



Volume 1 of 1 Project Manual

**Renovations of Second & Third Floors
White Hall
Western Connecticut State University
181 White Street
Danbury, CT
Project No.: BI-RD-299**

**Prepared By:
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06489**

Melody A. Currey – Commissioner

**State of Connecticut
Department of Administrative Services
Construction Services
450 Columbus Boulevard
Hartford, CT 06103**

Project Manual Date: February 13, 2019

FOR YOUR INFORMATION

IMPORTANT NOTICE

**From The State of Connecticut
Department of Administrative Services - Construction Services
Office of Legal Affairs, Policy, and Procurement**

THIS PROJECT MANUAL CONTAINS NEW REPORTING AND CONTRACTING REQUIREMENTS:


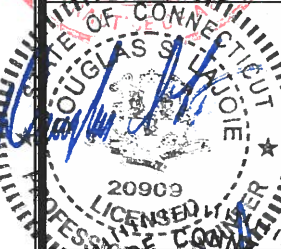
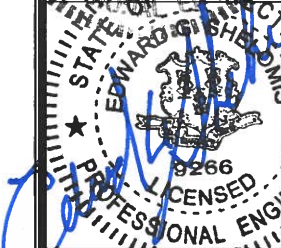
- **NEW REPORTING REQUIREMENTS FOR CONTRACTOR AND SUBCONTRACTOR PAYMENTS:**
 - For compliance with the Connecticut General Statutes Sections 4b-95 and 49-41, the Department of Administrative Services-Construction Services (DAS/CS) requires every Contractor (and its Subcontractors) who has been awarded a DAS/CS construction contract to log on to the State of Connecticut web-based platform, BizNet, each month and enter payments they have received from the state, from the Contractor, or from a higher tier Subcontractor (as applicable).
 - The process is described as follows: The state will pay the Contractor on a monthly basis for work performed (and purchases made) by it and its Subcontractors. The Contractor will input the payment date and amount they receive from the state on a monthly basis. The Contractor's first-level Subcontractor (Tier 1 Subcontractor) will input the payment they receive from the Contractor. The second-level Subcontractor (Tier 2 Subcontractor) will input the payment they receive from the Tier 1 Subcontractor. And so on.
 - Detailed instructions can be found in the DAS/CS publication, "**6002 Instructions to Contractors/Subcontractors for Entering Payments in BizNet**", available for download by going to the DAS Homepage (www.ct.gov/DAS) and selecting Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 6000 Series.
- **NEW CONTRACTING REQUIREMENTS FOR CONTRACTOR AND SUBCONTRACTOR PAYMENTS:**
 - Contractors awarded a DAS/CS construction contract shall contain a provision in their subcontract agreements requiring their Subcontractors to enter payment receipt from the Contractor in the State of Connecticut web-based platform, BizNet, for work performed or purchases made in relation to state projects.
- **THE FOLLOWING DOCUMENTS HAVE BEEN REVISED TO REFLECT THE NEW REQUIREMENTS:**
 - Section 00 11 16 Invitation to Bid;
 - Section 00 21 13 Instructions to Bidders (Subsection 3.13);
 - Section 00 41 10 Bid Package Submittal Requirements; and
 - Section 01 11 00 Summary of Work.

END

**White Hall Renovations
 Danbury, CT**

Project No.: BI-RD-299

**Prepared By:
 AMES AND WHITAKER ARCHITECTS
 31 LIBERTY STREET, SUITE 208
 Southington, Connecticut, 06489**

Seals & Signatures		Seals & Signatures	
	<p>AMES & WHITAKER ARCHITECTS, PC</p> <p>ALAN S. LAGOCKI <i>(Print Consultant Name)</i></p>		<p><i>(Print Consultant Name)</i></p>
	<p>CES ENGINEERING CONSULTANTS, LLC</p> <p>DOUGLAS S. LAJOIE <i>(Print Consultant Name)</i></p>		<p><i>(Print Consultant Name)</i></p>
	<p>LOUREIRO ENGINEERING ASSOCIATES, INC.</p> <p>EDWARD SHELOMIS <i>(Print Consultant Name)</i></p>		<p><i>(Print Consultant Name)</i></p>
	<p><i>(Print Consultant Name)</i></p>		<p><i>(Print Consultant Name)</i></p>
	<p><i>(Print Consultant Name)</i></p>		<p><i>(Print Consultant Name)</i></p>

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DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

Section No.	Title	Page Count	Not Used
00 01 01	Title Page	1	<input type="checkbox"/>
00 01 07	Seals Page	1	<input type="checkbox"/>
00 01 10	Table of Contents	8	<input type="checkbox"/>
00 01 15	List of Drawing Sheets	3	<input type="checkbox"/>
00 11 16	Invitation to Bid	3	<input type="checkbox"/>
00 21 13	NEW: Instructions To Bidders	17	<input type="checkbox"/>
00 25 13	NEW: Pre-Bid Meeting Agenda	3	<input type="checkbox"/>
00 30 00	General Statements for Available Information	2	<input type="checkbox"/>
00 30 10	General Statement for Existing Conditions Information		<input checked="" type="checkbox"/>
00 30 20	General Statement for Environmental Assessment Information		<input checked="" type="checkbox"/>
00 30 30	General Statement for Hazardous Building Materials Inspection and Inventory		<input type="checkbox"/>
00 30 40	General Statement for Subsurface Geotechnical Report		<input checked="" type="checkbox"/>
00 30 50	General Statement for Elevator Agreement		<input checked="" type="checkbox"/>
00 30 60	General Statement for FM Global Checklist for Roofing Systems		<input checked="" type="checkbox"/>
00 30 70	General Statement for "Statement of Special Inspections"		<input checked="" type="checkbox"/>
00 30 80	General Statement for Other Information		<input checked="" type="checkbox"/>
00 40 14	Certificate (of Authority) (<i>Bidder uploads to BizNet</i>)	2	<input type="checkbox"/>
00 40 15	CT DAS Contractor Prequalification Forms (<i>Bidder uploads to BizNet</i>)	4	<input type="checkbox"/>
00 41 00	Bid Proposal Form (<i>Bidder uploads to BizNet</i>)	9	<input type="checkbox"/>
00 41 10	NEW: Bid Package Submittal Requirements	4	<input type="checkbox"/>
00 43 16	Standard Bid Bond (<i>Bidder uploads to BizNet</i>)	1	<input type="checkbox"/>
00 45 14	General Contractor Bidder's Qualification Statement (<i>Bidder uploads to BizNet</i>)	7	<input type="checkbox"/>
00 45 15	Objective Criteria Established for Evaluating Qualifications of Bidders	3	<input type="checkbox"/>
00 45 17	Named Subcontractor Bidder's Qualification Statement	7	<input type="checkbox"/>
00 52 03	Contract	3	<input type="checkbox"/>
00 52 73	Subcontract Agreement Form	3	<input type="checkbox"/>
00 62 16	Certificate of Insurance	1	<input type="checkbox"/>
00 62 16.1	Asbestos Attachment to Acord Form	1	<input checked="" type="checkbox"/>
00 72 13	General Conditions of the Contract for Construction – For Design-Bid-Build	25	<input type="checkbox"/>
00 72 13.1	Supplementary Conditions	2	<input type="checkbox"/>
00 73 27	Set-Aside Contractor Schedule – <i>SAMPLE</i>	1	<input type="checkbox"/>
00 73 38	CHRO Contract Compliance Regulations	7	<input type="checkbox"/>
00 73 44	Prevailing Wage Rates/Contractor's Wage Certification/Payroll Certification	35	<input type="checkbox"/>
00 73 63	CT DOC Security Requirements	3	<input checked="" type="checkbox"/>
00 92 10	Additional Forms To be Submitted After Bond Commission Funding Approval	7	<input type="checkbox"/>
00 92 30	Procedures Regarding Taxation for Nonresident General/Prime Contractor and Subcontractors	2	<input type="checkbox"/>

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01 11 00	Summary of Work	9	<input type="checkbox"/>
01 20 00	Contract Considerations		<input checked="" type="checkbox"/>
01 23 13	Supplemental Bids	2	<input type="checkbox"/>
01 25 00	Substitution Procedures	5	<input type="checkbox"/>
01 26 00	Contract Modification Procedures	3	<input type="checkbox"/>
01 29 76	Progress Payment Procedures	5	<input type="checkbox"/>
01 31 00	Project Management and Coordination	5	<input type="checkbox"/>
01 31 19	Project Meetings	4	<input type="checkbox"/>
01 32 16	Construction Progress Schedules	3	<input type="checkbox"/>
01 32 16.13	CPM Schedules		<input checked="" type="checkbox"/>
01 32 33	Photographic Documentation	2	<input type="checkbox"/>
01 33 00	Submittal Procedures	8	<input type="checkbox"/>
01 35 16	Alteration Project Procedures	5	<input type="checkbox"/>
01 35 26	Government Safety Requirements	11	<input type="checkbox"/>
01 42 20	Reference Standards & Definitions	3	<input type="checkbox"/>
01 45 00	Quality Control	5	<input type="checkbox"/>
01 45 23.13	Testing for Indoor Air Quality, Baseline Indoor Air Quality, and Materials		<input checked="" type="checkbox"/>
01 50 00	Temporary Facilities & Controls	11	<input type="checkbox"/>
01 57 30	Indoor Environmental Control		<input checked="" type="checkbox"/>
01 57 40	Construction Indoor Air Quality Management Plan		<input checked="" type="checkbox"/>
01 60 00	Product Requirements	3	<input type="checkbox"/>
01 71 23	Field Engineering		<input checked="" type="checkbox"/>
01 73 29	Cutting and Patching	4	<input type="checkbox"/>
01 74 19	Construction Waste Management & Disposal		<input checked="" type="checkbox"/>
01 75 00	Starting & Adjusting	2	<input type="checkbox"/>
01 77 00	Closeout Procedures	5	<input type="checkbox"/>
01 78 23	Operation & Maintenance Data	5	<input type="checkbox"/>
01 78 30	Warranties & Bonds	4	<input type="checkbox"/>
01 80 13	Sustainable Design Requirements		<input checked="" type="checkbox"/>
01 91 00	Commissioning		<input checked="" type="checkbox"/>

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DIVISION 03 **CONCRETE** Not Used

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040120.63	Masonry Repair	8

DIVISION 05 **METALS** Not Used

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DIVISION 06 **WOOD, PLASTICS AND COMPOSITES** Not Used

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061063	Miscellaneous Rough Carpentry	6

DIVISION 07 **THERMAL AND MOISTURE PROTECTION** Not Used

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077200	Roof Accessories	6
078413	Penetration Fireproofing	7
079200	Joint Sealants	11

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081416	Flush Wood Doors	7
087100	Door Hardware	23
088000	Glazing	10
088813	Fire-Resistant Glazing	8
089119	Fixed Louvers	6

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092216	Non-Structural Metal Framing	8	
092900	Gypsum Board	7	
093013	Ceramic Tiling	11	
095113	Acoustical Panel Ceilings	9	
096513	Resilient Base and Accessories	5	
096519	Resilient Tile Flooring	6	
096813	Tile Carpeting	8	
099113	Exterior Painting	6	
099123	Interior Painting	8	

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101423.16	Room-Identification Panel Signage	7	
102113.19	Solid Surface Toilet Compartments	9	
102800	Toilet, Bath, and Laundry Accessories	5	
104413	Fire Protection Cabinets	3	
104416	Fire Extinguishers	2	

DIVISION 11		EQUIPMENT	Not Used <input checked="" type="checkbox"/>
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DIVISION 12		FURNISHINGS	Not Used <input type="checkbox"/>
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122113	Horizontal Louver Blinds	6	

DIVISION 13		SPECIAL CONSTRUCTION	Not Used <input checked="" type="checkbox"/>
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DIVISION 14		CONVEYING SYSTEMS	Not Used <input checked="" type="checkbox"/>
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DIVISION 21	FIRE SUPPRESSION	Not Used <input type="checkbox"/>
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21 05 00	Common Work Results for Fire Suppression Trades	11
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22 05 23	General-Duty Valves for Plumbing Piping	6
22 05 29	Hangers and Supports for Plumbing Piping and Equipment	12
22 05 48	Vibration and Seismic Controls for Plumbing Piping and Equipment	12
22 05 53	Identification for Plumbing Piping and Equipment	6
22 07 00	Plumbing Insulation	8
22 30 00	Plumbing Specialties	8
22 40 00	Plumbing Fixtures	7
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23 05 13	Common Motor Requirements for HVAC Equipment	3
23 05 16	Expansion Fittings and Loops for HVAC Piping	6
23 05 23	General-Duty Valves for HVAC Piping	5
23 05 29	Hangers and Supports for HVAC Piping and Equipment	8
23 05 48	Vibration and Seismic Controls for HVAC Piping and Equipment	18
23 05 53	Identification for HVAC Piping and Equipment	5
23 05 93	Testing, Adjusting, and Balancing for HVAC	9
23 07 00	HVAC Insulation	9
23 09 00	Direct-Digital Control System for HVAC	26
23 09 93	Sequence of Operations for HVAC Controls	8
23 21 13	Hydronic Piping	7
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23 33 00	Air Duct Accessories	7
23 36 00	Air Terminal Units	4
23 37 00	Air Outlets and Inlets	3
23 81 03	Packaged Rooftop Air Conditioning Units	8
23 81 27	Variable Refrigerant Volume Mini Split Systems	5
23 82 00	Convection Heating and Cooling Units	3

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DIVISION 25	INTEGRATED AUTOMATION	Not Used <input checked="" type="checkbox"/>
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DIVISION 26	ELECTRICAL	Not Used <input type="checkbox"/>
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26 05 29	Hangers and Supports for Electrical Systems	9
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26 05 53	Identification for Electrical Systems	5
26 24 16	Panelboards	6
26 27 26	Wiring Devices	5
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27 05 33	Conduits and Backboxes for Communications Systems	7
27 13 00	Telecommunications and Data Wiring System	11

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DIVISION 32	EXTERIOR IMPROVEMENTS	Not Used <input checked="" type="checkbox"/>
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DIVISION 33	UTILITIES	Not Used <input checked="" type="checkbox"/>
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DIVISION 34	TRANSPORTATION	Not Used <input checked="" type="checkbox"/>
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DIVISION 35	WATERWAYS AND MARINE	Not Used <input checked="" type="checkbox"/>
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DIVISION 40	PROCESS INTEGRATION	Not Used <input checked="" type="checkbox"/>
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DIVISION 41	MATERIAL PROCESSING	Not Used <input checked="" type="checkbox"/>
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DIVISION 44	POLLUTION CONTROL EQUIPMENT	Not Used <input checked="" type="checkbox"/>
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DIVISION 45	INDUSTRY SPECIFIC MANUFACTURING EQUIPMENT	Not Used <input checked="" type="checkbox"/>
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DIVISION 50	PROJECT-SPECIFIC AVAILABLE INFORMATION	Page Count	Not Used <input type="checkbox"/>
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50 10 00	Existing Conditions Information		<input checked="" type="checkbox"/>
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50 20 00	Environmental Assessment Information		<input checked="" type="checkbox"/>
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50 30 00	Hazardous Building Materials Inspection and Inventory	62	<input type="checkbox"/>
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50 40 00	Subsurface Geotechnical Report		<input checked="" type="checkbox"/>
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50 50 00	Elevator Agreement		<input checked="" type="checkbox"/>
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50 60 00	FM Global Checklist For Roofing Systems		<input checked="" type="checkbox"/>
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50 70 00	Statement of Special Inspections		<input checked="" type="checkbox"/>
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50 80 00	Other Information:		<input checked="" type="checkbox"/>
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	50 80 00.1 [insert name of report, form, certification, etc.]		<input type="checkbox"/>
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	50 80 00.2 [insert name of report, form, certification, etc.]		<input type="checkbox"/>
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	50 80 00.3 [insert name of report, form, certification, etc.]		<input type="checkbox"/>
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Advertisement No.:	19-09	Advertisement Date:	March 15, 2019
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<p>INVITATION TO BID</p> <p>Connecticut Department of Administrative Services (DAS) Construction Services (CS) Office of Legal Affairs, Policy and Procurement 450 Columbus Blvd, Suite 1302, Hartford, CT 06103-1835</p>
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Find Invitations to Bid on the State Contracting Portal:	Go to the DAS website www.ct.gov/das Click on “ State Contracting Portal ”; Select “ Administrative Services, Construction Services ”; Select the appropriate Invitation to Bid .
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Instructions for On-Line Bidding:	Follow the instructions in 6001 Construction On-line Bidding Instructions . (http://portal.ct.gov/-/media/DAS/Construction-Services/DAS-CS-Library/6000-Series/6001-Construction-On-Line-Bidding-Instructions.pdf) For questions, call 860-713-5794.
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Date and Time of Bid Opening:	<table border="1" style="display: inline-table; margin-right: 10px;"> <tr> <td style="text-align: center;">MAY</td> </tr> <tr> <td style="text-align: center;"><i>(Month)</i></td> </tr> </table> <table border="1" style="display: inline-table; margin-right: 10px;"> <tr> <td style="text-align: center;">1</td> </tr> <tr> <td style="text-align: center;"><i>(Day)</i></td> </tr> </table> <table border="1" style="display: inline-table; margin-right: 10px;"> <tr> <td style="text-align: center;">2019</td> </tr> <tr> <td style="text-align: center;"><i>(Year)</i></td> </tr> </table>	MAY	<i>(Month)</i>	1	<i>(Day)</i>	2019	<i>(Year)</i>	Time:	<table border="1" style="display: inline-table; margin-right: 10px;"> <tr> <td style="text-align: center;">1:00</td> </tr> <tr> <td style="text-align: center;"><i>(ET)</i></td> </tr> </table> PM	1:00	<i>(ET)</i>
MAY											
<i>(Month)</i>											
1											
<i>(Day)</i>											
2019											
<i>(Year)</i>											
1:00											
<i>(ET)</i>											

This Invitation to Bid is for the following Project:

Construction Costs:	Greater Than \$500,000		
Bidding Limited To:	Contractors Prequalified by DAS for General Building Construction (Group B)		
Threshold Limits: (C.G.S. §29-276b)	This Project DOES NOT exceed Threshold Limits.		
Project Title:	Renovations of Second & Third Floors White Hall Western Connecticut State University		
Project Location:	181 White Street Danbury, CT		
Project Number:	BI-RD-299		
Project Description:	Renovation of the Second and Third Floors of White Hall of approximately 63,000 gross square feet. The project consists of the renovations of major portions of the Second Floor including the toilet rooms, portions of the Third Floor including HVAC equipment suitable for future interior fit-out of those portions not included in this project. There is also a Supplemental Bid for the renovations to the Third Floor Toilet Rooms		
Work Includes But Is Not Limited To The Following:	Selective Demolition, masonry repair and infills, metal fabrications, rough carpentry, thermal and moisture protection, doors and frames, hardware, louvers, glazing, finishes, specialties, mechanical, electrical, plumbing and fire protection work		
Date DAS Began Planning Project:	9-14-2016		
Special Requirements:	N/A		
Cost Estimate Range:	\$ 3,846,799.	To	\$ 4,251,715.
Date Plans & Specs Ready:	March 20, 2019		
Plans and Specs Download:	Plans and Specs are available for electronic download on the DAS State Contracting Portal.		



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Invitation to Bid (continued)

Contract Time Allowed:	Calendar Days:	260
Liquidated Damages:	\$ 2,752.00	Per Calendar Day Beyond Substantial Completion.
	\$ 1,996.00	Per Calendar Day Beyond 90 days After Substantial Completion
Pre-Bid Meeting Date:	March 28, 2019	
	<input type="checkbox"/>	Bidders are strongly encouraged to attend the Pre-Bid Meeting.
	<input checked="" type="checkbox"/>	Bidders are required to attend a MANDATORY Pre-Bid Meeting.
Pre-Bid Meeting Time:	09:30	<input checked="" type="checkbox"/> AM <input type="checkbox"/> PM
Pre-Bid Meeting Location:	WCSU Midtown Campus, 181 White Street, Danbury, CT – Meet at the Warner Hall, Room 103, Park at the 5 th Avenue Parking Garage	
Pre-Bid Meeting Contact:	DAS/CS Project Manager:	Anthony DeNapoli
	Phone No.:	860.713.5844
Pre-Bid Meeting Registration:	At the Pre-Bid Meeting, all prospective bidders shall <i>sign</i> his or her name on the official roster and <i>list</i> the name and address of the company he or she represents. For MANDATORY Pre-Bid Meetings, this shall be done no later than the designated start time of the Pre-Bid Meeting. No attendee will be allowed to register <i>after</i> the advertised start time. Bids submitted by contractors who have <i>not properly</i> registered and attended the MANDATORY Pre-Bid Meeting <i>shall be rejected as non-responsive</i> . See Section 00 25 13 Pre-Bid Meeting Agenda for additional details.	
Subcontractor and/or Supplier Small Business Enterprise (SBE) & Minority Business Enterprise (MBE) Set-Aside Requirements:	See 00 41 00 Bid Proposal Form	
Bid Proposal Submission and Other Bid Submittal Requirements:	See Sections 00 21 13 Instructions to Bidders, 00 41 00 Bid Proposal Form, and 00 41 10 Bid Package Submittal Requirements for Bid Proposal submission requirements, including requirements for Affidavits, Certifications, Addenda, Pre-Bid Equals and Substitution Requests, and other bidding documents.	
Bid Upload and Bid Opening:	Bids can be uploaded and edited electronically in BizNet UNTIL 1:00 p.m. on the Bid Opening Date and thereafter shall be locked down and publicly opened in the State Contracting Portal.	
Bid Results:	Within approximately two (2) days after the Bid Opening Date, the Bid Results will be posted on the State Contracting Portal.	
Guide to the Code of Ethics For Current or Potential State Contractors (for contracts greater than \$500,000):	Anyone seeking a contract with a value of more than \$500,000 shall electronically download the “ Guide to the Code of Ethics For Current or Potential State Contractors ” from the of Office of State Ethics (OSE) website www.ct.gov/ethics , then click on the “ Publications ” link:	
Prevailing Wage Rates:	Prevailing wages are required on this project, in accordance with the schedule provided in the bid documents, pursuant to Connecticut General Statutes (C.G.S.) Section 31-53 (a) through (h), as amended. Each contractor who is awarded a contract on or after October 1, 2002 shall be subject to provisions of C.G.S. § 31-55a concerning annual adjustments to prevailing wages. Wage Rates will be posted each July 1st on the Department of Labor website www.ctdol.state.ct.us . Such prevailing wage adjustment shall not be considered a matter for any contract amendment.	
To access Executive Orders:	Go to www.ct.gov > Governor Ned Lamont > Executive Orders.	



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Invitation to Bid (continued)

Important Notices:

UPDATED DOCUMENTS:

Many **Division 00** and **Division 01** documents have been updated. Read all of the contents of the Project Manual *carefully!*

All Contractors are cautioned that any modifications or alterations made to either the Project Manual or any of the forms and documents contained herein may be just cause to **reject the bid!**

NEW PROCESS FOR CONSTRUCTION STORMWATER GENERAL PERMIT:

See Section 01 50 00 Temporary Facilities and Controls.

For all DAS/CS construction projects disturbing **one or more total acres of land area** on a site regardless of project phasing, the **Architect/Engineer** shall be responsible for filing a Department of Energy and Environmental Protection (DEEP) *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (DEEP-WPED-GP-015)* registration and Stormwater Pollution Control Plan (SPCP) through the online DEEP ezFile Portal **prior** to bidding.

Once the **Contractor** is under contract with DAS/CS, and **prior** to the commencement of any construction activities, the Contractor (and all other contractors and subcontractors listed on the SPCP) shall assume responsibility for storm water pollution control and conform to the general permit obligations and requirements by **signing** the SPCP "Contractor Certification Statement" and License Transfer Form as directed by the Architect/Engineer.

At completion of the project, the Contractor shall file a Notice of Termination (DEP-PED-NOT-015) with the DEEP in order to terminate the Construction Stormwater General Permit. A project shall **only** be considered complete after all **post-construction** measures are installed, cleaned, and functioning and the site has been stabilized for at least **three (3) months** following the cessation of construction activities.

NEW PROCESS FOR CONTRACTOR AND SUBCONTRACTOR PAYMENTS REPORTING:

See Section 00 21 13 Instructions to Bidders (Subsection 3.13) and Section 01 11 00 Summary of Work (Subsection 1.11).

For compliance with **C.G.S. § 4b-95 and 49-41**, DAS/CS requires every Contractor (and its Subcontractors) who has been awarded a DAS/CS construction contract to log on to the State of Connecticut web-based platform, BizNet, **each month** and **enter payments** they have received from the state, from the Contractor, or from a higher tier Subcontractor (as applicable).

The process is described as follows: The state will pay the Contractor on a monthly basis for work performed (and purchases made) by it and its Subcontractors. The Contractor will input the payment date and amount they receive from the state on a monthly basis. The Contractor's first-level Subcontractor (Tier 1 Subcontractor) will input the payment they receive from the Contractor. The second-level Subcontractor (Tier 2 Subcontractor) will input the payment they receive from the Tier 1 Subcontractor. And so on.

Contractors awarded a DAS/CS construction contract shall contain a **provision in their subcontract agreements** requiring their Subcontractors to enter payment receipt from the Contractor in the State of Connecticut web-based platform, BizNet, for work performed or purchases made in relation to state projects.

Detailed instructions can be found in the DAS/CS publication, "**6002 Instructions to Contractors/Subcontractors for Entering Payments in BizNet**", available for download by going to the DAS Homepage (www.ct.gov/DAS) and selecting Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 6000 Series.

IMPORTANT NOTE: *The Commissioner of the CT Department of Administrative Services reserves the right to do any of the following without liability, including but not limited to: (a) waive technical defects in the bid proposal as he or she deems best for the interest of the State; (b) negotiate with a contractor in accordance with Connecticut General Statutes Section 4b-91; (c) reject any or all bids; (d) cancel the award or execution of any contract prior to the issuance of the "Notice To Proceed"; and (e) advertise for new bids.*



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Invitation to Bid (continued)

All Project Questions, Bid Questions, and Pre-Bid Equals and Substitution Requests must be submitted fourteen (14) Calendar Days prior to the Bid Due Date.

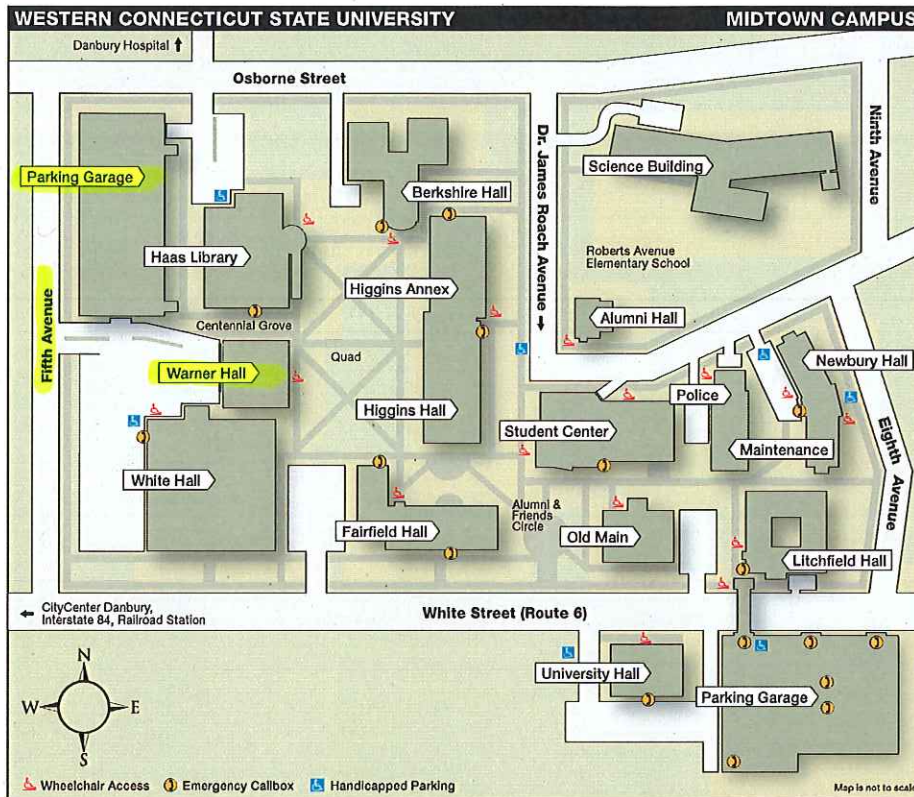
All **Project Questions** and **Pre-Bid Equals and Substitution Requests** must be emailed (not phoned) to the **Architect/Engineer** with a **copy** to the **Construction Administrator** and the **DAS/CS Project Manager** listed below.

Architect/Engineer:	Ames & Whitaker Architects, P.C.	Email:	al@amesandwhitaker.com
Construction Administrator:	Downes Construction Company, LLC	Email:	mmacdonald@downesco.con
DAS/CS Project Manager:	Anthony DeNapoli	Email:	Anthony.DeNapoli@ct.gov

All **Bid Questions** must be emailed to the **DAS/CS Associate Fiscal Administrative Officer** listed below.

DAS/CS Associate Fiscal Administrative Officer:	Mellanee Walton	Email:	Mellanee.Walton@ct.gov
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Campus Maps & Directions



To Midtown campus

(181 White Street, Danbury, Conn.)

From the East: Take Exit 5 off I-84 to first traffic light (Clapboard Ridge Road); turn right and continue on Main Street to White Street (fifth traffic light); turn left on White Street and continue one half mile to campus on left.

From the West: Take Exit 5 off I-84 to first traffic light (Main Street); turn right and continue on Main Street to White Street (fourth traffic light); turn left on White Street and continue one half mile to campus on left.

To Westside campus

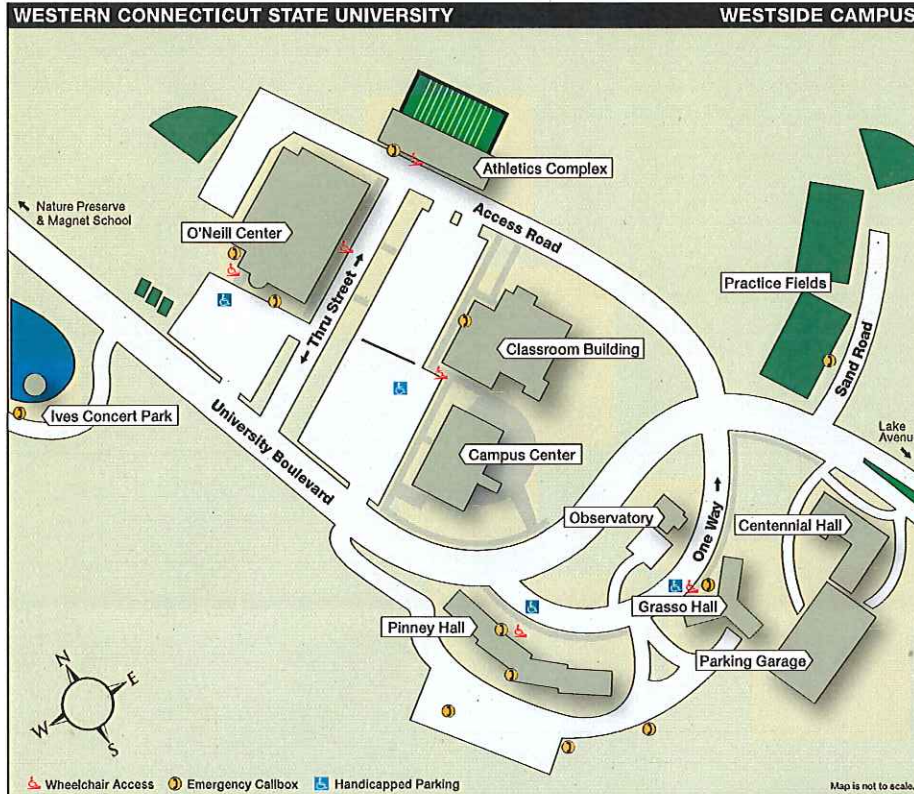
(43 Lake Avenue Ext., Danbury, Conn.)

