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE (RB-1)

A. Manufacturers: Subject to compliance with requirements, provide products by the following

1. Roppe Corporation, USA or equal

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Style and Location:

a. Style B, Cove: Provide in areas with resilient flooring

1) Profile: Standard Toe Cove Base

C. Thickness: 1/8 inch

D. Height: 4 inches

E. Lengths: Coils in manufacturer's standard length or Cut lengths 48 inches long or coils in manufacturer's standard length.

F. Outside Corners: Job formed

G. Inside Corners: Job formed

H. Colors: As indicated by manufacturer's designations

a. 100 Black

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches.

    a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches.

    a. Miter corners to minimize open joints.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096516 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes vinyl sheet flooring.

B. Related Sections:
   1. 096513 Resilient Base and Accessories

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: In manufacturer's standard size, but not less than 6” x 9”.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient sheet flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for resilient sheet flooring installation and seaming method indicated.

   1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store resilient sheet flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F. Store rolls upright.

1.8 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive resilient sheet flooring during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during resilient sheet flooring installation.

D. Close spaces to traffic for 48 hours after resilient sheet flooring installation.

E. Install resilient sheet flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

B. FloorScore Compliance: Resilient sheet flooring shall comply with requirements of FloorScore certification.

2.2 VINYL SHEET FLOORING WITH BACKING (VSF-1)

A. Products: Subject to compliance with requirements, provide the following

1. Johnsonite

B. Product Standard: ASTM F 1303.

1. Type (Binder Content): Type I, minimum binder content of 90 percent
2. Wear-Layer Thickness: Grade 1.
3. Overall Thickness: 0.080” (2.0 mm)
4. Backing Class: Class B (nonfoamed plastic)

C. Sheet Width: As standard with manufacturer

D. Seamless-Installation Method: Heat welded

E. Colors and Patterns
1. Ruby Heterogeneous Vinyl Sheet Flooring; RBY-R, 049 Dover

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.

C. Seamless-Installation Accessories:

1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.

a. Color: Match flooring.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 7 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer's written recommendations, but not less stringent than the following:
    a. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 80 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient sheet flooring until it is the same temperature as the space where it is to be installed.

1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 RESILIENT SHEET FLOORING INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient sheet flooring.

B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.

C. Lay out resilient sheet flooring as follows:

1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Avoid cross seams.

D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.

E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

H. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.

B. Perform the following operations immediately after completing resilient sheet flooring installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient sheet flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 096516

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Steel.
2. Galvanized metal.
3. Wood.
4. Gypsum board.

B. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 06 Sections for shop priming carpentry with primers specified in this Section.

1.3 SUBMITTALS

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

B. Samples for verification for each color and finish specified

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Benjamin Moore & Co.
2. Kelly-Moore Paints.
3. Parker Paint Mfg. Co. Inc.
4. Rodda Paint Co.
5. Sherwin-Williams Company (The).

6. Miller Paint.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Floor Coatings: VOC not more than 100 g/L.
5. Shellacs, Clear: VOC not more than 730 g/L.
6. Shellacs, Pigmented: VOC not more than 550 g/L.
7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
10. Floor Coatings: VOC not more than 100 g/L.
11. Shellacs, Clear: VOC not more than 730 g/L.
12. Shellacs, Pigmented: VOC not more than 550 g/L.
13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.
b. Acrylonitrile.
c. Antimony.
d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.
u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

D. Colors: As indicated in a color schedule on drawings or as selected by Architect.

2.3 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

B. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.4 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

B. Quick-Drying Alkyd Metal Primer: MPI #76.

C. Waterborne Galvanized-Metal Primer: MPI #134.

2.5 WOOD PRIMERS

A. Interior Latex-Based Wood Primer: MPI #39.

2.6 LATEX PAINTS

A. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).

B. High-Performance Architectural Latex (Semigloss): MPI #141 (Gloss Level 5).

2.7 ALKYD PAINTS

A. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).

2.8 OIL BASED WOOD STAIN: MPI #90

A. Interior Oil Based Wood Stain.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Wood: 15 percent.
   2. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

   1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

F. Wood Substrates:

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.

G. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Tanks that do not have factory-applied final finishes.
e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

a. Switchgear.
b. Panelboards.
c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. High-Performance Architectural Latex System: MPI INT 5.1R.

a. Prime Coat: Quick-drying alkyd metal primer.
b. Intermediate Coat: High-performance architectural latex matching topcoat.
c. Topcoat: High-performance architectural latex semi-gloss.

B. Galvanized-Metal Substrates:

1. High-Performance Architectural Latex System: MPI INT 5.3M.

a. Prime Coat: Waterborne galvanized-metal primer.
b. Intermediate Coat: High-performance architectural latex matching topcoat.
c. Topcoat: High-performance architectural semi-gloss.

C. Gypsum Board Substrates Standard:

1. Alkyd Over Latex Primer System: MPI INT 9.2C.

a. Prime Coat: Interior latex primer/sealer.
b. Intermediate Coat: Interior latex matching topcoat.
c. Topcoat: Interior latex eggshell.

D. Plywood Substrates:

1. Alkyd Over Latex Primer System: MPI INT 9.2C-G5

a. Prime Coat: Interior latex primer/sealer.
b. Intermediate Coat: Interior alkyd matching topcoat.
c. Topcoat: Interior alkyd eggshell.

3.7 INTERIOR PAINT COLORS

A. PT-1 Match Existing

B. PT-2 Behr Kilz 710E-2 Pensive Sky

END OF SECTION 099123

SECTION 123661 - SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Quartz agglomerate countertops and backsplashes

B. Related Sections:
   1. 123623.13 Plastic Laminate Clad Countertops

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:
   1. One manufacturer’s standard size quartz agglomerate countertop sample

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.5 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOPS (SC-1)

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: Straight, slightly eased at top

2. Backsplash: Straight, slightly eased at corner

B. Countertops: 3cm thick, quartz agglomerate with front edge built up with same material

C. Backsplashes: 3cm thick, quartz agglomerate

D. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly

2.2 COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following

a. Cambria
b. Cosentino USA
c. Wilsonart

2. Colors and Patterns: Basis of Design:

a. Cambria Classic Collection; Snowdon White

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

1. Install backsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
2. Seal edges of cutouts in particleboard subtops by saturating with varnish.

END OF SECTION 123661

SECTION 22 00 00 - PLUMBING GENERAL CONDITIONS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Conform to General Conditions, Supplementary Conditions, the modifications thereto and Division 01 - General Requirements for all work in Division 22.

1.2 SUMMARY

A. Design Intent: Provide plumbing revisions, new piping and fixtures for an interior remodel.

B. Provide labor, materials and appliances necessary for satisfactory installation of mechanical work ready to operate in strict accordance with these specifications and drawings. Work of Division 22 includes, but is not limited to, that as delineated in the following specification sections:

22 00 00	Plumbing General Conditions
22 05 00	Common Work Results for Plumbing
22 07 00	Plumbing Insulation
22 11 00	Facility Water Distribution
22 13 00	Facility Sanitary Sewerage
22 23 00	Natural-Gas Systems
22 40 00	Plumbing Fixtures

C. TEST AND BALANCE: Provided by 23 05 93. Provide all necessary coordination, assistance and documentation.

1.3 CODES AND STANDARDS

A. Conform to following code and agency requirements having jurisdictional authority over mechanical installations.
1. Uniform Plumbing Code (UPC) with local amendments.
2. International Mechanical Code (IMC) with local amendments.
3. International Building Code (IBC) with local amendments.
4. International Fuel Gas Code (IFGC) with local amendments.
5. National Electrical Code (NEC) NFPA 70.
6. Requirements of OSHA and EPA.
7. National Fire Protection Association (NFPA) Codes and Standards.

8. ASME code for construction of pressure vessels.
9. American Gas Association (AGA) Standards.
10. ASTM, ANSI and NEMA standards, as referenced in subsequent sections.
11. Local Sewer District Requirements.
12. Local Water District Requirements.
13. Local Health Department Requirements.
14. Washington State Energy Code.

1.4 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to International Building Code with local amendments, FM and UL for fire resistance ratings and surface burning characteristics.

1.5 PRODUCT SUBSTITUTIONS:

A. Manufacturers and models of equipment and material indicated herein and on drawings are those upon which mechanical design is based. Other manufacturers with products considered equal in general quality may be listed without specific model designation. Manufacturers not listed must be submitted for approval.

B. Substitutions will be evaluated based on product manufacturer only. Specific product model, specifications, options and accessories will be evaluated during submittals. Approval of a manufacturer substitution does not constitute approval of the submitted product.

C. Any equipment other than the basis of design is considered a substitution.

D. In selecting substitute equipment, the Contractor is responsible for and must guarantee equal performance and fit. Cost of redesign and all additional costs incurred to accommodate the substituted equipment shall be borne by the Contractor.

E. Unless indicated otherwise, "or approved" may be assumed for all products in Division 22.

1.6 SUBMITTALS

A. Provide one electronic copy of product data submittals for all products listed under “Part 2 Products” of Division 22 and all additional products noted on drawings or required for completion of sequence of operations.

B. Electronic: **Submittals shall be complete in one PDF file with bookmarks for each Division. Multi-part submittals will be returned without review.**
1. First Page: Name of Project, Owner, Location & Contracting Company.
2. Index Page: List of specification sections with contents by Tag or item.
3. Bookmarks: Electronic bookmark of each specification section corresponding to listing in index.

4. Acceptable forms of delivery are:
   a. Email (for file sizes less than 10 MB)
   b. Online File Transfer: Dropbox, Google Drive or similar
   c. FTP: Architects or General Contractors file server (if available)

C. Clearly indicate on each page the equipment schedule designation (Tag) and/or specification section, as applicable. Indicate selected model and all accessories intended for use.

D. Equipment vendor cover page with contact information shall precede submittal by that vendor.

E. Submitted product information shall include (as applicable) but not be limited to the following information:
1. Product description
2. Manufacturer and model
3. Dimensions
4. Performance Ratings (i.e. capacity, rpm, HP, temperature)
5. Construction Materials
6. Ratings (i.e. UL, ASTM, NEMA, etc)
7. Electrical data
8. Sound level data (corresponding to scheduled values)
9. Vibration Isolation
10. Controls and wiring diagrams
11. Accessories
12. Engineering technical data (i.e. pressure drops, leakage rates, pump curves)

F. If requested by Architect or Engineer, submit Manufacturer's Installation Instructions on any equipment, procedures, or certifications so requested.

G. Do no ordering, fabrication or manufacturing of products until return of approved submittals.

1.7 SHOP DRAWINGS

A. The Contractor shall submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract Drawings are contemplated because of job conditions, interference or substitution of equipment, or when requested by the Engineer for purposes of clarification of the Contractor’s intent. Also submit detailed drawings, rough-in sheets, etc., for all special or custom-built items or equipment. Drawings and details under the section shall include (but not be limited to) the following, where applicable to this project:
1. Electrical interlock wiring diagrams.
2. Piping layout plans and interference details.
3. Custom sink layout.

B. By submission of plumbing shop drawings, the Contractor acknowledges that coordination has been done to ensure that all piping fits and no conflicts exist.

C. The Architect's review of shop drawings shall not relieve the Contractor of responsibility for deviations from the Contract drawings or specifications, unless he has, in writing, called the attention of the Architect to such deviations at the time of the submission, nor shall it relieve him from responsibility for errors or omission in such shop drawings.

1.8 PLUMBING PERMIT

A. Plumbing contractor shall prepare all documents for plumbing permit application, submit for and obtain the permit. All costs and fees to obtain the permit shall be paid by the Plumbing Contractor.

B. Contractor shall not commence work until permit is obtained. Contractor is solely responsible to insure that the permit application and any revisions are submitted in a timely manner so as not to impact project schedule.

1.9 QUALITY ASSURANCE

A. Perform Work in accordance with the Uniform Plumbing Code including State and local amendments.

B. Provide products requiring electrical connections listed and classified by UL as suitable for purpose specified and indicated.

C. Perform Work in accordance with Washington State Energy Code.

1.10 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years' experience.

B. Installer: Company specializing in performing Work of this section with minimum three years' experience.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect all equipment, materials, and insulation from weather, construction traffic, dirt, water, chemicals, and damage by storing in original packaging and under cover. Where original packaging is insufficient, provide additional protection. Maintain protection in place until installation.

C. Inspect all products and materials for damage prior to installation.

D. Protect piping from all entry of foreign materials by providing temporary end caps or closures on piping and fittings. Furnish temporary protective coating on cast iron and steel valves.

E. Protect materials and finishes during handling and installation to prevent damage.

F. Comply with manufacturer's installation instruction for rigging, unloading and transporting units.

G. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.12 ENVIRONMENTAL REQUIREMENTS

A. Do not apply fire stopping materials when temperature of substrate material and ambient air is below 60 degrees F. Maintain this minimum temperature before, during, and for minimum 3 days after installation of fire stopping materials.

B. Provide ventilation in areas to receive solvent cured materials.

C. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer. Maintain temperature during and after installation for minimum period of 24 hours.

1.13 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

B. Verify by field measurements, sizes and configurations are compatible with wall construction and layout.

C. Existing systems and utility lines indicated on drawings are in accordance with information furnished to the Architect and may not be complete. Contractor is responsible for locating, uncovering, disposing of or maintaining existing systems.

1.14 COORDINATION

A. Visit the site and become familiar with existing conditions affecting work.

B. Existing systems and utility lines indicated on drawings are in accordance with information furnished to the Architect and may not be complete. Contractor is responsible for locating, uncovering, disposing of or maintaining existing systems.

C. Plumbing drawings are diagrammatic and do not indicate all possible site conditions. The contractor shall verify all measurements, dimensions and connections on site and coordinate between trades to preclude interferences.

The contractor shall provide adjustments to piping as necessary to fit conditions including but is not limited to relocation, offsets, and transitions.

D. In the event of a conflict with other trades of work, the following priority from highest to lowest shall be followed: Structural, lighting, HVAC, plumbing/piping and sprinklers. Starting with the lowest priority, the HVAC, plumbing, and sprinkler contractors shall provide whatever materials, offsets, labor etc. is required to resolve the conflict.

E. When discrepancies occur between plans and specifications, the Architect will determine which takes precedence and the Contractor shall perform the selected requirement at no additional cost.

F. Prior to ordering equipment cross-check plumbing and electrical drawings and specifications to assure proper location and electrical characteristics of connections serving mechanical and electrical equipment.

G. Advise the Architect of any modifications required to suit equipment furnished. Costs for modifications due to equipment substitution will be borne by the contractor.

H. Wherever conflicts occur between different parts of the Contract Documents the greater quantity, the better quality, or larger size shall prevail unless the Architect informs the Contractor otherwise in writing.

I. The scale of each drawing is relatively accurate, but the Contractor is warned to obtain the necessary dimensions for any exact takeoffs from the Architect. No additional cost to the Owner will be considered for failure to obtain exact dimensions where not clear or in error on the drawings. Any device or fixture roughed in improperly and not positioned on implied centerlines or as required by good practice must be repositioned at no cost to the Owner.

J. Where the word ‘verify’ is used on the documents, the contractor shall field verify the existing conditions and modify the scope of the installation as required to meet the verified conditions without additional cost to the Owner.

K. Coordinate wall openings, piping rough-in locations, concrete housekeeping pads, and electrical rough-in locations to accommodate Work of this Section.

1.15 CUTTING, FITTING, REPAIRING AND PATCHING

A. Arrange and pay for all cutting, fitting, repairing, patching and finishing of work by other trades where necessary for installation of plumbing work. Perform work only with craftsmen skilled in their respective trades.

B. Cut all holes neatly and as small as possible to admit work. Perform cutting in manner so as not to weaken walls, partitions or floors. Drill holes required to be cut in floors without breaking out around holes.

1.16 SALVAGE

A. Remove excess piping and plug or cap any unused branch connections. Remove scrap pipe and all other excess materials from the site.

B. Comply with contractor’s Construction Waste Management Plan.

1.17 PROJECT CLOSEOUT

A. Completion, submission and approval of the following is required for final project closeout.
   1. Execution of Architect's and Engineer’s final observation reports (punchlist)
   2. Operating and Maintenance Manual
   3. Equipment and Pipe Cleaning
   4. Record Drawings
   5. Testing
   6. Warranty

B. See Division 01 for additional requirements.

1.18 OPERATING AND MAINTENANCE MANUALS

A. Contents: Furnish, in accord with Division 1, three (3) bound copies of operating and maintenance manuals to include the following:
   1. Manufacturers, suppliers, contractor names, addresses and phone numbers.
   2. Warranty service contractors' names, address and phone numbers (if different from above).
   3. Schedule and description of routine maintenance for each component to include oiling, lubrication and greasing data.
   4. Test data log.
   5. Manufacturer's cuts and rating tables, including brochures for all submittal items.
   6. Part numbers of all replaceable items.
   7. Control diagrams and operation sequence.
   8. Written guarantees.
   9. Record drawings corrected and completed.
   10. Completed equipment start-up forms and checklists.

B. Operation and Maintenance Data:
   1. Submit frequency of treatment required for interceptors. Include, spare parts lists, exploded assembly views for pumps and equipment.
   2. Submit fixture, trim, exploded view and replacement parts lists.
   3. Submit replacement part numbers and availability, and nearest service depot location and telephone number.

C. Binders:

1. Furnish typewritten or printed index and tabbed dividers between principal categories.
2. Bind each manual in a hard-backed loose-leaf binder.

D. Imprint on cover:
1. Name of project.
2. Owner.
3. Location of project.
4. Architect.
5. Contractor.
6. Year of completion.

E. Imprint on backing:
1. Name of project.
2. Year of completion.

F. Submittals:
1. Preliminary Copies: Prior to scheduled completion of the project, submit two copies for review by the Architect.
2. Final Copies: After approval of the preliminary copies, submit three (3) finished copies to the Owner.

1.19 EQUIPMENT AND PIPE CLEANING

A. Clean interior and exterior of all equipment. Equipment shall be free of dirt, construction debris, corrosion, etc.

B. Adequate provisions shall be made during construction to eliminate dirt, debris or other material from entering and collecting inside of pipe and equipment. Any collection of material shall be thoroughly cleaned before equipment startup and if necessary again before owner occupancy.

C. Clean exterior of all exposed pipe and equipment.

1.20 RECORD DRAWINGS

A. Submit one CD or DVD with all drawings in PDF format.

B. Show location of equipment, location and size of piping. Locate all valves and similar equipment with tag or label identification. Indicate locations and elevations of exterior pipe and utility connections. Maintain continuously updated drawings during progress of project.

C. Record actual locations of equipment, clean-outs, controlling devices, and all above grade, under-floor, and buried piping.

1.21 TESTING

A. Provide completed start-up forms and checklists.

B. Coordinate Test and Balance with Division 23 05 93. Provide all necessary assistance and documentation.

1.22 WARRANTIES AND CONTRACTOR'S GUARANTEE

A. All work, material and equipment shall be free of defect, complete and in perfect operating order at time of delivery to Owner.

B. Furnish one year warranty from date of substantial completion for all systems unless specifically noted otherwise.

C. Without cost to Owner, **correct all defects and failures discovered within one year from date of final acceptance**, except when in the opinion of the Architect a failure is due to neglect or carelessness of the Owner.

D. The guarantee of the Contractor is independent of shorter time limits by any manufacturer of equipment furnished. Submit with Operation and Maintenance Manual all guarantees that exceed one year (e.g.: water heaters).

E. The presence of any inspector or observer during any construction does not relieve the Contractor from responsibility for defects discovered after completion of the work.

PART 2 NOT USED

PART 3 EXECUTION

3.1 DOCUMENTATION

A. Additional plan submittals to reviewing authority: If additional drawing submittals are required at any time during construction contractor shall submit drawings, review with authority, and pick up subsequent approved drawings. Engineer will revise and/or prepare drawings for submittal.

3.2 INSPECTION

A. Do not allow any work to be covered up or enclosed until inspected, tested and approved by the Architect and all authorities having jurisdiction over the work.

B. Should any work be enclosed or covered up before such inspection and test, Contractor shall at his own expense uncover work, and after it has been inspected, tested and approved, make all repairs as necessary to restore all work disturbed by him to its original condition.

3.3 FIELD QUALITY CONTROL

A. Inspect installed fire stopping for compliance with specifications and submitted schedule.

B. Test domestic water piping system in accordance with applicable code and local authority having jurisdiction.

3.4 CLEANING

A. Clean adjacent surfaces of fire stopping materials.

B. Clean plumbing fixtures and equipment.

C. Use acceptable cleaning products per IAQ Management Plan.

3.5 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

B. Do not permit use of plumbing fixtures before final acceptance.

END OF SECTION

SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. General Plumbing Valves.
2. Hangers and Supports.
3. Firestopping.
4. Tags and Identification.
5. Execution

1.2 GENERAL REQUIREMENTS

A. Comply with requirements and recommendations of Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58 and SP-69.

B. Comply with Federal "Reduction of Lead in Drinking Water Act" – 2011. Pipes, pipe fittings, plumbing fittings and fixtures shall be "Lead Free" meaning not more than a weighted average of 0.25% lead in wetted surfaces.

1.3 SCOPE

A. This section includes products, assemblies and methods applicable to more than one of the systems specified in the following sections of Division 22.

1.4 MATERIALS AND EQUIPMENT

A. Where two or more units of same class of equipment are required, use products of a single manufacturer. All equipment shall be new and free from damage.

B. Provide major equipment components with manufacturer's name, address, catalog number and capacity indicated on a nameplate, securely affixed in a conspicuous place.

C. Furnish standard and fabricated hangers and supports complete with necessary inserts, bolts, nuts, rods, washers and other accessories.

1.5 QUALITY ASSURANCE

A. Installed products shall have surface Burning Characteristics: 25/50 flame spread/smoke developed index when tested in accordance with ASTM E84.

B. Perform work in accordance with local jurisdiction’s requirements and AWS D1.1 for welding hanger and support attachments to building structure.

PART 2 PRODUCTS

2.1 GENERAL VALVE REQUIREMENTS

A. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted. Brass valves are not permitted.

B. Valve Sizes: Same as upstream piping unless otherwise indicated.

2.2 GATE VALVES

A. Manufacturers: NIBCO or equal by Apollo, Hammond, Milwaukee, Stockham or approved equal.

B. 4 inches and Smaller: Use ball valve or butterfly valve in lieu of gate valve.

2.3 BALL VALVES

A. Manufacturers: NIBCO or equal by Apollo, Hammond, Milwaukee, Stockham or approved equal.

B. 2 inches and Smaller: Lead-Free, NSF-61-8, UPC-IGC-157, MSS SP 110, 600 psi WOG, two piece silicon performance bronze body, bronze trim, bronze ball, full port, PTFE seats, blow-out proof stem, solder or threaded ends with union, lever handle. For insulated piping provide 2" extended handles of non-thermal conductive material. Nibco Model T/S-585-80-LF.

2.4 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports with incompressible insulation inserts and shields for all piping to be insulated per 220700.
   1. Manufacturer: Pipe Shields, INC or approved equal.
   2. Material: Calcium Silicate or Uretherne per temperature application.
   3. Thickness: Insert thickness shall match required insulation thickness per 220700.

B. Secondary Pipe Positioning and Supports:
   1. Makeshift, field devised methods of plumbing pipe support, such as with the use of scrap framing materials, are not allowed. Support and positioning of piping shall be by means of engineered methods that comply with IAPMO PS 42-96. Hubbard "HOLDRITE" support systems or approved equal.
   2. For vertical mid-span supports of piping 4” and under, use HOLDRITE Stout Brackets™ with HOLDRITE Stout Clamps or two-hole pipe clamps (MSS Type 26).
   3. For plenum applications use pipe supports that meet ASTM E-84 25/50 standards, such as the HOLDRITE Flame Fighter™ or approved equal.

2.5 HANGER ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.6 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:
1. Ferrous Piping: Class 150, 300 psi CWP, malleable iron, threaded.
2. Copper Piping: Class 150, 300 psi CWP, bronze unions.
3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.7 FORMED STEEL CHANNEL

A. Manufacturers: Allied Tube & Conduit, B-Line Systems, Unistrut or approved equal.

B. Product Description: Galvanized 12 gage steel with holes 1-1/2 inches on center.

2.8 FIRESTOPPING-APPLIED

A. Manufacturers: RectorSeal, Dow Corning, 3M Fire Protection or approved equal.

B. General:
1. Fire stopping materials shall conform to Flame (F) and Temperature (T) ratings as required by applicable building codes and tested by nationally accepted test agencies per ASTM E 814 or UL 1479 fire tests for through penetrations, and ASTM E 1966 or UL 2079 for construction joints, and UL 2307 for perimeter edge joints.
2. Fire stopping material shall be free of asbestos, PCBs, ethylene glycol, and lead.
3. Do not use any product containing solvents or that requires hazardous waste disposal.
4. Fire stopping shall be performed by a contractor trained or approved by firestop manufacturer.
5. Select products with rating not less than rating of wall or floor being penetrated.

C. Single Source Responsibility: Provide firestop systems for all conditions from a single supplier.

D. Product Description: Provide Latex caulk/sealant, Silicone caulk/sealant, Intumescent Wrap Strip, Firestop Putty, Firestop Collar or Intumescent Sleeve to meet each specific application and performance requirement.

E. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

F. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
1. Forming/Damming Materials: Mineral fiberboard, backer rod or other type recommended by Manufacturer's tested system.

2.9 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches high.

B. Metal Tags: Brass, Aluminum or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges. Plain English designations.

C. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.

D. Tag Chart: Plain English designations so no chart or index is required.

2.10 PIPE MARKERS

A. Color and Lettering shall conform to ASME A13.1 and UPC. Specific examples are noted in the table below.

Service	Background Color	Letter Color	Legend
Domestic Cold Water	Green	White	DOMESTIC COLD WATER
Domestic Hot Water	Green	White	DOMESTIC HOT WATER
Natural Gas	Yellow	Black	NATURAL GAS

B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.1 EXISTING WORK

A. Provide access to existing piping and equipment and other installations remaining active and requiring access.

B. Extend existing piping installations using materials and methods compatible with existing installations.

3.2 SURFACE PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond of adhesives or firestopping.

C. Install backing or damming materials to arrest liquid material leakage.

D. Obtain permission from Architect/Engineer before drilling or cutting structural members.

E. Degrease and clean surfaces to receive adhesive for identification materials.

3.3 INSTALLATION - VALVES

A. Install valves with stems upright or horizontal, not inverted.

B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C. Install valves with clearance for installation of insulation and allowing access.

D. Provide access panels where valves and fittings are not accessible.

E. Insulate valves according to application in Section 22 07 00.

F. For installation of valves in domestic water systems refer to Section 22 11 00.

3.4 VALVE APPLICATIONS

A. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.5 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as scheduled.

B. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

C. Adjust hangers and supports as required to bring system to proper line and grade. Piping shall be plumb with floor and parallel/perpendicular to building structure.

D. Provide copper plated hangers and supports for copper piping, or sheet lead packing between pipe and hanger.

E. Provide clearance in hangers and from structure and other equipment for installation of insulation. Insulated piping shall have insulation run continuous through hangers and supports with use of rigid inserts. Insulation shall be glued

to both sides of insert at hangers and supports, no insulation gaps are allowed. Refer to Section 22 07 00.

F. Support of pipe, tubing and equipment shall be accomplished by means of engineered products, specific to each application. Makeshift, field devised methods shall not be allowed.

3.6 INSTALLATION-PIPING PROTECTION

A. Provide protective shield plates in concealed locations where piping, other than cast-iron or steel, is installed in studs, joists or rafters. Plates shall be 16 gage steel and cover the pipe area plus 2". Shields may be omitted if piping is more than 1-1/2" from nearest edge of structural member.

B. Prevent contact between dissimilar metals, such as copper tubing and steel, by use of copper-plated, plastic coated, or flexible materials. All supports which contact copper tubing shall be copper plated.

3.7 INSTALLATION – FIRESTOPPING AND SEALS AT PARTITIONS

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping and other items requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating and to uniform density and texture. Remove dam material after firestopping material has cured.

D. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.

E. Place intumescent coating in sufficient coats to achieve rating required.

F. Clean adjacent surfaces of firestopping materials.

G. Fire Rated Surface:
   1. Seal opening at floor, wall, partition, ceiling, and/or roof as follows:
      a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
      b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
      c. Pack void with backing material.
      d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.

H. Non-Rated Surfaces:

1. Seal opening through non-fire rated wall, partition, floor, ceiling, and/or roof opening as follows:
   a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
   b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
2. Install escutcheons where piping penetrates non-fire rated surfaces in occupied spaces.
3. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.
4. Interior partitions: Seal pipe penetrations air tight. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.8 INSTALLATION - IDENTIFICATION

A. Install identifying devices after completion of coverings and painting.

B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.

C. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.

D. Valve Tags: Identify valves in main and branch piping with tags.
   1. Do not provide numbered tags.
   2. Provide tags with plain English description of service and function. i.e. “Domestic Hot Water, Kitchen”

E. Pipe Labels: Identify piping, concealed or exposed, with plastic tape pipe markers.
   1. Identify service, flow direction, and pressure.
   2. Install in clear view and align with axis of piping.
   3. Locate identification on straight runs including risers and drops with spacing not to exceed 20 feet.
   4. Locate adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

F. Equipment and Valve Tag Index: Plain English designations so no chart or index is required.

3.9 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by firestoppping material installation.

3.10 SCHEDULES

A. Pipe Hanger Spacing

PIPE MATERIAL	MAXIMUM HANGER SPACING (Feet)	HANGER ROD DIAMETER (Inches)
Cast Iron (All Sizes)	5	3/8
Cast Iron (All Sizes) with 10 foot length of pipe	10	3/8
Copper Tube, 1-1/4 inches and smaller	6	1/2
Copper Tube, 1-1/2 inches and larger	10	1/2
PVC (All Sizes)	4	3/8
Steel, 3 inches and smaller	6	1/2
Steel, 4 inches and larger	12	3/8

END OF SECTION

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Piping system insulation.

1.2 QUALITY ASSURANCE

A. Provide insulation tested for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

B. All systems components subject to heat loss or gain, such as, piping, storage tanks, vessels, valves etc. shall be insulated to conform with the Washington State Energy Code (as minimum).

1.3 IDENTIFICATION

A. Insulation shall bear a manufacturer's mark indicating the product R-value or K-value and thickness. This mark shall be visible after installation and shall be repeated at an interval of no more than 10 feet.

PART 2 PRODUCTS

2.1 GLASS FIBER, RIGID

A. Manufacturers: Johns Manville Micro-Lok AP-T Plus or equal by Owens-Corning, Knauf or approved equal.

B. Insulation: Rigid, noncombustible. ASTM C547.
   1. 'K' factor: 0.23 at 75 degrees F.
   2. Fiberglass or Earthwool with ECOSE
   3. Maximum Service Temperature: 850 degrees F.
   4. Maximum Moisture Absorption: 0.2 percent by volume.
   5. Density: 3.0 lb/cu ft.

C. Vapor Retarder Jacket: ASJ+ or Type I, reinforced facing, paintable. Longitudinal acrylic adhesive closure system with factory supplied butt strips. ASTM C1136.

D. Rigid clamp/hanger insert: Preformed, incompressible (Calcium Silicate or similar), matching pipe size and insulation thickness.

2.2 POLYOLEFIN INSULATION

A. Manufacturers: IMCOA or similar.

B. Polyolefin or Polyethylene pipe insulation is **NOT ACCEPTABLE** for any application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify piping and equipment has been tested before applying insulation materials.

B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A. Apply insulation when building is thoroughly dry to prevent shrinkage.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulate entire piping system including fittings, valves, unions, flanges, strainers, flexible connections, pump fittings, connections to equipment and expansion joints. Use canvas jackets for valves and other irregular shapes.

D. Insulate flanges and unions with removable sections and jackets.

E. Piping Inserts and Shields:
1. Insulation shall be continuous through supports and hangers with incompressible inserts and shields. Do not directly clamp/support pipe scheduled to be insulated.
2. Shields: Galvanized steel saddle between pipe clevis hangers or pipe rollers and insulation. Minimum 6 inches long, of contour matching adjoining insulation; may be factory fabricated.
3. Inserts: Between pipe clamps, hangers or rollers and piping.
4. Insert material: Compression resistant insulating material suitable for insulation type and planned temperature range and service.
5. Glue insulation to both sides of insert.
6. Shields without inserts may be used at clevis hangers on refrigerant piping 5/8” and smaller with continuous insulation.

F. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions.

G. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.