From the East or West: Take Exit 4 off I-84; turn right onto Lake Avenue. Go approximately one mile. Campus entrance on right.

Campus-to-Campus

Midtown to Westside: Follow White Street and take a right onto Main Street (third traffic light). Follow Main Street to third traffic light (Main Street becomes Clapboard Ridge). Turn left onto I-84 West. Take Exit 4 off I-84. Turn right onto Lake Avenue. Go approximately one mile. Campus entrance is on the directly across from Super Stop & Shop. General parking is available along University Boulevard.

Westside to Midtown: Turn left onto Lake Avenue. Go approximately one mile. Turn left onto I-84 East. (third traffic light). Take Exit 5 off I-84 to first traffic light (Main Street). Turn right and continue on Main Street to White Street (fourth traffic light). Turn left on White Street and continue one half mile. The campus is on the left. Visitor's parking is available in the lot adjacent to Old Main.



Instructions to Bidders

DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

1.0 General Bid Proposal Information

1.1 On-Line Bidding:

1.1.1 The Department of Administrative Services (DAS) Construction Services (CS) has streamlined the Bid process by allowing contractors to submit their **Bid Package Documents on line** through the **State Contracting Portal** and **BizNet**. Rather than submitting paper Bid Package Documents, contractors simply respond to an **Invitation to Bid** on the **State Contracting Portal** by retrieving and uploading their documents electronically through their **BizNet** account. Once completed, the Bid Proposal must be **electronically signed prior** to the date and time of the **Bid Opening**. See **Page 1** of the **Invitation to Bid** for the **Date and Time of the Bid Opening**.

1.1.2 All Bidders shall **electronically** upload their **Bid Package Documents** to BizNet following the **instructions** in the DAS/CS publication, [6001 Construction On-line Bidding Instructions](#), available for download here: Go to the DAS Homepage (www.ct.gov/DAS), Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 6000 Series > **6001 Construction On Line Bidding Instructions**. For questions, call 860-713-5794.

1.2 Bid Opening:

All Bids shall be publicly opened in BizNet by the awarding authority as stated in **Section 00 11 16 Invitation to Bid**.

1.3 Withdrawal of Bid:

Any **Bid** once uploaded into BizNet cannot be deleted. A Bid may only be **withdrawn** by uploading a written **Letter of Withdrawal** to BizNet using the "**Other Solicitation Document**" link **prior** to the date and time of the Bid Opening.

1.4 Disqualification from Bidding:

Any contractor who violates any provision of **Connecticut General Statutes (C.G.S.) § 4b-95**, as revised, shall be **disqualified** from bidding on other contracts for a period not to exceed **twenty-four (24) months**, commencing from the date on which the violation is discovered, for each violation.

1.5 Waive Minor Irregularities:

1.5.1 The awarding authority **shall** be authorized to **waive minor irregularities** which he or she considers in the best interest of the State, provided the reasons for any such waiver are stated in writing by the awarding authority and made a part of the contract file.

1.5.2 **No** such bid shall be rejected because of the failure to submit prices for, or information relating to, any item or items for which no specific space is provided in the bid form furnished by the awarding authority, but this sentence shall not be applicable to any failure to furnish prices or information required by **C.G.S. § 4b-95**, as revised, to be furnished in the bid form provided by the awarding authority.

1.6 Minimum Percentage of Work:

The awarding authority **may** require in the **Bid Proposal Form** that the contractor agree to perform a stated, minimum percentage of work with its **own forces**, in accordance with **C.G.S. § 4b-95(b)**.

1.7 Set-Aside Contracts:

The awarding authority **may also** require the contractor to set aside a portion of the contract for subcontractors who are eligible for **set-aside contracts**.

1.8 Connecticut Sales And Use Taxes:

1.8.1 **All Bidders shall** familiarize themselves with the current statutes and regulations of the **Connecticut Department of Revenue Services (DRS)**, including the Regulations of Connecticut State Agencies (R.C.S.A.) §12-426-18 and all relevant state statutes. The tax on materials or supplies exempted by such statutes and regulations shall not be included as part of a bid. See the **Sales and Use Tax Exemption for Purchases by Qualifying Governmental Agencies (CERT-134)**, available for download from the DRS website (www.ct.gov/drs) under "Exemption Certificates".

1.8.2 The State of Connecticut construction contract has the following tax exemptions: (1) Purchasing of materials which will be physically incorporated and become a permanent part of the project; and (2) Services that are resold by the contractor. For example, if a Contractor hires a plumber, carpenter or electrician, a resale certificate may be issued to the subcontractor because these services are considered to be integral and inseparable component parts of the building contract.

1.8.3 The following items are **not** exempt from taxes when used to fulfill a State of Connecticut construction contract: Tools, supplies and equipment used in fulfilling the construction contract.

1.9 Union Labor:	
Attention is called to the fact that there may or could be construction work carried on at the site by union labor. This fact must be kept in mind by all Bidders.	
1.10 Rejection of Bids:	
The awarding authority <i>shall reject</i> every such Bid Proposal , including but not limited to, the following reasons:	
1.10.1	A Bid Proposal Form that does <i>not</i> contain the signature of the bidder or its authorized representative.
1.10.2	A Bid Proposal Form that is <i>not</i> accompanied by the following documents in BizNet:
.1	Section 00 43 16 Standard Bid Bond , completed for <i>either</i> the Bid Bond option <i>or</i> Certified Check option;
.2	A Certified Check (if applicable) delivered to the DAS/CS Office of Legal Affairs, Policy, and Procurement <i>prior</i> to the date and time of the Bid Opening;
.3	Section 00 45 14 General Contractor Bidder's Qualification Statement
.4	A DAS Contractor Prequalification Certificate for the Bidder for Projects <i>greater</i> than \$500,000 ;
.5	A DAS Update (Bid) Statement for the Bidder for Projects <i>greater</i> than \$500,000 ;
.6	A Gift and Campaign Contribution Certification – Office of Policy and Management (OPM) Ethics Form 1 ;
.7	A Consulting Agreement Affidavit – OPM Ethics Form 5 . NOTE: If the Bidder fails to submit or upload the Consulting Agreement Affidavit required under C.G.S. § 4a-81, such bidder shall be <i>disqualified</i> and the award shall be made to the next lowest responsible qualified bidder or new bids or proposals shall be sought;
.8	An Ethics Affidavit (Regarding State Ethics) – OPM Ethics Form 6 ;
.9	An Iran Certification – OPM Ethics Form 7 .
1.10.3	A Bid Proposal Form that:
.1	Fails to acknowledge all Addenda in the space provided in the Bid Proposal Form ;
.2	Fails to correctly list the Named Subcontractors on the Bid Proposal Form ;
.3	Fails to correctly state a Named Subcontractor's price on the Bid Proposal Form ; and
.4	Fails to list Named Subcontractors who are DAS Prequalified at the time of the bid .
1.10.4	A Bid Proposal Form that is <i>not</i> submitted on the forms furnished for the specific project. NOTE: In no event will bids or changes in bids be made by telephone, telegraph, facsimile or other communication technology except through BizNet. All pages of the Bid Proposal Form <i>must</i> be uploaded to BizNet prior to the date and time of the Bid Opening.
1.10.5	A Bid Proposal Form that has omitted items, omitted pages, added items not called for, altered the form, contains conditional bids, contains alternative bids, or contains obscure bids.
1.10.6	A paper Bid Package sent to the DAS/CS Office of Legal Affairs, Policy, and Procurement. Such bids will be returned to the bidder unopened.
1.10.7	Any Bidder that does <i>not</i> make all required pre-award submittals <i>within</i> the designated time period. DAS/CS <i>may</i> reject such bids as non-responsive .
1.11 Pre-Bid Meeting:	
1.11.1	See Section 00 11 16 Invitation to Bid and Section 00 25 13 Pre-Bid Meeting Agenda for details.
1.11.2	When a Pre-Bid Meeting is " strongly encouraged ", all attendees shall sign his or her name to the official roster and list the name and address of the company he or she represents.
1.11.3	When a Pre-Bid Meeting is MANDATORY , all attendees will be required to register. Proper registration means that the attendee has signed his or her name to the official roster and listed the name and address of the company he or she represents on the official roster no later than the designated start time of the MANDATORY Pre-Bid Meeting . Bidders are advised to register early as no attendee will be allowed to register <i>after</i> the advertised start time of the MANDATORY Pre-Bid Meeting . All bids submitted by all contractors who have <i>not</i> properly registered and attended the MANDATORY Pre-Bid Meeting shall be rejected as non-responsive.
1.11.4	All Bidders Attending a Pre-Bid Meeting at a Connecticut Department of Corrections (DOC) Facility: Prior to the Pre-Bid Meeting , download the " Security Background Questionnaire " from the CT DOC website (www.ct.gov/doc under " Forms "), complete and submit the form as directed, and obtain approval, otherwise admission to the Pre-Bid Meeting will be denied . It is recommended that the approved form be brought as evidence of approval to attend the Pre-Bid Meeting.

1.12 Pre-Bid Equals and Substitution Requests Procedures:	
1.12.1	All submissions requesting "Equals and/or Substitutions" shall be made by the Bidder in accordance with Section 01 25 00 Substitution Procedures of the Division 01 General Requirements and Article 15, Materials: Standards of Section 00 72 13 General Conditions . Every submission shall contain all the information necessary for DAS/CS to evaluate the submission and the request. Failure to submit sufficient information to make a proper evaluation, including submittal of data for the first manufacturer listed as well as the data for the " Equals and/or Substitutions " proposed, shall result in a rejection of the submission and request. Upon receipt of the submission and request, DAS/CS shall notify the Bidder that the request has been received and as soon as possible shall render a decision on such submission and request.
1.12.2	Pre-Bid-Opening Substitution of Materials and Equipment: The Owner will consider requests for equals or substitutions <i>if received fourteen (14) Calendar Days prior</i> to the Bid Opening Due Date , as stated in the Invitation To Bid . The Equal or Substitute Product Request (Form 7001) must be used to submit requests. Download Form 7001 from the DAS Homepage (www.ct.gov/DAS) > Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 7000 Series.
1.12.3	Equals and/or Substitutions Requests Submittal: Requests for Equals or Substitutions shall be submitted to the DAS/CS Project Manager, Architect / Engineer, and Construction Administrator .
1.12.4	Substitution Request Deadline: Any substitution request not complying with requirements will be denied. Substitution requests sent after the Deadline will be denied.
1.12.5	Addendum: An Addendum shall be issued to inform all prospective bidder of any accepted substitution in accordance with our addenda procedures.
1.12.6	Time Extensions: No extensions of time will be allowed for the time period required for consideration of any Substitution or Equal.
1.12.7	Post Contract Award Substitution of Materials and Equipment: All requests for "Equals and Substitutions" after the Award of the Contract shall be made only by the Prime Contractor for materials or systems specified that are no longer available. The requests will not be considered if the product was not purchased in a reasonable time after award, in accordance with Article 15, Materials: Standards of Section 00 72 13 General Conditions .
1.13 Joint Ventures:	
1.13.1	Each entity in a Joint Venture shall submit with the Venture's bid a letter on their respective company letterheads stating: <ul style="list-style-type: none"> · Their agreement to bid as a Joint Venture with the other named Joint Venture, and set forth the name and address of the other Joint Venture(s). · The respective percentage of the project work that would be the responsibility of each of the Joint Ventures.
1.13.2	Prequalification: Each entity in a Joint Venture shall submit its Prequalification Certificate and Update (Bid Statement) . Each entity in a Joint Venture shall be prequalified at the time of the bid and during the entire project construction. Each entity in a Joint Venture shall have the prequalification single project limit , and remaining aggregate capacity balance to meet the value of its respective percentage of the joint proposed bid.
1.13.3	Each entity in a Joint Venture shall submit Section 00 45 14 General Contractor Bidder's Qualification Statement .
1.13.4	Bonding: The Joint Venture shall obtain the required bonding from a surety for the total amount of the contract price.
1.13.5	Insurance: Each entity in a Joint Venture shall have the required insurance coverages and limits to meet the insurance requirements of the contract. The Joint Venture shall provide Builder's Risk insurance .
1.13.6	Bid Submission and Contract Signing: If a Joint Venture submits a bid proposal, it shall be considered to be a proposal by each of the Joint Ventures, jointly and severally, for the performance of the entire contract as a Joint Venture in accordance with the terms and conditions of the contract. Each entity in a Joint Venture is required to sign the contract acknowledging that each Joint Venture shall be jointly and severally liable for the performance of the entire contract.
1.13.7	Certificate of Legal Existence: Each entity in a Joint Venture shall obtain a Certificate of Legal Existence and submit it with the contract documents.
1.14 Procedure for Alleged Violation(s) of Part II Chapter 60 of C.G.S. Bidding and Contracts:	
1.14.1	The Regulations of Connecticut State Agencies establishes a procedure for promptly hearing and ruling on claims alleging a violation or violations of the contract bidding provisions of Part II of Chapter 60 of the Connecticut General Statutes (hereinafter "Chapter 60"). In view of the fact that time is normally of the essence in awarding construction contracts under Chapter 60, the grievance procedures are intended to be quick, informal and conclusive so as to avoid delays which can increase costs and jeopardize the very ability of the State to proceed with needed public works projects.
1.14.2	Download " 6510 Procedure for Alleged Violation(s) " and " 6505 Petition for Alleged Violation(s) " from the DAS Homepage (www.ct.gov/DAS) > Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 6000 Series > Scroll down to locate documents.

1.15 Labor Market Area:	
1.15.1	All Bidders <i>shall</i> have read C.G.S. §§ 31-52 and 31-52a , as revised. These sections relate to the preference of State citizens and the preference of residents of the labor market area in which the work under the contract is to be done and the penalties for violations thereof.
1.15.2	In order to avoid violations by the contractor and to cooperate with and assist the State in the implementation of the statutory mandates, any bidder awarded a contract with the State shall be required to provide the State with the following information: <ul style="list-style-type: none"> .1 The names and addresses of employees utilized by the contractor and by its subcontractors and how long each such employee has resided in Connecticut. .2 How long each employee has resided in the labor market area, as established by the State Labor Commissioner, in which the work under the contract is to be done. Labor market areas are indicated on the end of this section. .3 Within thirty (30) days after the start of work, the contractor shall submit a signed statement setting forth the procedures the contractor and its subcontractors have taken to assure that they have sought out qualified residents of the labor market area. Also, the statement shall include information as to how many persons were considered for employment and how many were actually hired. Such procedures will include, but not be limited to, obtaining names of available persons from area Employment Security Offices. .4 In the same manner as Subsection 1.15.2.3 above, the statement shall indicate the steps taken to assure that the contractor and its subcontractors have sought out qualified residents of this State.
1.15.3	The contractor shall cooperate with and provide information to the DAS/CS Project Manager or their designee assigned to collect and verify the information required. The State may request that all such information be updated during the term of the contract at reasonable times.
1.15.4	All such information gathered and compiled by the State shall be forwarded to the Labor Commissioner.
1.15.5	Pursuant to C.G.S. § 31-52b, as revised: <p style="padding-left: 40px;">"The provisions of C.G.S. § 31-52 and 31-52a shall not apply where the State or any subdivision thereof may suffer the loss of revenue granted or to be granted from any agency or department of the federal government as a result of said sections or regulative procedures pursuant thereto."</p> <p>However, no exception shall be determined to be applicable unless stated in writing by the Commissioner of the Department of Administrative Services.</p>
1.15.6	Website Link: For guidance on the CT DOL Labor Market Areas (LMA) go to the CT DOL website http://www.ctdol.state.ct.us/ , under "Program Services", click on "Labor Market information".
1.16 Executive Orders:	
1.16.1	All Executive Orders of which are incorporated into and are made a part of the Contract as if they had been fully set forth in it. The Contract is subject to the provisions of the following: <ul style="list-style-type: none"> .1 Executive Order No. 3: Governor Thomas J. Meskill, promulgated 06/16/71, concerning labor employment practices; .2 Executive Order No. 17: Governor Thomas J. Meskill promulgated 02/15/73, concerning the listing of employment openings; .3 Executive Order No. 16: Governor John G. Rowland promulgated 08/04/99, concerning violence in the workplace; .4 Executive Order No. 14: Governor M. Jodi Rell, promulgated 04/17/06, concerning procurement of cleaning products and services; and .5 Executive Order No. 49: Governor Dannel P. Malloy, promulgated 05/22/15, concerning the requirement for certain state contractors to disclosure campaign contributions to candidates for statewide public office or The General Assembly and to ensure convenient public access to information related to gifts and campaign contribution disclosure affidavits by state contractors.
1.16.2	All Executive Orders are available for download from the State of Connecticut website. Go to www.ct.gov , click on "Governor Ned Lamont" and scroll down to "Executive Orders".
1.17 Retaliation For Disclosure of Information:	
1.17.1	Each contract between a state or quasi-public agency and a large state contractor shall provide that, if an officer, employee, or appointing authority of a large state contractor takes or threatens to take any personnel action against any employee of the contractor in retaliation for such employee's disclosure of information to the Auditors of Public Accounts or the Attorney General under the provisions of C.G.S. § 4-61dd (a) , the contractor shall be liable for a civil penalty of not more than five thousand dollars for each offense, up to a maximum of twenty per cent of the value of the contract. Each violation shall be a separate and distinct offense and in the case of a continuing violation each calendar day's continuance of the violation shall be deemed to be a separate and distinct offense. The executive head of the state or quasi-public agency may request the Attorney General to bring a civil action in the Superior Court for the judicial district of Hartford to seek imposition and recovery of such civil penalty.
1.17.2	Each large state contractor shall post a notice of the provisions of C.G.S. § 4-61dd relating to large state contractors in a conspicuous place that is readily available for viewing by the employees of the contractor.

1.18 Laws of the State of Connecticut:

Forum and Choice of Law. The Bidder agrees that in the event it is awarded a Contract, the Bidder and the State deem the Contract to have been made in the City of Hartford, State of Connecticut. Both parties agree that it is fair and reasonable for the validity and construction of the Contract to be, and it shall be, governed by the laws and court decisions of the State of Connecticut, without giving effect to its principles of conflicts of laws. To the extent that any immunities provided by Federal law or the laws of the State of Connecticut do not bar an action against the State, and to the extent that these courts are courts of competent jurisdiction, for the purpose of venue, the complaint shall be made returnable to the Judicial District of Hartford only or shall be brought in the United States District Court for the District of Connecticut only, and shall not be transferred to any other court, provided, however, that nothing here constitutes a waiver or compromise of the sovereign immunity of the State of Connecticut. The Bidder waives any objection which it may now have or will have to the laying of venue of any claims in any forum and further irrevocably submits to such jurisdiction in any suit, action or proceeding.

1.19 State's Sovereign Immunity:

Nothing in this Agreement shall be construed as a waiver or limitation upon the **State's sovereign immunity**. To the extent this Section is found to be inconsistent with any other part of this Agreement, this Section shall control. This Section of the Agreement shall survive the completion and/or termination of this Agreement.

2.0 Bid Proposal Form Instructions:

2.1 Bid Proposal Form:

2.1.1 All Bidders shall upload **ALL** pages of **Section 00 41 00 Bid Proposal Form** to BizNet, prior to the date and time of the Bid Opening.

2.2 Threshold Projects:

2.2.1 See **page 1** of the **Bid Proposal Form** to determine if this Project exceeds the **Threshold Limits**.

2.2.2 If this Project exceeds Threshold Limits, **all Bidders** shall list their Firm's **Major Contractor Registration License Number** in the **Bid Proposal Form**.

2.2.3 The **Apparent Low Bidder** shall also provide the Subcontractor(s) **Major Contractor Registration License** number(s) to the DAS/CS Office of Legal Affairs, Policy, and Procurement within **ten (10) business days after** receipt of the Letter of Intent from DAS/CS.

2.2.4 Summary of Registration Requirements for Major Contractors: Any person engaged in the business of construction, structural repair, structural alteration, dismantling or demolition of a structure or addition that exceeds the threshold limits provided in **C.G.S §29-276b**, or any person who, under the direction of a general contractor, performs or offers to perform any work that impacts upon the structural integrity of a structure or addition, including repair, alteration, dismantling or demolition of a structure or addition that exceeds the threshold limits shall engage in or offer to perform the work of a Major Contractor unless such person has first obtained a license or certificate of registration from the Connecticut Department of Consumer Protection (DCP). Individuals must be licensed under the requirements of **C.G.S §20-341gg "Registration of Major Contractors"**. DCP shall issue a certificate of registration to any person who is prequalified pursuant to section 4a-100 who applies for registration in accordance with this section.

2.2.5 The Bidder and all Subcontractors that engage in work that impacts upon the structural integrity of a structure or addition must register as a **Major Contractor** with DCP and obtain a **Major Contractor License** issued by DCP **PRIOR** to the date and time of the Bid Opening for this Project.

2.2.6 For further information go to the DCP Website: www.ct.gov/dcp.

2.3 Proposed Lump Sum Base Bid, Allowances, and Contingent Work:

2.3.1 The proposed **Lump Sum Base Bid** shall be set forth in the space **provided on Section 00 41 00 Bid Proposal Form**.

2.3.2 The **Proposed Lump Sum Base Bid** shall *include* all **Allowances**, all work indicated on the drawings and/or described in the specifications *except* for **Contingent Work**. See the **Bid Proposal Form, Section 01 20 00 Contract Considerations, and Section 01 23 13 Supplemental Bids** of Division 01 General Requirements for details regarding **Contingent Work**.

2.3.3 "**Contingent Work**" includes **Unit Prices** (for Earth and Rock Excavation, Environmental Remediation, and/or Hazardous Building Materials Abatement) and **Supplemental Bids**. See **Section 01 20 00 Contract Considerations** and **Section 01 23 13 Supplemental Bids**, respectively, for applicability.

2.3.4 The **Proposed Lump Sum Base Bid** shall be shown in *both numerical figures* and "**printed**" words **dollar amount**. In the event of any discrepancy the "**printed**" words **dollar amount** shall govern.

2.4 Addenda and Interpretations:	
2.4.1	The Number of Addenda issued by the State of Connecticut shall be set forth in the space provided on the Bid Proposal Form . It shall be the Bidder's responsibility to make inquiry as to, and to obtain, the Addenda issued, if any.
2.4.2	Addenda , if issued, will be posted on the State Contracting Portal.
2.4.3	Failure to acknowledge all Addenda in the space provided in the Bid Proposal Form shall be cause for rejection of the bid.
2.4.4	Attaching Addenda to the Bid Proposal Form does not constitute an acknowledgement of all Addenda and does not relieve the Bidder from the requirement for the Bidder to acknowledge all Addenda in the space provided on the Bid Proposal Form.
2.4.5	No interpretations of the meaning of the plans, specifications or other contract documents will be made orally at any time. Every request for such interpretation shall be in writing to the awarding authority and to be given consideration shall be received at least fourteen (14) Calendar Days <i>prior</i> to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written Addenda to the specifications which, if issued, will be posted on the State Contracting Portal.
2.4.6	Contractors who have subscribed through BizNet to receive daily e-mail alert notices when new Bids/RFPs are issued will be notified via a daily CT DAS " Connecticut Procurement Portal Daily Notice ".
2.5 Bidder's Qualification Statement and Objective Criteria for Evaluating Bidders:	
2.5.1	All Bidders shall download, complete, and upload Section 00 45 14 General Contractor Bidder's Qualification Statement to BizNet prior to the date and time of the Bid Opening. See BizNet for a template. This information shall be considered as part of the Bid Proposal Form . Failure of a Bidder to answer any question or provide required information may be grounds for the awarding authority to disqualify and reject the bid.
2.5.2	All Bidders shall comply with Section 00 45 15 Objective Criteria Established for Evaluating Qualifications of Bidders . The Objective Criteria Established for Evaluating Qualifications of Bidders are to assure that the State of Connecticut will secure the "lowest responsible and qualified bidder" who has the ability and capacity to successfully complete the Bid Proposal Form and the Work. Failure to comply with any portion of this requirement may cause rejection of the bid. Note: Individual Specification Sections may contain General Contractor and/or Subcontractor Qualification requirements that <i>exceed</i> those in Section 00 45 15 Objective Criteria Established for Evaluating Qualifications of Bidders .
2.6 Bidder's Prequalification Requirements for Projects exceeding \$500,000:	
2.6.1	All Bidders for Projects with estimated Construction Costs greater than \$500,000 shall upload a current copy of their " DAS Prequalification Certificate " and " DAS Update (Bid) Statement " for the applicable Class of Work on page 1 of Section 00 11 16 Invitation to Bid to Biznet <i>prior</i> to the date and time of the Bid Opening.
2.6.2	Pursuant to C.G.S. § 4b-91(a)(2) and C.G.S. §4a-100 , as revised, every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or any other public work by the state that is estimated to exceed five hundred thousand dollars (\$500,000) shall be awarded only to the lowest responsible and qualified Bidder who is " prequalified " by DAS in the Class of Work for this Project , as specified in Section 00 11 16 Invitation to Bid . No person who's Contract or Subcontract exceeds \$500,000 in value may perform work as a Contractor or Subcontractor, unless the person is prequalified , <i>at the time of bid submission</i> , in accordance with C.G.S. § 4a-100 , as amended, C.G.S. § 4b-91(a)(2) , and C.G.S. §4b-91 (j) . "Prequalified" includes the contractor's or substantial subcontractor's prequalification classifications, aggregate work capacity ratings and single project limits.
2.6.3	The State may waive minor irregularities that otherwise may cause rejection of a Bid only when waiving such minor irregularities is in the best interests of the State and the minor irregularities have been corrected by the Bidder within seven (7) Calendar Days after the Bid Due Date. Failure to properly <u>complete</u> , <u>sign</u> and <u>upload</u> either the " DAS Prequalification Certificate " or " DAS Update (Bid) Statement " to Biznet prior to the date and time of the Bid Opening shall cause rejection of the bid and shall not be considered a minor irregularity under C.G.S. § 4b-95 .
2.6.4	See Section 00 40 15 CT DAS Prequalification Forms for instructions on preparing and/or downloading your Firm's " DAS Contractor Prequalification Certificate " and " DAS Update (Bid) Statement ".
2.6.5	Bidder's Certification: Within ten (10) business days after receipt of the Letter of Intent from DAS/CS, the Apparent Low Bidder shall submit a Bidder's Certification certifying that the information in the bid is true, that there has been no substantial change in the Bidder's financial position or corporate structure since its most recent DAS Prequalification Certificate and DAS Update (Bid) Statement and that the bid was made without fraud or collusion with any person. See Section 00 92 10 Additional Forms of this Project Manual for a sample form.

2.7 Named Subcontractor Requirements:	
2.7.1	All Bid Proposals shall be for the complete work as specified and shall include the names of any Subcontractors for the four (4) Classes of Work specified in C.G.S. § 4b-93(a) , as revised, and for each other class of work for which the awarding authority has required a separate section pursuant to said subsection, together with the dollar amounts of their subcontracts. The contractor shall be selected on the basis of such bids.
2.7.2	The Named Subcontractor Bid Price shall be the price set forth in the space provided on the Bid Proposal Form .
2.7.3	No bid shall be rejected because of an error in setting forth the Name of a Subcontractor as long as the Subcontractor or Subcontractors designated are clearly identifiable.
2.7.4	No bid shall be rejected because the Named Subcontractor's plans and specifications do not accompany the bid or are not submitted with the bid.
2.7.5	Failure to correctly state a Named Subcontractor's price on the Bid Proposal Form shall be cause for rejection of the Bid.
2.7.6	Named Subcontractor Replacement: The awarding authority may require the Bidder to replace a Named Subcontractor whenever the awarding authority determines in their sole discretion that such replacement is in the best interest of the State .
2.7.7	Named Subcontractor Substitution:
.1	The awarding authority shall not permit substitution of a subcontractor for one Named in accordance with the provisions of C.G.S. § 4b-95 , as revised, except for " Good Cause ".
.2	The awarding authority shall not permit substitution of a subcontractor for any designated sub-trade work bid to be performed by the Bidder's own forces in accordance with the provisions of C.G.S. § 4b-95 except for " Good Cause ".
.3	"Good Cause": The term "good cause" includes but is not limited to, a subcontractor's or, where appropriate, a Bidder's: (1) death or physical disability, if the listed subcontractor is an individual; (2) dissolution, if a corporation or partnership; (3) bankruptcy; (4) inability to furnish any performance and payment bond shown on the bid form; (5) inability to obtain, or loss of, a license necessary for the performance of the particular category of work; (6) failure or inability to comply with a requirement of law applicable to contractors, subcontractors, or construction, alteration, or repair projects; and (7) failure to perform its agreement to execute a subcontract under C.G.S. § 4b-96, as revised.
2.7.8	Named Subcontractor DAS Prequalification Requirement for Subcontracts exceeding \$500,000:
.1	The Three (3) Apparent Lowest Bidders shall receive <i>VIA EMAIL</i> a "Set-Aside Contractor Schedule Request" ("Request") from the DAS/CS Office of Legal Affairs, Policy, and Procurement. For Subcontracts greater than \$500,000 , the Three (3) Apparent Lowest Bidders shall submit within ten (10) Calendar Days after receipt of the Request current DAS Prequalification Certificate(s) and Update (Bid) Statement(s) for each Named Subcontractor in Table 2.7 of the Bid Proposal Form , to the extent the Class of Work for the Named Subcontractor is a Prequalification Classification . This information shall be considered as part of the Bid Proposal Form and failure to comply with any portion of this requirement may cause rejection of the bid.
.2	Instructions for downloading " DAS Contractor Prequalification Certificates " and " DAS Update (Bid) Statement " can be found in Section 00 40 15 CT DAS Prequalification Forms .
.3	In accordance C.G.S. §4b-91 (j) , no person whose subcontract <i>exceeds</i> five hundred thousand dollars in value may perform work as a subcontractor on a project, which project is estimated to cost more than five hundred thousand dollars and is paid for, in whole or in part, with state funds, <i>unless, at the time of bid submission</i> , the person is prequalified in accordance with C.G.S. §4a-100 , as amended. "Prequalified" includes the contractor's or substantial subcontractor's prequalification classifications, aggregate work capacity ratings and single project limits. For Subcontracts estimated to exceed \$500,000 , the Named Subcontractor must be " prequalified " by DAS in the Class of Work specified in Table 2.7 of Section 00 41 00 Bid Proposal Form <i>at the time of bid submission</i> , pursuant to C.G.S. §4b-91(j) and C.G.S. § 4a-100 , as amended. This requirement also applies to the Bidder, if the Bidder is a Named Subcontractor.
2.7.9	Named Subcontractor Bidder's Qualification Statements (Section 00 45 17)
.1	The Three (3) Apparent Lowest Bidders shall receive <i>VIA EMAIL</i> a "Set-Aside Contractor Schedule Request" ("Request") from the DAS/CS Office of Legal Affairs, Policy, and Procurement. For Projects with estimated Construction Costs greater than \$500,000 , the Three (3) Apparent Lowest Bidders shall submit within ten (10) Calendar Days after receipt of the Request completed Section 00 45 17 Named Subcontractor Bidder's Qualification Statement(s) of this Project Manual for each Named Subcontractor in Table 2.7 of the Bid Proposal Form . This information shall be considered as part of the Bid Proposal Form and failure to comply with any portion of this requirement may cause rejection of the bid.
.2	Important Note: Individual Technical Specification Sections may contain qualification requirements that exceed those from Section 00 45 17 Named Subcontractor Bidder's Qualification Statement .