H. Finish insulation at supports, protrusions, and interruptions.

3.3 SCHEDULES

A. Piping: Provide on piping as listed below.

		PIPE SIZE			
Service	**Insulation Type**	**<1”**	**1" to 1-1/4”**	**1-1/2" to 4"**	**4" to 8”**
Domestic Cold Water	Glass Fiber RIGID	1/2"	1/2"	1/2"	1/2"
Domestic Hot Water	Glass Fiber RIGID	1"	1"	1-1/2"	1-1/2"

END OF SECTION

SECTION 22 11 00 - FACILITY WATER DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Domestic water piping.
   2. Piping Accessories.

1.2 SCOPE

A. This section includes hot and cold water supply, equipment and accessories.

1.3 GENERAL REQUIREMENTS

A. Comply with Federal "Reduction of Lead in Drinking Water Act" – 2011. Pipes, pipe fittings, plumbing fittings and fixtures shall be "Lead Free" meaning not more than a weighted average of 0.25% lead in wetted surfaces.

1.4 QUALITY ASSURANCE

A. The mechanical press fitting manufacturer’s factory trained representative shall provide on-site training for contractor’s field personnel in the use of press fittings and crimping tools. The representative shall periodically visit the jobsite and review installation. (A distributor’s representative is not considered qualified to conduct the training or jobsite visit(s).)

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: Type L hard drawn seamless. ASTM B88.
   1. Fittings:
      a. Wrought copper and bronze. ASME B16.22, ASTM B75.
      b. Copper press with EPDM O-ring, ASME B16.22, 200 psi.
   2. Joints:
      a. Solder, lead free, 95-5 tin-antimony, or tin and silver. ASTM B32.
      b. Press connection, Viega ProPress or approved equal.

2.2 WATER HAMMER ARRESTORS

A. Manufacturers: Wade, PPP or approved equal.

B. ASSE 1010; stainless steel or copper construction, pre-charged, bellows or piston type sized in accordance with PDI WH-201.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel or groove plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with groove couplings, flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

B. Install piping on interior side of building insulation.

C. Protection: Where piping, other than cast iron or steel, is installed in a concealed location through holes or notches in framing (i.e. studs, joists, rafters, etc.), less than 1-1/2 from framing edge, provide shield plates. Shield plates shall be 16 gauge steel and cover the piping area within framing plus 2” on each side along framing.

D. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 22 07 00.

E. Install non-conducting dielectric connections wherever jointing dissimilar metals.

F. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

G. Insulate piping. Refer to Section 22 07 00.

H. Install pipe identification in accordance with Section 22 05 00.

3.3 INSTALLATION - DOMESTIC WATER PIPING SYSTEMS

A. Install domestic water piping system in accordance with ASME B31.9.

B. Install water piping on interior side of building insulation. Provide heat tape for all piping in unheated areas.

3.4 FIELD QUALITY CONTROL

A. Test domestic water piping system at 100 psig minimum for a period of not less than 4 hours.

3.5 CLEANING

A. Flush system with water for minimum of 60 minutes to remove all dirt and foreign materials. Use minimum of 80 psi flushing pressure.

B. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain residual from 50 to 80 mg/L.

C. Bleed water from outlets to obtain distribution and test for disinfectant residual at a minimum of 15 percent of outlets.

D. Maintain disinfectant in system for 24 hours.

E. Flush disinfectant from system until residual concentration is equal to incoming water or 1.0 mg/L.

END OF SECTION

SECTION 22 13 00 - FACILITY SANITARY SEWERAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Sanitary sewer piping, above grade.
2. Garbage disposals.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe & Fittings: ASTM A888, CISPI 301, hub-less. Made in USA by AB&I, Charlotte or Tyler marked with collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International.
1. Fittings: Long pattern cast iron.
2. Joints: Neoprene gasket ASTM C-564, all type 304 stainless steel clamp and shield assemblies, 80 in/lbs worm drive. FM-1680, Class 1. Husky, Mission, Clamp-All or approved equal.

B. **[VENT ONLY]** ABS Pipe: Schedule 40, ABS, DWV, Cellular Core, bell and spigot style solvent sealed ends (If approved by local authorities). NSF Standard 14, ASTM F628, ASTM D3965. **Not for use in air plenum.**
1. Fittings: ABS, DWV, ASTM D2661.
2. Joints: Solvent weld. ASTM D2235.

C. **[VENT ONLY]** PVC Pipe: Schedule 40 solid wall PVC, bell and spigot solvent sealed ends (If approved by local authorities). NSF Standard 14, ASTM D1785, ASTM D1784. **Not for use in air plenum.**
1. Fittings: Schedule 40, PVC, ASTM D2665.
2. Joints: Solvent weld with ASTM D2564 solvent cement.

2.2 GARBAGE DISPOSAL

A. Manufacturers: In-Sink-Erator or approved equal.

B. Commercial: Heavy duty quiet induction motor, auto-reverse grinding system, insulated outer shell, stainless steel grinding chamber and components, permanently lubricated bearings, dishwasher connection, 1 hp.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove scale and dirt, on inside and outside, before assembly.

B. Verify and provide required extensions, clamps and drain styles to match floor construction and finish.

3.2 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient at 1/4” per foot where possible, but in no case less than 1/8” per foot. Route parallel and perpendicular to walls.

B. Install piping on interior side of building insulation.

C. Protection: Where piping, other than cast iron or steel, is installed in a concealed location through holes or notches in framing (i.e. studs, joists, rafters, etc.), less than 1-1/2 from framing edge, provide shield plates. Shield plates shall be 16 gauge steel and cover the piping area within framing plus 2” on each side along framing.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

E. Insulate piping. Refer to Section 22 07 00.

F. Install pipe identification in accordance with Section 22 05 00.

3.3 INSTALLATION - SANITARY WASTE AND VENT SYSTEMS

A. Install sanitary waste and vent piping systems in accordance with ASME B31.9 and local plumbing code.

3.4 FIELD QUALITY CONTROL

A. Obtain written approval of local Plumbing Authority prior to covering or concealing any work.

B. Test sanitary waste and vent piping system to hydrostatic test of 10 feet head of water.

END OF SECTION

SECTION 22 23 00 - NATURAL GAS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Natural gas piping above grade.

1.2 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.

B. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded or threaded connections to valves, equipment.

C. Use ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

1.3 QUALITY ASSURANCE

A. Comply with requirements and recommendations of NFPA 54 and the International Fuel Gas Code.

B. Perform work in accordance with applicable code and local gas company requirements.

C. Furnish shutoff valves complying with ASME B16.33 or ANSI Z21.15.

PART 2 PRODUCTS

2.1 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53, Schedule 40 black, seamless. Manufactured in the USA.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234, forged steel welding type.
   2. Joints: 2 inch and smaller pipe - Threaded.

2.2 BALL VALVES

A. Manufacturers: Nibco, Stockham, Milwaukee, or approved equal.

B. 1/2 inch to 3/4 inch (appliance shutoff valve): 1/2 psi rated for indoor appliance connections per ANSI Z21.15. Forged brass body, chrome plated brass ball, fluorocarbon o-rings, brass stem, painted aluminum lever handle. (Nibco G10)

C. 1/4 inch to 1 inch: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, full port. (Nibco T585-70-UL)

2.3 FLEXIBLE PIPE CONNECTIONS

A. Tubing: Annealed, 304 stainless steel, ASTM A240

B. Fittings: Brass or stainless steel.

C. Coating: Yellow polymer.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside of pipe, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

A. Install natural gas piping in accordance with NFPA 54 and the International Fuel Gas Code.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Provide flexible pipe at connections to all equipment. Use sufficient length to allow for 4” of movement.

D. Grade horizontal pipe not less than ¼” in 15 feet.

E. Route piping in orderly manner and to conserve building space and not interfere with use of space.

F. Provide 6” long drip leg at bottom of vertical pipe.

G. Take from top or side of horizontal pipe.

H. Provide clearance for access to valves and fittings.

I. Provide access doors where valves and fittings are not exposed.

J. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.

K. Install identification on piping systems.

L. Install valves with stems upright or horizontal, not inverted.

M. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

3.3 FIELD QUALITY CONTROL

A. Pressure test natural gas piping in accordance with NFPA 54 and the International Fuel Gas Code.

B. Subject pipe to air pressure of 60 psig for 30 minutes with no perceptible drop in pressure.

C. When pressure tests do not meet specified requirements, remove defective work, replace and retest.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. General Plumbing Fixtures: Sinks.
2. Faucets and valves
3. Accessories.

1.2 SCOPE

A. This section includes all plumbing fixtures, trim and installation, to include owner furnished equipment.

1.3 REQUIREMENTS

A. Fixtures by type and material shall be of the same manufacturer except when scheduled or approved otherwise.

B. Fixtures shall be designed or equipped to meet the following water use efficiency standards:
1. Kitchen faucets 2.0 GPM

PART 2 PRODUCTS

2.1 SINKS

A. Manufacturers: Elkay, Just, Acorn or approved equal.

B. Single Compartment: Seamless 18 gauge. Type 304 stainless steel, self-rimming, radius corners, sound deadening undercoat.

2.2 FAUCET, SINK

A. Manufacturers: Chicago, Delta HDF, Symmons or approved equal.

B. Swing Spout:
1. Single Handle: Polished chrome plated cast brass, deck mount, metal lever handle, ceramic mixing cartridge, temperature limit stop. Spout length, drain and hole spacing as scheduled.

C. Gooseneck:
1. Dual Handle: Polished chrome plated cast brass, deck mount, metal indexed wristblade handles. Spout height, reach, drain and hole spacing as scheduled.

2.3 RECESSED VALVE BOX

A. Manufacturers: Guy Gray, Acorn, Oatey, Sioux Chief or approved equal.

B. General: Box construction shall match fire rating of wall.

C. Washing Machine: 2” drain socket, 3/4” hot & cold brass valves, wall brackets, face plate.

D. Water: 1/4 turn brass ball valve with recessed wall box, wall brackets, face plate.

2.4 INSTANTANEOUS HOT WATER DISPENSER

A. Manufacturers: In-Sink-Erator or approved equal.

B. 1/2 gallon insulated tank, 1.75 gal/hour capacity @ 190 F, 140-200 F adjustable thermostat, instant self-closing valve, chrome, UL listed.

2.5 FIXTURE SUPPLIES

A. Manufacturers: Brass Craft or approved equal.

B. Chrome plated brass angle stops with fixed key metal handle and chrome plated escutcheon. Chrome plated copper flexible supplies for exposed connections, braided supplies acceptable where concealed. Provide stop and supply type as applicable to specific fixtures.

2.6 TRAPS

A. Manufacturers: Brass Craft, Dearborn Brass or approved equal.

B. Adjustable type, polished chrome plated brass with escutcheon. Provide type as applicable to specific fixture installation. PVC acceptable only where concealed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify electric power is available and of correct characteristics.

C. For all lavatories and sinks verify required number of holes and hole spacing before ordering.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures and in accordance with manufacturer's details.

B. Locate fixtures in accordance with architectural drawings, details on structural drawings and/or Engineer's direction in field. Mount ADA fixtures according to dimensions on architectural drawings.

C. If drain, tailpiece, strainer or other accessories are not furnished by fixture manufacturer then provide accessories by Brass Craft or approved equal.

3.3 INSTALLATION

A. Support piping at stop, valve or flush valve.

B. Align fixtures and equipment installed in accord with architectural drawings.

C. Locate water recessed valve boxes for refrigerators at 18” AFF.

D. Locate water recessed valve boxes for coffee makers per architectural plans.

E. Seal fixtures to wall and floor surfaces with silicon sealant, color to match fixture.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and ordering.

3.5 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

END OF SECTION

SECTION 23 00 00 - HVAC GENERAL CONDITIONS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Conform to General Conditions, Supplementary Conditions, the modifications thereto and Division 01 - General Requirements for all work in Division 23.

1.2 SUMMARY

A. Design Intent: Provide ventilation and electric heat for interior fire station remodel.

B. Provide labor, materials and appliances necessary for satisfactory installation of mechanical work ready to operate in strict accordance with these specifications and drawings. Work of Division 23 includes, but is not limited to, that as delineated in the following specification sections:

23 00 00 HVAC General Conditions

23 05 00 Common Work Results for HVAC

23 05 93 Testing, Adjusting and Balancing

23 07 00 HVAC Insulation

23 09 00 Instrumentation and Control for HVAC

23 31 00 HVAC Ducts and Casings

23 33 00 Air Duct Accessories

23 34 00 HVAC Fans

23 37 00 Air Outlets and Inlets

23 82 00 Terminal Heating Units

1.3 CODES AND STANDARDS

A. Conform to following code and agency requirements having jurisdictional authority over mechanical installation.
1. Uniform Plumbing Code (UPC) with local amendments.
2. International Mechanical Code (IMC) with local amendments.
3. International Building Code (IBC) with local amendments.
4. International Fuel Gas Code (IFGC) with local amendments.
5. National Electrical Code (NEC) NFPA 70.
6. Requirements of OSHA and EPA.

7. National Fire Protection Association (NFPA) Codes and Standards.
8. ASME code for construction of pressure vessels.
9. American Gas Association (AGA) Standards.
10. ASTM, ANSI and NEMA standards, as referenced in subsequent sections.
11. Local Sewer District Requirements.
12. Local Water District Requirements.
13. Local Health Department Requirements.
14. Washington State Energy Code.

1.4 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to International Building Code with local amendments, FM, and UL for fire resistance ratings and surface burning characteristics.

1.5 PRODUCT SUBSTITUTIONS

A. Manufacturers and models of equipment and material indicated herein and on drawings are those upon which mechanical design is based. Other manufacturers with products considered equal in general quality may be listed without specific model designation. Manufacturers not listed shall be submitted for approval, see Division 01.

B. Substitutions will be evaluated based on product manufacturer only. Specific product model, specifications, options and accessories will be evaluated during submittals. Approval of a manufacturer substitution does not constitute approval of the submitted product.

C. Any equipment other than the basis of design is considered a substitution.

D. In selecting substitute equipment, the Contractor is responsible for and shall guarantee equal performance and fit. Cost of redesign and all additional costs incurred to accommodate the substituted equipment shall be borne by the Contractor.

E. Unless indicated otherwise, “or approved” may be assumed for all products in Division 23.

1.6 SUBMITTALS

A. Provide one electronic copy of product data submittals for all products listed under “Part 2 Products” of Division 23 and all additional products noted on drawings or required for completion of sequence of operations.

B. Electronic: **Submittals shall be complete in one PDF file with bookmarks for each Division. Multi-part submittals will be returned without review.**
1. First Page: Name of Project, Owner, Location & Contracting Company.
2. Index Page: List of specification sections with contents by Tag or item.
3. Bookmarks: Electronic bookmark of each specification section corresponding to listing in index.

4. Acceptable forms of delivery are:
   a. Email (for file sizes less than 10 MB)
   b. Online File Transfer: Dropbox, Google Drive or similar
   c. FTP: Architects or General Contractors file server (if available)

C. Clearly indicate on each page the equipment schedule designation (Tag) and/or specification section, as applicable. Indicate selected model and all accessories intended for use.

D. Equipment vendor cover page with contact information shall precede submittal by that vendor.

E. Submitted product information shall include (as applicable) but not be limited to the following information:
1. Product description
2. Manufacturer and model
3. Dimensions
4. Performance Ratings (i.e. capacity, rpm, HP, temperature)
5. Construction Materials
6. Ratings (i.e. UL, ASTM, NEMA, etc)
7. Electrical data
8. Sound level data (corresponding to scheduled values)
9. Vibration Isolation
10. Controls and wiring diagrams
11. Accessories
12. Engineering technical data (i.e. pressure drops, leakage rates, pump curves, fan curves)

F. If requested by Architect or Engineer, submit Manufacturer's Installation Instructions on any equipment, procedures, or certifications so requested.

G. Do no ordering, fabrication or manufacturing of products until return of approved submittals.

1.7 SHOP DRAWINGS

A. The Contractor shall submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract Drawings are contemplated because of job conditions, interference or substitution of equipment, or when requested by the Engineer for purposes of clarification of the Contractor’s intent.

B. Submit detailed drawings, rough-in sheets, etc., for all special or custom-built items or equipment. Drawings and details under the section shall include (but not be limited to) the following, where applicable to this project:
1. Electrical interlock wiring diagrams.
2. Piping layout plans and interference details.