2.7 Named Subcontractor Requirements (continued):	
2.7.10 Bidder Performing Work as Named Subcontractor:	
.1	In accordance with C.G.S. § 4b-95(c) , it shall be presumed that the Bidder intends to perform, with its own employees, all work in such four (4) Classes of Work and such other classes, for which no Subcontractor is named in Table 2.7 of the Bid Proposal Form . In accordance with C.G.S. § 4b-92 , as revised, the Bidder's qualifications for performing such work shall be subject to review.
.2	If the Bidder has listed itself as a Named Subcontractor(s) for a Class(es) of Work in Table 2.7 of the Bid Proposal Form and the proposed dollar value of the Subcontract(s) is greater than \$500,000, then to the extent the Class(es) of Work is a Prequalification Classification , the Bidder shall provide a current DAS Prequalification Certificate and Update (Bid) Statement for each of the applicable Class(es) of Work within ten (10) Calendar Days after receipt of the "Set-Aside Contractor Schedule Request" from DAS/CS.
2.8 Set-Aside Requirements:	
2.8.1 Bidder's DAS Set-Aside Certificate For Projects With Construction Costs Estimated To Be Less Than \$500,000: All Small Business Enterprise (SBE) / Minority Business Enterprise (MBE) Bidders	shall upload a copy of their Firm's current "DAS Set-Aside Certificate" to BizNet prior to the date and time of the Bid Opening.
2.8.2 Bidder Contract Compliance Monitoring Report For Projects With Construction Costs Estimated To Be Less Than \$500,000:	All Firm's shall upload a completed copy of the CHRO Employment Information Form, " Bidder Contract Compliance Monitoring Report " <i>with</i> their Bid Proposal Form prior to the date and time of the Bid Opening. The report is posted on the CHRO Webpage : http://www.ct.gov/chro/cwp/view.asp?a=2525&Q=315900&chroPNavCtr= 45679 .
2.8.3 All Bidders shall be required	to award not less than the percentage(s) stated on page 1 of Section 00 41 00 Bid Proposal Form to Subcontractors who are currently certified and eligible to participate under the State of Connecticut Set-Aside Program for SBE and/or MBE contractors, in accordance with C.G.S. § 4a-60g. Failure to meet these requirements shall cause rejection of the bid. The MBE participation does count as part of the SBE participation.
2.8.4 Set-Aside Contractor Schedule Request:	The SBE/MBE participation requirement <i>must be met</i> even if the Bidder is <i>certified</i> and <i>eligible</i> to participate in the Small Business Set-Aside Program . To facilitate compliance with this requirement for set-aside subcontractors, the Three (3) Apparent Lowest Bidders shall receive VIA EMAIL a "Set-Aside Contractor Schedule Request" ("Request") from the DAS/CS Office of Legal Affairs, Policy, and Procurement. As directed in the Request, the Three (3) Apparent Lowest Bidders shall submit within ten (10) Calendar Days after receipt of the Request, a list of certified set-aside contractors to be used on this project along with the dollar amounts to be paid to each. (See Section 00 73 27 Set-Aside Contractor Schedule for a sample Request.) A copy of the current DAS Set-Aside Certificate for each Subcontracted SBE and/or MBE firm(s) listed in the " Set-Aside Contractor Schedule " must be attached to the Request. This information will be considered as part of your Bid Proposal Form and failure to comply with any portion of this requirement within the ten (10) days, including but not limited to failure to list or meet the necessary dollar amount or percentage of the bid price, will be cause to reject your bid.
2.8.5 Percentage of Work Performed by SBE/MBE Contractors and Subcontractors:	The percentage of the work performed by the SBE/MBE Contractors and Subcontractors on this project shall not be less than the percentage noted in Subsection 5.1 Amount of Work Required to Be Done by "Set-Aside" Contractors of Section 00 73 38 Commission on Human Rights (CHRO) Contract Compliance Regulations .
2.8.6 To view and/or download a Set-Aside Certificate:	Go to the DAS Homepage (www.ct.gov/DAS) > Small and Minority Businesses > Apply for Small Business Enterprise or Minority Business Enterprise Certification (SBE or MBE) > View/Search SBE/MBE Directory.
2.9 Insurance Coverages:	
2.9.1	The Insurance coverages required for this project shall be those listed in Article 35 Contractors Insurance of Section 00 73 13 General Conditions of this Project Manual. See Section 00 41 00 Bid Proposal Form and Section 00 62 16 Certificate of Insurance of this Project Manual for additional details.
2.9.2	The Apparent Low Bidder shall submit the Firm's Certificate of Liability Insurance Acord® form within ten (10) business days after receipt of the Letter of Intent from DAS/CS.

3.0 All Other Required Bid Documents, Affidavits, and Certifications:

3.1 Affidavits and Certifications:

Important Note: *The State may waive minor irregularities that otherwise may cause rejection of a Bid only when waiving such minor irregularities is in the best interests of the State and the minor irregularities have been corrected by the Bidder within seven (7) Calendar Days after the Bid Due Date. Failure to properly complete, sign and upload **all** of the following Affidavits and Certifications to Biznet prior to the date and time of the Bid Opening **shall** cause **rejection** of the bid and shall **not** be considered a minor irregularity under C.G.S. § 4b-95.*

3.1.1 Gift and Campaign Contribution Certification – OPM Ethics Form 1: All Bidders

- .1 All Bidders:** In accordance with Executive Order No. 49, and pursuant to C.G.S. §§ 4-250, 4-252(c) and 9-612(f)(2), as revised, any principal or key personnel of the person, firm or corporation submitting a bid or proposal for a contract that has a value of **\$50,000** or more, shall be required to upload to BizNet a **Gift and Campaign Contribution Certification** prior to the date and time of the Bid Opening.
- .2** Any bidder or proposer that **does not** upload the **Gift and Campaign Contribution Certification** to BizNet prior to the date and time of the Bid Opening as required under this section shall be **disqualified** and DAS shall award the contract to the next highest ranked proposer or the next lowest responsible qualified bidder or seek new bids or proposals. Failure to upload this form to BizNet **prior** to the date and time of the Bid Opening shall not be considered a minor irregularity under CGS 4b-95.
- .3** Once uploaded, an updated **Gift and Campaign Contribution Certification** shall be uploaded within **30 days** of any changes to the submitted information.
- .4** **Annually**, on or within **two (2)** weeks of the **anniversary** date of the execution of this contract, the Contractor shall upload a completed **Annual Certification** with authorizing resolution. For the purposes of this paragraph, the execution date of the contract will be the date the DAS Commissioner signs the contract.

3.1.2 Consulting Agreement Affidavit – OPM Ethics Form 5: All Bidders

- .1 All Bidders:** Pursuant to C.G.S. §§ 4a -81a and 4a -81b, as revised, a **Consulting Agreement Affidavit** must be completed and uploaded to BizNet prior to the date and time of the Bid Opening for contracts with a value of **\$50,000** or more.
- .2** In the event that a Bidder or vendor fails or refuses to upload the **Consulting Agreement Affidavit** to BizNet prior to the date and time of the Bid Opening, as required under C.G.S. § 4a-81, such bidder shall be **disqualified** and the award shall be made to the next lowest responsible qualified bidder or new bids or proposals shall be sought. Failure to upload this form to BizNet **prior** to the date and time of the Bid Opening shall not be considered a minor irregularity under CGS 4b-95.
- .3** Once uploaded, an updated **Consulting Agreement Affidavit** **shall** be amended and uploaded not later than (1) **thirty (30) days** after the effective date of any such change or (2) upon the submittal of any new bid or proposal, whichever is earlier. For the purposes of this paragraph, the **execution date** of the contract will be the date the DAS Commissioner signs the contract.
- .4** Other Contributions by Individuals. Principals of Investment Services Firms, State Contractors, Principals Of State Contractors, Prospective State Contractors Or Principals Of Prospective State Contractors. Lists. Subcontracts Study. State Officials or Employees: All acquisitions, agreements and contracts are subject to the provisions of the C.G.S. § 9-612 regarding **Campaign Contribution or Contributions**.

3.1 Affidavits and Certifications Forms (continued):

3.1.3 Ethics Affidavit – OPM Ethics Form 6: All Bidders and Apparent Low Bidder

- .1 **All Bidders:** Pursuant to C.G.S. §§ 1-101mm and 1-101qq, as revised, when DAS/CS is seeking a contract for a large state construction or procurement contract having a cost of more than **\$500,000**, DAS shall inform all potential consultant and contractor firms of the summary of state ethics laws developed by the Office of State Ethics (OSE) pursuant to C.G.S. § 1-81b. "Large State Contract" means an agreement or a combination or series of agreements between a state agency and a person, firm or corporation, having a total value of more than **\$500,000** in a calendar or fiscal year a project for the construction, alteration or repair of any public building or public work. For a **Guide to the Code of Ethics For Current or Potential State Contractors** go to the Office of State Ethics (OSE) website (www.ct.gov/ethics), then click on the "**Publications**" link.
- .2 **All Bidders:** Pursuant to C.G.S. § 1-101qq, as revised, DAS is also required to notify all potential consultant and contractor firms or a large state construction or procurement contract that they must upload an **Affirmation of Receipt of State Ethics Laws Summary** to BizNet prior to the date and time of the Bid Opening affirming that their key employees have read and understand the summary and agree to comply with the provisions of state ethics law.
- .3 Failure to upload this affidavit to BizNet prior to the date and time of the Bid Opening **shall** result in **rejection** of the bid and shall not be considered a minor irregularity under CGS 4b-95.
- .4 **Apparent Low Bidder:** Furthermore, the **Apparent Low Bidder** shall provide the **Summary of the State Ethics Laws** to each **Named Subcontractor** and any other **Subcontractor** or **Subconsultant** with a contract valued over **\$500,000** and obtain a **Subcontractor and Subconsultant State Ethics Affidavit** stating that the key personnel of the subcontractor have read, understand, and agree to comply with provisions of the state ethics laws. The **Apparent Low Bidder** shall submit such subcontractor(s) affidavits to the DAS/CS Office of Legal Affairs, Policy, and Procurement within **ten (10) business days** after receipt of the Letter of Intent from DAS/CS.

3.1.4 Iran Certification – OPM Ethics Form 7: All Bidders

- .1 **All Bidders:** Pursuant to C.G.S. § 4-252a, when DAS/CS is seeking a contract for a large state construction or procurement contract having a cost of more than **\$500,000**, an **Iran Certification** must be completed and uploaded to BizNet **prior to the date and time of the Bid Opening**.
- .2 Pursuant to C.G.S. § 4-252a, *"This form must always be submitted with the bid or proposal, or if there was no bid process, with the resulting contract, regardless of where the principal place of business is located. Entities whose principal place of business is located outside of the United States are required to complete the entire form, including the certification portion of the form. United States subsidiaries of foreign corporations are exempt from having to complete the certification portion of the form. Those entities whose principal place of business is located inside of the United States must also fill out the form, but do not have to complete the certification portion of the form."*

3.1.5 Nondiscrimination Certification – Form A, B, C, D, or E: All Bidders

- .1 **All Bidders:** Pursuant to C.G.S. §§ 4a-60 and 4a-60a, as amended, a contractor must provide an awarding State agency with written representation or documentation that certifies the contractor complies with the State's nondiscrimination agreements and warranties prior to the award of any contract with the State. A **Nondiscrimination Certification** is required for all State contracts, regardless of type, term, cost or value. The **appropriate form** must be uploaded to BizNet prior to the date and time of the Bid Opening.
- .2 Once uploaded, an updated **Nondiscrimination Certification** shall be uploaded within **30 days** of any changes to the submitted information.
- .3 **Annually**, on or within **two (2)** weeks of the **anniversary** date of the execution of this contract, the Contractor shall upload a completed **Annual Certification** with authorizing resolution. For the purposes of this paragraph, the execution date of the contract will be the date the DAS Commissioner signs the contract.

- 3.1.6 For instructions on how to electronically download and upload **Affidavits and Non-Discrimination Forms**, go to the DAS Homepage (www.ct.gov/DAS) > Doing Business with the State > Create a BizNet Account for Doing Business with the State > Documents/Forms > Vendor Guide to Uploading Affidavits and Nondiscrimination Forms Online.

3.2 Security For Faithful Performance:	
3.2.1 Certified Check or Bid Bond: All Bidders	
.1	All Bidders for bids in excess of \$50,000 shall submit either a Certified Check or a Bid Bond , in the form required by the awarding authority. See Section 00 43 16 Standard Bid Bond in BizNet for a template and important instructions regarding submitting the Bid Bond or Certified Check. Complete and upload Section 00 43 16 Standard Bid Bond to Biznet prior to the date and time of the Bid Opening for either the Bid Bond option or the Certified Check option.
.2	Certified Check Option: The Certified Check shall be drawn to the order of "Treasurer, State of Connecticut" , in which it is understood shall be cashed and the proceeds thereof used so far as may be necessary to reimburse the State of Connecticut for losses and damages arising by virtue of the Bidder's failure to file the required Bonds and execute the required contract if this proposal is accepted by the Awarding Authority.
.3	Bid Bond Option: The Bid Bond shall be in the form required by the awarding authority, having as surety thereto such surety company or companies acceptable to the DAS Commissioner and as are authorized to do business in this State, for an amount not less than 10 percent of the bid.
.4	Return of Certified Check: All checks submitted by unsuccessful Bidders shall be returned to them after the contract has been awarded.
.5	Failure to submit the Bid Bond or Certified Check prior to the date and time of the Bid Opening shall cause rejection of the bid and shall not be considered a minor irregularity under CGS 4b-95.
.6	Forfeiture of Certified Check or Bid Bond: Failure of the successful bidder to execute a contract awarded as specified and bid shall result in the forfeiture of the certified check or bid bond.
3.2.2 Performance Bond: Apparent Low Bidder:	Within ten (10) business days after receipt of the Letter of Intent from DAS/CS, the Apparent Low Bidder shall substitute for the certified check or bid bond accompanying its bid an executed performance bond , in the amount not less than 100 percent of the contract price, conditioned upon the faithful performance of the contract, and having as surety thereto such surety company or companies satisfactory to the Commissioner and as are authorized to transact business in this State. This bond is to be furnished pursuant to C.G.S. § 49-41 , as revised. See Section 00 92 10 Additional Forms of this Project Manual for a template.
3.2.3 Labor and Material Bond: Apparent Low Bidder:	Within ten (10) business days after receipt of the Letter of Intent from DAS/CS, the Apparent Low Bidder shall submit a labor and material bond in the amount not less than 100 percent of the contract price which shall be binding upon the award of the contract to such bidder, with surety or sureties satisfactory to the Commissioner and as are authorized to transact business in this State, for the protection of persons supplying labor or materials in the prosecution of the work provided for in the contract for the use of each such person. Any such bond furnished shall have as principal the name of the successful Bidder. This bond is to be furnished pursuant to C.G.S. § 49-41 , as revised. See Section 00 92 10 Additional Forms of this Project Manual for a template.
3.2.4	The following section of the General Statutes of Connecticut, as revised, is inserted as information concerning this bond and will be incorporated into the Contract for the Work: C.G.S. § 49-41a. Enforcement of payment by general contractor to subcontractor and by subcontractor to his subcontractors. (a) When any public work is awarded by a contract for which a payment bond is required by section 49-41, the contract for the public work shall contain the following provisions: (1) A requirement that the general contractor, within thirty days after payment to the contractor by the State or a municipality, pay any amounts due any subcontractor, whether for labor performed or materials furnished, when the labor or materials have been included in a requisition submitted by the contractor and paid by the State or a municipality; (2) a requirement that the general contractor shall include in each of its subcontracts a provision requiring each subcontractor to pay any amounts due any of its subcontractors, whether for labor performed or materials furnished, within thirty days after such subcontractor receives a payment from the general contractor which encompasses labor or materials furnished by such subcontractor. (b) If payment is not made by the general contractor or any of its subcontractors in accordance with such requirements, the subcontractor shall set forth his claim against the general contractor and the subcontractor of a subcontractor shall set forth its claim against the subcontractor through notice by registered or certified mail. Ten days after the receipt of that notice, the general contractor shall be liable to its subcontractor, and the subcontractor shall be liable to its subcontractor, for interest on the amount due and owing at the rate of one percent per month. In addition, the general contractor, upon written demand of its subcontractor, or the subcontractor, upon written demand of its subcontractor, shall be required to place funds in the amount of the claim, plus interest of one per cent, in an interest-bearing escrow account in a bank in this State, provided the general contractor or subcontractor may refuse to place the funds in escrow on the grounds that the subcontractor has not substantially performed the work according to the terms of his or its employment. In the event that such general contractor or subcontractor refuses to place such funds in escrow, and the party making a claim against it under this section is found to have substantially performed its work in accordance with the terms of its employment in any arbitration or litigation to determine the validity of such claim, then such general contractor or subcontractor shall pay the attorney's fees of such party. (c) No payment may be withheld from a subcontractor for work performed because of a dispute between the general contractor and another contractor or subcontractor. (d) This section shall not be construed to prohibit progress payments prior to final payment of the contract and is applicable to all subcontractors for material or labor whether they have contracted directly with the general contractor or with some other subcontractor on the work.
3.2.5	Surety Sheet: Apparent Low Bidder: Within ten (10) business days after receipt of the Letter of Intent from DAS/CS, the Apparent Low Bidder shall submit a Surety Sheet that provides information regarding the Surety Company and Agent. See Section 00 92 10 Additional Forms of this Project Manual for a template.

3.3 Certificate (of Authority):	
3.3.1	All Bidders for bids in excess of \$50,000 shall upload a signed and scanned Section 00 40 14 Certificate (of Authority) to BizNet prior to the date and time of the Bid Opening. See BizNet for a template.
3.3.2	The Apparent Low Bidder shall submit a second Certificate (of Authority) within ten (10) business days after receipt of the Letter of Intent from DAS/CS.
3.4 Security Requirements for CT Department of Correction (CT DOC) Facilities:	
3.4.1	All Bidders for Projects at a CT DOC Facility shall read and comply with Section 00 73 63 CT DOC Security Requirements for Contract Forces on CT DOC Facilities.
3.4.2	NEW: All Bidders for Projects at a CT DOC Facility: Prior to the Pre-Bid Meeting, all Bidders shall download the “Security Background Questionnaire” from the CT DOC website (www.ct.gov/doc), under “Forms”, complete and submit the form as directed, and obtain approval, otherwise admission to the Pre-Bid Meeting will be denied . It is recommended that the approved form be brought as evidence of approval to attend the Pre-Bid Meeting.
3.5 Affirmative Action Plan & Employment Information Form (DAS-45): Apparent Low Bidder	
3.5.1	For Projects greater than \$500,000 and/or Firms with 50 or more employees, the Apparent Low Bidder shall submit the Firm’s Affirmative Action Plan and Employment Information Form (DAS-45) to CHRO within fifteen (15) calendar days after receipt of the “Request for the <i>Affirmative Action Plan</i> and <i>Employment Information Form</i> Letter” from DAS/CS. See Section 00 73 38 Commission on Human Rights and Opportunities/ Contract Compliance Regulations .
3.5.2	The Apparent Low Bidder shall submit a copy of the Transmittal Letter to the DAS/CS Office of Legal Affairs, Policy, and Procurement within fifteen (15) calendar days after receipt of the “Request for the <i>Affirmative Action Plan</i> and <i>Employment Information Form</i> Letter” from DAS/CS.
3.6 Prevailing Wage: Apparent Low Bidder	
3.6.1	The Apparent Low Bidder shall submit the “ Contractor’s Wage Certification Form ” to CT Department of Labor (CT DOL) within fifteen (15) calendar days after receipt of the “Request for the <i>Affirmative Action Plan</i> and <i>Employment Information Form</i> Letter” from DAS/CS. See Section 00 73 44 Prevailing Wage Rates/Contractor’s Wage Certification/Payroll Certification of this Project Manual.
3.6.2	Each contractor who is awarded a contract on or after October 1, 2002 shall be subject to provisions of C.G.S. § 31-53, as revised . See Section 00 73 44 Prevailing Wage Rates/Contractor’s Wage Certification/Payroll Certification of this Project Manual.
3.6.3	Annual Adjustment Of Prevailing Wage Rates: In determining bid price, consideration should be given to C.G.S. § 31-53 and 31-55a, as revised , regarding annual adjustment of prevailing wage rates . Annual adjustments of prevailing wage rates will not be considered a matter for a contract amendment.
3.7 NEW PROCESS: General Permit for the Discharge of Stormwater & Dewatering Wastewaters from Construction Activities: Apparent Low Bidder	
3.7.1	All DAS/CS construction projects disturbing one or more total acres of land area on a site regardless of project phasing must file a Department of Energy and Environmental Protection (DEEP) General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (DEEP-WPED-GP-015) (“Construction Stormwater General Permit”) registration and Stormwater Pollution Control Plan (SPCP) with the DEEP. The DAS/CS Architect/Engineer (A/E) shall be responsible for registering the Construction Stormwater General Permit and SPCP through the online DEEP ezFile Portal prior to bidding.
3.7.2	Once the Apparent Low Bidder is under contract with DAS/CS, and prior to the commencement of any construction activities, the Apparent Low Bidder (“Contractor”) shall be required to provide the necessary information from all applicable contractors and/or subcontractors working on the Project to the DAS/CS A/E in order to finalize the SPCP and transfer the Construction Stormwater General Permit obligations to the Contractor.
3.7.3	All Contractors and Subcontractors listed on the SPCP shall be required to sign the SPCP “Contractor Certification Statement” and License Transfer Form prior to commencement of any construction activity.

3.8 Section 00 52 73 Subcontract Agreement Forms: Apparent Low Bidder

3.8.1 The **Apparent Low Bidder** shall submit a completed **Section 00 52 73 Subcontract Agreement Form** of this Project Manual for *each* Named Subcontractor within **ten (10) Business Days** after receipt of the "Letter of Intent" from DAS/CS. This information *shall* be considered as part of the **Bid Proposal Form** and failure to comply with any portion of this requirement *may* cause **rejection** of the bid.

3.8.2 Each **Named Subcontractor** shall be the matter of a **Subcontract** as required by **C.G.S. § 4b-96**.

3.9 Non-Resident Contractors and Taxation: Apparent Low Bidder

3.9.1 **Nonresident contractors** must comply with the **provisions C.G.S. § 12-430 (7), Procedures for Nonresident Contractors**, and the regulations established pursuant to that section. See **Section 00 92 30 Procedures Regarding Taxation for Nonresident General/Prime Contractor and Subcontractors** of this Project Manual for additional details.

3.9.2 **Apparent Low Bidder who is a Nonresident Contractor:** Within **ten (10) business days after** receipt of the "**Letter of Intent**" from DAS/CS, a certificate(s) from DRS must be provided which evidences that C.G.S. §12-430 for non-resident contractors has been met. As described in Section 00 92 30 "Procedures Regarding Taxation for Nonresident General/Prime Contractor and Subcontractors", **Verified Nonresident** General/Prime Contractors must submit a copy of their "**Notice of Verified Status**" (Verification Letter) from DRS. **Unverified Nonresident** General/Prime Contractors must submit a copy of **Form AU-965 "Acceptance of Surety Bond"** from DRS.

3.10 Certificate of Legal Existence: Apparent Low Bidder

3.10.1 A **corporation** that is awarded the contract must comply with the laws of this State regarding the procurement of a certificate of authority to transact business in this State from the **Secretary of the State**. A "**Certificate of Legal Existence**" which is not older than **ninety (90) calendar days** from the date of the contract signing must be filed with the DAS/CS Office of Legal Affairs, Policy, and Procurement within **ten (10) business days after** receipt of the "Letter of Intent" from DAS/CS.

3.11 State Election Enforcement Commission (SEEC) Form 10: Apparent Low Bidder

3.11.1 The **Apparent Low Bidder** shall submit a **State Election Enforcement Commission's (SEEC) Form 10** "Notice to Executive Branch State Contractors and Prospective State Contractors of Campaign Contribution and Solicitation Limitations" within **ten (10) business days after** receipt of the "Letter of Intent" from DAS/CS for contracts with a value of \$50,000 or more.

3.11.2 Pursuant to C.G.S. § 9-612, as revised, a State Contract means an agreement or contract with the state or any state agency or any quasi-public agency having a value in a calendar year of **\$50,000** or more, or a combination or series of such **agreements** or **contracts** having a value of **\$100,000** or more, the **authorized signatory** to this **submission** in response to the State's solicitation expressly **acknowledges receipt** of, and must submit **in writing**, the **SEEC Form 10 notice** advising prospective state contractors of the state campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the **notice**.

3.11.3 For instructions on how to download "**SEEC Form 10**", go to the SEEC Homepage (www.ct.gov/seec); click on "Forms" at the top of the page; click on "Contractor Reporting Forms"; click on "SEEC Form 10" and follow the directions.

3.12 OSHA Training Course: Successful Bidder

3.12.1 Pursuant to **C.G.S. §. 31-53b (a)**, as revised, each contract entered into for the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public building project by the state or any of its agents, or by any political subdivision of the state or any of its agents, where the total cost of all work to be performed by all contractors and subcontractors in connection with the contract is at least **one hundred thousand dollars (\$100,000)**, shall contain a provision requiring that, not later than **thirty (30) days** after the date such contract is awarded, **each contractor furnish proof to the Labor Commissioner** that all employees performing manual labor on or in such public building, pursuant to such contract, have completed a **course** of at least **ten (10) hours** in duration in **construction safety and health** approved by the federal Occupational Safety and Health Administration or, in the case of telecommunications employees, have completed at least **ten (10) hours** of training in accordance with 29 CFR 1910.268.

3.13 NEW PROCESS: Contractor and Subcontractor Payments Reporting: Successful Bidder

3.13.1 For compliance with **C.G.S. §. 4b-95 and 49-41**, DAS/CS requires every Contractor (and its Subcontractors) who has been awarded a DAS/CS construction contract to log on to the State of Connecticut web-based platform, BizNet, **each month and enter payments** they have received from the state, from the Contractor, or from a higher tier Subcontractor (as applicable).

The process is described as follows: The state will pay the Contractor on a monthly basis for work performed (and purchases made) by it and its Subcontractors. The Contractor will input the payment date and amount they receive from the state on a monthly basis. The Contractor's first-level Subcontractor (Tier 1 Subcontractor) will input the payment they receive from the Contractor. The second-level Subcontractor (Tier 2 Subcontractor) will input the payment they receive from the Tier 1 Subcontractor. And so on.

Contractors awarded a DAS/CS construction contract shall contain a **provision in their subcontract agreements** requiring their Subcontractors to enter payment receipt from the Contractor in the State of Connecticut web-based platform, BizNet, for work performed or purchases made in relation to state projects.

Detailed instructions can be found in the DAS/CS publication, "**6002 Instructions to Contractors/Subcontractors for Entering Payments in BizNet**", available for download by going to the DAS Homepage (www.ct.gov/DAS) and selecting Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 6000 Series.

4.0 Nondiscrimination and Affirmative Action

This contract is subject to Federal and state laws, including Title VII of the 1964 Civil Rights Act, 42 U.S.C. § 2000e-2(a)(1), and the Connecticut Fair Employment Practices Act, C.G.S. §46a-60 et seq., prohibit various forms of discrimination and illegal harassment in employment.

4.1 Nondiscrimination and Affirmative Action Provisions:

4.1.1 This section is inserted in connection with C.G.S. § 4a-60, as revised.

4.1.2 References in this section to "contract" **shall** mean this Contract and references to "contractor" **shall** mean the Contractor/Bidder.

4.1.3 C.G.S. § 4a-60, as revised:

- (a) Every contract to which the state or any political subdivision of the state other than a municipality is a party shall contain the following provisions:
 - (1) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the state of Connecticut; and the contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, gender identity or expression, intellectual disability, mental disability or physical disability, including, but not limited to, blindness, unless it is shown by such contractor that such disability prevents performance of the work involved;
 - (2) The contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the contractor, to state that it is an "affirmative action-equal opportunity employer" in accordance with regulations adopted by the commission;
 - (3) The contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the commission advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment;
 - (4) The contractor agrees to comply with each provision of this section and sections 46a-68e and 46a-68f and with each regulation or relevant order issued by said commission pursuant to sections 46a-56, 46a-68e and 46a-68f; and
 - (5) The contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the contractor as relate to the provisions of this section and section 46a-56.
- (b) If the contract is a public works contract, the contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works project.

- (c) (1) Any contractor who has one or more contracts with the state or a political subdivision of the state that is valued at less than fifty thousand dollars for each year of the contract shall provide the state or such political subdivision of the state with a written or electronic representation that complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section, provided if there is any change in such representation, the contractor shall provide the updated representation to the state or such political subdivision not later than thirty days after such change.
- (2) Any contractor who has one or more contracts with the state or a political subdivision of the state that is valued at fifty thousand dollars or more for any year of the contract shall provide the state or such political subdivision of the state with any one of the following:
- (A) Documentation in the form of a company or corporate policy adopted by resolution of the board of directors, shareholders, managers, members or other governing body of such contractor that complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section;
- (B) Documentation in the form of a company or corporate policy adopted by a prior resolution of the board of directors, shareholders, managers, members or other governing body of such contractor if (i) the prior resolution is certified by a duly authorized corporate officer of such contractor to be in effect on the date the documentation is submitted, and (ii) the head of the agency of the state or such political subdivision, or a designee, certifies that the prior resolution complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section; or
- (C) Documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson or other corporate officer duly authorized to adopt company or corporate policy that certifies that the company or corporate policy of the contractor complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section and is in effect on the date the affidavit is signed.
- (3) Neither the state nor any political subdivision shall award a contract to a contractor who has not provided the representation or documentation required under subdivisions (1) and (2) of this subsection, as applicable. After the initial submission of such representation or documentation, the contractor shall not be required to resubmit such representation or documentation unless there is a change in the information contained in such representation or documentation. If there is any change in the information contained in the most recently filed representation or updated documentation, the contractor shall submit an updated representation or documentation, as applicable, either (A) not later than thirty days after the effective date of such change, or (B) upon the execution of a new contract with the state or a political subdivision of the state, whichever is earlier. Such contractor shall also certify, in accordance with subparagraph (B) or (C) of subdivision (2) of this subsection, to the state or political subdivision, not later than fourteen days after the twelve-month anniversary of the most recently filed representation, documentation or updated representation or documentation, that the representation on file with the state or political subdivision is current and accurate.
- (d) For the purposes of this section, "contract" includes any extension or modification of the contract, "contractor" includes any successors or assigns of the contractor, "marital status" means being single, married as recognized by the state of Connecticut, widowed, separated or divorced, and "mental disability" means one or more mental disorders, as defined in the most recent edition of the American Psychiatric Association's "Diagnostic and Statistical Manual of Mental Disorders", or a record of or regarding a person as having one or more such disorders. For the purposes of this section, "contract" does not include a contract where each contractor is (1) a political subdivision of the state, including, but not limited to, a municipality, (2) a quasi-public agency, as defined in section 1-120, (3) any other state, as defined in section 1-267, (4) the federal government, (5) a foreign government, or (6) an agency of a subdivision, agency, state or government described in subparagraph (1), (2), (3), (4) or (5) of this subsection.
- (e) For the purposes of this section, "minority business enterprise" means any small contractor or supplier of materials fifty-one per cent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) Who are active in the daily affairs of the enterprise, (2) who have the power to direct the management and policies of the enterprise, and (3) who are members of a minority, as such term is defined in subsection (a) of section 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements.
- (f) Determination of the contractor's good faith efforts shall include but shall not be limited to the following factors: The contractor's employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.
- (g) The contractor shall develop and maintain adequate documentation, in a manner prescribed by the commission, of its good faith efforts.
- (h) The contractor shall include the provisions of subsections (a) and (b) of this section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the state and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the commission. The contractor shall take such action with respect to any such subcontract or purchase order as the commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with section 46a-56; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the commission, the contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

4.2 Nondiscrimination Provisions Regarding Sexual Orientation:

4.2.1 This section is inserted in connection with C.G.S. § 4a-60a, as revised.

4.2.2 References in this section to "contract" shall mean this Contract and references to "contractor" shall mean the Contractor/Bidder.

4.2.3 C.G.S. § 4a-60a, as revised:

- (a) Every contract to which the state or any political subdivision of the state other than a municipality is a party shall contain the following provisions:
- (1) The contractor agrees and warrants that in the performance of the contract such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or of the state of Connecticut, and that employees are treated when employed without regard to their sexual orientation;
 - (2) The contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the Commission on Human Rights and Opportunities advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment;
 - (3) The contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said commission pursuant to section 46a-56; and
 - (4) The contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the contractor which relate to the provisions of this section and section 46a-56.
- (b) (1) Any contractor who has one or more contracts with the state or a political subdivision of the state that is valued at less than fifty thousand dollars for each year of the contract shall provide the state or such political subdivision of the state with a written representation that complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section.
- (2) Any contractor who has one or more contracts with the state or a political subdivision of the state that is valued at fifty thousand dollars or more for any year of the contract shall provide the state or such political subdivision of the state with any of the following:
- (A) Documentation in the form of a company or corporate policy adopted by resolution of the board of directors, shareholders, managers, members or other governing body of such contractor that complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section;
 - (B) Documentation in the form of a company or corporate policy adopted by a prior resolution of the board of directors, shareholders, managers, members or other governing body of such contractor if (i) the prior resolution is certified by a duly authorized corporate officer of such contractor to be in effect on the date the documentation is submitted, and (ii) the head of the agency of the state or such political subdivision, or a designee, certifies that the prior resolution complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section; or
 - (C) Documentation in the form of an affidavit signed under penalty of false statement by a chief executive officer, president, chairperson or other corporate officer duly authorized to adopt company or corporate policy that certifies that the company or corporate policy of the contractor complies with the nondiscrimination agreement and warranty under subdivision (1) of subsection (a) of this section and is in effect on the date the affidavit is signed.
- (3) Neither the state nor any political subdivision shall award a contract to a contractor who has not provided the representation or documentation required under subdivisions (1) and (2) of this subsection, as applicable. After the initial submission of such representation or documentation, the contractor shall not be required to resubmit such representation or documentation unless there is a change in the information contained in such representation or documentation. If there is any change in the information contained in the most recently filed representation or updated documentation, the contractor shall submit an updated representation or documentation, as applicable, either (A) not later than thirty days after the effective date of such change, or (B) upon the execution of a new contract with the state or a political subdivision of the state, whichever is earlier. Such contractor shall also certify, in accordance with subparagraph (B) or (C) of subdivision (2) of this subsection, to the state or political subdivision, not later than fourteen days after the twelve-month anniversary of the most recently filed representation, documentation or updated representation or documentation, that the representation on file with the state or political subdivision is current and accurate.
- 4) For the purposes of this section, "contract" includes any extension or modification of the contract, and "contractor" includes any successors or assigns of the contractor. For the purposes of this section, "contract" does not include a contract where each contractor is (A) a political subdivision of the state, including, but not limited to, a municipality, (B) a quasi-public agency, as defined in section 1-120, (C) any other state, as defined in section 1-267, (D) the federal government, (E) a foreign government, or (F) an agency of a subdivision, agency, state or government described in subparagraph (A), (B), (C), (D) or (E) of this subdivision.

(c) The contractor shall include the provisions of subsection (a) of this section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the state and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the commission. The contractor shall take such action with respect to any such subcontract or purchase order as the commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with section 46a-56; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the commission, the contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

**End of Section
00 21 13 Instructions to Bidders**

00 30 00 GENERAL STATEMENTS FOR AVAILABLE INFORMATION NOT USED

- A. **Summary:** This Section is not a Bidding Document, but directs Bidders to **Division 50 00 00 Project-Specific Available Information** that provides project-specific information available for review by Bidders.
- B. **Bidder Responsibility:** The Bidder is responsible for information, including but not limited to, any interpretations and opinions of information contained in any plans, reports, evaluations, and logs, or shown on any drawings, or indicated on any drawings. **Division 50 00 00 Project-Specific Available Information** is provided to Bidders for their use in the preparation of a Bid.
- C. **Measurement:** **Division 50 00 00 Project-Specific Available Information** shall be utilized for determination of payment for the Work during construction of the project.
- D. **Payment:** No separate payment will be made for any Work under **Division 50 00 00 Project-Specific Available Information**.
- E. **Related Sections:** Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section. **See Division 50 00 00 Project-Specific Available Information** for information that is available for this Project.
- F. Please read the following **General Statement(s)** that describe the type of project-specific information that is available in **Division 50 00 00 Project-Specific Available Information**:

00 30 00	General Statements For Available Information Table Of Contents	Not Used
00 30 10	General Statement for Existing Conditions Survey	<input checked="" type="checkbox"/>
00 30 20	General Statement for Environmental Assessment Information	<input checked="" type="checkbox"/>
00 30 30	General Statement for Hazardous Building Materials Inspection and Inventory	<input type="checkbox"/>
00 30 40	General Statement for Subsurface Geotechnical Report	<input checked="" type="checkbox"/>
00 30 50	General Statement for Elevator Agreement	<input checked="" type="checkbox"/>
00 30 60	General Statement for FM Global Checklist for Roofing Systems	<input checked="" type="checkbox"/>
00 30 70	General Statement for "Statement of Special Inspections"	<input checked="" type="checkbox"/>
00 30 80	General Statement for Additional Information	<input checked="" type="checkbox"/>

00 30 10 GENERAL STATEMENT FOR EXISTING CONDITIONS SURVEY Not Used

00 30 20 GENERAL STATEMENT FOR ENVIRONMENTAL ASSESSMENT INFORMATION Not Used

C. **Description of Work:**

1. **Soil Contamination Report:** Not Used

2. **Groundwater Contamination Report:** Not Used

00 30 30	GENERAL STATEMENT FOR HAZARDOUS BUILDING MATERIALS INSPECTION AND INVENTORY	Not Used <input type="checkbox"/>
----------	---	-----------------------------------

A. Related Documents:

Asbestos Abatement:

- Section 01 20 00 Contract Considerations
- Section 01 35 16 Alteration Project Procedures
- **Section 02 82 00 Asbestos Remediation**
- **Section 02 82 13 Asbestos Abatement**
- **Section 02 82 13.33 Asbestos Containing Roofing Material Abatement**
- **Section 23 07 00 Thermal Insulation Specifications**
- **Section 23 33 00 Flexible Connections Specifications**

B. Description of Work:

1.	Work Involving Asbestos Containing Material (ACM):	Not Used <input type="checkbox"/>
----	--	-----------------------------------

1.1 Testing for asbestos has been conducted at the facility scheduled for renovation, demolition, reconstruction, alteration, remodeling, or repair. Results of the asbestos testing are summarized in **Division 50 00 00 Project-Specific Available Information, Section 50 31 26.23 Hazardous Building Materials Inspection and Inventory** at the end of the Technical Specification Sections.

1.2 Under no circumstance shall this information be the sole means used by the Contractor for determining the extent of asbestos. The Contractor shall be responsible for verification of all field conditions affecting performance of the Work.

2.	Work Involving Lead-Based Paint (LBP):	Not Used <input checked="" type="checkbox"/>
----	--	--

3.	Work Involving Polychlorinated Biphenyls (PCBs) in Building Materials:	Not Used <input checked="" type="checkbox"/>
----	--	--

4.	Work Involving Mold:	Not Used <input checked="" type="checkbox"/>
----	----------------------	--

5.	Work Involving Universal Wastes (Products Containing Persistent Bioaccumulative Toxic Chemicals (PBT's)):	Not Used <input checked="" type="checkbox"/>
----	--	--

00 30 40	GENERAL STATEMENT FOR SUBSURFACE GEOTECHNICAL REPORT	Not Used <input checked="" type="checkbox"/>
----------	--	--

00 30 50	GENERAL STATEMENT FOR ELEVATOR AGREEMENT	Not Used <input checked="" type="checkbox"/>
----------	--	--

00 30 60	GENERAL STATEMENT FOR FM GLOBAL CHECKLIST FOR ROOFING SYSTEMS	Not Used <input checked="" type="checkbox"/>
----------	---	--

00 30 70	GENERAL STATEMENT FOR "STATEMENT OF SPECIAL INSPECTIONS"	Not Used <input checked="" type="checkbox"/>
----------	--	--

00 30 80	GENERAL STATEMENT FOR ADDITIONAL INFORMATION	Not Used <input checked="" type="checkbox"/>
----------	--	--

End of Section
00 30 00 General Statements for Available Information

Certificate (of Authority)

DAS Construction Services Project No.: _____

I _____, _____
 (Signer's Name)¹ (Signer's Title)

of _____, an entity lawfully organized and existing under the laws
 (Name of Entity)

of _____, do hereby certify that the following is a true and correct
 (Name of State or Commonwealth)

copy of a resolution adopted on the _____ day of _____, 20 _____ by the governing body of
 (Day)² (Month)² (Year)²

_____, in accordance with all of its documents of governance and
 (Name Of Entity)

management and the laws of _____ and further certify that such resolution has not
 (Name of State or Commonwealth)

been modified, rescinded or revoked, and is at present in full force and effect.

RESOLVED: that _____, _____
 (Name of Signer of Contract Documents)³ (Title of Signer of Contract Documents)³

of _____ is empowered and authorized, on behalf of the entity,
 (Name of Entity)

to execute and deliver contracts and amendments thereto, and all documents required by the Governor, the Connecticut Department of Administrative Services, the Connecticut State Properties Review Board and the Office of the Attorney General associated with such contracts and amendments.

IN WITNESS WHEREOF, the undersigned has executed this certificate this _____ day of _____, 20 _____.
 (Day)⁴ (Month)⁴ (Year)⁴

 (Signature)

 (Print Name)

 (Title)

Reference Notes:

- 1 The signer of this certificate must be someone *other than* the signer of the contract documents *except for* a sole managing member of an LLC or the sole officer or sole principal of a corporation. *If* the signer is a sole managing member of an LLC, *then* along with this certificate the signer must provide a letter on company letterhead that indicates the signer is a sole member and managing member. If the signer is the sole officer or sole principal of a corporation, then the signer must provide with the certificate a letter on company letterhead setting forth this fact.
- 2 This date must be on or before the **date of signing** of the Bid Proposal (or Contract).
- 3 This person shall sign the Contract and other required documents.
- 4 This date must be on or after the **date of signing** of the Bid Proposal (or Contract).

For Your Information:

Certificate (of Authority)

All Bidders:

Complete page 1, print, sign, and scan to PDF. Upload the PDF form to BizNet.

What the **Certificate** is saying is that the organization authorized the signatory to sign the pertinent **documents other than** the Certificate (of Authority) and that, as of the date of **execution** of the CERTIFICATE (i.e., the date set forth in the "In Witness Whereof" blanks) there has been no change in that authorization.

Instructions For Completing The Certificate (of Authority)

The Certificate (of Authority) to Accompany the Bid Proposal Form:

1. 1st Paragraph:

- 1.1 First, enter the name and title of the individual signing the Certificate (of Authority).
- 1.2 Second, enter the legal name of the entity (exactly as it is shown on the Secretary of State registry).
- 1.3 Third, enter the name of the state or commonwealth the entity is registered in.
- 1.4 Fourth, enter the date the resolution was adopted by the governing body. This **date** is **on** or **before** the date the **Bid Proposal** is signed.
- 1.5 Fifth, enter the name of the state or commonwealth the entity is registered in.

2. 2nd Paragraph:

- 2.1 First, enter the name and title of the individual signing bid documents for the entity.
- 2.2 Second, enter the legal name of the entity (exactly as it is shown on the Secretary of State registry).

3. Last Paragraph:

- 3.1 Enter the **Witness Date**¹. This date will likely be the date of execution of the **Bid Proposal form**.

¹ ***This Witness Date Should Not Be Before The Date Of Execution Of The Bid Proposal.***

The Certificate (of Authority) to Accompany the Contract:

1. 1st Paragraph:

- 1.1 First, enter the name and title of the individual signing the Certificate (of Authority).
- 1.2 Second, enter the legal name of the entity (exactly as it is shown on the Secretary of State registry).
- 1.3 Third, enter the name of the state or commonwealth the entity is registered in.
- 1.4 Fourth, enter the date the resolution was adopted by the governing body. This **date** is **on** or **before** the date the **Contract** is signed.
- 1.5 Fifth, enter the name of the state or commonwealth the entity is registered in.

2. 2nd Paragraph:

- 2.1 First, enter the name and title of the individual signing contract documents for the entity.
- 2.2 Second, enter the legal name of the entity (exactly as it is shown on the Secretary of State registry).

3. Last Paragraph:

- 3.1 Enter the **Witness Date**¹. This date will likely be the date of execution of the **Contract**.

¹ ***This Witness Date Should Not Be Before The Date Of Execution Of The Contract.***

End of Section 00 40 14 Certificate (of Authority)

State of Connecticut Department of Administrative Services (DAS) Contractor Prequalification Forms

IMPORTANT INFORMATION – PLEASE READ
For Projects with estimated Construction Costs greater than \$500,000

WHEN YOU SUBMIT A BID YOU MUST INCLUDE WITH YOUR OTHER DOCUMENTS THE FOLLOWING:

1. A copy of your “DAS Contractor Prequalification Certificate”.

This document may be found at the [DAS Contractor Prequalification Search](#):

Go to the DAS Homepage (www.ct.gov/DAS), click on “Doing Business with the State”, click on “Apply for DAS Construction Contractor Prequalification”, click on “How To”, and then click on “Search Prequalified Companies”.

To search for your company, just type in your company name and click on “Go” to pull up your company. When your company information appears you will notice that your company name is shown as a blue link. Just click on this link and it will take you to your Prequalification Certificate.

2. A “DAS Update (Bid) Statement”.

This document may be found and completed on-line at the [Bid Statement Online Application](#).


Go to the DAS Homepage (www.ct.gov/DAS), click on “Doing Business with the State”, click on “Apply for DAS Construction Contractor Prequalification”, click on “Documents/Forms”, click on “Update Bid Statement”, and then click on “Bid Statements”.

Follow instructions in the “[Instructions for Prequalification](#)”.

Go to the DAS Homepage (www.ct.gov/DAS), click on “Doing Business with the State”, click on “Apply for DAS Construction Contractor Prequalification”, click on “How To”, and then click on “View Instructions for Prequalification”.

Should you have any questions or concerns, please call (860) 713-5280.





[ABOUT DAS](#) | [FAQS](#) | [PRESS ROOM](#) | [SITE MAP](#) | [CONTACT US](#) | [HOME](#)

[Quick Links: >> GOVERNMENT >> BUSINESSES >> PUBLIC](#)

» DAS Contractor Prequalification Certificate

Contractor Prequalification Company Information

Company: **Sample Corporation**

Address: 165 Capitol Avenue
 Hartford, CT 06106

Prequalification Contact: **John T. Reed**

Telephone: (860) 111-2222 **Fax:** (860) 111-3333

Email: jreed@samplecorp.com

Web Addr: www.samplecorp.com

Contractor Prequalification History

Active Date	Expiration Date	Single Project	AWC
Oct 8, 2004	Oct 7, 2005	\$20,000,000.00	\$50,000,000.00

Prequalification Classification(s)

Classification	Description
GENERAL BUILDING CONSTRUCTION (GROUP C)	The undertaking of general contracts for the construction of buildings (i.e. new construction, renovation, rehabilitation, alteration, addition, etc.). The contract must include a variety of construction practices and supervision of a minimum of three sub-trades. Includes buildings that are truly custom, requiring extensive detailing, or that have large amounts of integrated scientific or complex mechanical/electrical equipment in order for them to function. Examples include hospitals, chemistry buildings, special collections buildings, historic preservation to a landmark structure, and/or any other structure that is truly one of a kind within the State's inventory.

Note: If you are prequalified for General Building Construction under Group C, you are automatically prequalified for Group A and Group B.

Prequalification Licenses

License #	Trade	Active	Expire
000009	Asbestos Contractor	Sep 8, 2004	Aug 31, 2005
900235	Major Contractor	Jul 1, 2004	Jun 30, 2005
667 Class A	Demolition Contractor	Apr 1, 2004	Mar 31, 2005

This certificate prequalifies the named company to bid solely. It is not a statement of the company's capacity to perform a specific project. That responsibility lies with the awarding authority.

It is the Department of Administrative Services' (DAS) recommendation that all awarding authorities verify the above information by visiting the DAS website: <http://www.das.state.ct.us> - click on contractor prequalification (under the business section).

For information regarding the DAS Contractor Prequalification Program visit the above mentioned website or call (860) 713-5280.

[eProcurement](#) | [Business](#) | [Event Services](#) | [Jobs](#) | [Human Resources](#) | [Resource Director](#) | [News](#)

[CT.gov Home](#) | [About DAS](#) | [Contact DAS](#) | [Press Room](#) | [DAS Home](#) | [Quick Links](#) | [FAQ](#) | [Site Map](#)

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 All State disclaimers and permissions apply.
 Need to contact us? Send e-mail to das.webmaster@state.ct.us

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State of Connecticut
Department of Administrative Services (DAS) Contractor Prequalification
Update Bid Statement
 (Statement to be included with the bid)

Public Act No. 04-141 - AN ACT REVISING PREQUALIFICATION REQUIREMENTS FOR STATE CONSTRUCTION CONTRACTS.

On and after October 1, 2004, each bid submitted for a contract shall include a copy of a prequalification certificate issued by the Commissioner of Administrative Services. The bid shall also be accompanied by an update statement in such form as the Commissioner of Administrative Services prescribes. The form for such update statement shall provide space for information regarding all projects completed by the bidder since the date the bidder's prequalification certificate was issued or renewed, all projects the bidder currently has under contract, including the percentage of work on such projects not completed, the names and qualifications of the personnel who will have supervisory responsibility for the performance of the contract, any significant changes in the bidder's financial position or corporate structure since the date the certificate was issued or renewed, any change in the contractor's qualification status, and such other relevant information as the Commissioner of Administrative Services prescribes. Any bid submitted without a copy of the prequalification certificate and an update statement shall be invalid.

Name of Project that company	SAMPLE	
Project Number:		
Name of Company:		
FEIN:		
Company Address:		
Prequalification Contact and Telephone Number		
Date of Prequalification with the DAS:	Single Limit:	Aggregate Work Capacity (AWC):
* This amount equals your company's AWC minus the Total \$ Amount of Work Remaining.		* Remaining Aggregate Work Capacity:

Please list all of your company's (100%) completed projects since date of Prequalification:
 (Please add additional page(s) if required)

Name of Project	Owner of Project	Date Project Completed	Total Contract Amount

(Please add additional page(s) if required. Please total the Work Remaining column)

Name of Project	Owner of Project	Total Contract Amount	% Complete	Work Remaining (\$)
Total \$ Amount of Work Remaining →				

Please list the names and titles of the personnel who will have supervisory responsibility for the performance of the contract being bid on:
(Please add additional page(s) if required)

Individual Name	Individual
	

Have there been any other business organizations, which might affect your company's ability to successfully complete this contract?

Yes or No

If yes, please explain:

I, certify under penalty of law that all of the information contained in this Update Statement is true and accurate to the best of my knowledge as of the date below.

Signature

Date

It is the responsibility of the Awarding Authority to determine if any of the information provided above will impact the contractor's performance on this project.

The DAS' Contractor Prequalification Program can be reached at (860) 713-5280

Rev.12.22.2004

Bid Proposal Form
 DAS ● Construction Services ● Office of Legal Affairs, Policy, and Procurement
 450 Columbus Boulevard, Suite 1302 ● Hartford, CT 06103

Date and Time of Bid Opening:	See page 1 of Section 00 11 16 Invitation To Bid.
Instructions for On-Line Bidding:	Follow the instructions in 6001 Construction On-line Bidding Instructions , available for download from the DAS/CS Library (http://portal.ct.gov/DASCSLibrary) > 6000 Series – Bid Phase Forms. For questions, call 860-713-5794 or 860-713-5783.

- Instructions for Completing This Bid Proposal Form:**
- **Download** and **save** the Bid Proposal Form to your computer. Close the form. Open your *saved* Bid Proposal Form and type required information in blue boxes. (Remember to keep saving to your computer.)
 - On your Word Toolbar, **click “View” then “Edit Document” or “Print Layout”** in order to edit the form.
 - When your Bid Proposal Form is complete, perform a final “save” to your computer! **Print ALL pages and sign** your Bid Proposal Form. **Scan ALL** pages of your Bid Proposal Form to **PDF**. Upload the **PDF** Bid Proposal Form to BizNet.
 - **Duly Authorized Signature:** A duly authorized representative of the Bidder or Bidder’s partnership, firm, corporation or business organization must sign the Bid Proposal Form.
 - **No Facsimile Signature** is permitted. **All information below** is to be filled in by the **Bidder**.
 - *If an Addendum is issued that **changes** the **Bid Proposal Form** then the **Revised Bid Proposal Form** (issued with the Addendum) **must** be uploaded instead.*
 - Upload to BizNet **only** the additional **Bid Package Documents** as described in **Table 1** of **Section 00 41 10 Bid Package Submittal Requirements**.
 - A signed and scanned **Certificate (of Authority), Section 00 40 14, must** be uploaded to Biznet **prior** to the date and time of the Bid Opening.
 - *Any Bid Proposal Form* that has omitted or added items, altered the form, contains conditional, alternative, or obscure bids, or is submitted *without* the signature of the bidder or its authorized representative, **will be rejected**.
 - See **Section 00 21 13 Instructions to Bidders** for additional information.

1.0 General Bid Proposal Information:

Construction Costs:	Greater Than \$500,000
Bidding Limited To :	Contractors Prequalified by DAS for General Building Construction (Group B)
Threshold Limits: (C.G.S. §29-276b)	This Project DOES NOT exceed Threshold Limits.
Set Aside Requirements:	SBE Subcontractors &/or Suppliers: 25%; MBE Subcontractors &/or Suppliers: 6.25%
Project Title:	Renovations of Second & Third Floors White Hall Western Connecticut State University
Project Location:	181 White Street Danbury, CT
Project Number:	BI-RD-299
Pre-Bid Meeting:	See Section 00 11 16 Invitation to Bid and Section 00 25 13 Pre-Bid Meeting .
Plans and Specifications prepared by A/E:	Ames & Whitaker Architects, 31 Liberty Street, Suite 208, Southington, CT 06489

1.1 Commencement and Acceptance: (See Section 00 73 13 General Conditions, Article 4 - Commencement and Progress of Work and Article 1 - Definitions)

The Selected Bidder shall commence Work within **fourteen (14) Calendar Days after** receiving a “**Construction Start Date and Notice to Proceed**” by the Commissioner or authorized representative and continue for

260
90

Calendar Days for “**Substantial Completion**” of the project; **and** then continue

90

Calendar Days for “**Acceptance**” of the Work.

1.2 Liquidated Damages: (See Section 00 73 13 General Conditions, Article 8 – Damages & Article 1 - Definitions)

1.2.1 Liquidated Damages – Substantial Completion:

The Selected Bidder shall be assessed \$

2,752.00

 per **Calendar Day beyond** the date established for Substantial Completion of the Contract according to the **Contract Time** as defined in **Article 1.28 of Section 00 73 13 General Conditions**, and not otherwise excused or waived pursuant to the Contract Documents, as defined in **Article 1.23 of Section 00 73 13 General Conditions**.

1.2.2 Liquidated Damages – Acceptance:

The Selected Bidder shall be assessed \$

1,996.00

 per **Calendar Day beyond ninety (90) days after** the date of said Substantial Completion that the Selected Bidder fails to achieve **Acceptance**, as defined in **Article 1.1 of Section 00 73 13 General Conditions** and not otherwise excused or waived as described above.

1.3 Bid Proposal Statements and Conditions: This **Bid Proposal Form** shall be submitted according to, and in compliance with, the foregoing and following statements, conditions, and/or information:

1.3.1 This Bid Proposal Form is submitted in accordance with Chapter 60 Construction And Alterations Of State Buildings, Part II Bidding And Contracts of the Connecticut General Statutes (C.G.S.), as amended, particularly C.G.S. § 4b-91(a)(5)(A) – (C), and pursuant to, and in compliance with, the **Invitation to Bid** (Section 00 11 16), the **Instructions to Bidders** (Section 00 21 13), the **Bid Package Submittal Requirements** (Section 00 41 10), and the **Contract** (Section 00 52 03).

1.3.2 The Bidder proposes to furnish the labor and/or materials, installed as required for the Project named and numbered on this **Bid Proposal Form**, submitted herein, furnishing all necessary equipment, machinery, tools, labor and other means of construction, and all materials specified in the manner and at the time prescribed strictly in accordance with the provisions of the **Contract** including, but not limited to, the specifications and/or drawings together with all **Addenda** issued by the Awarding Authority and received by the Bidder, prior to the scheduled **Date and Time of the Bid Opening** as stated on **page 1** of the **Invitation To Bid**, and in conformity with requirements of the Awarding Authority and any laws or Departmental regulations of the State of Connecticut or of the United States which may affect the same, for and in consideration of the price(s) stated on this **Bid Proposal Form**, hereof.

1.3.3 The Bidder acknowledges that the **Proposed Lump Sum Base Bid** submitted on this **Bid Proposal Form** includes all work indicated on the drawings and/or described in the specifications, **except** for the **Contingent Work** described in **Subsection 2.4**.

1.3.4 The Bidder acknowledges and agrees to furnish all labor and materials required for this **Project**, in accordance with the accompanying **Plans and Specifications** prepared by the **Architect/Engineer** listed on **page 1** of this Bid Proposal Form, for the **Contract Sum** specified in the **Proposed Lump Sum Base Bid** in **Subsection 2.1** of this Bid Proposal Form, subject to **additions** and **deductions** according to the terms of the specifications, and including the number of **Addenda** stated in **Subsection 2.2** of this Bid Proposal Form.

1.4 Award:

1.4.1 All Bid Proposals shall be subject to the provisions of **Section 00 21 13 Instructions to Bidders** and for purpose of award, consideration shall be given only to Bid Proposals submitted by qualified and responsible Bidders.

1.4.2 The award shall be made on the **lowest Lump Sum Bid** and any or all **Supplemental Bid(s)** as stated in **Subsection 2.4.2** of this **Bid Proposal Form**, taken sequentially, as applicable, provided funds are available.

1.4.4 In the event of any **discrepancy** between the amount written in words and the amount written in numerical figures, the amount written in words shall be controlling.

2.0 Bid Proposal Requirements:

Bidder Information:

Bid Uploaded On:
(Month) (Day) (Year)

Proposal Of:
(Complete Bidder's Legal Company Name As Registered With the CT Secretary of State)

Firm Address: , ,
(Avenue / Street) (Town / City) (State) (Zip Code)

Contact Person:
(Name) (Title)

Contact Information:
(Phone Number) (Fax Number) (Email Address)

Threshold Project: Major Contractor Registration License No.:

All Bidders for Projects that exceed Threshold Limits (see page 1 of this Bid Proposal Form): Insert your Firm's **Major Contractor Registration License Number** in the space provided above. **NOTE:** If this Project does **NOT** exceed Threshold Limits, insert **"Not Applicable"** in the blue box above. Delete this note by **pressing the spacebar**.

2.1 Proposed Lump Sum Base Bid:

2.1.1 All Bidders: Insert the **Proposed Lump Sum Base Bid** in the spaces provided below, including **both numerical figures** and **"printed words" dollar amount**. The **Proposed Lump Sum Base Bid** shall *include* all **Allowances**, all work indicated on the drawings and/or described in the specifications **except for Contingent Work**.

2.1.2 The **Proposed Lump Sum Base Bid** shall be shown in **both numerical figures** and **"printed words" dollar amount**. In the event of any discrepancy the **"printed" words dollar amount** shall govern.

2.1.3 The **Proposed Lump Sum Base Bid** is:

\$
(Place Numerical Figures in the Box Above)

Dollars
(Insert "Printed Words" Dollar Amount in the Box Above)

2.2 Number of Addenda:

2.2.1 All Bidders: Insert the **Number of Addenda** issued by the State of Connecticut in the space provided below.

2.2.2 Failure to acknowledge the **correct number** of all **Addenda** in **the box below** in this **Bid Proposal Form** **shall** cause **rejection** of the bid.