C. By submission of piping and ductwork shop drawings, the Contractor acknowledges that coordination has been done to ensure that all piping and ductwork fits and that no conflicts exist.

D. The Architect's review of shop drawings shall not relieve the Contractor of responsibility for deviations from the Contract drawings or specifications, unless he has, in writing, called the attention of the Architect to such deviations at the time of the submission, nor shall it relieve him from responsibility for errors or omission in such shop drawings.

1.8 HVAC PERMIT

A. HVAC contractor shall prepare all documents for mechanical permit application, submit for, and obtain the permit. HVAC Contractor shall pay all costs and fees to obtain the permit.

B. Contractor shall not commence work until permit is obtained. Contractor is solely responsible to insure that the permit application and any revisions are submitted in a timely manner so as not to impact project schedule.

C. Contractor shall retain services of a third party structural engineer to provide support, anchoring and seismic calculations for all applicable equipment.

1.9 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.9 – Building Services Piping for installation of piping systems and ASME Section IX – Welding and Brazing Qualifications for welding materials and procedures.

B. Perform Work in accordance with the International Mechanical Code including State and local amendments.

C. Provide products requiring electrical connections listed and classified by UL as suitable for purpose specified and indicated.

D. Perform Work in accordance with Washington State Energy Code.

1.10 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' experience.

B. Installer: Company specializing in performing Work of this section with minimum three years' experience.

1.11 SEQUENCING

A. Sequence balancing between completion of systems tested and Date of Substantial Completion.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect all equipment, materials, and insulation from weather, construction traffic, dirt, water, chemicals, and damage by storing in original packaging and under cover. Where original packaging is insufficient, provide additional protection. Maintain protection in place until installation.

C. Inspect all products and materials for damage prior to installation.

D. Protect dampers from damage to operating linkages and blades.

E. Protect materials and finishes during handling and installation to prevent damage.

F. Comply with manufacturer's installation instruction for rigging, unloading and transporting units.

G. Comply with contractor’s construction Indoor Air Quality (IAQ) Plan.

1.13 ENVIRONMENTAL REQUIREMENTS

A. Do not apply fire stopping materials when temperature of substrate material and ambient air is below 60 degrees F. Maintain this minimum temperature before, during, and for minimum 3 days after installation of fire stopping materials.

B. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer. Maintain temperature during and after installation for minimum period of 24 hours.

C. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers. Maintain temperatures during and after installation of duct sealant.

1.14 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

B. Verify by field measurements, sizes and configurations are compatible with wall construction and layout.

C. Existing systems and utility lines indicated on drawings are in accordance with information furnished to the Architect and may not be complete. Contractor is responsible for locating, uncovering, disposing of or maintaining existing systems.

1.15 COORDINATION

A. Visit the site and become familiar with existing conditions affecting work.

B. Existing systems and utility lines indicated on drawings are in accordance with information furnished to the Architect and may not be complete. Contractor is responsible for locating, uncovering, disposing of or maintaining existing systems.

C. HVAC drawings are diagrammatic and do not indicate all possible site conditions. The contractor shall verify all measurements, dimensions and connections on site and coordinate between trades to preclude interferences. The contractor shall provide adjustments to piping or ductwork as necessary to fit conditions including but is not limited to relocation, offsets, and transitions.

D. In the event of a conflict with other trades of work, the following priority from highest to lowest shall be followed: Structural, lighting, HVAC, plumbing/piping and sprinklers. Starting with the lowest priority, the HVAC, plumbing, and sprinkler contractors shall provide whatever materials, offsets, labor etc. is required to resolve the conflict.

E. When discrepancies occur between plans and specifications, the Architect will determine which takes precedence and the Contractor shall perform the selected requirement at no additional cost.

F. Prior to ordering equipment cross-check mechanical and electrical drawings and specifications to assure proper location and electrical characteristics of connections serving mechanical and electrical equipment.

G. Advise the Architect of any modifications required to suit equipment furnished. Costs for modifications due to equipment substitution will be borne by the contractor.

H. Wherever conflicts occur between different parts of the Contract Documents the greater quantity, the better quality, or larger size shall prevail unless the Architect informs the Contractor otherwise in writing.

I. The scale of each drawing is relatively accurate, but the Contractor is warned to obtain the necessary dimensions for any exact takeoffs from the Architect. No additional cost to the Owner will be considered for failure to obtain exact dimensions where not clear or in error on the drawings. Any device or equipment roughed in improperly and not positioned on implied centerlines or as required by good practice shall be repositioned at no cost to the Owner.

J. Coordinate installation of roof curbs with roof structure, roof deck and roof membrane installation.

1.16 CUTTING, FITTING, REPAIRING AND PATCHING

A. Arrange and pay for all cutting, fitting, repairing, patching and finishing of work by other trades where necessary for installation of mechanical work. Perform work only with craftsmen skilled in their respective trades.

B. Cut all holes neatly and as small as possible to admit work. Perform cutting in manner so as not to weaken walls, partitions or floors. Drill holes required to be cut in floors without breaking out around holes.

1.17 SALVAGE

A. Remove excess piping and ductwork, plug or cap any unused branch connections. Remove scrap pipe and all other excess materials from the site.

B. Comply with contractor's Construction Waste Management Plan. Retain and submit all trip and tip tickets for all construction debris and waste hauling, indicating material content, tonnage, date hauled and facility to where materials were hauled.

1.18 ELECTRICAL

A. Motors:
1. Temperature Rating: Rated for 40 degree C environment with maximum 50 degree C temperature rise for continuous duty at full load.
2. Starting Capability: Not less than 12 starts per hour.
3. Phase Characteristics: Squirrel-cage induction poly-phase motors for 3/4 HP and larger, and capacitor-start single-phase motors for 1/2 HP and smaller. At equipment manufacturer's option, 1/6 HP and smaller may be split-phase type.
4. Service Factor: 1.15 for polyphase motors and 1.35 for single-phase motors.
5. Enclosure Type: Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation, and guarded drip-proof motors where exposed to contact by employees or building occupants. Weather-protected Type I for outdoor use, Type II, where not housed.
6. Overload Protection: Built-in thermal overload protection.
7. Name Plate: Indicate full identification of manufacturer, ratings, characteristics, construction, special features and similar information.
8. All motor efficiencies shall conform to Washington State Energy Code and NEMA MG-1.

B. Motor Starters: By mechanical equipment manufacturer where factory mounted controls are provided. Variable frequency drives by Division 23, all other starters provided by Electrical Contractor.

C. Power Wiring: By Electrical Contractor.

D. Control Wiring: Responsibility of Division 23, including all line and low voltage control wiring. Owner will not entertain additional cost due to lack of coordination between HVAC Contractor and Electrical Contractor.

1.19 PROJECT CLOSEOUT

A. Completion, submission and approval of the following is required for final project closeout.
1. Execution of Architect's and Engineer's final observation reports (punchlist)
2. Operating and Maintenance Manual
3. Equipment Cleaning

4. Record Drawings
5. Testing
6. Warranty

B. See Division 01 for additional requirements.

1.20 OPERATING AND MAINTENANCE MANUALS

A. Contents: Furnish, in accord with Division 1, three (3) bound copies of operating and maintenance manuals to include the following:
   1. Manufacturers, suppliers, contractor names, addresses and phone numbers.
   2. Warranty service contractors' names, address and phone numbers (if different from above).
   3. Schedule and description of routine maintenance for each component to include oiling, lubrication and greasing data.
   4. Manufacturer's cuts and rating tables, including brochures for all submittal items.
   5. Part numbers of all replaceable items.
   6. Control diagrams and operation sequence.
   7. Written guarantees.
   8. Record drawings corrected and completed.
   9. Completed equipment start-up forms and checklists.
   10. Final copy of testing, adjusting, and balancing report.

B. Operation and Maintenance Data:
   1. Include, spare parts lists, exploded assembly views for all equipment.
   2. Submit installation instructions, adjustment instructions, spare parts lists, exploded assembly views for all equipment.
   3. Submit inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
   4. Submit manufacturer's descriptive literature, operating instructions, and maintenance and repair data. Include directions for resetting constant volume regulators.

C. Filters: Operation and Maintenance Data: Submit instructions for operation, changing, and periodic cleaning.
   1.
   2. Submit replacement part numbers and availability, and nearest service depot location and telephone number.

D. Binders:
   1. Furnish typewritten or printed index and tabbed dividers between principal categories.
   2. Bind each manual in a hard-backed loose-leaf binder.

E. Imprint on cover:
   1. Name of project.
   2. Owner.
   3. Location of project.
   4. Architect.

5. Contractor.
6. Year of completion.

F. Imprint on backing:
1. Name of project.
2. Year of completion.

G. Submittals:
1. Preliminary Copies: Prior to scheduled completion of the project, submit two copies for review by the Architect.
2. Final Copies: After approval of the preliminary copies, submit three (3) finished copies to the Owner.

1.21 EQUIPMENT CLEANING

A. Clean interior and exterior of all equipment. Equipment shall be free of dirt, construction debris, corrosion, etc.

B. Adequate provisions shall be made during construction to eliminate dirt, debris or other material from entering and collecting inside of pipe, ductwork and equipment. Any collection of material shall be thoroughly cleaned before equipment startup and if necessary again before owner occupancy.

C. Clean exterior of all exposed pipe and ductwork.

1.22 RECORD DRAWINGS

A. Submit one CD or DVD with all drawings in PDF format.

B. Make all notes and revisions on PDF set in red.

C. Show location of equipment, location and size of piping, location and size of ductwork. Locate all valves, control dampers and similar equipment with tag or label identification. Indicate locations and elevations of exterior pipe and utility connections. Maintain continuously updated drawings during progress of project.

D. Record actual locations of tagged valves and control dampers; include valve tag numbers. Record actual locations of flexible connectors and expansion joints.

E. Record actual locations of equipment, clean-outs, controlling devices, and all above grade, under-floor, and buried piping and ductwork. Provide dimensions from gridline or walls to indicate specific locations.

1.23 TESTING

A. Provide completed start-up forms and checklists.

B. Perform testing and balancing of HVAC systems as described in this Division and as required by applicable codes and ordinances.

C. Provide changes in sheaves, belts, and dampers as required for correct balance.

1.24 WARRANTIES AND CONTRACTOR'S GUARANTEE

A. All work, material and equipment shall be free of defect, complete and in perfect operating order at time of delivery to Owner.

B. Furnish one year warranty from date of substantial completion for all systems unless specifically noted otherwise.

C. Without cost to Owner, **correct all defects and failures discovered within one year from date of final acceptance**, except when in the opinion of the Architect a failure is due to neglect or carelessness of the Owner.

D. The guarantee of the Contractor is independent of shorter time limits by any manufacturer of equipment furnished. Submit with Operation and Maintenance Manual all guarantees which exceed one year.

E. Make all necessary balancing and control adjustments during first year of operation.

F. The presence of any inspector or observer during any construction does not relieve the Contractor from responsibility for defects discovered after completion of the work.

PART 2 NOT USED

PART 3 EXECUTION

3.1 DOCUMENTATION

A. Additional plan submittals to reviewing authority: If additional drawing submittals are required at any time during construction contractor shall submit drawings, review with authority, and pick up subsequent approved drawings. Engineer will revise and/or prepare drawings for submittal.

3.2 INSPECTION

A. Do not allow any work to be covered up or enclosed until inspected, tested and approved by the Architect and all authorities having jurisdiction over the work.

B. Should any work be enclosed or covered up before such inspection and test, Contractor shall at his own expense uncover work, and after it has been inspected, tested and approved, make all repairs as necessary to restore all work disturbed by him to its original condition.

C. Energy Code C104 specifically requires the following inspections.
1. Mechanical Equipment Efficiency and Economizer: To be made after all equipment and controls required by the Energy Code and this specification are installed and prior to the concealment of such equipment or controls.

2. Mechanical Pipe and Duct Insulation: To be made after all pipe and duct insulation is in place, but before concealment.
3. Motor Inspections: To be made after installation of all equipment covered by the Energy Code and this specification but before concealment.

3.3 CLEANING

A. Clean adjacent surfaces of fire stopping materials.

B. Clean ductwork and equipment.

3.4 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Hangers and Supports.
2. Firestopping.
3. Tags and Identification.
4. Execution

1.2 GENERAL REQUIREMENTS

A. Comply with requirements and recommendations of Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58 and SP-69.

B. Comply with requirements and recommendations of Sheetmetal and Air Conditioning Contractors National Association (SMACNA) HVAC Duct Construction Standards.

C. Conform to requirements of IBC 1613 and SMACNA "Seismic Restraint Manual Guidelines for Mechanical Systems".

1.3 MATERIALS AND EQUIPMENT

A. Where two or more units of same class of equipment are required, use products of a single manufacturer. All equipment shall be new and free from damage.

B. Protect stored material and equipment against weather, corrosion and dirt. Protect installed mechanical components, including but not limited to piping, ductwork, and equipment against weather damage, corrosion, dirt and construction dust. Seal equipment and ductwork where and when necessary to be kept clean.

C. Furnish standard and fabricated hangers and supports complete with necessary inserts, bolts, nuts, rods, washers and other accessories.

1.4 REQUIREMENTS

A. Firestopping Materials: Provide to achieve fire ratings as noted on architect’s drawings for adjacent construction, but not less than 1 hour fire rating. ASTM and UL.
1. Surface Burning: UL 723 with maximum flame spread / smoke developed rating of 25/50.
2. Firestop interruptions to fire rated assemblies, materials, and components.

B. Firestop interruptions to fire rated assemblies, materials and components.

1.5 QUALITY ASSURANCE

A. Installed products shall have surface Burning Characteristics: 25/50 flame spread/smoke developed index when tested in accordance with ASTM E84.

B. Perform work in accordance with local jurisdiction's requirements and AWS D1.1 for welding hanger and support attachments to building structure.

C. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

PART 2 PRODUCTS

2.1 DUCT HANGERS AND SUPPORTS

A. Hanger straps and rods shall be in accord with SMACNA Duct Construction Standards.

B. Fasten bracing to ductwork, including riveting, bolting, and tack welding per SMACNA.

C. Provide galvanized steel band or fabricated angle iron brackets for wall supports.

D. Hanger Rods: Carbon Steel, with hex nuts and flat washers.

2.2 HANGER ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 EQUIPMENT CURBS

A. Manufacturers' curbs where indicated on drawings.

B. Fabricated: Welded 18 gage galvanized steel shell and base, mitered 3 inch cant, variable step to match roof insulation, 1-1/2 inch thick insulation, wood nailer.

2.4 SLEEVES

A. Sleeves for Ductwork: 18 gage thick galvanized steel.

B. Sealant: Acrylic

C. Size large enough to allow for movement due to expansion and to provide for continuous insulation or installation of fire sealant at fire-rated walls. Note that insulation is discontinuous at fire walls.

2.5 FORMED STEEL CHANNEL

A. Manufacturers: Allied Tube & Conduit, B-Line Systems, Unistrut or approved equal.

B. Product Description: Galvanized 12 gage thick steel, with holes 1-1/2 inches on center.

2.6 FIRESTOPPING-APPLIED

A. Manufacturers: RectorSeal, Dow Corning, 3M Fire Protection or approved equal.

B. General:
1. Fire stopping materials shall conform to Flame (F) and Temperature (T) ratings as required by applicable building codes and tested by nationally accepted test agencies per ASTM E 814 or UL 1479 fire tests for through penetrations, and ASTM E 1966 or UL 2079 for construction joints, and UL 2307 for perimeter edge joints.
2. Fire stopping material shall be free of asbestos, PCBs, ethylene glycol, and lead.
3. Do not use any product containing solvents or that requires hazardous waste disposal.
4. Fire stopping shall be performed by a contractor trained or approved by firestop manufacturer.
5. Select products with rating not less than rating of wall or floor being penetrated.

C. Single Source Responsibility: Provide firestop systems for all conditions from a single supplier.

D. Product Description: Provide Latex caulk/sealant, Silicone caulk/sealant, Intumescent Wrap Strip, Firestop Putty, Firestop Collar or Intumescent Sleeve to meet each specific application and performance requirement.

E. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

F. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
1. Forming/Damming Materials: Mineral fiberboard, backer rod or other type recommended by Manufacturer’s tested system.

2.7 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches high.

B. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.

C. Tag Chart: Plain English designations so no tag or valve chart is required.

2.8 PAINT

A. Factory Finished Equipment: See individual equipment specification.

B. Ductwork: Paint interior of ductwork visible through grilles and diffusers with a flat black paint. Prepare and paint surfaces in accord with Division 9.