2.2.3 The Bidder acknowledges that their **Proposed Lump Sum Base Bid Proposal** **includes:**

Number of Addenda. If none, enter "0".

2.3 Allowances:

See Section 01 20 00 Contract Considerations in Division 01 General Requirements for Allowances for applicability.

2.4 Contingent Work:

2.4.1 Base Bid Quantities and Defined Unit Prices: See **Section 01 20 00 Contract Considerations** in Division 01 General Requirements for **applicability** regarding Base Bid Quantities and Defined Unit Prices for Earth and Rock Excavation, Miscellaneous Items, Alterations Items, Environmental Remediation, and/or Hazardous Building Materials Abatement.

2.4.2 Supplemental Bids:

.1 See **Section 01 23 13 Supplemental Bids** in Division 01 General Requirements for **applicability**.

.2 **All Bidders: If Supplemental Bids are applicable** to this Project, insert the **Supplemental Bids** in the spaces provided below. Any **Supplemental Bids** listed below, *if* accepted by the Owner, will be taken cumulatively and in numerical order as scheduled. No Supplemental Bid will be skipped or taken out of numerical order as scheduled.

Supplemental Bid No. 1: Enter information in blue boxes below:		
ADD: \$	<input type="text"/>	<input type="text"/> Dollars
	<i>(Insert Numerical Figures)</i>	<i>(Insert "Printed Words" Dollar Amount)</i>
Supplemental Bid No. 2: NOT APPLICABLE		
ADD: \$	<input type="text"/>	<input type="text"/> Dollars
	<i>(Insert Numerical Figures)</i>	<i>(Insert "Printed Words" Dollar Amount)</i>
Supplemental Bid No. 3: NOT APPLICABLE		
ADD: \$	<input type="text"/>	<input type="text"/> Dollars
	<i>(Insert Numerical Figures)</i>	<i>(Insert "Printed Words" Dollar Amount)</i>
Supplemental Bid No. 4: NOT APPLICABLE		
ADD: \$	<input type="text"/>	<input type="text"/> Dollars
	<i>(Insert Numerical Figures)</i>	<i>(Insert "Printed Words" Dollar Amount)</i>

2.5 Bidder's Qualification Statement and Objective Criteria for Evaluating Bidders:

2.5.1 All Bidders: Download **Section 00 45 14 General Contractor Bidder's Qualification Statement** from BizNet for a template and instructions. Complete and upload **Section 00 45 14 General Contractor Bidder's Qualification Statement** to Biznet **prior** to the date and time of the Bid Opening. Information with regards to the **General Contractor's Bidder's Qualification Statement** is submitted and is made part of this **Bid Proposal Form**. Failure of a Bidder to answer any question or provide required information **shall** be grounds for the awarding authority to **disqualify** and **reject** the bid, pursuant to Connecticut General Statutes §4b-92.

2.5.2 All Bidders shall comply with **Section 00 45 15 Objective Criteria Established for Evaluating Qualifications of Bidders**. **Note:** Individual Specification Sections may contain General Contractor and/or Subcontractor Qualification requirements that exceed those in **Section 00 45 15 Objective Criteria Established for Evaluating Qualifications of Bidders**.

2.6 Bidder's Prequalification Requirements for Projects Exceeding \$500,000:

All Bidders for Projects with estimated Construction Costs greater than \$500,000: Upload to BizNet a current copy of your Firm's "**DAS Contractor Prequalification Certificate**" and "**Update (Bid) Statement**" for the applicable **Class of Work** on **page 1** of this **Bid Proposal Form** **prior** to the date and time of the Bid Opening. Failure to comply with this requirement **shall** cause rejection of the bid and shall not be considered a minor irregularity under **C.G.S. § 4b-95**. See **Section 00 40 15 CT DAS Prequalification Forms** for instructions on preparing and/or downloading your Firm's "**DAS Contractor Prequalification Certificate**" and "**DAS Update (Bid) Statement**".

2.7 Named Subcontractors and Classes of Work:
 2.7.1 All Bidders for Projects with one or more Classes of Work checked in Table 2.7 below: Complete Table 2.7 according to the instructions below. Failure to properly provide all of the **required information** in Table 2.7 may cause rejection of the bid.

Table 2.7: Named Subcontractors and Classes of Work:	
<input checked="" type="checkbox"/>	Electrical Work: Enter information in blue boxes below: Complete Subcontractor Name: _____ Proposed Dollar Value of Subcontract: \$ _____
<input checked="" type="checkbox"/>	HVAC Work: Enter information in blue boxes below: Complete Subcontractor Name: _____ Proposed Dollar Value of Subcontract: \$ _____
<input type="checkbox"/>	Masonry Work: NOT APPLICABLE Complete Subcontractor Name: _____ Proposed Dollar Value of Subcontract: \$ _____
<input type="checkbox"/>	Plumbing Work: NOT APPLICABLE Complete Subcontractor Name: _____ Proposed Dollar Value of Subcontract: \$ _____
<input type="checkbox"/>	Environmental Remediation: NOT APPLICABLE Complete Subcontractor Name: _____ Proposed Dollar Value of Subcontract: \$ _____
<input type="checkbox"/>	Hazardous Materials Abatement: NOT APPLICABLE Complete Subcontractor Name: _____ Proposed Dollar Value of Subcontract: \$ _____

- 2.7.2 Instructions For Table 2.7:**
- .1 Each **Class of Work** set forth in a separate section of the specifications pursuant to this Section shall be a **subtrade** designated in **Table 2.7** of this **Bid Proposal Form** and shall be the matter of a **subcontract**.
 - .2 When a box is checked in **Table 2.7**, the Bidder shall insert the name of the Subcontractor with the **largest** proposed Subcontract Value; this is known as the **“Named Subcontractor”**. The Bidder shall provide all of the information for each **checked Class of Work**.
 - .3 If a **Bidder** intends to use a **Subcontractor** to perform **any portion** of the **Named Classes of Work**, including circumstances where the Subcontractor is a Small Business Enterprise (SBE) or a Minority Business Enterprise (MBE), *then* it must list the Subcontractor or SBE/MBE Subcontractor as the case may be, for such Class of Work. A **Bidder** may **not** substitute itself for any of the **Named Classes of Work**. The Bidder **should not list itself** as the **Named Subcontractor** if it intends to use a **Subcontractor** to perform any portion of the **Classes of Work** listed in **Table 2.7**. The Bidder should name the Subcontractor.
 - .4 For each **Class of Work** specified in **Table 2.7**, the Bidder shall list the **Subcontractor** with the **largest Proposed Dollar Value of Subcontract** for each Class of Work as the **Named Subcontractor** and the **Proposed Dollar Value** of its Subcontract. If the Bidder intends to use **more than one** Subcontractor to perform a Class of Work, then it shall indicate the Subcontractor Name and Subcontract Value for the **largest** single **Named Subcontractor**.
 - .5 If a Bidder customarily performs any of the specified **Classes of Work** and is Prequalified by DAS for the **Class of Work** at the time of the **Bid Opening Date** if the work is greater than \$500,000, the Bidder may list **itself** as a Subcontractor together with its **price** in the space provided in **Table 2.7**. Failure to properly provide all of the **required information** in **Table 2.7** **shall** cause **rejection** of the bid.
 - .6 If the Bidder does **not** name **itself** or a **Subcontractor** for a specified **Class of Work**, it shall be presumed that the Bidder intends to perform with its own employees **all work** in such specified classes. The Bidder shall be required to perform with its own employees **all** of the work of the specified class. Subcontracting any portion of such specified class of work subsequently, will be considered a violation of **C.G.S. § 4b-95** and subject the Bidder to disqualification under **C.G.S. § 4b-95(e)**.
 - .7 In the event the Bidder either lists itself or is presumed to perform with its own employees all work in a specified class, no such sub-bid by a Bidder shall be considered unless the Bidder can show to the satisfaction of the awarding authority, based on objective criteria established for such purpose, that it customarily performs such subtrade work and is qualified to do the character of work required by the applicable section of the specifications.

2.8 Set Aside Requirements: (see Section 00 73 38 "CHRO Contract Compliance Regulations")

2.8.1 For Projects Less Than \$500,000: Submit a current copy of your Firm's "DAS Set-Aside Certificate" *with* your Bid Proposal Form *prior* to the date and time of the Bid Opening.

2.8.2 For Projects Less Than \$500,000: Upload a completed copy of the CHRO Employment Information Form, "Bidder Contract Compliance Monitoring Report" *with* your Bid Proposal Form *prior* to the date and time of the Bid Opening. The report is on the CHRO Webpage (<http://www.ct.gov/chro/cwp/view.asp?a=2525&Q=315900&chroPNavCtr=#45679>).

2.8.3 All Bidders shall be required to award not less than the percentage(s) stated on **page 1 of this Bid Proposal Form** to Subcontractors who are currently certified and eligible to participate under the State of Connecticut Set-Aside Program for **SBE and/or MBE** contractors, in accordance with C.G.S. § 4a-60g. **Failure** to meet these requirements **shall** cause rejection of the bid.

2.9 Insurance Coverages: The **limits of liability** for the Insurance required for this project shall be those listed in **Article 35 Contractors Insurance of Section 00 73 13 General Conditions**. Also see Section 00 62 16 Certificate of Insurance.

2.9.1 Special Hazards Insurance:

None is Required.

"X-C-U" Coverage (explosion, collapse, and underground damage) **shall be required** in accordance with **Article 35 Contractors Insurance of Section 00 73 13 General Conditions**.

Asbestos Abatement Insurance is required.

2.9.2 Builders Risk Insurance:

None is Required.

The Bidder **shall be required to maintain Builder's Risk Insurance** providing coverage for the entire Work at the project site, portions of the Work located away from the site but intended for use at the site, and portions of the Work in transit. Coverage shall be written on an All-Risk, Replacement Cost, and completed Value Form basis in an amount at least equal to the projected completed value of the Work and the policy shall state that the State of Connecticut shall be named as a loss payee not as an additional insured for these coverages.

2.9.3 Commercial General Liability Insurance:

NOTE: There is a new requirement regarding **commercial general liability (CGL) insurance**: All selected firms are required to provide an endorsement to the CGL insurance stating that the State of Connecticut is an additional insured. Please be advised that a blanket endorsement **may not** be acceptable.

2.9.4 Owners and Contractors Protective Liability Insurance:

The Bidder shall maintain **Owner's and Contractor's Protective Liability** insurance providing a total limit of **\$1,000,000** for all damages arising out of bodily injury or death of persons in any one accident or occurrence and for all damages arising out of injury or destruction of property in any one accident or occurrence and subject to a total (aggregate) limit of **\$2,000,000** for all damages arising out of bodily injury to or death of persons in all accidents or occurrences and out of injury to or destruction of property during the policy period. This coverage shall be for and in the name of the State of Connecticut.

2.9.5 Umbrella Liability Insurance:

This project requires **Umbrella Liability Insurance**. The Bidder shall provide an endorsement to the Umbrella Liability Insurance stating that the State of Connecticut is an additional insured. Select the correct **Umbrella Limit** for this **Project's Contract Value** using the "Umbrella Liability Insurance Table" below.

Umbrella Liability Insurance Table:			
Contract Value			Umbrella Limit
\$1.00	to	\$500,000.00	\$1,000,000.00
\$500,000.01	to	\$1,000,000.00	\$2,000,000.00
\$1,000,000.01	to	\$10,000,000	\$5,000,000.00
\$10,000,000.01	to	\$30,000,000	\$10,000,000.00
\$30,000,000.01	to	\$80,000,000	\$15,000,000.00
\$80,000,000.01	to	\$150,000,000	\$20,000,000.00
\$150,000,000.01	to	\$300,000,000	\$25,000,000.00

3.0 Bid Proposal Acknowledgements:

The Bidder *acknowledges and agrees* to the following:

3.1 To Upload to BizNet Submit the Bid Proposal Form (all pages), All Other Bid Documents, Affidavits, and Certifications:

3.1.1 The Bidder acknowledges and agrees to electronically upload to DAS BizNet **all pages** of the **Bid Proposal Form**, and all other **Bid Documents, Affidavits, and Certifications** as directed in **Section 00 11 16 Invitation to Bid, Section 00 21 13 Instructions to Bidders**, and **Section 00 41 10 Bid Package Submittal Requirements**.

3.1.2 The State may waive minor irregularities which it considers in the best interest of the State and, when applicable, are corrected by the Bidder within seven (7) Calendar Days after the Bid Due Date. Failure to properly complete, sign and upload any of the items marked with an asterisk (*) in **Table 1 of Section 00 41 10 Bid Package Submittal Requirements** **shall** cause rejection of the bid and **shall not** be considered a minor irregularity under **C.G.S. § 4b-95**.

3.1.3 If there are any delays in the receipt of other documents then the Bid shall remain valid for the same additional number of days. For example, if the documents are submitted four (4) Calendar Days later; then the bid shall remain valid for ninety-four (94) Calendar Days.

3.1.4 Failure to submit the documents before the stated deadline **may** result in rejection of the bid at the sole discretion of the Commissioner of Administrative Services.

3.2 To Hold Bid Price:

The Bidder acknowledges and agrees to hold the **Proposed Lump Sum Base Bid** in **Subsection 2.1** of this Bid Proposal Form for **ninety (90) Calendar Days** and any extensions caused by the Bidder's delays in required submissions. The Bidder and the State may mutually agree to extend this period. The agreement to extend the **ninety (90) Calendar Day** period may occur after the expiration of the original **ninety (90) Calendar Day** period.

3.3 To Use and Accept Allowances:

When applicable to this Project, the Bidder **acknowledges and agrees** to accept and use the **Allowances** as shown in **Section 01 20 00 Contract Considerations** of Division 01 General Requirements as part of the **Proposed Lump Sum Base Bid** listed in **Subsection 2.1** of this Bid Proposal Form.

3.4 To Use and Accept the Following Contingent Work:

3.4.1 **Unit Prices:** When applicable to this Project, the Bidder **acknowledges and agrees** to accept and use the **Units, Add Unit Prices, and Deduct Unit Prices** as shown in **Section 01 20 00 Contract Considerations** of Division 01 General Requirements in evaluating either additions to or deductions from the Work.

3.4.2 **Supplemental Bid:** When applicable to this Project and if accepted by the Owner, the Bidder **acknowledges and agrees** to provide all labor, material and equipment to complete the Work in accordance with the **Supplemental Bid** described in **Section 01 23 13 Supplemental Bids** of Division 01 General Requirements and provided by the **Bidder** in **Subsection 2.4.2** of this Bid Proposal Form.

3.5 To Use the Named Subcontractors Listed in Table 2.7:

The Bidder **agrees** that each of the **Named Subcontractors** stated in **Table 2.7** of this Bid Proposal Form will be used for the **Class of Work** indicated, for the **Proposed Total Subcontract Value dollar amount stated**, **unless** a **substitution** is permitted by the awarding authority as provided for in and in accordance with C.G.S. § 4b-96, as amended.

3.6 To Make Good Faith Efforts to Employ MBEs:

The Bidder acknowledges and agrees to make **good faith efforts** to employ **Minority Business Enterprises (MBEs)** as **Subcontractors** and **Suppliers** of materials under such Contract.

3.7 To Submit a Certified Check or Bid Bond (if required):

The Bidder acknowledges and agrees to submit a **Certified Check** or **Standard Bid Bond** **prior** to the due date and time of the Bid Opening (if required). Download **Section 00 43 16 Standard Bid Bond** from BizNet for a template and instructions.

3.0 Bid Proposal Acknowledgements (continued):**3.8 To Accept the Current Prevailing Wage Rate Schedule:**

The U. S. Secretary of Labor's latest decision and the State of Connecticut Department of Labor (DOL) Prevailing Wage Rate Schedule are all incorporated in the documents. The higher rate (Federal or State) for any given occupation shall prevail. At the time of bidding, the Bidder agrees to accept the current Prevailing Wage Rate Schedule, as well as the annual adjustment to the prevailing wage rate that is in effect each July 1st, as provided by DOL. See **Section 00 73 44 Prevailing Wage Rates/Contractor's Wage Certification/Payroll Certification**. Annual adjustments of prevailing wage rates will *not* be considered a matter for a contract amendment with DAS/CS.

3.9 To Comply With CHRO Requirements:

If applicable, the Apparent Low Bidder acknowledges and agrees to provide the Commission on Human Rights and Opportunities with such information as is requested by the Commission concerning their **employment practices and procedures** as they relate to the current provisions of the Connecticut General Statutes governing Contract requirements within **fifteen (15) calendar days after** receipt of the "Request for the *Affirmative Action Plan and Employment Information Form Letter*" from the DAS/CS Office of Legal Affairs, Policy, and Procurement.

3.10 To Ensure Executive Order No. 11246 for Equal Employment Opportunity & Non-Segregated Facilities Has Been Met:

The Apparent Low Bidder acknowledges and agrees to ensure that Executive Order No. 11246 for Equal Employment Opportunity & Non-Segregated Facilities has been met for their firm and their Subcontractors. The Apparent Low Bidder also agrees to certify (if required) to the compliance of non-segregated facilities.

3.11 To Obtain and Maintain Required Insurance Coverages:

The Bidder acknowledges and agrees to obtain and maintain the required Insurance Coverages and submit the Firm's "**Certificate of Liability Insurance Acord® form**" within **ten (10) business days after** receipt of the "Letter of Intent" from the DAS/CS Office of Legal Affairs, Policy, and Procurement, as discussed in **Section 00 62 16 Certificate of Insurance** and **Article 35, "Contractors Insurance"** in **Section 00 73 13 General Conditions**.

3.12 To Comply With Security Requirements for CT Department of Correction Facilities:

When applicable to this Project, the Bidder acknowledges and agrees to comply with **Section 00 73 63 CT Department of Correction (CT DOC) Security Requirements** for Contract Forces on CT DOC Facilities.

3.13 To Ensure C.G.S. § 12-430 for Non-Resident Contractors Has Been Met:

If applicable, the Apparent Low Bidder acknowledges and agrees to provide either a copy of the "**Notice of Verified Status**" (Verification Letter) from the Connecticut Department of Revenue Services (DRS) (for **Verified Nonresident** General/Prime Contractors) or a copy of **Form AU-965 "Acceptance of Surety Bond"** from DRS (for **Unverified Nonresident** General/Prime Contractors) within **ten (10) business days after** receipt of the "Letter of Intent" from the DAS/CS Office of Legal Affairs, Policy, and Procurement which evidences that **C.G.S. § 12-430** for non-resident contractors has been met, as described in **Section 00 92 30 Procedures Regarding Taxation for Nonresident General/Prime Contractor and Subcontractors**.

3.14 To Execute Contract:

If selected as the Prime Contractor, the Bidder acknowledges and agrees to **execute a Contract** in accordance with the terms of this **Bid Proposal Form** and the **Contract** within **ten (10) Calendar Days** (legal State holidays excluded) **after** notification thereof by the awarding authority. See **Section 00 52 03 Contract** for a sample.

4.0 Confidentiality of Documents:

- 4.1** The **undersigned** agrees that if not selected as the Prime Contractor for this project, all plans and specifications in their possession for the project shall be destroyed.
- 4.2** The **undersigned** agrees that if selected as the Prime Contractor for this project:
- 4.2.1** The **plans and specifications** shall not be disseminated to anyone except for construction of this project.
- 4.2.2** The **following provision** shall be included in all of its contracts with subcontractors and sub-consultants:
- “Any and all drawings, specifications, maps, reports, records or other documents associated with the contract shall only be utilized to the extent necessary for the performance of the work and duties under this contract. Said drawings, specifications, maps, reports, records and other documents may not be released to any other entity or person except for the sole purpose of the work described in this contract. No other disclosure shall be permitted without the prior written consent of DAS Construction Services. When any such drawings, specifications, maps, reports, records or other documents are no longer needed, they shall be destroyed.”*
- 4.2.3** Upon completion of the construction and the issuance of a certificate of occupancy, the plans and specifications shall be returned to DAS Construction Services, or destroyed, or retained in a secure location and not released to anyone without first obtaining the permission of DAS Construction Services.

5.0 Bid Proposal Declarations:

I (we), the undersigned, hereby declare that I am (we are) the only person(s) interested in the Bid Proposal and that it is made without any connection with any other person making any Bid Proposal for the same work. No person acting for, or employed by, the State of Connecticut is directly or indirectly interested in this Bid Proposal, or in any Contract which may be made under it, or in expected profits to arise therefrom. This Bid Proposal is made without directly or indirectly influencing or attempting to influence any other person or corporation to bid or refrain from bidding or to influence the amount of the Bid Proposal of any other person or corporation. This Bid Proposal is made in good faith without collusion or connection with any other person bidding for the same work and this proposal is made with distinct reference and relation to the plans and specifications prepared for this Contract. I (we) further declare that in regard to the conditions affecting the Work to be done and the labor and materials needed, this Bid Proposal is based solely on my (our) own investigation and research and not in reliance upon any representations of any employee, officer or agent of the State.

6.0 Duly Authorized Signature:

Type of Business: *(Check Applicable Box)*

<input type="checkbox"/> Limited Liability Corporation (LLC) <input type="checkbox"/> Partnership <input type="checkbox"/> Sole Proprietor <input type="checkbox"/> Doing Business As (d/b/a) <i>(If d/b/a box is checked provide complete name below)</i> <input style="width: 100%;" type="text"/> <i>(Doing Business As Name)</i>	<input type="checkbox"/> Corporation <i>(If Checked, Provide Corporate Seal Below)</i> <div style="border: 1px solid black; width: 100px; height: 100px; margin: 0 auto;"></div> <i>(Provide <u>exact</u> corporate name from corporate seal below)</i> <input style="width: 100%;" type="text"/> <i>(Name On Corporate Seal)</i>
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Signed:	<input style="width: 100%;" type="text"/> <i>(Month)</i>	<input style="width: 100%;" type="text"/> <i>(Day)</i>	<input style="width: 100%;" type="text"/> <i>(Year)</i>
Bidder's Signature:	<input style="width: 100%;" type="text"/> <i>(Duly Authorized)</i>		<input style="width: 100%;" type="text"/> <i>(Title)</i>
	<input style="width: 100%;" type="text"/> <i>(Print Named)</i>		<input style="width: 100%;" type="text"/> <i>(Date)</i>

Bid Package Submittal Requirements:

**DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement
 450 Columbus Boulevard, Suite 1302 | Hartford, CT 06103**

1.1	On-Line Bidding:
1.1.1	All Bidders shall electronically upload their Bid Package Documents to BizNet following the instructions in the DAS/CS publication, 6001 Construction On-line Bidding Instructions , available for download here: Go to the DAS Homepage (www.ct.gov/DAS) > Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 6000 Series > 6001 Construction On Line Bidding Instructions .
1.1.2	For questions, call 860-713-5794.

1.2	Bid Package Submittal Requirements:
	All Bidders are required to electronically upload Bid Package Documents to BizNet prior to the date and time of the Bid Opening. Additional documents must be either electronically uploaded to BizNet or submitted as paper copies to the appropriate Agency . See Tables 1, 2, and 3 for specific submittal requirements.
1.2.1	All Bidders: See Table 1. All Documents in Table 1 <u>must be electronically uploaded to BizNet.</u>
1.2.2	Three (3) Apparent Lowest Bidders: See Table 2.
1.2.3	Apparent Low Bidder: See Table 3.

1.3	Deadlines for Receipt of Bid Package Documents:
1.3.1	Table 1: Bid Package Documents must be uploaded to BizNet prior to the date and time of the Bid Opening. The State may waive minor irregularities that otherwise may cause rejection of a Bid only when waiving such minor irregularities is in the best interests of the State and the minor irregularities have been corrected by the Bidder within seven (7) Calendar Days after the Bid Due Date. Failure to properly <u>complete, sign and upload</u> to BizNet any of the items marked with an asterisk (*) in Table 1 prior to the date and time of the Bid Opening shall cause rejection of the bid and shall not be considered a minor irregularity under Connecticut General Statutes (C.G.S.) § 4b-95 .
1.3.2	Tables 2 and 3: See the tables for additional deadlines. Failure to submit the documents before the stated deadlines may result in rejection of the bid at the sole discretion of the Commissioner of Administrative Services.

1.4	Delays in Receipt of Supportive Documents from the Three Apparent Lowest Bidders:		
1.4.1	If there are any delays in the receipt of the supportive documents specified in Tables 2 and 3, then the Bids shall remain valid for the same additional number of days. <table style="margin-left: 20px; border: none;"> <tr> <td style="width: 20px;">.1</td> <td>For example, since the Three (3) Apparent Lowest Bidders are required to Hold The Bid Price for ninety (90) calendar days, if supportive documents are submitted four (4) calendar days later, then the bid shall remain valid for ninety-four (94) calendar days.</td> </tr> </table>	.1	For example, since the Three (3) Apparent Lowest Bidders are required to Hold The Bid Price for ninety (90) calendar days , if supportive documents are submitted four (4) calendar days later , then the bid shall remain valid for ninety-four (94) calendar days .
.1	For example, since the Three (3) Apparent Lowest Bidders are required to Hold The Bid Price for ninety (90) calendar days , if supportive documents are submitted four (4) calendar days later , then the bid shall remain valid for ninety-four (94) calendar days .		
1.4.2	Failure to submit the documents before the stated deadline may result in rejection of the bid at the sole discretion of the Commissioner of Administrative Services.		

TABLE 1 ALL BIDDERS			
Construction Costs:		The Bid Proposal Form, Other Bid Package Documents, Affidavits, and Certifications <u>shall</u> be electronically uploaded to BizNet by <u>all</u> Bidders prior to the Date and Time of the Bid Opening.	Form Location
Less Than \$500,000	Greater Than \$500,000		
Bid Proposal Form and Other Bid Package Documents			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	* Section 00 41 00 Bid Proposal Form	BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	* Section 00 43 16 Standard Bid Bond or Certified Check	BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	* Section 00 45 14 General Contractor Bidder's Qualification Statement	BizNet
	<input checked="" type="checkbox"/>	* DAS Prequalification Certificate	BizNet
	<input checked="" type="checkbox"/>	* DAS Update (Bid) Statement	BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Section 00 40 14 Certificate (of authority)	BizNet
<input checked="" type="checkbox"/>		DAS Set-Aside Certificate	BizNet
<input checked="" type="checkbox"/>		Bidder Contract Compliance Monitoring Report	CHRO Website
Affidavits and Certifications			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	* Gift and Campaign Contribution Certification – OPM Ethics Form 1	BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	* Consulting Agreement Affidavit – OPM Ethics Form 5	BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> *	Ethics Affidavit (Regarding State Ethics) – OPM Ethics Form 6	BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> *	Iran Certification – OPM Ethics Form 7	BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Nondiscrimination Certification – Form A, B, C, D, or E	BizNet

*** NOTE:** The State may waive minor irregularities that otherwise may cause rejection of a Bid only when waiving such minor irregularities is in the best interests of the State and the minor irregularities have been corrected by the Bidder within seven (7) Calendar Days after the Bid Due Date. Failure to properly complete, sign and upload to BizNet any of the items marked with an **asterisk (*)** in **Table 1** prior to the date and time of the Bid Opening **shall** cause rejection of the bid and shall **not** be considered a minor irregularity under C.G.S. § 4b-95.

TABLE 2 THREE (3) APPARENT LOWEST BIDDERS			
Construction Costs:		WHEN APPLICABLE:	Form Location
Less Than \$500,000	Greater Than \$500,000	Submit within ten (10) Calendar Days <i>after</i> receipt of the “ Set-Aside Contractor Schedule Request ” from the DAS/CS Procurement Unit:	
	<input checked="" type="checkbox"/>	Set-Aside Contractor Schedule for each subcontracted SBE and/or MBE firm(s) (See Section 00 73 27 Set-Aside Contractor Schedule for a sample Request.)	Email From DAS/CS Procurement Unit
	<input checked="" type="checkbox"/>	DAS Set-Aside Certificate(s) for each subcontracted SBE and/or MBE firm(s) listed in the Set-Aside Contractor Schedule.	Download from BizNet
	<input checked="" type="checkbox"/>	Section 00 45 17 Named Subcontractor Bidder’s Qualification Statements for each Named Subcontractor listed in the Bid Proposal Form.	Copy from Project Manual
	<input checked="" type="checkbox"/>	DAS Prequalification Certificate(s) and Update (Bid) Statement(s) for each Named Subcontractor listed in the Bid Proposal Form with Subcontracts greater than \$500,000.	Download from BizNet

TABLE 3 APPARENT LOW BIDDER			
Construction Costs:		When Applicable, submit the following documents as noted:	Form Location
Less Than \$500,000	Greater Than \$500,000		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If Contractor has 50 or more employees and/or the Project is equal to or greater than \$500,000, submit to CHRO: Affirmative Action Plan and Employment Information Form (DAS-45).	CHRO Website & BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Submit to DAS/CS Procurement Unit: Copy of Transmittal Letter to confirm the Affirmative Action Plan was filed with CHRO.	(copy of transmittal letter)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Submit to CT Department of Labor: Contractors Wage Certification Form. See Section 00 73 44 Prevailing Wage Rates/Contractor’s Wage Certification/Payroll Certification.	Copy from Project Manual

Submit within fifteen (15) calendar days <i>after</i> receipt of the “ Request for the Affirmative Action Plan and Employment Information Form Letter ” from the DAS/CS Procurement Unit:			
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If Contractor has 50 or more employees and/or the Project is equal to or greater than \$500,000, submit to CHRO: Affirmative Action Plan and Employment Information Form (DAS-45).	CHRO Website & BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Submit to DAS/CS Procurement Unit: Copy of Transmittal Letter to confirm the Affirmative Action Plan was filed with CHRO.	(copy of transmittal letter)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Submit to CT Department of Labor: Contractors Wage Certification Form. See Section 00 73 44 Prevailing Wage Rates/Contractor’s Wage Certification/Payroll Certification.	Copy from Project Manual

TABLE 3 APPARENT LOW BIDDER (continued)			
Construction Costs:		Submit within ten (10) business days <i>after</i> receipt of the “Letter of Intent” from the DAS/CS Procurement Unit:	Form Location
Less Than \$500,000	Greater Than \$500,000		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Section 00 40 14 Certificate (of authority)	Email From DAS/CS Procurement Unit
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Section 00 52 03 Contract	Email From DAS/CS Procurement Unit
	<input checked="" type="checkbox"/>	Section 00 52 73 Subcontract Agreement Form (Named & Listed)	Email From DAS/CS Procurement Unit
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Certificate of Liability Insurance Acord® form (See Section 00 62 16 Insurance Certificate Form for details)	Email From DAS/CS Procurement Unit
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Certificate of Asbestos Abatement Liability Insurance (for asbestos abatement only; see Section 00 62 16.1 Asbestos Abatement Liability Insurance for details)	Email From DAS/CS Procurement Unit
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Section 00 92 10: Additional Forms	Performance Bond
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Labor & Material Bond
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Surety Sheet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Bidder’s Certification: Financial Position & Corporate Structure
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Power of Attorney from the Surety Company	Surety Company
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Nonresident (Out of State) Contractors: <u>Verified Nonresident</u> General/Prime Contractors must submit a copy of their “ Notice of Verified Status ” (Verification Letter) from the CT Department of Revenue Services (DRS). <u>Unverified Nonresident</u> General/Prime Contractors must submit a copy of Form AU-965 “Acceptance of Surety Bond” from the DRS. (See Section 00 92 30 Procedures Regarding Taxation for Nonresident General/Prime Contractor and Subcontractors for additional details.)	CT Department of Revenue Services
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	NEW: General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities: For projects disturbing one or more total acres of land area , submit a copy of the signed Stormwater Pollution Control Plan “Contractor Certification Statement” and License Transfer Form , as directed by the DAS/CS Architect/Engineer, prior to commencement of any construction activities.	DAS/CS Architect/Engineer
	<input checked="" type="checkbox"/>	Ethics Affidavit (Regarding State Ethics) OPM Ethics Form 6 for each Named Subcontractor	BizNet
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Threshold Projects Only: Submit Major Contractor Registration License Number(s) for Subcontractors	CT Department of Consumer Protection
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	SEEC Form 10	SEEC Website
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Certificate of Legal Existence from Corporations	Secretary of the State
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	NEW: Contractor and Subcontractor Payments Reporting: Every Contractor (and its Subcontractors) shall log on to BizNet each month and enter payments they have received from the state, from the Contractor, or from a higher tier Subcontractor (as applicable).	BizNet

End of Section
 00 41 10 Bid Package Submittal Requirements

INSTRUCTIONS FOR CERTIFIED CHECK OR BID BOND (select one):
All Bidders:
Edit this page, print, sign, and scan to PDF. Upload the PDF form to BizNet.

- CERTIFIED CHECK OPTION:** *Prior* to the Date and Time of the Bid Opening:
 (1) Check the box for "Certified Check Option";
 (2) Print, scan to PDF, and upload the PDF form to Biznet; and
 (3) Deliver the Certified Check, made payable to "Treasurer, State of Connecticut", to the following address:
 State of Connecticut
 Department of Administrative Services, Construction Services
 Office of Legal Affairs, Policy, and Procurement
 450 Columbus Boulevard, North Tower, Suite 1302
 Hartford, CT 06103-1835
- BID BOND OPTION** (see template below): *Prior* to the Date and Time of the Bid Opening:
 (1) Check the box for "Bid Bond Option";
 (2) Complete the **Standard Bid Bond** (below), print, sign, scan to PDF, and upload the PDF Bid Bond to Biznet.

Standard Bid Bond

DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

KNOW ALL MEN BY THESE PRESENTS, That we,

, hereinafter called the Principal,
 of , as Principal,
 and , hereinafter
 called the Surety, a corporation organized and existing under the laws of the
 State of , and duly authorized to transact a
 surety business in the State of Connecticut, as Surety, are held and firmly bound unto the State of
 Connecticut, as Obligee, in the penal sum of ten (10) percent of the amount of the bid set forth in a
 proposal hereinafter mentioned,

,
 lawful money of the United States of America, for the payment of which, well and truly to be made to the Obligee,
 the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns,
 jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That, whereas the Principal has submitted
 or is about to submit a proposal to the Obligee related to a contract for Project No.:

NOW, THEREFORE, if the said contract be awarded to the Principal and the Principal shall, within such time as
 may be specified, enter into the said contract in writing with the State of Connecticut and give the required
 bonds, with surety acceptable to the Obligee, or if the Principal shall fail to do so, pay to the Obligee the
 damages which the Obligee may suffer by reason of such failure not exceeding the penalty of this bond, then
 this obligation shall be void, otherwise to remain in full force and effect.

SIGNED, SEALED AND DELIVERED this day of , 20

<input type="text"/>	<input type="text"/>
<i>(Principal's Signature)</i>	Surety
<input type="text"/>	<input type="text"/>
<i>(Print Name)</i>	Its attorney in fact Signature
<input type="text"/>	<input type="text"/>
Company Name	<i>(Print Name)</i>

General Contractor Bidder's Qualification Statement

DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

Instructions:

- All Bidders are **required** to **upload this form to BizNet**, properly completed, **prior to the date and time of the Bid Opening**.
- Failure of a Bidder to answer any question or provide required information **shall** be grounds for the awarding authority to disqualify and reject the bid, pursuant to Connecticut General Statutes §4b-92.
- If a question or request for information does not pertain to your organization in any way, use the symbol "NA" (Not Applicable).
- Attach additional information on 8 ½" x 11" sheets with your letterhead as necessary and reference specific section and subsection numbers.
- **NOTE:** The Department reserves the right to request any additional or supplemental information necessary to complete its evaluation of a Bidder's qualification.

1.0 Project Information:

1.1 DAS/CS Project Number:

1.2 Project Name:

1.3 Project Location:

2.0 Projects with Construction Costs Estimated To Be Greater than \$500,000:

- Select the applicable **Class of Work** as stated in the **00 11 16 Invitation to Bid**.
- Select **YES** if your Firm has the applicable the **DAS Prequalification Certificate and Update (Bid) Statement** or **NO** if it does not.
- If **YES**, upload the applicable **DAS Prequalification Certificate and Update (Bid) Statement** to BizNet **prior** to the date and time of the Bid Opening.

Not Applicable - Construction Costs Less than \$500,000

	Class of Work:	Does your Firm have the applicable DAS Prequalification Certificate and Update (Bid) Statement?
2.1	<input type="checkbox"/> General Building Construction (Group A):	YES <input type="checkbox"/> NO <input type="checkbox"/>
2.2	<input type="checkbox"/> General Building Construction (Group B):	YES <input type="checkbox"/> NO <input type="checkbox"/>
2.3	<input type="checkbox"/> General Building Construction (Group C):	YES <input type="checkbox"/> NO <input type="checkbox"/>
2.4	<input type="checkbox"/> General Trades (Interior Work Only):	YES <input type="checkbox"/> NO <input type="checkbox"/>
2.5	<input type="checkbox"/> CPS Projects ONLY: Insert Class of Work	YES <input type="checkbox"/> NO <input type="checkbox"/>

3.0 Firm's Present Legal Name: (the *complete legal name exactly* as it appears with the **Secretary of State registry**. The appropriate **title** must be used throughout the documents, for example: General Partner, Member, Manager, Sole Member, etc.)

Name:

4.0 How many years has your Firm been in business under its **Present Legal Name**?

Years:

5.0 How many years has your Firm been in business as a General Contractor?

Years:

6.0 Indicate **all** other **names** by which your Firm has been known and the **length of time** known by each name:

6.1

Years	Months

6.2

Years	Months

6.3

Years	Months

7.0 This Firm's **Certification** with the CT Secretary of State:

Check Box

Type of Business Entity:

Certification Year

Corporation

Partnership

Sole Proprietorship

Limited Liability Company (LLC)

Other:

8.0 Attach resumes of all **supervisory personnel**, such as **Principals, Project Managers, and Superintendents**, who will be directly involved with the project on which you are now a bidder. Indicate their construction related training, certifications and licenses and the number of years of actual construction experience. Indicate the number of years of this actual construction experience which were in a Supervisory capacity.

9.0 Named Subcontractor – Bidder Intends to Self-Perform:

Check **YES** or **NO** for each “Named Subcontractor” **Class of Work** which your firm intends to perform with its own employees for this Contract; see **Section 2.7** of **Section 00 41 00 Bid Proposal Form**.

NOTE: For Projects with Construction Costs estimated to be greater than \$500,000, complete **Section 00 45 17 Named Subcontractor Bidder's Qualification Statement** for each **Named Subcontractor Class of Work** checked **YES** and submit within ten (10) calendar days *after* receipt of the “Set-Aside Contractor Schedule Request” from DAS/CS Office of Legal Affairs, Policy, and Procurement.

<input type="checkbox"/>	Not Applicable – No Named Subcontractors &/or Not Self-Performing	
	Named Subcontractor Class of Work	Does your Firm intend to self-perform this Named Subcontractor Class of Work?
9.1	Electrical:	YES <input type="checkbox"/> NO <input type="checkbox"/>
9.2	HVAC:	YES <input type="checkbox"/> NO <input type="checkbox"/>
9.3	Masonry:	YES <input type="checkbox"/> NO <input type="checkbox"/>
9.4	Plumbing:	YES <input type="checkbox"/> NO <input type="checkbox"/>
9.5	Environmental Remediation:	YES <input type="checkbox"/> NO <input type="checkbox"/>
9.6	Hazardous Materials Abatement:	YES <input type="checkbox"/> NO <input type="checkbox"/>

10.0 Named Subcontractor - Class of Work Greater than \$500,000 and Self-Performing:

- Select the applicable **Named Subcontractor Class of Work** which your firm intends to perform with its own employees for this Contract.
- Select **YES** if your Firm has the applicable the **DAS Prequalification Certificate and Update (Bid) Statement** or **NO** if it does not.
- If **YES**, submit the applicable **DAS Prequalification Certificate and Update (Bid) Statement** within ten (10) calendar days *after* receipt of the “Set-Aside Contractor Schedule Request” from DAS/CS Office of Legal Affairs, Policy, and Procurement.

<input type="checkbox"/>	Not Applicable – No Class of Work Greater \$500,000 &/or Not Self-Performing	
	Named Subcontractor Class of Work Greater Than \$500,000	Does your Firm have the applicable DAS Prequalification Certificate and Update (Bid) Statement?
10.1	<input type="checkbox"/> Electrical:	YES <input type="checkbox"/> NO <input type="checkbox"/>
10.2	<input type="checkbox"/> HVAC:	YES <input type="checkbox"/> NO <input type="checkbox"/>
10.3	<input type="checkbox"/> Masonry:	YES <input type="checkbox"/> NO <input type="checkbox"/>
10.4	<input type="checkbox"/> Plumbing:	YES <input type="checkbox"/> NO <input type="checkbox"/>

11.0 List all construction projects your Firm has completed in the **past five (5) years**. Provide **all** of the information listed below. DAS/CS *may* reject a bid as **non-responsive** if the bidder does not make **all** required pre-award submittals within the designated time period. Attach additional sheets as necessary **using the following format**:

IMPORTANT NOTE: **Two (2)** of the construction projects completed in the past five (5) years shall be (1) single project contracts that have reached substantial completion, not aggregate projects; (2) of commercial and/or institutional construction work (this includes compliance with general requirements); (3) within the Cost Estimate Range stated in Section 00 11 16 Invitation to Bid for this project; and (4) of the size and complexity of this Project. Failure to identify to **two** such projects **shall** result in rejection of the bid.

11.1 Project Title:		
11.2 Project Location:		
11.3 Construction Start Date:		
11.4 Construction Finish Date:		
11.5 Describe the Scope of Work your Firm performed:		
11.6 Original Contract Amount:		
11.7 Final Contract Amount:		
11.8 Original Contract Duration (Calendar Days):		
11.9 Final Contract Duration (Calendar Days):		
11.10 Owner:		
11.11 Owner's Representative:		
	<i>(Name)</i>	<i>(Phone Number)</i>
11.12 Design Firm:		
11.13 Design Firm's Representative:		
	<i>(Name)</i>	<i>(Phone Number)</i>

12.0 References:

Furnish references from **architects, engineers or owners** indicating that your Firm has satisfactorily completed in a timely manner contract work for projects within the cost estimate range, size and complexity of this project. Provide explanations where delays have occurred. This information should cover work done over the past five years.

13.0 Construction Scheduler:

For Projects greater than \$5 Million: Submit the **name, resume and references** of the **Construction Scheduler** in accordance with the requirements called for in Section **01 32 16.13 Critical Path Method Schedules** of the General Requirements.

Not Applicable – Project Less Than \$5 Million

14.0 List and explain if your Firm has ever failed to complete a contract or if any officer or partner of your Firm has ever been an officer or partner of another organization that failed to complete a contract. Indicate below the circumstances leading to the project failure and the name of the company which provided the bonding for the failed contract(s):

Not Applicable

15.0 List and explain if your Firm has ever had a contract terminated, indicating the circumstances leading to the project termination of contract(s):

Not Applicable

16.0 List and explain all legal or administrative proceedings against your Firm or any officers, principals, partners, members, or employees of the organization currently pending or concluded adversely within the last five years, and any judicial or administrative sanctions that are still in effect against such organization, and any of its officers, principals, partners, members, or employees. (Exclude Occupational Safety and Health Act [OSHA] violations which are called for elsewhere in this statement). Add attachments as necessary.

Not Applicable

17.0 List and explain any disbarments or suspensions that have been imposed on your Firm in the past five years or that were still in effect during the five year period or that are still in effect. Such list must include disbarments and suspensions of officers, principals, partners, members, and employees of your Firm:

Not Applicable

18.0 List and explain any other reason(s) that precludes your Firm or any officer, principal, partner, member, or employees thereof from bidding on a contract in Connecticut or any other jurisdiction:

Not Applicable

19.0 List and explain all willful or serious violations your Firm has had of any OSHA or of any standard, order or regulation promulgated pursuant to such act, during the three year period preceding the bid, provided such violations were cited in accordance with the provisions of any State Occupational Safety and Health Act or Occupational Safety and Health Act of 1970. Indicate whether these were abated within the time fixed by the citation or whether the citation was appealed. If appealed what is the status or disposition. Add attachments as necessary.

Not Applicable

20.0 List and explain any criminal convictions your Firm has had related to the injury or death of any employee in the three-year period preceding the bid: Add attachments as necessary.

Not Applicable

21.0 List and explain any changes in your Firm's financial condition or business organization, which might affect your Firm's ability to successfully complete this contract:

Not Applicable

22.0 **NEW:** List and explain if your Firm has ever failed to submit an Affirmative Action Plan to the Commission on Human Rights and Opportunities (CHRO). Indicate below the circumstances leading to the failure to submit the Affirmative Action Plan to CHRO:

Not Applicable

23.0 **NEW:** List and explain if your Firm's Affirmative Action Plan has ever been disapproved by CHRO or determined to be noncompliant. Indicate below the circumstances leading to the disapproval or finding of noncompliance of your Affirmative Action Plan by CHRO:

Not Applicable

24. Signature

Dated at

Signed this

 day of , 20

Name of Firm:

Firm Address:

Signature:

Print or Type Name:

Title:

25. Notary Statement

Mr./Mrs./Ms. being duly sworn

deposes and says that he/she is the of
(Position or Title)

, and that the answers to the foregoing
(Firm Name)

questions and all statements therein contained are true and correct.

Subscribed and sworn before me this day of , 20

Notary Public

My Commission Expires , 20

End of Section

00 45 14 General Contractor Bidder's Qualification Statement

Objective Criteria Established for Evaluating Qualifications of Bidders:

CT DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

The following items are established pursuant to Sections 4b-92, 4b-94 and 4b-95a of the Connecticut General Statutes (C.G.S.) as amended.

The **Objective Criteria Established for Evaluating Qualifications of Bidders** (Section 00 45 15) are to assure that the State of Connecticut will secure the "lowest responsible and qualified bidder" who has the ability and capacity to successfully complete the Bid Proposal Form and the Work. Failure to comply with any portion of this requirement **may** cause **rejection** of the bid. **Note:** Individual Specification Sections **may** contain General Contractor and/or Subcontractor Qualification requirements that **exceed** those in **Section 00 45 15 Objective Criteria Established for Evaluating Qualifications of Bidders**.

THE BIDDER MUST HAVE OR HAVE COMPLETED THE FOLLOWING:

1.1 DAS Prequalification Requirements:

For Projects with Construction Costs greater than \$500,000, **all Bidders** shall upload to BizNet a valid Department of Administrative Services (DAS) **Prequalification Certificate** and **Update (Bid) Statement** *prior* to the date and time of the Bid Opening.

1.2 Evaluation:

1.2.1 All Bidders shall upload to BizNet **Section 00 45 14 General Contractor's Bidder Qualifications Statement** *prior* to the date and time of the Bid Opening.

1.2.2 If applicable, the **Three (3) Lowest Bidders** shall submit **Section 00 45 17 Named Subcontractor's Bidder Qualification Statement(s)** to DAS Construction Services (DAS/CS) Office of Legal Affairs, Policy, and Procurement within **ten (10)** calendar days **after** receipt of the "Set-Aside Contractor Schedule Request" *from* DAS/CS.

1.2.3 The Bidder must demonstrate that the Bidder and, if applicable, its Named Subcontractors, meet the **objective criteria** for this specific project.

1.2.4 The **responses** to the Statement(s) must identify two (2) **projects completed** – single project contracts that have reached substantial completion, not aggregate projects – of commercial and/or institutional construction work (this includes compliance with general requirements) during the past five (5) years within the Cost Estimate Range stated in Section 00 11 16 **Invitation to Bid** for this project, and of the size and complexity of this project. The failure to identify to such projects shall result in rejection of the bid.

1.2.5 If the Bidder identifies two projects that meet the above criteria, the **State's evaluation** shall be based on the **performance record** of the prospective Bidder as a general, prime contractor and its named subcontractors during the course of the two (2) comparable projects, and not just the end result. The state will conduct the evaluation based on its interpretation of its objective criteria. **Evaluation criteria** shall include: Faithful and efficient performance; fulfilment of contract obligations; financial, managerial and technical abilities; and integrity and the absence of any conflicts of interest. Any one or all of the factors noted in this paragraph as well as in the other criteria set forth in this **Section 00 45 15** may be grounds for the determination by the State, in its sole discretion, of the Bidder's responsibility and qualifications necessary for the faithful performance of the work required of this project.

1.3 References:

Furnished **references from architects, engineers or owners** indicating that it has satisfactorily completed in a timely manner contract work for projects and provide explanations where delays have occurred. This information should cover work done over the **past five years**. Review of DAS/CS projects shall be included in the evaluation of the bidder's qualifications and anticipated future performance.

1.4	Qualified Personnel:
1.4.1	Shown that it customarily employs or has on its payroll supervisory personnel, qualified to perform the work required for this project and to coordinate the work called for in the Bid Specifications.
1.4.2	If the project is for \$5 Million or more, submit the name, resume and references of the Construction Scheduler in accordance with the requirements called for in Section 01 32 16.13 Critical Path Method Schedules of the General Requirements.
1.5	Past Performance:
	Demonstrated a good track record of past performance on State or other projects relative to quantity, quality, timeliness, cost, cooperation and harmonious working relationships with subcontractors, suppliers and client agencies. DAS/CS will review the Bidders past performance ratings prepared by DAS/CS or prepared as part of the DAS Contractor Prequalification Program. This review may focus on the comments relative to: Quality of Supervision, Adherence to Contract Documents, On Time Project Completion, Subcontractor performance, and the handling of Change Orders. Unacceptable ratings for several criteria shall be sufficient cause to deem a bidder not responsible.
1.6	Financial Responsibility:
	Shown that it is financially responsible to perform the work as bid. If requested, additional financial information shall be provided. Prompt and proper payments to its subcontractors and material suppliers is a critical factor to be considered by DAS/CS.
1.7	[Left Blank]
1.8	Equipment Requirements:
	Shown that it owns or possesses, rented, or leased equipment of the type customarily required by contractors in the performance of contract work and that such equipment, if needed, is available for this project.
1.9	Materials and Suppliers:
	Purchased materials over the past three years from suppliers who customarily sell such materials in quantity to contractors.
1.10	Physical Facilities:
	Control of adequate physical facilities from which the work can be performed.
1.11	Compliance with Subcontractor Requirements:
	Demonstrated that on previous state projects the bidder complied in good faith with the requirements of listing subcontractors as outlined in C.G.S. Sections 4b-93 and 4b-95.
1.12	Threshold Building and Major Contractor Requirements:
	Demonstrated that all major subcontractors are in compliance with the provisions of C.G.S. Section 20-341gg, as revised, concerning licensure requirements to perform work on any structure that exceeds the threshold limits contained in C.G.S. Section 29-276b, as revised.
1.13	OSHA Requirements:
	Proven that the Bidder has not been found to be in violation of three or more willful or serious violations of Occupational Safety and Health Administration (OSHA) regulations in the past three years.

1.14 Criminal Convictions and Injuries or Death of Employees:

Not received a **criminal conviction** related to the injury or death of any employee in the three-year period preceding the bid.

1.15 Legal or Administrative Proceedings:

Listed all **legal** (court and/or arbitration) or **administrative proceedings** currently pending as well as any legal (court and/or arbitration) or administrative proceeding related to procurement or performance of any public or private construction contracts which has concluded adversely within the last three years.

1.16 Contract Performance and Surety:

Identified any situations where: (1) the bidder failed to complete a construction contract; or (2) bonds were called during the past three years. If applicable, attach a sheet providing explanation including date(s) and location(s).

1.17 State Tax Requirements:

Not been found to be in violation of any **state tax** requirements of the Connecticut Department of Revenue Services in the five (5)-year period preceding the bid.

1.18 State and Federal Labor Requirements:

Not been found to be in violation of any State or Federal **labor laws** as required through the Department of Labor including violations of prevailing wage laws in the five (5)-year period preceding the bid.

1.19 Change Order Pricing and State Ethics:

Been found to be in compliance with all statutory and regulatory requirements. This Item shall include, but not be limited to, any DAS/CS determinations related to improper Change Order pricing relative to C.G.S. Section 1-101nn of The State Ethics Statutes.

1.20 Internal Revenue Services (IRS) Requirements:

Not been found in violation of any of the **Internal Revenue Service Tax Requirements** regarding classification of employees and independent contractors in the five (5)-year period preceding the bid.

1.21 Workers Compensation and Insurance Requirements:

Not been found to be in any violation of C.G.S. Section 31-288 relating to employee classification for purposes of Workers' Compensation insurance premiums in the five (5)-year period preceding the bid.

NOTE: The foregoing Item Numbers **1.13** and **1.14** are meant to comport with C.G.S. Section 31-57b.

End of Section
00 45 15 Objective Criteria Established for Evaluating Qualifications of Bidders

Named Subcontractor Bidder's Qualification Statement

DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

Instructions:

- This Section is **only applicable** to Projects with Construction Costs **Greater than \$500,000.00**. See **Subsection 2.7 Named Subcontractors and Classes of Work** of **00 41 00 Bid Proposal Form** for applicability.
- If a question or request for information does not pertain to your organization in any way, use the symbol "NA" (Not Applicable). Attach additional information on 8 ½" x 11" sheets with your letterhead as necessary and reference specific subsection number.
- Submit this form for **each** of the Named Subcontractors, within **ten (10)** calendar days **after** receipt of the "Set-Aside Contractor Schedule Request" to:

State of Connecticut
Department of Administrative Services, Construction Services
Office of Legal Affairs, Policy, and Procurement
450 Columbus Boulevard, Suite 1302
Hartford, CT 06103

1.0 Project Information:

1.1 DAS/CS Project Number:

1.2 Project Name:

1.3 Project Location:

2.0 Named Subcontractor Class of Work:

Check the applicable Class of Work:

2.1 Electrical Work:

2.2 HVAC Work:

2.3 Masonry Work:

2.4 Plumbing Work:

2.5 Environmental Remediation:

2.6 Hazardous Materials Abatement:

3.0 Subcontractor's Present Legal Name:

Name:

4.0 How many years has the **Subcontractor** been in business under its **Present Legal Name**?

Years:

5.0 How many years has the **Subcontractor** been in business as a Subcontractor for this Class of Work?

Years:

6.0 If the **Subcontractor** has not always been a Subcontractor for this Class of Work then list the trade(s) that your firm customarily performed prior to the time that you became a Subcontractor in this **Class of Work**:

6.1

6.2

6.3

7.0 Indicate **all** other **names** by which this **Subcontractor** has been known and the **length of time** known by each name:

7.1	<input style="width: 95%; height: 40px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
		<i>Years</i>	<i>Months</i>
7.2	<input style="width: 95%; height: 40px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
		<i>Years</i>	<i>Months</i>
7.3	<input style="width: 95%; height: 40px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>	<input style="width: 40px; height: 20px;" type="text"/>
		<i>Years</i>	<i>Months</i>

8.0 The **Subcontractor's Certification** with the CT Secretary of State:

Check Box	Type of Business Entity:	Certification Year
<input type="checkbox"/>	Corporation	<input style="width: 100%; height: 25px;" type="text"/>
<input type="checkbox"/>	Partnership	<input style="width: 100%; height: 25px;" type="text"/>
<input type="checkbox"/>	Sole Proprietorship	<input style="width: 100%; height: 25px;" type="text"/>
<input type="checkbox"/>	Limited Liability Company (LLC)	<input style="width: 100%; height: 25px;" type="text"/>
<input type="checkbox"/>	Other: <input style="width: 350px; height: 25px;" type="text"/>	<input style="width: 100%; height: 25px;" type="text"/>

9.0 Attach resumes of all supervisory personnel, such as Principals, Project Managers, and Superintendents, who will be directly involved with this project on which you are now a **Named Subcontractor Bidder** for a specific **Class of Work**. Indicate the number of years of construction experience and number of years of which they were in a Supervisory capacity.

10.0 List all sub-trades which your firm customarily performs with own employees – **this table must be completed for electrical and plumbing trades for all projects.**

	Trade Name	License Holder Name	Connecticut D.C.P. License No.: Format: Prefix - Number - Suffix
10.1			
10.2			
10.3			
10.4			
10.5			

11.0 Trade References:
 Names, addresses and telephone numbers of several firms with whom your organization has regular business dealings (attach separate sheets as necessary).

12.0 List all construction projects your firm currently has under contract. Provide all of the information listed below. DAS/CS *may* reject a bid as **non-responsive** if the bidder does not make **all** required pre-award submittals within the designated time period. Attach additional sheets as necessary **using the following format:**

12.1	Project Title:		
12.2	Project Location:		
12.3	Construction Start Date:		
12.4	Construction Finish Date:		
12.5	Describe the Scope of Work your Firm performed:		
12.6	Original Contract Amount:		
12.7	Final Contract Amount:		
12.8	Original Contract Duration (Calendar Days):		
12.9	Final Contract Duration (Calendar Days):		
12.10	*Briefly describe any complaints about your Firm's quality control or construction management.		
	*Attach a separate sheet if more space is required.		
12.11	Owner:		
12.12	Owner's Representative:		
		<i>(Name)</i>	<i>(Phone Number)</i>
12.13	Design Firm:		
12.14	Design Firm's Representative:		
		<i>(Name)</i>	<i>(Phone Number)</i>
12.15	General Contractor:		
12.16	G.C.'s Representative:		
		<i>(Name)</i>	<i>(Phone Number)</i>

13.0 List all construction projects your firm has completed in the **past five (5) years or list the ten (10) projects** your firm has most recently completed. Provide **all** of the information listed below. DAS/CS *may* reject a bid as **non-responsive** if the bidder does not make **all** required pre-award submittals within the designated time period. Attach additional sheets as necessary **using the following format:**

13.1 Project Title:		
13.2 Project Location:		
13.3 Construction Start Date:		
13.4 Construction Finish Date:		
13.5 Describe the Scope of Work your Firm performed:		
13.6 Original Contract Amount:		
13.7 Final Contract Amount:		
13.8 Original Contract Duration (Calendar Days):		
13.9 Final Contract Duration (Calendar Days):		
13.10 *Briefly describe any complaints about your Firm's quality control or construction management.		
	<i>*Attach a separate sheet if more space is required.</i>	
13.11 Owner:		
13.12 Owner's Representative:		
	<i>(Name)</i>	<i>(Phone Number)</i>
13.13 Design Firm:		
13.14 Design Firm's Representative:		
	<i>(Name)</i>	<i>(Phone Number)</i>
13.15 General Contractor:		
13.16 G.C.'s Representative:		
	<i>(Name)</i>	<i>(Phone Number)</i>

14.0 Has your Firm ever failed to complete a contract or has any officer or partner of your Firm ever been an officer or partner of another organization that failed to complete a contract? If so, indicate below the circumstances leading to the project failure and the name of the company which provided the bonding for the failed contract(s):

Not Applicable

15.0 List all legal or administrative proceedings currently pending or concluded adversely within the last five years which relate to procurement or performance of any public or private construction contracts. (Exclude Occupational Safety and Health Act [OSHA] violations which are called for elsewhere in this statement). Add attachment as necessary.

Not Applicable

16.0 List all willful or serious violations of any OSHA or of any standard, order or regulation promulgated pursuant to such act, during the three year period preceding the bid, provided such violations were cited in accordance with the provisions of any State Occupational Safety and Health Act or Occupational Safety and Health Act of 1970. Indicate whether these were abated within the time fixed by the citation or whether the citation was appealed. If appealed what is the status or disposition. Add attachments as necessary.

Not Applicable

17.0 Has your Firm had any criminal convictions related to the injury or death of any employee in the three-year period preceding the bid? Please list any such convictions below. Add attachments as necessary.

Not Applicable

18. Signature

Dated at

Signed this day of , 20

Name of Firm:

Firm Address:

(Signature)

(Print or Type Name)

(Title)

19. Notary Statement

Mr./Mrs./Ms. being duly sworn

deposes and says that he/she is the of

(Position or Title)

, and that the answers to the foregoing

(Firm Name)

questions and all statements therein contained are true and correct.

Subscribed and sworn before me this day of , 20

Notary Public

My Commission Expires , 20

Contract

DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

Contract For:

Dated as of by and between the **State of Connecticut** (herein called the
(Month, Day, Year)

“State”) acting herein by its Commissioner, Department of Administrative Services under the provisions of the Connecticut General Statutes (C.G.S.) Sections 4-8, 4a-1, 4a-1a, 4a-2, 4b-1, and 4b-3, as revised, and (herein called the “Contractor”).

(Print Name of Contractor)

WITNESSETH, that the State and the Contractor in consideration of the hereinafter contained mutual promises and covenants, do hereby agree as follows:

1. CONTRACT AND CONTRACT DOCUMENTS:

The **Invitation for Bids**, the enumerated **Plans**, the **Specifications** and **Amendments** thereto, the **Addenda**, the **Bid Proposal** as accepted by the Commissioner, Department of Administrative Services, **Order of Award**, which Order is made a part of this **Contract**, the **General Conditions**, the **General Requirements**, the **Contract** and the **Bonds** shall form part of this **Contract** and the **provisions** thereof shall be as binding upon the parties as if they were fully set forth herein. The tables of contents, titles, headings, running headlines and marginal notes contained herein and in said Documents, are solely to facilitate to various provisions of the Contract Documents and in no way affect, limit, or cast light upon the interpretations of the provisions to which they refer. Whenever the term “Contract Documents” is used, it shall mean and include this **Contract**, the **Invitation for Bids**, the enumerated **Plans**, **Specifications** and **Amendments** thereto, the **Addenda**, the **Bid Proposal** as accepted by the Commissioner, Department of Administrative Services, the **General Conditions**, the **General Requirements**, the **Bonds**, the **Notice to Bidders**, the **Wage Scales**, the **Supplementary Conditions**, and the **Insurance Certificates**.