2.9 SEISMIC SUPPORTS

A. Provide seismic support as required by IBC 1613 and local authorities.

B. Sway bracing for ductwork, piping, and equipment shall consist of steel angles, rods or pipes. Shapes, lengths and methods of attachment shall be in accord with SMACNA “Guidelines for Seismic Restraints of Mechanical Systems”.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond of adhesives or firestopping.

C. Install backing or damming materials to arrest liquid material leakage.

D. Obtain permission from Architect/Engineer before drilling or cutting structural members.

E. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION-CLEARANCE

A. Appliances and equipment shall be accessible for inspection, service, repair and replacement.

B. Clearance shall be provided for the replacement of filters.

C. A minimum of 30” of clearance shall be provided in front of the control side of appliances and equipment. Provide additional space when required by NEC.

D. All control components shall be accessible for inspection and replacement.

3.3 INSTALLATION – DUCTWORK

A. Locate hangers, supports and accessories to handle loads imposed by ductwork, and air distribution devices and with maximum spacing noted.

B. Support all ductwork to prevent sag, undue play and swing.

C. Maximum support spacing per SMACNA standards. Spacing shall not exceed 10 feet.

D. Assemble and install hangers and supports on ductwork.

E. Adjust hangers and supports as required to bring system to proper line and grade. Ductwork shall be plumb with floor and parallel/perpendicular to building structure.

3.4 INSTALLATION - FLASHING

A. Provide flexible flashing and metal Counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide curbs for roof installations 14 inches minimum high above roofing surface. Flash and counter-flash with sheet metal; seal watertight. Attach Counterflashing to equipment and lap base flashing on roof curbs. Flatten and solder joints.

C. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.5 INSTALLATION - SLEEVES

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with insulation and caulk or fireproof airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

3.6 INSTALLATION – FIRESTOPPING AND SEALS AT PARTITIONS

A. Installation of Firestop shall be performed by either a specialty contractor specializing in firestop application (FM G 4991 or UL Qualified Firestop Contractor), or general or sub-contractors with experience in similar applications and projects with installers qualified, trained, and certified by the firestop manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.

B. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, and other items, requiring firestopping.

C. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

D. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating, to uniform density and texture.

E. Install dams when required to properly contain Fire stopping materials within openings and as required to achieve required fire resistance rating. Combustible

damming material must be removed after appropriate curing. Incombustible damming materials may be left as a permanent component of the Firestop system.

F. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.

G. Place intumescent coating in sufficient coats to achieve rating required.

H. Clean adjacent surfaces of firestopping materials.

I. Seal openings at surface as follows:
   1. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
   2. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
   3. Pack void with backing material.
   4. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.

3.7 INSTALLATION - PENETRATIONS OF NON-RATED SURFACES

A. Seal opening through non-fire rated wall, partition, floor, ceiling, and/or roof opening as follows:
   1. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
   2. Size sleeve allowing minimum of 1 inch void between sleeve and building element.

B. Install escutcheons where piping penetrates non-fire rated surfaces in occupied spaces.

C. Exterior wall openings below grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, in accordance with manufacturer's instructions.

D. Interior partitions: Seal pipe penetrations air tight. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.8 INSTALLATION-IDENTIFICATION

A. Install identifying devices after completion of coverings and painting.

B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.

C. Nameplates: Identify mechanical equipment (air handling units, air terminal units, pumps, heat transfer equipment, tanks, and water treatment devices) with plastic nameplates.
   1. Identify in-line pumps and other small devices with name tags.

2. Identify control panels and major control components outside panels with plastic nameplates.
3. Identity description should be as numbered on drawings or plain English description. i.e. “EF-1” or “Boiler Controls”.
4. Label automatic controls, instruments, and relays. Key to control schematic.
5. Label wall controls and switches with associated equipment designation and control function, i.e. “EF-1 Switch”.

3.9 CLEANING

A. Contractor shall make all mechanical components free of dust and dirt prior to startup.

3.10 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.1 SCOPE

A. Testing, adjusting and balancing of air systems.

B. Measurement of final operating conditions of above systems.

C. Duct pressure (leakage) testing as required by 23 31 00.

D. Preparation of formal report.

1.2 PERFORMANCE CRITERIA

A. Work shall be performed by approved independent testing and balancing agency.

B. Perform testing and balancing in accordance with Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB). All work shall be supervised.

C. Calibrate instruments used for testing and balancing within a period of six months of start of work.

D. Mechanical contractor shall assist Balancing Agency in testing and balancing of mechanical system.

1.3 SUBMITTAL

A. Provide three (3) copies of typed and bound report to be included in Operations and Maintenance Manual.

1.4 FORMAT

A. Report shall consist of test sheets similar to AABC Standard Forms for Diffusers and Grilles, Air Handling Equipment, Exhaust Fans, and Pumps (i.e., Form 12666 for Diffusers and Grilles).

B. Report shall include the following.
   1. Preface suggesting abnormalities and problems encountered.
   2. Instrumentation List including type, model, manufacturer, serial number, and calibration dates.
   3. System Identification reporting location of equipment, zones, supply, return, and exhaust openings.
   4. Record following for each piece of air handling equipment.
      a. Manufacturer, model number, and serial number.
      b. Design and manufacturer rated data.
      c. Actual CFM
      d. Suction and discharge static pressure of each fan.

e. Outside-air and return-air total CFM.
f. Actual operating current, voltage, and brake horsepower of each fan motor.
g. Final RPM of each motor.
h. Fan and motor sheave manufacturer, model, size, number of grooves and center distance.
i. Belt size and quantity.
j. Static-pressure controls final operating set points.

1.5 QUALIFICATIONS

A. Work of this section shall be performed by independent Air Testing and Balance Agency specializing in testing and balancing of heating, ventilating, and cooling systems to balance, adjust, and test air moving equipment, air distribution, and exhaust systems.

B. Agency shall provide proof of having successfully completed at least five years of specialized experience in air and hydronic system balancing. Work by this Agency shall be done under direct supervision of qualified heating and ventilating engineer employed by Agency.

C. Agency shall be approved in writing by Architect.

D. Neither Architect's engineering consultant nor anyone performing work on this Project under Division 23 shall be permitted to do this work.

1.6 ACCEPTABLE TEST AND BALANCE COMPANIES

A.	AIRTEST Co., Inc.	425-313-0172
B.	Neudorfer Engineers, Inc.	206-621-1810
C.	Hardin & Sons	253-862-6645
D.	American Air Measurement	425-788-4036

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify systems are complete and in good working order before commencing work. Then, put all systems and equipment into operation and continue operation until all adjusting, balancing, testing, demonstrations, instructions and cleaning of systems have been completed. Verify the following:
1. Systems are started and operating in safe and normal condition.
2. Temperature control systems are installed complete and operable.

3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Access doors are closed and duct end caps are in place.
9. Air outlets are installed and connected.
10. Duct system leakage is minimized.

3.2 PREPARATION

A. If requested, conduct tests in presence of Architect.

B. Instruments used by Agency shall be accurately calibrated and maintained in good working order.

C. Furnish instruments required for testing, adjusting, and balancing operations including ladders, scaffolding, additional dampers and clean filters.

D. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

E. During balancing technician's initial test of air handling systems, the Mechanical Contractor shall have his sheet metal foreman present to assist in any drive changes or dampers necessary.

3.3 INSTALLATION TOLERANCES

A. Diffuser, register and grille air flow rates shall be measured and adjusted to deliver final flow rates within 10% and within 50 cfm of design rates.

B. Fan air flow rates shall be measured and adjusted to deliver final flow rates within 10% and within 50 cfm of design rates.

3.4 ADJUSTING

A. Ensure that clean filters, of the type specified, are installed prior to air balancing.

B. Provide additional volume dampers as necessary to accomplish design balances.

C. Set minimum position of motorized dampers for scheduled minimum outside air.

D. Check motors for proper rotation, coupling and drive alignment, belt tension and freedom from vibration, etc.

E. Provide belt drive/sheave changes to adjust fan rpm as necessary to accomplish design balances.

F. Verify recorded data represents actual measured or observed conditions.

G. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

H. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.

I. Report defects and deficiencies noted during performance of services, preventing system balance.

J. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

K. After completion of testing and balancing, operate systems under normal conditions for at least two days of 8 hours each to demonstrate specified performance.

3.5 AIR SYSTEM PROCEDURE

A. Perform soloing testing and balancing functions in accordance with Associates Air Balance Council National Standards.

B. Adjust air handling and air distribution systems to obtain design supply, return, and/or exhaust air quantities.
1. Test and adjust total system CFM by adjustment of fan speeds. Provide sheave drive changes as necessary.
2. Perform tests at high and low speeds of variable speed systems.
3. Adjust branch air quantities by damper regulation. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open to minimize throttling losses.
4. Make air quantity measurements in main ducts and for outside air by Pitot tube traverse of entire cross sectional area of duct.
5. Measure air quantities at air inlets and outlets.

C. Diffusers, Registers and Grilles:
1. Adjust air distribution to obtain uniform space temperatures free from objectionable drafts.
2. Use volume control devices to regulate air quantities only to the extent that the adjustments do not create objectionable air motion or sound levels.
3. Effect volume control by using volume dampers located in ducts.

D. Provide system schematic:
1. Identify the location and area of each grille, diffuser, register, and terminal box.
2. Record the required and actual air quantities at each outlet or inlet.
3. Record size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.

E. Pressure:
1. Measure static pressure conditions on air units, including filter and coil pressure drops, and total pressure across fan with suction and discharge pressures.
2. Make air balancing allowances for 50 percent loading of filters.

3. Measure building static pressure.

F. Electrical:
1. Record nameplate motor current and voltage.
2. Measure actual motor current and voltage at balanced condition.

G. Dampers:
1. Adjust outside air, return air, and exhaust dampers for design conditions.
2. At modulating damper locations, take measurements and balance at extreme conditions.

H. Permanently mark all outside air, supply air, and return air damper positions after balancing has been completed.

3.6 FINAL INSPECTION AND ADJUSTMENTS

A. System shall be balanced and reports submitted before substantial completion inspection.

B. Balancing Agency shall be represented at inspection meeting(s) by qualified testing personnel with balancing equipment and two copies of current air balancing test report.
1. Architect will choose and direct spot balancing. Differences greater than specified tolerance between the spot balance and test report will be justification for requiring repeat of testing and balancing for entire building and submission of a new test report. In such case a new inspection will be made.
2. Perform rebalancing in presence of Architect/Engineer and subject to their approval.
3. If re-balancing is required, submit revised air test and balance reports to Architect before Substantial Completion.
4. Spot balance and rebalance shall be performed at no additional cost to Owner.

C. Where systems provides over 5 percent more air than schedule requirements, rooms supplied by that system shall have their supply air quantities increased by ratio of actual total air quantity supplied to minimum air quantity required by system schedule.

3.7 SUPPLEMENTAL WARRANTY

A. Test and balance agency shall include an extended warranty of 90 days, after occupancy, during which the Owner's representative, at his discretion, may request a recheck or resetting of any outlet, supply air or exhaust fan, as listed in test report.

END OF SECTION

SECTION 23 07 00 - HVAC INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Ductwork insulation.
   2. Duct liner.

1.2 QUALITY ASSURANCE

A. Insulation must have maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.

B. All systems components subject to heat loss or gain, such as, piping, storage tanks, vessels, valves etc. shall be insulated to conform with the Washington State Energy Code (as minimum) and this section.

1.3 IDENTIFICATION

A. Insulation shall bear a manufacturer's mark indicating the product R-value or K-value and thickness. This mark shall be visible after installation and shall be repeated at an interval of no more than 10 feet.

B. External duct insulation shall be legibly printed or indentified at intervals not greater than 36 inches with name of manufacturer, R-value, thickness, flame spread and smoke-developed index.

C. R-values shall be based on insulation only at 75 F mean temperature difference.

D. For rigid or spray foam the aged R-value per inch shall be provided in submittals.

PART 2 PRODUCTS

2.1 FLEXIBLE GLASS FIBER DUCT LINER (SOUND LINER)

A. Manufacturers: Johns Manville Linacoustic RC or equal by Knauf or approved equal.

B. Description: Flexible duct liner, glass fiber bonded with thermosetting resin, airstream surface protected with reinforced coating.
   1. ASTM E84, UL 723
   2. Installed R Value: 1" R-4.2, 2" R-8.0
   3. Maximum service temperature: 250 degrees F.
   4. Maximum Velocity on Coated Air Side: 6,000 fpm.
   5. Acrylic polymer coating to prevent dust incursion and biological growth.

C. Liner Fasteners: Galvanized steel, impact applied or welded with integral head.

D. Field coat edges with Superseal edge treatment.

2.2 GLASS FIBER DUCT WRAP

A. Manufacturers: Johns Manville Microlite XG 75 or equal by Owens-Corning, Knauf or approved equal.

B. Description: Formaldehyde-free, flame-attenuated glass fibers bonded with thermosetting acrylic resin, FSK facing.
1. ‘ASTM E84, UL 723
2. Installed R Value: 1-1/2" R-4.2, 2” R-5.6, 3” R-8.3.
3. Maximum Service Temperature: 250 degrees F.
4. Density: 0.75 lb/cu ft

C. Vapor Retarder Jacket: Reinforced FSK facing. Seal with pressure sensitive 2” tape.

D. Identification: At intervals not greater than 36” print the name of manufacturer, the thermal resistance R-value at insulation thickness, the flame spread and smoke developed indexes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify piping and equipment has been tested before applying insulation materials.

B. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A. Apply insulation when building is thoroughly dry to prevent shrinkage.

B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions.

C. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.

D. Finish insulation at supports, protrusions, and interruptions.

E. Insulate exhaust air ductwork where it is outside the insulated building envelope to prevent condensation.

F. For all insulated ductwork:

1. Provide insulation with vapor retarder jackets.
2. Finish with tape and vapor retarder jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

G. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 100 percent coverage.
2. Secure insulation with mechanical liner fasteners. Comply with SMACNA Standards for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

3.3 SCHEDULES

A. Ductwork: Provide on ductwork as listed below. Insulation thickness is provided as reference; each application must meet minimum installed R-Value.

Service	Location	Insulation Type	Approx. Thickness	Min. Installed R-Value	Jacket
Exhaust Air	Unconditioned Space Inside Bldg.	Glass Fiber Duct Wrap	2"	R-6	FSK
Exhaust Air	Outside the Insulated Building Envelope	Glass Fiber Duct Wrap	2"	R-6	FSK
Exhaust Air	Between backdraft damper & building exterior.	Glass Fiber Duct Wrap	3"	R-7	FSK

1. Secure duct wrap with mechanical fasteners spaced 12” on center, minimum. For horizontal ducts 24” or more in width, duct wrap shall also be secured with mechanical fasteners spaced 18” on center, on centerline of bottom of duct.
2. Insulation is not required on sound lined ductwork with sufficient insulating value.

END OF SECTION

SECTION 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Thermostats
2. Timers
3. Electric damper actuators.
4. Gas sensors

1.2 SCOPE

A. The mechanical contractor shall install a complete, properly adjusted and effective control system.

B. This section includes field assembled instrumentation and controls.

C. See drawings for Sequence of Operation.

D. See Equipment Schedules and associated specification sections for controls integral to HVAC equipment.

E. Controls shall be electric/electronic systems.

F. Any additional parts necessary to or incidental for a complete and operating system shall be the responsibility of the contractor.

1.3 MAINTENANCE SERVICE

A. Furnish service and maintenance of control system for one year from Date of Substantial Completion.

B. Furnish complete service of controls systems, including callbacks and service calls.

1.4 QUALITY ASSURANCE

A. Control Air Damper Performance: Test in accordance with AMCA 500.

PART 2 PRODUCTS

2.1 THERMOSTATS

A. Manufacturers: Honeywell (or as noted below) or approved equal.

B. Bi-metal thermostats are not allowed for any application.

C. Line Voltage Heating Thermostat (Programmable Electronic): King ESP230, Honeywell TL8130A or equal.
   1. Integral manual On/Off switch, single-pole.
   2. Accuracy: +/- 1.5 degrees F.
   3. Load / Motor capacity rating of 22 amps, 208/240 volt.
   4. Electronic thermistor temperature sensor with 40 F to 95 F range.
   5. 7 day independent programmable schedules with 4 daily setpoints.
   6. LCD display showing day, time, room temperature and setpoint, Green LED backlight, Red LED heat on Indicator, temperature adjustment buttons.
   7. Positive off position/function to serve as NEC required disconnect.