2. SCOPE OF THE WORK:

The Contractor shall furnish all plant, labor, materials, supplies, equipment, and other facilities and things necessary or proper for or incidental to the work contemplated by this Contract as required by and in strict accordance with applicable Plans, Specifications and Amendments thereto, and Addenda (hereinafter enumerated), and as required by and in strict accordance with such changes as are ordered and approved pursuant to this Contract, and will perform all other obligations imposed on him by this Contract.

3. ENUMERATION OF PLANS, SPECIFICATIONS AND ADDENDA:

The following is an enumeration of the Plans, Specifications, and Addenda:

Prepared By:	<input type="text"/> <i>(Print Name of Architect/Engineer Firm)</i>
Plans and Specifications:	<input type="text"/>
Addenda:	<input type="text"/>

4. COMPENSATION TO BE PAID THE CONTRACTOR

The State will pay and the Contractor will accept in full consideration for the performance of the Contractor's obligation hereunder the sum of:

<input type="text"/>	Dollars and 00/100 (\$	<input type="text"/>)
----------------------	------------------------	----------------------	---

5. PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

For all State contracts as defined in the **C.G.S. §9-612(f)(1)(C)**, having a value in a calendar year of \$50,000 or more or a combination or series of such agreements or contracts having a value of \$100,000 or more, the authorized signatory to this Agreement expressly acknowledges receipt of the State Elections Enforcement Commission's notice advising state contractors of campaign contribution and solicitation prohibitions, and will inform its principals of the contents of the notice. See **SEEC Form 10**.

Contractor hereby irrevocably assigns to the State of Connecticut all rights, title and interest in and to all **Claims* associated with this Contract** that Contractor now has or may or will have and that arise under the antitrust laws of the United States, **15 USC Section 1, et seq.** and the antitrust laws of the State of Connecticut, **C.G.S. §35-24, et seq.**, including but not limited to any and all Claims for overcharges. This assignment shall become valid and effective immediately upon the accrual of a Claim without any further action or acknowledgment by the parties.

***Definition of Claims associated with this Contract:** "All actions, suits, claims, demands, investigations and proceedings of any kind, open, pending or threatened, whether mature, unmaturing, contingent, known or unknown, at law or in equity, in any forum."

IN WITNESS WHEREOF, the Commissioner, Department of Administrative Services for and on behalf of the State of Connecticut, and the Contractor have executed this contract on the day and year first written.

Attested By:		State Of Connecticut	
WITNESS: <input type="text"/>	<i>(Signature)</i>	By: <input type="text"/>	<i>(Signature)</i>
Print Name: <input type="text"/>		Print Name: Josh Geballe	
WITNESS: <input type="text"/>	<i>(Signature)</i>	Its: Commissioner	
Print Name: <input type="text"/>		Department of Administrative Services	
		Date Signed: <input type="text"/>	
			<input type="text"/>
			SEAL
WITNESS: <input type="text"/>	<i>(Signature)</i>	Contractor: <input type="text"/>	
Print Name: <input type="text"/>		By: <input type="text"/>	<i>(Signature)</i>
WITNESS: <input type="text"/>	<i>(Signature)</i>	Its: <input type="text"/> , Duly Authorized	
Print Name: <input type="text"/>		Print Name: <input type="text"/>	
		Date Signed: <input type="text"/>	

**End of Section
00 52 03 Contract**

Subcontract Agreement Form

DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

In accordance with the requirements of the Connecticut General Statutes (C.G.S.) §4b-96, the Contractor selected for the Contract shall provide to each of its listed or substitute Named Subcontractors the relevant subcontract, along with a notice setting forth the time limit for execution of such subcontract. The Contractor selected for the Contract shall file with the State of Connecticut Department of Administrative Services (DAS) Construction Services Office of Legal Affairs, Policy, and Procurement an executed copy of each subcontract within ten (10) days (Saturdays, Sundays and legal holidays excluded) of presentation of the subcontract to each subcontractor. Each subcontract shall include at least the provisions set forth in the **Subcontract** form found in C.G.S. §4b-96 and shall follow the order of this **Subcontract Agreement Form**.

C.G.S. §4b-96. Subcontract, form. Procedure on failure of subcontractor to execute subcontract. General bidder's responsibilities.

Within five days after being notified of the award of a general contract by the awarding authority, or, in the case of an approval of a substitute subcontractor by the awarding authority, within five days after being notified of such approval, the general bidder shall present to each listed or substitute subcontractor (1) a subcontract in the form set forth in this section and (2) a notice of the time limit under this section for executing a subcontract. If a listed subcontractor fails within five days, Saturdays, Sundays and legal holidays excluded, after presentation of a subcontract by the general bidder selected as a general contractor, to perform his agreement to execute a subcontract in the form hereinafter set forth with such general bidder, contingent upon the execution of the general contract, the general contractor shall select another subcontractor, with the approval of the awarding authority. When seeking approval for a substitute subcontractor, the general bidder shall provide the awarding authority with all documents showing (A) the general bidder's proper presentation of a subcontract to the listed subcontractor and (B) communications to or from such subcontractor after such presentation. The awarding authority shall adjust the contract price to reflect the difference between the amount of the price of the new subcontractor and the amount of the price of the listed subcontractor if the new subcontractor's price is lower and may adjust such contract price if the new subcontractor's price is higher. The general bidder shall, with respect to each listed subcontractor or approved substitute subcontractor, file with the awarding authority a copy of each executed subcontract within ten days, Saturdays, Sundays and legal holidays excluded, of presentation of a subcontract to such subcontractor. The subcontract shall be in the following form:

(See page 2 and page 3)

SUBCONTRACT

THIS AGREEMENT made this day of , 20, by and between a corporation organized and existing under the laws of (a partnership consisting of) (an individual doing business as) hereinafter called the "Contractor" located at (insert complete address) _____, and a corporation organized and existing under the laws of (a partnership consisting of) (an individual doing business as) hereinafter called the "Subcontractor", located at (insert complete address) _____.

WITNESSETH that the Contractor and the Subcontractor for the considerations hereafter named, agree as follows:

1. The Subcontractor agrees to furnish all labor and materials required for the completion of all work specified in Section No. of the specifications for (Name of Subtrade) and the plans referred to therein and addenda No. , , , and for the (Complete title of project and the project number taken from the title page of the specifications) all as prepared by (Name of Architect or Engineer) for the sum of (\$) and the Contractor agrees to pay the Subcontractor said sum for said work. This price includes the following alternates:

Supplemental No. (s) , , , , , .

(a) The Subcontractor agrees to be bound to the Contractor by the terms of the hereinbefore described plans, specifications (including all general conditions stated therein which apply to his trade) and addenda No. , , , and , and , and to assume to the Contractor all the obligations and responsibilities that the Contractor by those documents assumes to the (Awarding Authority) , hereinafter called the "Awarding Authority", except to the extent that provisions contained therein are by their terms or by law applicable only to the Contractor.

(b) The Contractor agrees to be bound to the Subcontractor by the terms of the hereinbefore described documents and to assume to the Subcontractor all the obligations and responsibilities that the Awarding Authority by the terms of the hereinbefore described documents assumes to the Contractor, except to the extent that provisions contained therein are by their terms or by law applicable only to the Awarding Authority.

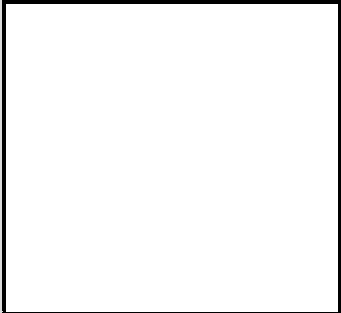
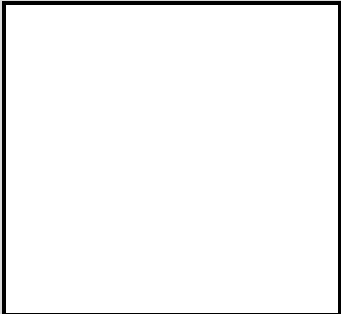
2. The Contractor agrees to begin, prosecute and complete the entire work specified by the Awarding Authority in an orderly manner so that the Subcontractor will be able to begin, prosecute and complete the work described in this subcontract; and, in consideration thereof, upon notice from the Contractor, either oral or in writing, the Subcontractor agrees to begin, prosecute and complete the work described in this Subcontract in an orderly manner in accordance with completion schedules prescribed by the general contractor for each subcontract work item, based on consideration to the date or time specified by the Awarding Authority for the completion of the entire work.

3. The Subcontractor agrees to furnish to the Contractor, within a reasonable time after the execution of this subcontract, evidence of workers' compensation insurance as required by law and evidence of public liability and property damage insurance of the type and in limits required to be furnished to the Awarding Authority by the Contractor.

4. The Contractor agrees that no claim for services rendered or materials furnished by the Contractor to the Subcontractor shall be valid unless written notice thereof is given by the Contractor to the Subcontractor during the first forty (40) days following the calendar month in which the claim originated.

5. This agreement is contingent upon the execution of a general contract between the Contractor and the Awarding Authority for the complete work.

IN WITNESS WHEREOF, the parties hereto have executed this agreement the day and year first above-written.

Subcontractor	
	<input type="text"/>
	Subcontractor
	By: <input type="text"/>
	<i>(Print Name)</i>
	Its: <input type="text"/>
	Duly Authorized
ATTEST: <input type="text"/>	<input type="text"/>
<i>(Signature)</i>	<i>(Subcontractor Signature)</i>
Date: <input type="text"/>	Date: <input type="text"/>
Contractor	
	<input type="text"/>
	Contractor
	By: <input type="text"/>
	<i>(Print Name)</i>
	Its: <input type="text"/>
	Duly Authorized
ATTEST: <input type="text"/>	<input type="text"/>
<i>(Signature)</i>	<i>(Contractor Signature)</i>
Date: <input type="text"/>	Date: <input type="text"/>

**End of Section
00 52 73 Subcontract Agreement Form**



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A.C. No. Ext):	FAX (A.C. No.):
INSURED Contractor's Legal Name and Address	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
	INSURER A:	NAIC#
	INSURER B:	
	INSURER C:	
	INSURER E:	

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADD. SUIN INSR. W/O	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-WIDE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PROJECT <input type="checkbox"/> LOC		Policy Number must be provided	Policy Effective Date must be provided	Policy Expiration Date must be provided	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADY INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMPYOP AGG \$ 2,000,000
	AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS		Policy Number must be provided	Policy Effective Date must be provided	Policy Expiration Date must be provided	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
	<input type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED: RETENTION \$					EACH OCCURRENCE \$ AGGREGATE \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N <input type="checkbox"/> N/A If yes, describe under DESCRIPTION OF OPERATIONS below		Policy Number must be provided	Policy Effective Date must be provided	Policy Expiration Date must be provided	<input checked="" type="checkbox"/> WC STATUTORY LIMITS <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ 100,000 E.L. DISEASE - EA EMPLOYEE \$ 100,000 E.L. DISEASE - POLICY LIMIT \$ 500,000
	Owner's and Contractor's Protective Liability Builder's Risk (include here when applicable)					Bodily Injury or Death (per occ.) Total \$ 1,000,000 Property Damages Total (aggregate) \$ 2,000,000 Completed Value

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Indicate Project Number and Title here

The State of Connecticut is an Additional Insured with respect to General Liability and Umbrella/Excess Liability Insurance coverage.

If Builder's Risk and or Inland Marine/Transit Insurance is required then the State is endorsed as a Loss Payee.

CERTIFICATE HOLDER State of Connecticut Department of Administrative Services, Construction Services Office of Legal Affairs, Policy and Procurement 450 Columbus Boulevard, Suite 1302 Hartford, CT 06103-1838	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Agent of Producer
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ACORD 25 (2010/05)

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End of Section
 00 62 16 Certificate of Insurance

**General Conditions of the Contract for Construction
 For Design-Bid-Build
 Department of Construction Services
 State of Connecticut
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ARTICLE 1
DEFINITIONS

WHENEVER THE FOLLOWING TERMS, OR PRONOUNS IN PLACE OF THEM, ARE USED THE INTENT AND MEANING SHALL BE AS FOLLOWS:

1.1 ACCEPTANCE: The Owner's acknowledgement of the Work from the Contractor upon certification by the Construction Administrator and Architect or Engineer that all Work has been completed.

1.2 ADDITIONAL OR DELETED WORK: Work required by the Department that, in the judgment of the Commissioner, involves any addition to, deduction from, or modification of the Work required by the Contract Documents.

1.3 AGENCY: The (User) Agency of the State of Connecticut having administrative authority of the facility in which the Work is being performed.

1.4 APPLICATION FOR PAYMENT, PARTIAL PAYMENT OR REQUISITION: Contractor's certified request for payment for completed portions of the Work and, if the Contract so provides, for materials or equipment suitably stored pending their incorporation into the Work.

1.5 ARCHITECT OR ENGINEER: A sole proprietor, partnership, firm, corporation or other business organization under Contract with the Owner, commissioned to prepare Contract Drawings and Specifications, to advise the Owner and in certain cases, to perform regular inspections during construction and when authorized to perform the duties of the Construction Administrator.

1.6 AS-BUILT DRAWINGS: Construction Drawings revised by the Contractor to show all significant Modifications made during the construction process.

1.7 BASE BID: Monetary value stated in the Bid Proposal Form as the sum for which the Bidder offers to perform the Work described in the Bidding Documents, exclusive of adjustments for Supplemental Bids.

1.8 BID BOND: Form of Bid Security executed by the Bidder as Principal and by a Surety to guarantee that the Bidder will enter into a Contract within a specified time and furnish any required bond as mandated by Connecticut General Statute Section 4b-92.

1.9 BIDDER: A sole proprietor, partnership, firm, corporation or other business organization submitting a Bid on the Bid Proposal Form for the Work contemplated.

1.10 BIDDING DOCUMENTS: Collectively, the Bidding Requirements and the proposed Contract Documents, including any addenda issued prior to receipt of Bids.

1.11 BID OR BID PROPOSAL FORM: A complete and duly signed proposal to perform Work (or a designated portion thereof) for a stipulated sum submitted in accordance with the Bidding Documents.

1.12 BID SECURITY: Certified check or Bid Bond submitted with Bid Proposal Form, which provides that the Bidder, if awarded the Contract, will execute such Contract in accordance with the requirements of the Bidding Documents.

1.13 BUILDER'S RISK INSURANCE: A specialized form of property insurance which provides coverage for loss or damage to the Work pursuant to the Contract Documents.

1.14 CASH ALLOWANCE: An amount established in the Contract Documents for inclusion in the Contract Sum to cover the cost of prescribed items not specified in detail, and as shown in the Allowance Schedule.

1.15 CERTIFICATE OF ACCEPTANCE: A document issued by the Owner to the Contractor stating that all Work specified in the Certificate of Acceptance has been completed and accepted by the Owner.

1.16 CERTIFICATE OF COMPLIANCE: A document stating that for the portion of the Project completed, either the design portion or the construction portion, has been performed in substantial compliance with all applicable building codes.

1.17 CERTIFICATE OF OCCUPANCY: Document issued by the authority having jurisdiction certifying that all or a designated portion of a building is approved for its designated use.

1.18 CERTIFICATE OF SUBSTANTIAL COMPLETION: A document prepared by the Architect or Engineer and approved by the Owner on the basis of an inspection stating:

1.18.1 that the Work, or a designated portion thereof, is determined to be Substantially Complete;

1.18.2 the date of Substantial Completion;

1.18.3 the responsibilities of the Owner and the Contractor for security maintenance, heat, utilities, damage to the Work and insurance; and

1.18.4 the time within which the Contractor shall complete the remaining Work.

1.19 CHANGE ORDER: Written authorization signed by the Owner, authorizing a modification in the Work, an adjustment in the Contract Sum, or an adjustment in the Contract Time.

1.20 COMMISSIONER: The State of Connecticut, Department of Construction Services (CT DCS) Commissioner acting directly or through specifically authorized CT DCS personnel or agent(s) having authority to perform duties defined in Article 25.

1.21 COMMISSIONING AGENT (CxA): An independent entity under contract directly with the Owner or Owner's Representative responsible for performing the specified commissioning procedures.

1.22 CONSTRUCTION ADMINISTRATOR: A sole proprietor, partnership, firm, corporation or other business organization, under Contract or employed by the Owner commissioned and/or authorized to oversee the fulfillment of all requirements

of the Contract Documents. The authorized Construction Administrator may be a Department of Construction Services Assistant Project Manager, Department of Construction Services Project Manager, a Clerk of the Works, an Architect, a Consulting Architect, a Consulting Construction Administrator, a Consulting Engineer etc. or any other designee as authorized and identified by the Owner.

1.23 CONSTRUCTION CHANGE DIRECTIVE: A written authorization signed by the Owner, directing a modification in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum, Contract Time or both. Any Construction Change Directive effecting an adjustment to the Contract Sum or Contract Time shall result in a Change Order.

1.24 CONTRACT DOCUMENTS OR CONTRACT: The Agreement between Owner and Contractor, Conditions of the Contract (General Conditions, Supplementary Conditions, General Requirements and other Conditions), Drawings, Specifications, and Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract, all of which shall constitute the Contract.

1.25 CONTRACTOR OR GENERAL CONTRACTOR: A sole proprietor, partnership, firm or Corporation, under direct Contract with the Department of Construction Services, responsible for performing the Work under the Contract Documents. Whenever the words "Contractor" or "General Contractor" are used it shall be understood to mean Contractor.

1.26 CONTRACTOR'S LIABILITY INSURANCE: Insurance purchased and maintained by the Contractor that insures the Contractor for claims for property damage, bodily injury or death.

1.27 CONTRACT START DATE OR DATE OF COMMENCEMENT OF THE WORK: The date, specified by the Owner in the Notice to Proceed, on which the Contractor is required to start the Work.

1.28 CONTRACT SUM: The sum stated in the Contract, which is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

1.29 CONTRACT TIME: The period of time allotted in the Contract Documents for Substantial Completion of the Work, including authorized adjustments thereto. The Contract Time is the sum of all Working Days and Non-Working Days as further defined herein and specified in the Contract Documents.

1.30 DAY: Whenever the word Day is used it shall be understood to mean calendar day stated on the Bidding Documents, unless stated otherwise.

1.31 DEPARTMENT OF CONSTRUCTION SERVICES (CT DCS) PROJECT MANAGER: The individual employed by the Owner, designated and authorized by the Commissioner, to be

responsible for the overall management and oversight of the Project, and to represent the (User) Agency.

1.32 DIESEL VEHICLE EMISSIONS CONTROL: The reduction of air pollution emissions from diesel powered vehicles through the use of diesel engine emission control technologies.

1.33 EQUAL(S): Any deviation from the Specification which is defined as follows: A replacement for the specified material, device, procedure, equipment, etc., which is recognized and accepted as substantially equal to the first listed manufacturer or first listed procedure specified after review by the Architect/Engineer, and may be rejected or approved at the sole discretion of the Owner. All equals must be substantially equivalent to the first manufacturer or first procedure listed in the Specifications with reference to all of the following areas: the substance and function considering quality, workmanship, economy of operation, durability, and suitability for purposes intended; size, rating, and cost. The equal does not constitute a modification in the scope of Work, the Schedule, or Architect/Engineer's design intent of the specified material, device, procedure, equipment, etc.

1.34 FINAL INSPECTION: Review of the Work by the Architect or Engineer and Owner to determine whether Acceptance has been achieved.

1.35 FINAL PAYMENT: The last payment made by the Owner to the Contractor, made after notice of the Acceptance. Payment shall include the entire unpaid balance of the Contract Sum as adjusted by modifications.

1.36 GENERAL CONDITIONS: The General Conditions of the Contract for Construction, part of Division 00 of the Specifications.

1.37 GENERAL REQUIREMENTS: That part of the Contract Documents entitled General Requirements, which is Division 01 of the Specifications.

1.38 GUARANTEE: See Warranty.

1.39 LIQUIDATED DAMAGES: A sum established in a Contract, usually as a fixed sum per Day, as the predetermined measure of damages to be paid to the Owner due to the Contractor's failure to complete the Work within the Contract Time.

1.40 LUMP SUM: An item or category priced as a whole rather than broken down into its elements.

1.41 MOBILE SOURCE: A source designed or constructed to move from one location to another during normal operation except portable equipment and includes, but is not limited to, automobiles, buses, trucks, tractors, earth moving equipment, hoists, cranes, aircraft, locomotives operating on rails, vessels for transportation on water, lawnmowers, and other small home appliances.

1.42 NON-WORKING DAYS: All Saturdays, Sundays, Legal State Holidays (12), and any other Days identified in the

Contract Documents that the Contractor is not permitted to execute the Work. The restriction of Non-Working Days may be suspended upon the approval or direction of the Commissioner.

1.43 NOTICE TO BIDDER: A notice contained in the Bidding Document informing prospective Bidders of the opportunity to submit Bids on a Project.

1.44 NOTICE TO PROCEED: Written notice, issued by the Commissioner or the Commissioner's authorized representative, to the Contractor authorizing the Contractor to proceed with the Work and establishing the date for commencement of the Contract Time.

1.45 OWNER OR DEPARTMENT: The State of Connecticut, Department of Construction Services acting through its Commissioner or specifically authorized Department personnel or agent.

1.46 OVERHEAD: Indirect costs including: supervision (any position over the foreman), field and home office expense, insurance, and small tools and consumables.

1.47 PAYMENT, BOND, LABOR BOND OR MATERIAL BOND: A bond in which the Contractor and the Contractor's surety guarantee to the Owner that the Contractor will pay for labor and materials furnished for use in the performance of the Contract, as required by Connecticut General Statutes Section 49-41.

1.48 PERFORMANCE BOND OR SURETY BOND: A bond in which the Contractor and the Contractor's surety guarantee to the Owner that the Work will be performed in accordance with the Contract Documents, as required by Connecticut General Statutes Section 49-41.

1.49 PERFORMANCE SPECIFICATION: A description of the desired results or performance of a product, material, assembly, procedure, or a piece of equipment with criteria for identifying the standard.

1.50 PLANS OR DRAWINGS: All Drawings or reproductions of Drawings pertaining to the construction of the Work contemplated and its appurtenances.

1.51 PROJECT: The total construction of which the Work performed under the Contract Documents may be the whole or a part.

1.52 PROJECT MANUAL: The set of documents assembled for the Work which includes, but is not limited to, Contract Documents, Bidding Requirements, Sample Forms, General Conditions of the Contract for Construction, General Requirements, and the Specifications.

1.53 PROPRIETARY SPECIFICATION: A specification that describes a product, procedure, function, material, assembly, or piece of equipment by trade name and/or by naming the manufacturer(s) or manufacturer's procedure, exact model number, item, etc., of those products acceptable to the Owner.

1.54 RETAINAGE: A percentage of each Application for Payment and a percentage of the total Contract Sum retained by the Owner.

1.55 SCHEDULE: A Critical Path Method (CPM) or Construction Schedule as required by the Contract Documents which shall be a diagram, graph or other pictorial or written Schedule showing all events expected to occur and operations to be performed and indicating the Contract Time, start dates, durations and finish dates as well as Substantial Completion and Acceptance of the Work, rendered in a form permitting determination of the optimum sequence and duration of each operation.

1.56 SCHEDULE OF VALUES: A document furnished by the Contractor to the Architect or Engineer and Owner stating the portions of the Contract Sum allocated to the various portions of the Work, which is to be used for reviewing the Contractor's Applications for Payment.

1.57 SECONDARY SUBCONTRACTOR: A sole proprietor, partnership, firm or Corporation under direct Contract with the Subcontractor to the General Contractor.

1.58 SENSITIVE RECEPTOR SITES: Areas where concentrations of diesel emissions may be harmful to sensitive populations, including, but not limited to, hospitals, school and university buildings being occupied during a student semester, residential structures, daycare facilities, elderly housing, and convalescent facilities.

1.59 SHOP DRAWINGS: Drawings provided to Architect or Engineer and Owner by a Contractor that illustrate construction, materials, dimensions, installation, and other pertinent information for the incorporation of an element or item into the construction as detailed Contract Documents.

1.60 SPECIFICATIONS: The description, provisions and other requirements pertaining to the method and manner of performing the Work and/or to the quantities and quality of materials to be furnished under the Contract.

1.61 SUBCONTRACTOR: A sole proprietor, partnership, corporation or other business organization under direct Contract with the Contractor supplying labor and/or materials for the Work at the site of the Project.

1.62 SUBMITTALS: Documents including, but not limited to, samples, manufacturer's data, Shop Drawing, or other such items submitted to the Owner and Architect or Engineer by the Contractor for the purpose of approval or other action, as required by the Contract Documents.

1.63 SUBSTANTIAL COMPLETION: The stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents.

1.64 SUBSTITUTION: Any deviation from the specified requirements, which is defined as follows: A replacement for

the specified material, device, procedure, equipment, etc., which is not recognized or accepted as equal to the first manufacturer or procedure listed in the Specification after review by the Architect/Engineer, and may be rejected or approved by the Owner. The Substitution is not equal to the specified requirement in comparison to the first manufacturer or first procedure listed in the Specifications in one or more of the following areas: the substance and function considering quality, workmanship, economy of operation, durability, and suitability for purposes intended; size, cost, and rating. The Substitution constitutes a modification in the scope of Work, the Schedule, or the Architect/Engineer's design intent of the specified material, device, procedure, equipment, etc.

1.65 SUPERINTENDENT: The Contractor's representative at the site who is responsible for continuous field supervision, coordination, in, completion of the Work, and, unless another person is designated in writing by the Contractor to the Owner and the Construction Administrator, for the prevention of accidents.

1.66 SUPPLEMENTAL BID: The monetary value stated in the Bid to be added to the amount of the Base Bid if the corresponding Work, as described in the Bidding Documents, is accepted.

1.67 SUPPLEMENTARY CONDITIONS: An extension in the Bid to be added to the amount of the Base Bid if the corresponding Work, as described in the Bidding Documents, is accepted.

1.68 THRESHOLD LIMIT BUILDING: Any proposed (new) structures or additions as defined by the Connecticut General Statutes Section 29-276b.

1.69 UNIT PRICE: The monetary value stated by the Owner or the Contractor, as a price per unit of measurement for materials or services as described in the Contract Documents and/or Bidding Documents.

1.70 WARRANTY: A written, legally enforceable assurance of specified quality or performance of a product or Work or of the duration of satisfactory performance.

1.71 WORK: The construction and services required by the Contract Documents, and including all labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

ARTICLE 2 CONDITIONS OF WORK

2.1 The Contractor shall carefully examine and study the conditions under which the Work is to be performed and the site of the Work, and compare the Contract Documents with each other and to information furnished by the Owner including but not limited to the Plans and Specifications, the form of the Contract, General Conditions, Supplementary Conditions, General Requirements, Bonds and all other Contract Documents associated with the Work.

2.2 The Contractor shall report to the Construction Administrator all errors, inconsistencies or omissions discovered. The Contractor shall not be liable to the Owner for damage resulting from errors, inconsistencies or omissions in the Contract Documents unless the Contractor recognized such errors, inconsistencies or omission and failed to report it to the Construction Administrator. If the Contractor performs any actions or construction activity knowing it involves an error, inconsistency or omission in the Contract Documents without notice to the Construction Administrator, the Contractor shall assume responsibility for such performance and related costs for the correction and shall not be allowed to submit any claim related to error, inconsistencies or omission.

2.3 The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Construction Administrator at once; and it will be assumed that the Contractor has been satisfied as to all requirements of the Contract Documents. Any deterrent conditions at the site of the Work which are obvious and apparent upon examination of the site but are not indicated on the Plans shall be corrected by the Contractor without additional compensation.

2.4 In performing the Work, the Contractor must employ such methods or means as will not cause any interruption of or interference with the Work of any other Contractor, nor any inordinate disruption with the normal routine of the Owner, institution or Agency operating at the site.

2.5 No claims for additional compensation will be considered when additional costs result from conditions made known to, discovered by, or which should have been discovered by, the Contractor prior to Contract signing.

2.6 All Communications from the Contractor concerning proposed changes to the Contract Sum, Contract Time, or Work shall be in writing.

2.7 The Contractor shall perform the Work in accordance with the Contract Documents and approved Submittals pursuant to Article 5.

ARTICLE 3 CORRELATION OF CONTRACT DOCUMENTS

3.1 The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. Where discrepancies or conflict occur in the Contract Documents the following order of precedence shall be utilized:

3.1.1 Amendments and addenda shall take precedence over previously issued Contract Documents.

3.1.2 The Supplementary Conditions take precedence over the General Conditions.

3.1.3 The General Conditions take precedence over the General Requirements.

3.1.4 The Specifications shall take precedence over the Plans.

3.1.5 Stated dimensions shall take precedence over scaled dimensions.

3.1.6 Large-scale detail Drawings shall take precedence over small-scale Drawings.

3.1.7 The Schedules contained in the Contract Documents shall take precedence over other data on the Plans.

3.2 Neither party to the Contract shall take advantage of any obvious error or apparent discrepancy in the Contract Documents. The Contractor shall give immediate written notification of any error or discrepancy discovered to the Construction Administrator, who shall take the necessary actions to obtain such corrections and interpretations as may be deemed necessary for the completion of the Work in a satisfactory and acceptable manner. The Contractor shall then promptly proceed under the direction of the Owner and the provisions of Article 13. The Contractor's failure to provide immediate notice shall mean the Contractor will not be entitled to any additional compensation, either monetary or Contract Time adjustment, with respect to any discrepancy.

3.3 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

3.4 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings, shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

3.5 Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

ARTICLE 4 **COMMENCEMENT AND PROGRESS OF WORK**

4.1 The Work shall start upon the date given in the Notice to Proceed. The Contractor shall complete all the Work necessary for Final Payment, including but not limited to Substantial Completion, Contract close-out, testing and demonstration of all systems as required for Acceptance, punchlist Work, training and submission of Record Documents, manuals, Guarantees and Warranties as stated in the Contract Document.

4.2 Time is of the essence with respect to the Contract Time. By executing the Contract, the Contractor confirms and agrees that the Contract Time is a reasonable period to perform the Work. The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time. The Contractor may, at his discretion, plan to complete the Work and achieve Substantial Completion in less time than the Contract Time.

4.3 The Contractor's early completion Schedule

notwithstanding, the Owner reserves the right to order Modifications to the Work in accordance with Article 13 at any time during the Contract Time.

4.4 The Contractor shall not be entitled to costs for delay due to Owner ordered Modifications or any other circumstances for the period of time between the Contractor's elected early completion and the end of the Contract Time. Such costs include, but are not limited to, extended home office costs, field office costs, or supervisory and management costs incurred in performance of the Work. Early completion of the Work shall not merit additional compensation.

4.5 If the Contractor is delayed at any time in the progress of Work by acts of God, such as fire or flood or any action, injunction or stop order issued by any court, judge or officer of the court or any other court action beyond the Owner's control, then the Contract Time may be extended by Change Order for such reasonable time as demonstrated by the Contractor's Schedule and as the Owner may determine that such event has delayed the Work. In any event, the granting of an extension of time shall be solely within the discretion of the Owner.