2.2 TIMERS

A. Manufacturers: Intermatic or approved equal.

B. Spring wound twist timer, 120 volt, 1 HP (20 amp inductive) rated. 'Brushed metal' gray polycarbonate faceplate. Select time range and hold as scheduled or noted in sequence.

2.3 CONTROL AIR DAMPERS

A. See Section 23 33 00.

2.4 ELECTRIC DAMPER ACTUATORS

A. Manufacturers: Belimo or approved equal.

B. Operation: Two-position or proportional as required for application. [Reversing type proportional motor], spring-return.

C. Enclosure Rating: NEMA 250 Type 2 Enclosure.

D. Mounting: Direct mount.

E. Stroke: 30 seconds end to end full stroke, 15 seconds return to normal for spring return.

F. Protection: Electronic stall protection.

G. Control Input: 0-10 VDC or 0-20 mA DC.

H. Power: Nominal 24 \ 120 volt AC.

I. Torque: Size for minimum 150 percent of required duty.

J. Duty cycle: rated for 65,000 cycles.

K. Accessories:
   1. Cover mounted transformer.
   2. Auxiliary potentiometer.
   3. Damper linkage.

4. Direct drive feedback potentiometer.
5. Output position feedback.
6. Field selectable rotational, spring return direction, field adjustable zero and span.
7. End switch.

2.5 CO/NO2 SENSOR

A. Manufacturer: AirTest or approved equal.

B. Controller (CT2100): Integrated dual sensing capability for two gases with two sets of relays for fan/alarm activation. LED indication of power, fault and 2 threshold indicators for each gas channel. 2 minute low on delay, 10 min low off delay and 5 minute high on delay. NEMA 4X enclosure.

C. Integrated electrochemical CO sensor head (TR2000).

D. Remote NO2 Sensor: Electrochemical diffusion sensor in NEMA 4X enclosure, 0-10 ppm range, +/- 5% accuracy. (TR3210)

2.6 ENCLOSURES

A. All enclosures to be UL listed and all metal construction. All controls and instruments logically assembled at one or more panels.

2.7 CONTROL RELAYS

A. Shall be rated for the application, with a minimum of two sets of Form C contacts, enclosed in a dust proof enclosure. Relays shall be rated for a minimum life of one million operations. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays should be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage.

2.8 WIRING

A. Electric wiring and wiring connections required for the installation of the temperature control system as herein specified, shall be provided by the temperature control contractor. All wiring shall comply with the requirements of local and national electrical codes, and with applicable requirements of Electrical Division. Install all wiring in conduit.

B. Line voltage wiring type and size shall be per NEC.

C. Low voltage wiring type and size shall be per control manufacturer’s recommendations based on application and length of run.

2.9 CONTROL POWER

A. Provide transformers to supply power for control equipment operating at less than normal lighting circuit voltage. Do not connect wiring to lighting circuits.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify building systems to be controlled are ready to operate.

B. Verify location of thermostats, humidistats and other exposed control sensors with Drawings before installation.

3.2 COORDINATION

A. Furnish all control products to accomplish the specified sequence of operation, except those products specifically furnished under other sections.

B. Install all control products and connections, except where already installed by the equipment manufacturer.

3.3 INSTALLATION

A. General:
1. Install controls by mechanics skilled in erection of control systems employed by and under direct supervision of control manufacturer's representative.
2. Mount control equipment and devices as recommended by manufacturers and as shown on drawings; in case of conflicts between manufacturer's instructions and the drawings, consult the Project Manager for direction.
3. Fasten all equipment securely to structure. Install equipment and exposed piping and conduit runs parallel to building lines, plumb and level.

B. Wiring:
1. Provide line voltage and/or low voltage wiring as required to serve the complete system; conform to code.
2. Provide EMT or rigid conduit for exposed control wiring outside of cabinets or enclosures. Concealed low voltage wiring need not be in conduit, except in walls (see “3”).
3. Provide rigid conduit for control wiring concealed in partition walls, until conduit emerges from wall above ceilings.
4. Run low voltage control wiring separate from line voltage wiring and segregate from other systems to avoid Electromagnetic Interference (EMI).
5. All low voltage control wiring shall be home runs between components without splices.

C. Install thermostats, humidistat, space temperature sensors, and other exposed control sensors after locations are coordinated with other Work.

D. Install control panels adjacent to associated equipment on vibration free walls or freestanding supports. Install engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

3.4 THERMOSTATS AND SENSORS

A. Mount thermostats and other human interface devises at 48” centerline above finished floor to comply with ADA accessibility per ANSI A117.1. Align thermostats and devises with light switches and other controls.

B. Coordinate wall location of thermostats and other wall mount devises with light switches and controls provided by others. All devises in the same vicinity should be grouped at a common elevation with regular horizontal spacing intervals.

C. Mount CO/NO2 sensor controllers at 54” centerline above finished floor, CO sensor at 48” centerline above finished floor and NO2 sensor at 18” centerline above finished floor.

3.5 FIELD QUALITY CONTROL

A. After completion of installation, start-up, test and adjust each system. Submit data showing set points, final adjustments of controls and compliance with sequence of operations.

B. Conduct functional tests on complete systems, or individual portions as approved.

C. Conduct operational tests; set controls to operating conditions, record settings and readings of each control device.

D. Work in close coordination with testing and balancing Agency to set up control devices, set damper flow rates, and provide control system in perfect operating order. See Section 23 05 93.

3.6 DEMONSTRATION AND TRAINING

A. Demonstrate complete operation of systems, including sequence of operation prior to Date of Substantial Completion.

B. Not less than 60 days after beneficial occupancy by the Owner, recheck entire control system for compliance with Sequence of Operation.

END OF SECTION

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Ductwork
2. Duct Sealant
3. Fabrication
4. Duct Pressure Testing

1.2 PERFORMANCE REQUIREMENTS

A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

B. Standards: Comply with most stringent requirements and recommendations of International Mechanical Code or SMACNA (Sheet Metal and Air Conditioning Contractors National Association) Duct Construction Standards for fabrication, construction and sealant of duct, fittings, and accessories.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures during and after installation of duct sealant.

PART 2 PRODUCTS

2.1 DUCT MATERIALS

A. Galvanized Steel Ducts: ASTM A653 galvanized steel sheet, lock-forming quality, having G60 zinc coating of in conformance with ASTM A90.

B. Fasteners: Rivets, bolts, or sheet metal screws.

C. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 SINGLE WALL SPIRAL ROUND DUCTS

A. Manufacturers: McGill AirFlow, Semco or approved equal.

B. Product Description: UL 181, Class 1, round spiral lockseam duct constructed of galvanized steel.

C. Elbows: Smooth radius or 5 section, 1.5D.

D. Application: Required for all exposed round ductwork; all round ductwork 12” dia. and larger; all round ductwork with static pressure over 1” w.g.. Optional for all round ductwork.

E. Construct duct with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	26

F. Construct fittings with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	24

2.3 SINGLE WALL ROUND DUCTS (SNAP-LOCK)

A. Product Description: Product not acceptable for use.

2.4 DUCT SEALANT

A. Manufacturer: Design Polymerics, United McGill or approved equal.

B. Sealant shall be water based and formulated to withstand working temperatures of -25°F to +200°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 weight per gallon not to exceed 12.5, have solids by weight of 66% ± 2%, pass UL 723 with a flame spread of 5 and smoke developed of 5.

2.5 DUCTWORK FABRICATION

A. Fabricate and support rectangular and round ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible. Provide duct material, gages, reinforcing, and sealing for operating pressures corresponding to the ESP (external static pressure) of the fan system. i.e. Ductwork for a fan with and ESP of 0.75” w.g. should be constructed per SMACNA 1” w.g. pressure standard.

B. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide airfoil turning vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.

C. Indicated dimensions on drawings are net inside. Allow for thickness of duct lining where indicated.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

E. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

F. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

A. Make field measurements to establish locations of hangers and supports where installation will not damage building construction.

B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

C. Where ducts pass through partitions, ceilings or floors. Provide 1" clearance and insulate from structure with insulation material. Provide flanged sheet metal closure.

D. Where ducts pass through rated walls or assemblies without fire dampers, provide ¼” to 1” annular space and fill with firestop sealant. Ductwork shall be minimum 26 gauge metal.

E. Isolate joints between dissimilar metals with fiber gasket.

F. Drawings do not attempt to show all offsets in ductwork. Make such offsets as necessary for installation of work without additional cost to Owner. 15 degree maximum angle of offset.

G. Exposed ductwork shall be Appearance Grade. Ductwork located in crawl spaces, shafts, and suspended ceiling spaces are not considered exposed.
   1. All round ductwork shall be spiral seam (no snap-lock joints).
   2. All joints clean and workmanlike.
   3. Ductwork entirely free of dents.
   4. Ductwork subject to denting due to space function construct one gauge heavier than SMACNA standard for size indicated.
   5. All hangers trimmed of excess metal.
   6. Plumb, level, parallel or perpendicular to building structure.
   7. Sealed with transparent, paintable sealant to avoid streaking.

H. Install duct hangers and supports in accordance with Section 23 05 00.

I. Use double nuts and lock washers on threaded rod supports.

3.3 SEISMIC BRACING

A. See 23 05 00.

3.4 DUCT SEALING

A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible. Ductwork shall be sealed using welds, gaskets, or mastic. Duct tape is not permitted as a sealant on any ducts with the exception of that on fiberglass ducts specifically made for such use.

B. For all ductwork seal all transverse joints and longitudinal seams. For 2" w.g. and higher pressure class ductwork also seal all duct wall penetrations (i.e. screw, fastener, rod or wire).

C. Low pressure ductwork (less than 3" w.g.) shall be sealed to a leakage rate not to exceed 6 percent of the system airflow. All deficient ductwork shall be re-sealed until compliant.

3.5 PRESSURE (DUCT LEAKAGE) TESTING

A. Perform duct leakage rate testing in accordance with SMACNA Duct Leakage Test Procedures for the following.
   1. All ductwork regardless of pressure class located exterior of the building or in an unconditioned space shall have a leakage rate of less than 6%.
   2. At least 25% of all ductwork with a pressure class of 3" w.g. or more. The maximum duct leakage (CL) shall be 6.0 per Energy Code C403.2.7.3.3.

B. All ductwork found deficient by testing shall be resealed and retested until leakage compliance is reached.

C. Provide written documentation of testing to be included with the Test and Balance report, see 23 05 93. Include drawing(s) indicating where test measurements were taken.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Install openings in ductwork where required to accommodate thermometers and controllers. Install pitot tube openings for testing of systems. Install pitot tube complete with metal can with spring device or screw to prevent air leakage. Where openings are provided in insulated ductwork, install insulation material inside metal ring.

3.7 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air flow, clean one half of system

completely before proceeding to other half. Protect equipment with potential to be harmed by excessive dirt with temporary filters, or bypass during cleaning.

3.8 SCHEDULES

A. Ductwork Material Schedule:

AIR SYSTEM	MATERIAL
Supply, Return, Exhaust, Relief	Galvanized Steel
Outside Air Intake	Galvanized Steel

B. Ductwork Pressure Class Schedule: Install higher pressure class than indicated where corresponding fan system ESP (external static pressure) is higher.

AIR SYSTEM	PRESSURE CLASS
Constant Volume Low Pressure Supply	Minimum 1 inch wg.
Return, Exhaust	Minimum 1 inch wg

END OF SECTION

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Dampers
   2. Flexible duct connections

1.2 COORDINATION

A. Coordinate damper power, control and fire alarm interface with other trades.

B. See 23 09 00 for Electric Damper Actuators.

1.3 QUALITY ASSURANCE

A. Dampers tested, rated and labeled in accordance with the latest UL requirements.

B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

PART 2 PRODUCTS

2.1 INSULATED CONTROL DAMPERS

A. Manufacturers: Tamco, Ruskin, Greenheck or approved equal

B. Frame: Insulated extruded aluminum (6063T5) channel of minimum 0.080” thickness with mounting flanges on both sides.

C. Blades: Extruded aluminum (6063T5) airfoil internally insulated with expanded polyurethane foam and thermally broken. Maximum blade size 6 inches wide, 48 inches long, attached to minimum 7/16 inch hex shafts.

D. Bearings: Celcon inner bearing fixed to blade pin, rotating within a polycarbonate outer bearing inserted in the frame.

E. Seals: EPDM blade seals and silicone frame seals.

F. Damper Leakage: AMCA Pressure Class 1A, maximum leakage rate of 3.0 cfm/ft^2 at 1.0 inch w.g. pressure differential.

G. Maximum Pressure Differential: 6 inches w.g.

H. Rectangular Insulated: Tamco 9000, Ruskin CDTI-50 or equal.

I. Round: Provide rectangular damper with manufacturer's square-to-round transitions.

J. Options:
1. For dampers with a dimension over 48" provide multiple sections with jack shafts.
2. Provide parallel blade action for two position (open/closed) applications.
3. Provide opposed blade action for modulation or control applications.

2.2 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers: Duro-Dyne or approved equal

B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

C. Double fold "Grip-Loc" metal-to-fabric connection.

D. Indoor Connector: "Metal-Fab", 24 ga, 3"metal - 3" fabric - 3" metal.
1. Fabric: UL listed fire-retardant Neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd, 500 lbs tensile strength.

PART 3 EXECUTION

3.1 EXAMINATION

A. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 INSTALLATION.

A. Install in accordance with NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.

B. See Section 23 34 00, paragraph 1.3 for damper installation.

C. Provide motorized in lieu of gravity back-draft dampers per Energy Code.

D. Provide control dampers where not furnished with packaged equipment.

E. Provide insulated control dampers where:
1. The damper is installed behind a louver.
2. The damper is installed in a roof penthouse or gravity ventilator.
3. The damper is unducted and open to a conditioned space.

F. Install temporary duct test holes as required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

END OF SECTION

SECTION 23 34 00 - HVAC FANS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fans.

1.2 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.

C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

D. Balance Quality: Conform to AMCA 204.

1.3 DAMPERS

A. A gravity backdraft or motorized control damper is required on every exhaust fan.

B. Fans which are noted to operate continuously or have a capacity of 300 cfm or less shall have a gravity backdraft damper unless noted otherwise. All other fans shall have a motorized control damper.

C. See 23 33 00 for motorized control dampers.

D. Provide insulated control dampers where scheduled or where required by 23 33 00.

PART 2 PRODUCTS

2.1 CENTRIFUGAL ROOF EXHAUST FANS

A. Manufacturers: Greenheck, Cook or approved equal.

B. Construction: Spun aluminum with rigid internal support and aluminum birdscreen. Backward inclined aluminum wheel and inlet, statically and dynamically balanced.

C. Belt Drive:

1. Motor: Heavy duty ball bearing type with steel frame mounted on vibration isolators out of the air stream. Selected operating horsepower to be a maximum of 80% of rated motor horsepower without using safety factor.
2. Bearings: Pillow block type, self-aligning, permanently sealed, lubricated ball bearings, with L-10 life at 100,000 hours.
3. Shafts: Hot rolled steel, ground and polished, with key way.
4. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves selected so required rpm is obtained with sheaves set at mid-position. Matched belts, and drive rated minimum 1.5 times nameplate rating of motor.
5. Accessories:
   a. Gravity backdraft \ Motorized Control damper. (See Part I, Dampers)
   b. Insulated roof curb with liner; matched to roof slope.
   c. Curb seal.
   d. Aluminum birdscreen.
   e. NEMA disconnect switch.

2.2 CENTRIFUGAL INLINE FANS

A. Manufacturers: Greenheck, Cook or approved equal.

B. Construction: Square galvanized steel with duct collars, two removable access panels. Backward inclined aluminum wheel and inlet, statically and dynamically balanced.

C. Direct Drive:
1. Motor: Permanently lubricated mounted on vibration isolators.
2. Motor: Electronic Commutation DC brushless motor with internal solid state AC/DC converter circuitry and heavy duty ball bearings. Speed controllable down to 20% of full speed. Minimum 85% efficient at all speeds.
   a. Motor mounted potentiometer speed control dial.
3. Accessories:
   a. Gravity backdraft \ Motorized Control damper. (See Part I, Dampers)
   b. Nema rated disconnect switch.
   c. Insulated housing with 1" liner.
   d. Speed Control.
   e. Neoprene isolators

PART 3 EXECUTION

3.1 ROOF CURBS

A. Verify roof curbs are installed and dimensions are as instructed by manufacturer.

B. Provide sound attenuation material in curb where so indicated on drawings.

3.2 INSTALLATION

A. Secure roof fans with cadmium plated steel lag screws to roof curb.

B. Suspended Fans: Install flexible connections between inlet and outlet of fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.

C. Install gravity backdraft or motorized control dampers on discharge of exhaust fans and as indicated on Drawings.

D. Provide sheaves required for final air balance.

3.3 CLEANING

A. Vacuum clean inside of fan cabinet.

3.4 DEMONSTRATION

A. Demonstrate fan operation and maintenance procedures.

3.5 PROTECTION OF FINISHED WORK

A. Do not operate fans for until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Diffusers, Registers & Grilles
   2. Louvered Penthouse

1.2 QUALITY ASSURANCE

A. Diffuser, register, and grille performance shall be tested and rated in accordance with ASHRAE 70.

B. Louver performance shall be tested and rated in accordance with AMCA 500.

PART 2 PRODUCTS

2.1 EXHAUST/ RETURN GRILLES

A. Manufacturers: Titus, Price, Krueger or approved equal.

B. Type: Fixed blades, 1/2 inch blade spacing, with blades set at 35 degrees.

C. Frame: 1-1/4 inch margin with countersunk screw mounting, welded corners.

D. Fabrication: Steel with 20 gage minimum frames and 22 gage minimum blades, with factory white enamel finish.

2.2 LOUVERED PENTHOUSE

A. Manufacturers: Greenheck, Cook, Price or approved equal.

B. Product Description: Square Louvered type, with aluminum constructed housing; aluminum wire bird screen and insect screen; square base to suit roof curb with continuous curb gaskets.

C. Roof Curb: Galvanized steel or aluminum construction with continuously welded seams, built-in cant strips, 1 inch insulation with liner, damper tray, curb seal and factory installed nailer strip. Matched to roof pitch.

D. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked.

E. Motor Operated Damper: Aluminum multiple blade construction, sealed edged with offset hinge pin, nylon bearings, blades linked and motor drive, power open, spring return.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify inlet and outlet locations with Architectural Plans.

B. Verify ceiling/wall type before ordering.

C. Verify diffuser air patterns are as indicated before starting air balance.

3.2 INSTALLATION

A. Install diffusers to ductwork with airtight connection.

B. Install balancing dampers on duct take-off to diffusers, grilles, and registers, whether or not dampers are furnished as part of diffuser, grille, and register assembly.

C. Paint visible portion of ductwork behind air outlets and inlets matte black

3.3 INTERFACE WITH OTHER PRODUCTS

A. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

END OF SECTION

SECTION 23 82 00 - TERMINAL HEATING UNITS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Electric radiant heaters.

PART 2 PRODUCTS

2.1 ELECTRIC RADIANT PANEL

A. Manufacturers: Markel, Aztec or approved equal.

B. Assembly: Electric resistance graphite element imbedded between two layers of insulation, steel shell. T-bar mount, surface mount with aluminum frame or recessed mount with aluminum frame. UL listed and labeled.

C. Ceiling Panels: 24x48 inch with baked enamel white finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. For recessed units, verify recess dimensions are correct size.

B. Verify concealed blocking and supports are in place and connections are correctly located.

3.2 INSTALLATION

A. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.

B. Protection: Install finished cabinet units with protective covers during remainder of construction.

C. Coordinate to assure correct recess size for recessed units.

D. Install electric heating equipment including devices furnished by manufacturer but not factory-mounted. Furnish copy of manufacturer's wiring diagram submittal. Install electrical wiring in accordance with manufacturer's submittals.

3.3 CLEANING

A. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.

B. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.

END OF SECTION

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 Division 26. See Division 1 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 he has made a thorough examination of the Contract Documents, existing site and building conditions, and has 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 Division 26 work is 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. Cutting and Patching - See Division 1

C. Trenching, backfill and asphalt work – See Division 2.

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
NBFU	National Board of Fire Underwriters
NEC	National Electrical Code
---	State Electrical Code
NESC	National Electrical Safety Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association

U.L.	Underwriters Laboratories Inc.
IPCEA	Insulated Power Cable Engineers Associated
CBM	Certified Ballasts Manufacturers
---	Federal, State and Local Building Codes
ETL	Electrical Testing Laboratories

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 to 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, 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.

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 "Contractors" 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.

D. The contractor shall review the manufacturer provided installation instructions for each piece of equipment prior to rough-in. Any conflict between the drawings, specifications and installation instructions shall be brought to the Engineer’s attention immediately. The contractor will not be paid for any reinstallation required due to failing to comply with manufacturer’s recommendations or requirements unless specifically directed by the engineer, in writing, after the conflict has been identified.

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.

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.

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. 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 products actually 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 Architect.

1.13 WARRANTY

A. Provide a written warranty that the Division 26 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 certificate of final acceptance, provided that such failure is due to defects in material or workmanship, or failure to follow the specifications and drawings.

1.14 INSTRUCTIONS AND MANUALS

A. A preliminary copy, complete, except for the bound cover, shall be submitted 60 days prior to completion of the project for checking and review. Five (5) bound, corrected copies shall be delivered to the Owner 20 days prior to scheduled instruction periods.

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. Xerox 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. Where sheets show the equipment installed and other equipment, the installed equipment shall be neatly and clearly identified on such sheets. Parts lists shall give full ordering information assigned by the original parts manufacturer. Relabeled and/or renumbered parts information as reassigned by equipment supplier is 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 unity or other similar time unit.

D. The O & M Manual shall be assembled in a loose leaf, 3-ring, hard cover binder and electronically on compact disc. The information contained in the manuals shall be grouped in an orderly arrangement by specification index. The manuals shall have a typewritten index and divider sheets between categories with identifying tabs. The covers shall be imprinted with the name of the job, Owner, Architect, Electrical Engineer, Division 26 Contractor, and year of completion. The back edge shall be imprinted with the name of the job, Owner, and year of completion. As a minimum, the following selection shall be broken out:
   1. Light Fixtures
   2. Lamps and Ballasts - referenced to each fixture type
   3. Panelboards
   4. Motor Controls

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(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 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. Costs for time involved by Contractor shall be included in the bid.

1.17 COMPLETION OF WORK

A. Upon completion of the Division 26 work, the Contractor shall comply with requirements of Section 017000 for project closeout.

B. Arrange for and obtain all required inspections and certificates pertaining to the Division 26 work and include in the Operations and Maintenance Manuals.

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, in triplicate form. Electrical Inspector Fire Department	COMPLETION OF WORK 260000
3.	Warranty to Owner (with copy for Engineer	SUPPLEMENTARY GENERAL CONDITIONS 260000
4.	Marked Set, Electronic Media Set on CD in AutoCAD R-2013 Format of " As-Built" Electrical Drawings	GENERAL AS-BUILT DRAWINGS 260000
5.	Panelboard and Special Equipment Shop Drawings and Final Approved List of Materials Installed	MATERIALS, GENERAL 260000
6.	Certificate of Feeders Torque Results	WIRES AND CABLES 260519
7.	* Receipt from person to whom delivered the following: Spare Elements for Fire Detectors, Fuses for Switches, Spare Keys for Panelboards, receptacles switches, plugs, etc.	FIRE ALARM – 283100 FUSES – 262813 PANELBOARDS – 262416 SWITCHES & RECEPTACLES – 262726
8.	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.
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 applicable item numbers within that section.
5. Other Descriptive Data as required by the Architect/ Engineer.

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 26 – Electrical
   2. The contractor shall provide either a digital or hardware method of transporting the electronic submittal to the Architect. Files larger than 10Megabytes shall not be sent via email and shall be transferred via an FTP or similar 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
      b. 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.
      c. 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.
      d. Each Submittal Item listed on the Specification Section Divider shall be linked to the specific item being submitted. Each Submittal Item shall be hi-lighted Yellow with a Note Reference to the specific paragraph giving the submittal requirements.
      e. 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.
      f. Specification items shall be specifically hi-lighted as they apply to the project rather than hi-lighting an entire product family. Items that do not apply to this project shall be crossed out with a Red X.
      g. The PDF file shall be 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 each item indexed with dividers and separated per specification section and shall be, but not limited to 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. Disconnect Switches

4. Fuses and spare fuse cabinet
5. Lighting Fixtures (Complete)
6. Wiring Devices
7. Back Boxes
8. Coverplates
9. Raceways and Connectors
10. Fire Wall Penetration Seals
11. Copper Wire
12. Any other items requested by Engineer.

D. Within 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, Contractor shall submit a new list of items he proposes 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 Engineer's review.

F. Electrical Drawings for the project have been developed by the Engineer using AutoCAD™ Revision 2012 software. 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 1 and related project requirements.

B. Division 26 Breakdown: Provide schedule of values for the following categories (as a minimum):
1. Electrical General Project Management, General Design, General Coordination, Mobilization and Submittals
2. Branch Circuit Materials Rough-in & Labor
3. Branch Circuit Trim – Materials & Labor
4. Panelgear, Disconnects, Starters & Labor
5. Light Fixtures & Labor
6. Electrical Punchlist, Closeout, and Owner Training

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 the Division 26 work (or as indicated in Division 1, whichever is higher).

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 at his option 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. Panelboard Labels: Refer to Section 262416
   2. Switch and Receptacle Labels: Refer to Section 262726
   3. Motor Starter and Disconnect Labels: Refer to Section 262816
   4. Special Equipment/Outlet Labels: Refer to Appropriate Sections.

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 Division 26 wiring and equipment with Division 23 and other trades. Where insufficient room for proper installation appears, obtain clarification from Engineer before any installation is begun.

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 Division 26. The work shall coordinate with that of the other Contractors and/or other trades doing work in the building and 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 Division 26 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 a 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 so 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 where exposed in finished or unfinished areas.

B. All branch circuit wiring shall be installed in raceway with junction boxes and fittings.

C. Provide access panels as needed for pull boxes and equipment located above ceiling or behind walls.

D. Multiple feeder runs shall be rod hung, using a strut type channel with individual one hole clamps, back plates and machine screws.

E. Any low voltage cables that are not terminated at both ends shall be tagged and labeled per code.

3.9 PENETRATIONS OF FIRE RATED ELEMENTS

A. Must be made such as to retain that rating.

3.10 HANGERS AND SUPPORTS

A. Provide hangers, brackets, and suspension rods and supplementary steel to support equipment.

B. Hangers provided under other divisions shall not be used for support of Division 26 equipment unless permitted by Architect/Engineer.

3.11 PAINTING

A. Painting in general will be covered under another division of this specification, except items furnished under Division 26, 27, and 28 that are scratched, marred in shipment or installation, shall be refinished by the Division 26, 27, and 28 Contractor.

3.12 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 and workmanship like appearance.

B. All work and materials shall be subject to observation at any and all times by representatives of the Engineer.

3.13 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.

3.14 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 260005 - ELECTRICAL – EXISTING SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Portions of the existing electrical lighting, power and signal systems are to be removed as detailed on the drawings.

1.2 RELATED DOCUMENTS

A. Section 260000 – General Electrical Conditions

PART 2 - PRODUCTS

2.1 EXISTING MATERIALS

A. Existing materials which are a part of the building shall remain the property of the Owner.

2.2 EXISTING MATERIALS RE-INSTALLED

A. Existing materials and equipment that are removed as a part of the work or stored in surplus may be re-installed as a part of the new system subject to approval of condition suitability by the Architect/Engineer. The requirements of the specifications (i.e. installation, warranty, testing, etc.) shall apply as if the materials were new, supplied by the Contractor.

2.3 EXISTING MATERIALS NOT TO BE RE-INSTALLED

A. In coordination with the Architect/Engineer, these materials shall be made available for his inspection and decision as to whether the Owner will retain possession. Items selected for retention shall be delivered to a location on the premises selected by the Owner and turned over to him. Take reasonable care to avoid damage to this material. If the Contractor fails to conform to this requirement, he shall purchase and turn over to the Owner replacement materials of like kind and quality.

B. All material not selected for retention by the Owner and debris shall be disposed of by the Contractor. This shall include, but not be limited to, removal of PCB type ballasts and fluorescent lamps which shall be disposed of in accordance with EPA requirements.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

A. Examine the structure, building, and conditions under which Division 26 work is to be installed for conditions detrimental to proper and timely completion of the work. Do not proceed with work until deficiencies encountered in installation have been corrected. Report any delay or difficulties encountered in installation of Division 26 work which might be unsuitable to connect with work by other divisions of this specification. Failure to report conditions shall constitute acceptance of other work as being fit and proper for the installation of Division 26 work.

B. Maintain continuity of existing circuits of equipment to remain. Existing circuits of equipment shall remain energized. Circuits which are to remain but were disturbed during demolition shall have circuits, wiring, and power restored back to original condition.

3.2 DEMOLITION

A. Switchboards, panelboards, signaling systems, other electrical equipment free standing (or surface mounted), raceway (exposed) and conductors no longer in service as a result of this Contract shall be removed. Unused raceways or sleeves shall be cut flush at ceiling, floor or wall and filled with grout.

3.3 NEW DEVICES IN REMODEL AREAS

A. Provide surface mounting for devices on existing walls. Where existing boxes are indicated to be reused, extend box as necessary and provide new devices and plates.

3.4 EXISTING PANELBOARD

A. Any modifications made to existing panels must be incorporated into the existing circuit index on the panel. If more than three circuits are modified a new typewritten index incorporating the changes to the existing index shall be installed in the existing panel.

B. 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 with the Owner.

END OF SECTION 260005

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 – General Electrical Conditions

B. Section 260533 - Raceways

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, "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 his expertise in this type of work. Any delay resulting from failure to comply with this procedure will not be 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:

D 422-63	Particle Size Analysis of Soils.
D 423-66	Liquid Limit of Soils.
D 424-59	Plastic Limit and Plasticity Index of Soils.
D 1557-78	Moisture Density Relations of Soils using a 10 lb. (4.54kg) Rammer and 18 inch (457 mm) Drop.
D 2167-66	Density of Soil In-Place by the Rubber Balloon Method.
D 2217-66	Wet preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Contents.
D 2487-69	Classification of Soils for Engineering Purposes.
D 2922-81	Test Methods for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth).
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 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.).

2.3 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 BACKFILLIING 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 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 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 taped. 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.

B. Trench Backfill: Trenches shall be backfilled to finish grade.

C. 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.

D. Bedding and Initial Backfill: Bedding shall consist of satisfactory materials. Initial backfill shall be in 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

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 – General Electrical 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 project in original containers bearing the underwriters label. Provide Type AVA wire where conductors are subject to temperature above 167 Degrees 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 SPLICES

A. Above Grade: Solderless type only. Preinsulated "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.

2.3 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.

2.4 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 that 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 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. All circuits both in and out of the building shall test out free of grounds, short circuits and other defects.

C. 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.

D. The final test of all equipment shall be made on dates designated by the Architect/Engineer and all readings shall be made in his presence.

E. 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 rotation test, all bearings shall be inspected for proper lubrication.

F. Minimum megger test for equipment shall be as follows:

Equipment Maximum Voltage Rating	Minimum Test Resistance
1,000-Volts or less	2 Megohms

G. 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. Branch panelboards with bolted pressure lugs shall use aluminum conductors designed to minimize creep; i.e., Stabiloy by ALCAN. 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 AND BONDING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. A grounding system shall be provided for neutral ground and equipment ground as required by code.

1.2 RELATED DOCUMENTS

A. Section 260000 – General Electrical Conditions

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.

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 GROUND RODS

A. Provide as shown and/or required. Connect the ground conductor to each rod.

3.3 SIZE OF GROUND WIRE

A. As required by code. Where ground wire is exposed to physical damage or is used outside of building, protect with conduit.

3.4 GROUND CONNECTION OF WATER PIPING

A. Metal internal piping shall be grounded, as part of this Contract. This includes jumpers for dielectric fittings.

3.5 GROUND CONNECTION OF BUILDING STEEL

A. Structural metal shall be grounded, as part of this Contract.

3.6 CONNECTION TO THE GROUND BUS

A. Provide connections in accordance with the codes; including but not limited to raceway systems, switchboard/panelboard frames, service neutral, separately derived systems, 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 ground connections and ground cable splices by thermal welding. 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.

END OF SECTION 260526

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 – General Electrical 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 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 Manufacture 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 so as 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. Manufacturer: Similar to 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 so 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 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 in 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 insure 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, and to facilitate pulling of wire and to limit the number 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 or Junction Box required. The Contractor is permitted to provide boxes deemed necessary by him for his work when installed in accordance with these Specifications.

3.8 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.

3.9 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.

3.10 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 26 00 00 – General Electrical 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 (O.Z. 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 (O.Z. 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.

2.7 RIGID ALUMINUM CONDUIT

A. Permitted only in specified locations.

B. Fittings copper free cast aluminum.

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" C.O. stub 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 RIGID ALUMINUM CONDUIT

A. May be used in lieu of galvanized rigid steel conduit where Raceway is run above grade or inside of buildings; rigid aluminum conduit not permitted where Raceways are encased in or attached to concrete or are below grade.

3.6 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 code. Field bends, when necessary, shall be formed only with factory recommended heater. Penetrations through floor and walls shall be galvanized rigid steel conduit. PVC, if used, shall be increased in size from that shown to include code required ground wire. Bends in excess of 10 degrees shall be GRS.

C. Arrange and slope Raceways entering building to drain away from building.

D. Ground wires shall be provided in all PVC Raceway.

3.7 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.

3.8 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.

3.9 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 O.Z. 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.

3.10 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.

3.11 HANGARS FOR RACEWAYS

A. In suspended ceiling spaces Contractor may, at his 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 will use the same routing, group together on a patented channel support system (such as Unistrut).

3.12 SURFACE METAL RACEWAY

A. Install parallel to 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.

3.13 FLEXIBLE CONDUIT

A. Flexible conduit shall be used only for connection to motors and equipment subject to vibration with 90 degrees loop minimum to allow for isolation and for lay-in fluorescent 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.

3.14 PULL CORDS

A. Nylon type shall be included in all installed empty Raceway.

END OF SECTION 260533

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 RELATED DOCUMENTS

A. Section 26 00 00 – General Electrical Conditions

1.3 REGULATORY REQUIREMENTS

A. UL 1569. Products shall be tested, approved and labeled/listed by Underwriters Laboratories, Inc.

1.4 USES PERMITTED

A. MC Cable is permitted to be used for 20amp 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.

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 ½ 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. 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 seven (7) times the diameter of the metallic sheath.

F. Metal clad cable is not permitted to connect branch circuits to fumehoods, gas storage cabinets, or chemical storage cabinets.

G. No metal clad cable shall be installed in ventilation ducts or plenums.

H. 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.

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 three (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 that 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 Megohmeter. Circuits rated 240 volts and below shall be tested with a 500-volt Megohmeter. The D.C. potential shall be applied for thirty (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 260536 - BASKET STYLE TRAY

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Conform to General Conditions and Supplemental Conditions for Washington State Facilities Construction.

1.2 WORK INCLUDED

A. Provide Cable Tray System complete.

1.3 RELATED DOCUMENTS

A. Section 260000 – General Electrical Conditions

PART 2 - PRODUCTS

2.1 PRODUCT NAME

A. Flextray Cable Management System or approved equal. Approved flexible site configurable wire mesh basket tray – 5mm minimum wire gauge thickness.

2.2 MANUFACTURER

A. GS Metals Corp. Manufacturer must have US production facilities; tray must be produced and finished in the United States with full domestic content.

B. Tray specified shall be UL classified and listed. Tray shall have T-weld on top rail in order to avoid sharp surfaces or protrusions on tray surface.

2.3 CABLE MANAGEMENT SYSTEM

A. Product Description: Tray must be a welded wire mesh cable management system. The open mesh permits easy access to the tray and provides continuous ventilation of cables installed in the tray. A continuous ground conductor fixing system shall be accomplished by the use of approved splices and bonding jumper or a continuous rigid welded steel wire mesh cable management system. Continuous safety edge wire shall be welded to the top of tray. Wire mesh shall be welded at all intersections.

B. Composition & Materials:
   1. Cable tray shall be produced from high mechanical strength steel wire, which is first welded into a net, then formed into channels to carry the cables. Covers and inserts shall be available to protect cables. There shall be a minimum of (5) five splicing options to effectively connect trays end to end.

C. Mesh size shall be 2” x 4”. The channel depth shall be 4” and the width 12”.

PART 3 - EXECUTION

3.1 GENERAL

A. Install cable tray in configuration as indicated on the drawings.

B. Connect all tray sections together with approved splicing methods suggested by the manufacturer to maintain an effective ground bond.

C. Provide unistrut wall mounting and ceiling mounted supports for mounting of the cable tray system.

D. Install cable tray at a minimum height of 6” above the ceiling tile.

E. Maintain a 12” clearance above the cable tray, free from all obstructions.

F. Cable tray shall be installed at the same elevation, unless obvious obstructions prevent this.

G. Where cable tray is indicated to pass through a wall, the Contractor shall stop the tray on either side of the wall and provide sleeves through the wall. The sleeves shall be sized to accommodate the fill area and capacity of the cable tray.

H. Cable tray shall be bonded to all conduit sleeves and data racks.

END OF SECTION 260536

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 260000 – General Electrical 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 Degree C. wire when 75 Degree C. wire is indicated. Where aluminum conductors are utilized for feeders or branch circuits the connectors shall conform to 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. Seimens

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 on 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 coverplates. 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 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 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 ½-inch high characters (for panel name); attached with screws to each NEMA 1 panelboard front. White on black, include voltage, phases, wires and minimum A.I.C. Rating in 3/8-inch characters.

B. Nameplate color shall be:

Emergency System:	White letters on red
Normal System:	White letters on black

PART 3 - EXECUTION

3.1 MOUNTING

A. Secure in place with top of cabinet at 6'-0", unless otherwise noted. 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 with the Owner, and not room number assigned on Plans.

3.3 CABINET PAINTING

A. Cabinets furnished as prime painting shall be field painted to match color of adjacent wall. (See Division - 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 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 – General Electrical 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 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, "Hands-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 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 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.

2.4 FAN SHUTDOWN RELAYS

A. Contractor shall provide relay(s) with sufficient contacts to shutdown all fans over 2000 cfm upon receipt of Fire Alarm. See Section 283100. Coordinate coil voltage with Fire Alarm System Supplier.

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 with 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 a relay to shutdown fans upon receipt of Fire Alarm.

3.6 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.

3.7 MECHANICAL EQUIPMENT NAMEPLATE RATINGS

A. The Division 260000 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 RELATED DOCUMENTS

A. Section 260000 – General Electrical Conditions

1.2 WORK INCLUDED

A. Provide all wiring devices and plates.

B. No push-in, friction, spring type terminals allowed.

C. All devices color shall be white, unless otherwise noted.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Hubbell

B. Pass & Seymour

C. Leviton

D. Cooper

2.2 SWITCHES

A. "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 CS1221, Cooper CSB120, Leviton 1221, and P&S 20AC1

B. Interchangeable type shall be rated same as above.

C. LED Dimmer: LED dimmer switch shall be rated at 16 amps), 120V or 277V, 60 hertz. Dimmer switch shall have LED vertical slide with positive “off” button. Suitable for single-pole and 3-way. Dimmer shall have a radio/TV interference filter. Dimmer shall be matched with dimming driver. See Specification Section 265000. Leviton ‘Renoir II’ series.

D. Key Operated: Hubbell HBL1221L (or equal) with 1209 Key. Provide 24 spare Keys.

E. 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 – Inteli-switch Digital Time Switch.

F. 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, 'Motor Controllers'.

G. Device plates shall be Hubbell and Cooper Type 302 stainless steel.

2.3 RECEPTACLES

A. "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 HBL5362, Cooper 5362, P&S 5362A, and Leviton 5362.

B. Ground-Fault Circuit-Interrupter Duplex Receptacles: NEMA 5-20R. Hubbell GF20ILA, and Cooper VGF20, for 20 Amp, 125-Volt AC. Provide GFI receptacles where required by code.

C. Weather Resistant (WR) / Ground Fault Circuit-Interrupter (GFCI) Outdoor Duplex Receptacles: NEMA 5-20R. Hubbell GFTR201 or equal, for 20 Amp, 125-Volt AC.

D. Special Purpose Receptacles: For special purpose receptacles, see drawings for voltage, amperage, and phase. Provide with matching plug delivered to the Owner.

2.4 VACANCY/OCCUPANCY SENSORS

A. Provide self-adjusting occupancy sensor light switching devices for control of lighting in all rooms and offices shown on drawings. Sensors shall be ceiling or wall mounted to provide adequate coverage. Occupancy sensors shall be "Leviton", Model OSC20-M0W for ceiling mounting, OSW12-M0W for wall mounting, complete with OSP20-RD0 power pack and associated mounting hardware. Provide "Leviton" ODSOD-ID wall switch sensors where shown. Sensors shall be wired to maintain switching and circuits shown on drawings.

2.5 DEVICE PLATES

A. Interior: Plates for receptacles other than NEMA 5-20R shall have ampere rating, voltage and phase engraved in the plate. Plates for recessed boxes shall be Hubbell and Cooper Type 302 stainless steel. Attachment screws shall match finish of plate. Plates for surface mounted boxes shall be of pressed stainless steel with size to fit exactly the box used.

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 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.

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.

3.2 ORIENTATION

A. Set Switches vertical with handle operating vertically, up position "ON".

B. Set Receptacles vertical with ground slot down.

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.

B. Provide new covers on existing outlet boxes being reused.

3.4 DIMMER SWITCHES

A. Provide a separate neutral for each phase.

B. Fluorescent dimmer switches require a 4 square backbox per switch.

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 AMERICANS WITH DISABILITY ACCESS

A. Comply with all requirements of Washington State Americans with Disability and NEC 2014 codes.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 260000 – General Electrical Conditions

1.2 WORK INCLUDED

A. Provide all fuses as required. Provide three (3) spare 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 a 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 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. 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 r.m.s. symmetrical. The fuses shall be UL Class RK1 to maintain the Engineered protection of the system components.

B. Motor Circuits: All individual motor circuits with full load amperes 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 H.P. 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 three 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

PART 3 - EXECUTION

3.1 FUSES

A. Install in all fusible devices provided under this Contract.

END OF SECTION

SECTION 262816 - DISCONNECTS AND FUSED SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 260000 – General Electrical 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 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 sized in accordance with manufacturer's requirements of protected equipment.

2.4 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 2.5.

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

SECTION 265000 - LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 260000 – General Electrical Conditions

1.2 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.

1.3 FIXTURE SCHEDULE MANUFACTURER'S SERIES NUMBERS

A. Are a design series reference and do not necessarily represent the number, size, wattage or the type of lamp, ballast or special requirements as specified hereinafter.

1.4 SUBMITTALS

A. Shall be neatly and clearly marked to indicate the fixtures, lamps and ballasts fully comply with contract documents. 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. Fixtures not fully complying with contract documents are not permitted.

PART 2 - PRODUCTS

2.1 METAL PARTS

A. Interior Fixtures: Steel or aluminum with 300°F, baked enamel finish, brushed aluminum with baked acrylic clear lacquer finish, or stainless steel with a brushed finish, manufacturer's standard color 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.

2.2 LIGHT TRANSMITTING COMPONENTS

A. Virgin acrylic or polycarbonate plastic (0.125-inch thick overall minimum), UV stabilized or glass. Shall be contained in a captive metal frame that remains attached to the fixture when door is in open position.

2.3 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.

2.4 LAMPS

A. General Electric, Sylvania, or Philips. All lamps supplied shall be by the same manufacturer.

B. Provide for each fixture in the exact number and type for which the fixture is designed or as noted.

C. Fluorescent Type:
1. Bi-pin, T-8 rapid start; color temperature of 3500 K; CRI 82; average life of 36,000 hours per 3 hour start.
2. Bi-pin, T-5 high output; color temperature of 3500 K; CRI 82; average life of 30,000 hours per 3 hour start.

D. Compact Fluorescent Type:
1. Twin tube, double twin tube, triple tube; 4-pin, amalgam, color temperature of 3500 K; CRI 82; average life of 20,000 hours. (Sylvania – Dulux).
2. Biax; 4-pin, color temperature of 3500 K; CRI 82; high lumen output. (Sylvania – Dulux); average life of 20,000 hours.

E. Solid-State Lighting: Fixtures shall have a lumen maintenance life expectancy (L70) of > 50,000 hours, a CRI of > 82, and a CCT of 3500K. Each solid-state fixture model shall be tested in accordance with IES LM-79.

2.5 BALLASTS - FLUORESCENT (Electronic)

A. Tested and approved for lamp type employed and approved by Lighting Design Lab specification committee.

B. Acceptance Manufacturers:
1. Advance
2. Magnetek
3. Motorola
4. Osram/Sylvania

C. UL and CBM labels.

D. Low temperature and/or outdoor application. Provide ballasts suitable for low temperature where outdoors or space ambient is expected to be below 50°F.

E. Electronic ballasts shall be high power factor, greater than 95% and total harmonic distortion (THD) less than 20%. Provide for operation with T-8, T-5 and CFL lamps. "A" sound rating. Neutral wire to be used in lighting circuit associated with electronic ballasts shall be #10 AWG CU.

F. All ballasts shall be fused (see Section 26 28 13, Fuses).

G. All ballasts shall be provided with a UL listed factory pre-installed ballast disconnect.

H. Ballasts for T5 fluorescent lamps:
1. Sylvania “Quicktronic” or equivalent programmed rapid start.
2. Ballast factor of 98% or greater.
3. “A" sound rating.
4. Electronic pre-heat starting.
5. The ballast shall operate at 40 - 60 Khz without visible flicker.
6. Five Year Warranty.

I. Ballasts for T8 fluorescent lamps:
1. Advance "Centium" Series or Equivalent programmed rapid start.
2. Ballast factor of 98% or greater.
3. “A" sound rating for 265 MA. (T8 lamps).
4. The ballast shall operate at a frequency below 30 Khz or above 40 Khz without visible flicker.
5. Shall be designed for use with occupancy sensors by providing up to 30,000 lamp starts. The ballast shall heat the lamp cathodes to 650 degree C with no glow current before applying arc voltage to the lamp.
6. Electronic ballast harmonic distortion and current shall be less than 10% THD.
7. Where fluorescent light fixtures are to be located outside, the ballast shall be capable of 0 degree F. lamp ignition.
8. Five Year Warranty.

J. Ballasts for 5 to 30 Watt Compact Fluorescent Lamps:
1. Motorola "Gold" Edition rapid start or Equivalent.
2. Electronic, 4-pin.
3. Ballast factor of 98% or greater.
4. “A" sound rating.
5. The ballast shall operate at a frequency below 30 Khz or above 40 Khz without visible flicker (high frequency operation).
6. Electronic ballast harmonic distortion and current shall be less than 10% THD.
7. Minimum starting temperature –5 degree F/-20 degree C.
8. Five Year Warranty.

K. Emergency Battery Backup: Provide as indicated. Each fluorescent fixture unit shall consist of an automatic power failure device, test switch operable from outside of the fixture, pilot light visible from outside the fixture, automatic code-compliance testing, and fully automatic solid-state charger in a self-contained power pack. Battery shall be electrolyte type with power to supply two T-8 lamps at 1100 lumens each, two compact fluorescent lamps at 300 to 750 lumens each, or one T-5HO lamp at 1100 lumens for a period of 90 minutes. Emergency unit shall operate unattended and require no maintenance for a period of 5 years.
1. Emergency unit for T-8 lamps shall be Bodine B50 ST. or Lithonia PS1400QD/SD Emergency unit for compact fluorescent lamps shall be Bodine B94 or Lithonia PSDL3/SD. Notify the Engineer In cases where the Bodine units are too large to fit in the light fixtures. In such cases an ESI equivalent unit will be acceptable.

2.6 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 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.

2.7 EXIT SIGNS

A. Fronts: Cutout stencils made of minimum #20 gauge sheet steel or sheet aluminum with red glass or plastic back of the cutout. Mount fronts either on concealed hinges or pull-out type with chain catch. Removable cutout arrows shall indicate direction of travel.

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 FLUORESCENT AND LED 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 so installed, omit ornamental ends between sections.

3.5 LOCATION

A. Mount to the dimensions shown on 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, 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 FIXTURE TENTING

A. Contractor shall coordinate ceiling types with architectural drawings and specifications and provide equivalent fire rated enclosures above all light fixtures which penetrate rated ceilings.

END OF SECTION 265000