4.6 Except as otherwise may be provided herein, extensions of time shall be the Contractor's sole remedy for such delay. No payment or compensation of any kind shall be made to the Contractor for damages because of hindrance in the orderly progress of Work caused by the aforesaid causes.

4.7 The Contractor acknowledges that the Contract amount includes and anticipates any and all delays, whether avoidable or unavoidable, from said orders, which may issue from any court, judge, court officer, or act of God, and that such delays shall not, under any circumstances, be construed as compensable delays.

4.8 Any extension of the Contract Time shall be by Change Order pursuant to Article 13.

4.9 The Contractor shall employ a competent project manager who shall represent the Contractor. Communications given to the project manager shall be binding as if given to the Contractor. The project manager will be employed full time on the Project and be located and assigned to the Project site during and for the duration of the Work.

4.10 The Contractor shall employ a competent Superintendent and necessary assistants who will be in attendance at the project site during the performance of the Work.

4.11 Upon execution of the Contract, materials may be purchased. No material escalation costs will be valid or compensable unless the Owner directs, in writing, a delay in the procurement.

ARTICLE 5 **SUBMITTALS, PRODUCT DATA, SHOP** **DRAWINGS AND SAMPLES**

5.1 Contractor shall review, approve, and submit to the Construction Administrator all Submittals including but not limited to, product data, Shop Drawings, and samples, with such promptness as to cause no delay in the Work.

5.2 Correction or approval of such Submittals, Shop Drawings, product data and samples will be made with reasonable promptness by the Architect or Engineer. Approval will be general only and shall not relieve the Contractor from responsibility for errors in dimensions, for construction and field coordination of the Work or for any departure from the Contract Documents, unless such departure has received the Owner's written approval.

5.3 No Work governed by such Shop Drawings, Schedules or samples shall be fabricated, delivered or installed until approved by the Architect or Engineer.

5.4 No damages for delays or time extensions will be granted, even if approvals deviate from the approved Schedule.

ARTICLE 6 SEPARATE CONTRACTS

6.1 The Owner reserves the right to perform Work in connection with the Contract with the Owner's own forces, or to let separate contracts relating to the Contract (Project) site or in connection with Work on adjoining sites. In such cases, the Contractor shall afford such parties reasonable opportunity for storage of materials and equipment and coordinate and connect the Work with the work on adjoining sites or other Projects, and shall fully cooperate with such parties in the matter required under Article 7 herein.

6.2 Contractors working in the same vicinity shall cooperate with one another and, in case of dispute, decision of the Owner shall be final and binding to all Contractors involved, including Contractors under separate Contracts.

6.3 The Contractor shall assume all liability, financial or otherwise, in connection with this Contract and shall protect and hold harmless the Owner from any and all damages or claims that may arise because of inconvenience or delay which the Contractor may cause other Contractors. If the Contractor experiences a loss because of the presence and operations of other Contractors working adjacent to or within the limits of the same Project, then as between the Owner and the Contractor, the Contractor shall bear such loss.

6.4 Insofar as possible, the Contractor shall arrange the Work and shall place and dispose of the materials being used so as not to interfere with the operations of other Contractors adjacent to or within the limits of the same Project. The Contractor shall join its Work with that of others in an acceptable manner, and perform the Work in proper accordance with that of the others.

6.5 In no event shall the Owner be responsible for any claim or damages that are the result of the Contractor's failure

to coordinate the Work with any other Contractor or Subcontractor.

ARTICLE 7 COOPERATION OF TRADES

7.1 The Contractor shall be responsible for and shall control all activities of their Subcontractors. The Subcontractors shall consult and cooperate with one another. Each Subcontractor shall furnish all necessary information to other Subcontractors and shall lay out and install their own Work so as to avoid any delays or interference with the Work of others.

7.2 Any cost or changes, cutting and/or repairing, made necessary by the failure to observe the above requirements shall be borne by the party or parties responsible for such failure or neglect or their faulty Work installed.

ARTICLE 8 DAMAGES

8.1 The Liquidated Damages, provided in the Bidding Documents, will be assessed at two distinct times, as follows:

8.1.1 Liquidated Damages – Substantial Completion:

If the Contractor fails to achieve Substantial Completion of the Work by the Substantial Completion Date, and such delay is not otherwise excused under this Contract, then the Contractor agrees to pay to the Owner Liquidated Damages for the dollar amount specified in the Bid Proposal Form for this Project, for each Day beyond Substantial Completion that the Contractor fails to achieve Substantial Completion. The parties to this Contract acknowledge and agree that the actual damages that are to be anticipated as a result of the neglect, failure, or refusal of the Contractor to substantially complete the Project by the established Substantial Completion Date are uncertain in amount or extremely difficult to determine. Accordingly, the parties to this Contract do intend and in fact now agree to liquidate damages in advance and stipulate that the amount set forth in this subparagraph is reasonable and an appropriate remedy and is intended to constitute compensatory damages and does not constitute a penalty of any kind. The parties understand and agree that, by including a provision for Liquidated Damages in this Contract, or in pursuing any relief pursuant to such provision:

.1 the parties do not intend to set a price for the privilege not to perform;

.2 the availability of Liquidated Damages may not be relied upon as a basis for argument that the Owner has an adequate remedy at law; and

.3 the remedies available to the Owner under this Agreement are cumulative and not exclusive.

8.1.2 Liquidated Damages – Acceptance:

If the Contractor fails to complete all of the Work required for Acceptance of the Work within ninety (90) Days of Substantial Completion then the Contractor agrees to pay

to the Owner Liquidated Damages for the dollar amount specified in the Bid Proposal Form for each Day in excess of ninety (90) Days beyond the Substantial Completion Date that the Contractor fails achieve Acceptance. The parties to this Contract acknowledge and agree that the actual damages that are to be anticipated as a result of the failure of the Contractor to complete all of the Work required for Acceptance within ninety (90) Days of the established Substantial Completion Date are uncertain in amount or extremely difficult to determine. Accordingly, the parties to this Contract do intend and in fact now agree to liquidate damages in advance and stipulate that the amount set forth in this subparagraph is reasonable and an appropriate remedy and is intended to constitute compensatory damages and does not constitute a penalty of any kind. The parties understand and agree that, by including a provision for Liquidated Damages in this Contract, or in pursuing any relief pursuant to such provision:

- .1 the parties do not intend to set a price for the privilege not to perform;
- .2 the availability of Liquidated Damages may not be relied upon as a basis for argument that the Owner has an adequate remedy at law; and
- .3 the remedies available to the Owner under this Agreement are cumulative and not exclusive.

8.2 The Liquidated Damages or any portion thereof may be waived at the sole discretion of the Commissioner.

8.3 No payment by the Owner, either partial or final, shall be construed to waive the Owner's right to seek Liquidated Damages.

8.4 In the event a court determines that the Contract herein is null and void for any reason, Contractor agrees that Contractor will not seek or pursue any lawsuit or claim for damages, including, but not limited to, claims for loss of Overhead or anticipated profits, against the Owner and the Owner shall not be liable for any damages which Contractor may incur as a result of such decision. In addition, if the court enjoins the Owner from entering into or proceeding with the Contract herein, the Owner shall not be liable for any damages arising out of or relating to the award of such Contract which Contractor may have incurred as a result of the injunction.

ARTICLE 9 **MINIMUM WAGE RATES**

9.1 In accordance with the provisions of the Connecticut General Statutes Section 31-53, the following applies:

"The wages paid on an hourly basis to any person performing the work of any mechanic, laborer, or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in subsection (h) of this section, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such public works project is being constructed. Any contractor who is not obligated by agreement

to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each payday."

9.2 Each Contractor who is awarded a Contract on or after October 1, 2002 shall be subject to provisions of the Connecticut General Statutes, Section 31-53 as amended by Public Act 02-69, "An Act Concerning Annual Adjustments to Prevailing Wages."

No wage adjustment will be made to the Contract for any wage increase under this Article.

ARTICLE 10 **POSTING MINIMUM WAGE RATES**

10.1 The Contractor shall post at conspicuous points on the site of the Contract a Schedule showing all determined wage rates for all trades and all authorized deductions, if any, from wages to be paid.

10.2 The Contractor shall provide weekly certified payrolls to the Owner for all persons working on the site.

ARTICLE 11 **CONSTRUCTION SCHEDULES**

11.1 Unless otherwise specified in the Contract Documents, within twenty-one (21) Days from the Contract Start Date, the Contractor shall submit the following to the Owner for approval:

11.1.1 A comprehensive Schedule of Submittals required by the Specifications. Said Schedule shall include Submittal dates, required approval dates and date material must be on site.

11.1.2 The Contractor shall allow a minimum of 14 Days for the Owner and its agents' review of Submittals. No extension of the Contract Time shall be granted for revisions and resubmission. Further, the Contractor shall allow a minimum of eight weeks for testing and Acceptance of the Work by the Owner.

11.1.3 When the Contract Documents specify a "CPM Schedule" a detailed Critical Path Method Schedule is required using software approved by the Owner and/or Construction Administrator with as many activities as necessary to make the Schedule an effective tool for planning and monitoring the progress of the Work. The Contractor shall show all pertinent activities requiring coordination between trades.

11.1.4 When the Contract Documents specify a "Construction Schedule" a detailed Construction Schedule is required using software approved by the Owner as a horizontal bar chart with a separate bar for each major portion of the Work or operation to make the Schedule an effective

tool for planning and monitoring the progress of the Work.

11.2 Unless otherwise specified under the Contract Documents, the Contractor shall provide a monthly update of the CPM Schedule or Construction Schedule in the format required by the Owner as well as a disk of the updated Schedule and program. If, in the opinion of the Owner, the Work is falling behind Schedule, the Contractor shall submit a revised Schedule demonstrating a recovery plan to ensure Substantial Completion of the Work within the Contract Time.

11.3 Overtime, increased manpower, and additional shifts: If ordered by the Owner in writing, the Contractor shall work overtime, and/or add additional manpower and/or shifts:

11.3.1 If the Contractor is not behind Schedule, the Owner will pay the Contractor the actual additional premium portion of the wages for overtime or additional shift work not included in the Contract price, but the Contractor shall not be entitled to Overhead and Profit.

11.3.2 If the Contractor, through its sole or partial fault or neglect is behind Schedule, the Owner may order the Contractor, at the Contractor's expense, to increase its manpower or to work any overtime or additional shifts or take other action necessary to expedite the Work to meet the Project Schedule.

11.3.3 If the Schedule is shown to be more than 21 Days behind in any critical activity, overtime, increase manpower and/or additional shifts shall be implemented immediately regardless of who is at fault. A disagreement over the cause of the impact will not relieve the Contractor from the obligation of complying with this Article. Once liability for the impact is determined, compensation will be determined in accordance with 11.3.1 or 11.3.2.

11.3.4 The Owner reserves the right to suspend activity under Paragraph 11.3. Suspension shall be in writing and at the sole discretion of the Commissioner.

11.4 Requisitions for partial payment will not be processed until the Contractor has complied with this requirement.

ARTICLE 12 **PREFERENCE IN EMPLOYMENT**

12.1 Should this Contract be for the construction or repair of any building, then in the employment of labor to perform the Work specified herein, preference shall be given to citizens of the United States, who are, and continuously for at least three (3) months prior to the date hereof, have been residents of the labor market area, as established by the State of Connecticut Labor Commissioner, in which such Work is to be done, and if no such qualified person is available, then to citizens who have continuously resided in the county in which the Work is to be performed for at least three (3) months prior to the date hereof, and then to citizens of the state who have continuously resided in the State at least three months prior to the date hereof.

12. Should this Contract be for a Construction Services

Project other than for the construction, remodeling or repairing of public buildings covered by Connecticut General Statutes 31-52, then in the employment of mechanics, laborers or workmen to perform the Work specified herein, preference will be given to residents of the state who are, and continuously for at least six (6) months prior to the date hereof have been residents of this State, and if no such person is available then to residents of other states.

12.3 The provisions of this Article shall not apply where the state or any subdivision thereof may suffer the loss of revenue granted or to be granted from any Agency or Department of the federal government as a result of this Article or regulations related thereto.

ARTICLE 13 **COMPENSATION FOR CHANGES IN THE WORK**

13.1 At any time, without invalidating the Contract and by a written order and without notice to the sureties, the Owner, through the Construction Administrator, may order modifications in the Work consisting of additions, deletions or other revisions. Upon request, the Contractor shall supply the Construction Administrator promptly with a detailed proposal for the same, showing quantities of and Unit Prices for the Work and that of any Subcontractor involved.

13.2 Modifications to the Work will be authorized by a written Change Order, or if necessary to expedite the Work, a written Construction Change Directive, issued by the Owner as provided for in Article 25. Change Orders and Construction Change Directives shall be processed in accordance with the terms of the Contract Documents. Upon receipt of the written Change Order, the Contractor shall proceed with the Work when and as directed.

13.3 If a Change Order makes the Work less expensive for the Contractor, the proper deductions shall be made from the Contract Sum, said deductions to be computed in accordance with the provisions listed in this Article 13.

13.4 The Contractor shall not be entitled to an extension of time if in the opinion of the Owner the Additional Work in conjunction with the Work can be performed without impact on the Contract Time.

13.5 The Contractor may request, and the Owner may grant additional Contract Time when, in the opinion of the Owner, the Contractor has demonstrated that the Additional Work cannot be performed in conjunction with the Work without impact on the original Substantial Completion and/or Acceptance (if applicable) date.

13.6 The amount of compensation to be paid to the Contractor for any Additional or Deleted Work that results in a Change Order shall be determined in one of the following manners:

13.6.1 **AMOUNT OF COMPENSATION FOR CHANGE ORDER COSTS: LABOR, EQUIPMENT, BENEFITS AND MATERIAL:**

13.6.1.1 Unit Price: As stated in the Contract Documents.

13.6.1.2 Unit Price: As subsequently agreed upon by the Contractor and Owner

13.6.1.3 Lump Sum: Agreed upon sum by the Owner and the Contractor. The Owner may rely on costs, prices, and documentation provided by the Contractor or Subcontractor in agreeing to a Lump Sum. If the Owner believes that additional information is necessary to substantiate the accuracy of the cost, the Owner reserves the right to request and receive additional information from the Contractor. The Lump Sum must be based upon the following itemized costs:

13.6.1.3.1 Labor: (Contractor's or Subcontractor's own forces) No Change Order Proposal shall be negotiated if the request is solely for the increased labor rate over those originally carried by the Contractor in its original bid. Additional foreman hours shall not be included unless additional crews are added and/or a compensable time extension is granted. Project Executive time shall not be included as a direct cost as it is part of the overhead mark-up allowed. Project manager hours shall not be included unless a compensable time extension is granted.

13.6.1.3.2 Material: (Actual cost to the Contractor or Subcontractor) Cost shall not be based upon list pricing unless it reflects the actual prices being paid and no discounts or other offsets are being received by the Contractor or Subcontractor. No Change Order Proposal shall be negotiated if the request is solely for the escalation of material prices over those originally carried by the Contractor in its original bid.

13.6.1.3.3 Benefits: (The established rates of the following benefit costs inherent to the particular labor involved):

- 13.6.1.3.3.1** Workers Compensation.
- 13.6.1.3.3.2** Federal Social Security.
- 13.6.1.3.3.3** Connecticut Unemployment Compensation.
- 13.6.1.3.3.4** Fringe Benefits.

13.6.1.4 Rented Equipment: (Used directly on the Work and by the Contractor's or Subcontractor's own forces).

13.6.1.5 Owned Equipment: (Used directly on the Work and by the Contractor's or Subcontractor's own forces). Daily rate is not to exceed 3% of the monthly rental rate as identified by a nationally recognized construction cost estimating guide or service.

13.6.1.6 Small Tools:
Include items such as shovels, picks, rakes, ladders, and power tools which are expected to be utilized on a project. Trade related equipment, hand tools, and power tools normally supplied with the labor or are normally expected to be owned in the performance of the typical work for a trade are not compensable. These costs shall not be approved as part of the Direct Cost of a Change Order as they are included in the Contractor's overhead mark-up percentage.

13.6.2 OVERHEAD AND PROFIT PERCENTAGES: (Maximum allowable percentages applied to labor, equipment, and material)

13.6.2.1 Contractor's mark-up for Work performed by its own forces:

Change Order Amount	Overhead and Profit
\$0 to \$ 5,000	20%
\$5,001 to \$15,000	17%
\$15,001 to \$25,000	15%
\$25,000 and greater	12%

13.6.3 OVERHEAD AND PROFIT PERCENTAGES: (Maximum allowable percentages applied to labor, equipment, benefits and material)

13.6.3.1 Contractor's mark-up for Work performed by its Subcontractor's forces and not allowable for any subsidiary in which the Contractor has a majority ownership:

Change Order Amount	Overhead and Profit
\$0 and greater	6%

13.6.4 OVERHEAD AND PROFIT PERCENTAGES: (Maximum allowable percentages applied to labor, equipment, benefits and material) Subcontractor's mark-up for Work performed by its own forces:

Change Order Amount	Overhead and Profit
\$0 to \$ 5,000	20%
\$5,001 to \$15,000	17%
\$15,001 to \$25,000	15%
\$25,000 and greater	12%

13.6.5 OVERHEAD AND PROFIT PERCENTAGES: (Maximum allowable percentages applied to labor, equipment, benefits and material)

13.6.5.1 Subcontractor's mark-up for Work performed by its Secondary Subcontractor's forces. Limited to one level (tier) below the Subcontractor and not allowable for any subsidiary in which the Subcontractor has a majority ownership.

Change Order Amount	Overhead and Profit
\$0 and greater	6%

13.7 BOND COSTS

13.7.1 Actual additional bonding costs associated with the value of the Change Order will be compensable only when supported by written documentation by the bonding company that the Change Order requires an increase to the original Performance, Payment, Labor or Material Bond.

13.7.2 The Contractor shall notify the bonding company at each \$500,000 increase to the contract value as the cumulative result of change orders. A copy of the Consent of Surety must be provided to the Owner prior to the execution of any change order which exceeds each cumulative \$500,000.

13.8 Trade discounts, rebates, and amounts received from the sales by the Contractor of surplus materials and equipment shall accrue to the Owner.

13.9 If the parties cannot agree upon a Lump Sum, then the Commissioner, through the Project Manager, may at the option of the Commissioner take the following action(s):

13.9.1 Issue a Construction Change Directive for the Additional or Deleted Work. The amount of compensation shall be computed by the actual net costs to the Contractor determined by time and material or Unit Prices based upon the same information required in Subparagraphs 13.6.1.3.3.1 through 13.6.1.5:

13.9.1.1 Labor: (Contractor's or Subcontractor's own forces).

13.9.1.2 Material: (Used by Contractor's or Subcontractor's own forces).

13.9.1.3 Benefits: (The established rates of the following benefit costs inherent to the particular labor involved):

13.9.1.3.1 Workers Compensation.

13.9.1.3.2 Federal Social Security.

13.9.1.3.3 Connecticut Unemployment Compensation.

13.9.1.3.4 Fringe Benefits.

13.9.1.4 Rented Equipment: (Used directly on the Work and by the Contractor's or Subcontractor's own forces).

13.9.1.5 Owned Equipment: (Used directly on the Work and by the Contractor's or Subcontractor's own forces). Daily rate is not to exceed 3% of the monthly rental rate that can be identified by a nationally recognized construction cost estimating guide or service.

13.9.2 Issue a Change Order adjusting the Contract Sum in the amount as determined by the Commissioner.

13.10 For any Change Order or Construction Change Directive the Contractor shall, when requested, promptly furnish in a form satisfactory to the Construction Administrator and the Owner a complete detailed accounting of all costs relating to the Additional Work, including but not limited to certified payrolls and copies of accounts, bills and vouchers to substantiate actual costs. Further, the Owner reserves the right to access and make copies of the Contractor's records at any time upon written request from the Commissioner.

13.11 Failure of the Contractor to negotiate in good faith issues of time and costs or failure to provide requested documentation within fourteen (14) Days, or a time period accepted by the Commissioner, shall constitute a waiver by the Contractor of any claim. In such cases the Owner may elect to issue a unilateral Change Order in an amount deemed to be fair and equitable by the Commissioner. The provisions hereof shall not affect the power of the Contractor to act in case of emergency, threatened injury to persons, or damage to Work on any adjoining property. In this case the Commissioner, through the Project Manager, shall issue a Change Order for such amount as the Commissioner finds to be reasonable cost of such Work.

ARTICLE 14 DELETED WORK

14.1 Without invalidating any of the terms of the Contract, the Commissioner may order deleted from the Contract any items or portions of the Work deemed necessary by the Commissioner.

14.2 The compensation to be deducted from the Contract Sum for such deletions shall be determined in the manner provided for under the provisions of Article 13 or in the event none of the provisions of Article 13 are applicable then by the value as estimated by the Owner.

ARTICLE 15 MATERIALS: STANDARDS

15.1 Unless otherwise specifically provided for in the Specifications, all equipment, materials and articles incorporated in the Work are to be new and of the best grade of their respective kinds for the purposes. Wherever in the Contract Documents a particular brand, make of material, device, or equipment is shown or specified, the first manufacturer listed in the specification section is to be regarded as the standard. When the specification is proprietary and only one manufacturer is listed, the Contractor shall use the named manufacturer and no Substitutions or Equals will be allowed.

15.2 Any other brand, make of material, device, equipment, procedure, etc. which is a deviation from the specified requirement is prohibited from use, but may be considered by the Owner for approval as an Equal or Substitution. The Contractor is to adhere to the specific requirements of the Contract Documents. Substitutions are discouraged and are only approved by the Commissioner as an exception.

15.3 Submittals – Equals and Substitution Requests:

15.3.1 Substitution of Materials and Equipment before Bid Opening. The Owner will consider requests for Equals or Substitutions, if made prior to the receipt of the Bid. The information on all materials shall be consistent with the information herein.

15.3.1.1 Statement of Variances – a statement of variances must list all features of the proposed Substitution which differ from the Drawings, Specifications and/or product(s) specified and must further certify that the Substitution has no other variant features. A request will be denied if submitted without sufficient evidence.

15.3.1.2 Substitution Denial – any Substitution request not complying with the above requirements will be denied. Substitution request sent after the deadline established in the Notice to Bidder will be denied.

15.3.1.3 An addendum shall be issued to inform all prospective Bidders of any accepted Substitution in accordance with Owner's addenda procedures.

15.3.2 **Substitution of Materials and Equipment After Bid Opening:** Subject to the Architect or Engineer's determination, if the material or equipment is Equal to the

one specified or pre-qualified and the CT DCS Project Manager's approval of such determination, Substitution of Material or Equipment may be allowed after the Letter of Award is issued only:

15.3.2.1 If the specified or pre-qualified item is delayed by unforeseeable contingencies beyond the control of the Contractor which would cause a delay in the Project completion;

15.3.2.2 If any specified or pre-qualified item is found to be unusable or unavailable due to a change by the manufacturer or other circumstances; or

15.3.2.3 If the Contractor desires to provide a more recently developed material, equipment, or manufactured model from the same named manufacturer than the one specified or pre-qualified; or

15.3.2.4 If the specified material and/or equipment inadvertently lists only a single manufacturer.

15.4 Contractor shall submit each request for Equal or Substitution to the Architect or Engineer who shall review each request and make the following recommendations to the Owner:

15.4.1 Acceptance or non-acceptance of the adequacy of the submission and required back-up,

15.4.2 Determination of the category of the request for Substitution or Equal, and

15.4.3 Overall recommendation for approval or rejection of the Substitution or Equal. The determination of the category as a Substitution may be grounds for an immediate rejection by the Owner.

15.5 Approval of the Owner for each Equal or Substitution shall be obtained before the Contractor proceeds with the Work. The decision of the Commissioner, in this regard, shall be final and binding on the Contractor.

15.6 No extension of time will be allowed for the time period required for consideration of any Substitution or Equal. No extension of time will be allowed and no responsibility will be assumed by the Owner when a Contractor submits a request for Substitution or Equal, whether such request be approved or denied, and the Contractor shall not be entitled to any claim for damages for delay.

15.7 If the Contractor submits any request for an Equal or a Substitution, he shall bear the burden of proof that such requested Equal or Substitution meets the requirements of the Plans and Specifications.

15.8 The Contractor shall purchase no materials or supplies for the Work which is subject to any chattel mortgage or which are under a conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that the Contractor has good title to all materials and supplies used by him in the Work.

15.9 All products and systems supplied to the State as a result of a purchase by a Contractor shall be certified that, to the best of the supplier's knowledge, there are no materials that are classified as hazardous materials being used within the assembly. Hazardous materials include, but are not limited

to, products such as asbestos, lead, and other materials that have proven to cause a health risk by their presence.

ARTICLE 16 INSPECTION AND TESTS

16.1 The purpose of the inspections will be to assure that the Work is performed in accordance with the Contract Documents. These inspections shall include, but not be limited to, all inspections and testing as required by the Owner, and any authorities have jurisdiction.

16.2 All material and workmanship, if not otherwise designated by the Specifications, shall be subject to inspection, examination and test by the Commissioner at any and all times during manufacture and/or construction and at any and all places where such manufacture and/or construction is carried on. The Contract Documents additionally identify the parties responsible for performing and paying for the required testing and inspections. All required tests performed in a laboratory will be obtained and paid for by the Owner, except when the tests show the Work to be defective. The Contractor shall pay for all the costs associated with re-tests and re-inspections for all tests and inspections which fail. The Owner will issue a deduct Change Order to recover said retesting costs from the Contractor. All other tests, unless otherwise specified, shall be made at the Contractor's expense. Notice of the time of all tests to be made at the site shall be given to all interested parties, including the Owner.

16.3 Without additional cost to the Owner, the Contractor shall promptly furnish facilities, labor and materials necessary to coordinate and perform operational tests and checkout of the Work. The Contractor shall furnish promptly all reasonable facilities, labor, and materials necessary to make all such testing safe and convenient.

16.4 If, at any time before final payment and Acceptance of the Work, the Commissioner considers it necessary or advisable to examine of any portion of the Work already completed by removing or tearing out the same, the Contractor shall, upon request, furnish promptly all necessary facilities, labor, and materials. If such Work is found to be defective in any material respect, as determined by the Owner, because of a fault of the Contractor or any of the Contractor's Subcontractors, or if any Work shall have been covered without the approval or consent of the Commissioner (whether or not it is found to be defective), the Contractor shall be liable for testing costs and all costs of correction, including removal and/or demolition of the defective Work, including labor, material, and testing, including labor, material, re-testing or re-inspecting, services of required consultants, additional supervision, the Commissioner's and the Construction Administrator's administrative costs, and other costs for services of other consultants.

16.5 Cost of Systems Commissioning Retesting: The cost to retest a pre-functional or functional test, if the Contractor is responsible for the deficiency, shall be the Contractor's. If the Contractor is not responsible, any cost

recovery for retesting costs shall be negotiated with the Contractor.

16.5.1 For a deficiency identified, not related to any pre-functional checklist or start-up fault, the following shall apply: The Commissioning Agent (CxA) and Construction Administrator will direct the retesting of the equipment once at no "charge" to the Contractor for their time. However, the Commissioning Agent's and Construction Administrator's time for additional testing will be charged to the Contractor.

16.5.2 The time for the Systems Commissioning Agent and Construction Administrator to direct any retesting required because a specific pre-functional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the Contractor.

16.5.3 Any required retesting by any Subcontractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

ARTICLE 17 ROYALTIES AND PATENTS

17.1 If the Contractor desires to use any design, device, material or process covered by a patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the holder of said patent or copyright. The Contractor shall furnish a copy of this legal agreement to the Owner.

17.2 The Contractor shall indemnify and hold harmless the Owner and Construction Administrator for any costs, expenses and damage which it may be obliged to pay by reason of any infringement of a patent or a copyright, at any time during the prosecution or after the Final payment of the Work.

ARTICLE 18 SURVEYS, PERMITS AND REGULATIONS

18.1 Unless otherwise provided for, the Contractor shall furnish surveys necessary for the execution of the Work. The Owner will furnish the Contractor with two base lines and a benchmark.

18.2 The Contractor shall obtain and pay for permits and licenses necessary for the execution of the Work and the occupancy and use of the completed Work.

18.3 The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations including building and fire safety codes relating to the performance of the Work.

18.4 If underground utilities may be involved in part of the Work the Contractor is required to request "Call-Before-You-Dig" to verify the location of underground utilities at least (3) Working Days, as further defined under Paragraph 1.71 herein, prior to the start of any excavation. The Contractor shall also notify the Owner and Agency at least (3) Working Days prior to the start of any excavation. If "Call-Before-You-Dig" fails or refuses to respond to the Contractor's request, then the Contractor shall obtain the services of a qualified

underground utility locating firm, at no additional cost to the Owner, to verify locations of underground utilities prior to the start of any excavation. The Contractor shall be held responsible for providing safety, protecting the Work and protecting workmen as necessary to perform the Work. The Contractor shall be responsible for maintaining and protecting all original utility mark-out at no additional cost to the Owner.

ARTICLE 19 PROTECTION OF THE WORK, PERSONS AND PROPERTY

19.1 The Contractor shall continuously and adequately protect the Work against damage from any cause, and shall protect materials and supplies furnished by the Contractor or Subcontractors, whether or not incorporated in the Work, and shall make good any damage unless it be due directly to errors in the Contract Documents or is caused by agents or employees of the Owner.

19.2 To the extent required by law, by public authority, or made necessary in order to safeguard the health and welfare of the personnel or occupants of any of the state institutions, the Contractor shall adequately protect adjacent property and persons, and provide and maintain all facilities, including but not limited, to passageways, guard fences, lights, and barricades necessary for such protection.

19.3 The Contractor shall take all necessary precautions for the safety of employees on the Work and shall comply with applicable provisions of federal and state safety laws and building codes to prevent accidents or injury to persons on, about, or adjacent to the premises where the Work is being performed. The Contractor shall also comply with the applicable provisions of the Associated General Contractors' "Manual of Accident Prevention in Construction", the standards of the Connecticut Labor Department and Occupational Safety and Hazard Association (OSHA).

19.4 The Contractor shall erect and properly maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards for the protection of employees of the State and the public, and shall post danger signs warning against any dangerous condition or hazard created by such things as protruding nails, well holes, elevator hatchways, scaffolding, window openings, excavations, tripping hazards or slipping, stairways and falling materials.

19.5 The Contractor shall designate a qualified and responsible on-site staff person, whose duty shall be the prevention of accidents. The name and position of the designated person shall be reported to the Owner by the Contractor at the commencement of the Contract.

19.6 The Contractor shall at all times protect excavations, trenches, buildings, and all items of Work from damage by rain, water from melted snow or ice, surface water run off and subsurface water usual for the vicinity at the time of operations; and provide all pumps and equipment and enclosures to insure such protection.

19.7 The Contractor shall construct and maintain all necessary temporary drainage and provide all pumping necessary to keep excavation, basements, footings and foundations free of water.

19.8 The Contractor shall remove all snow and ice as may be required for access to the site and proper protection and prosecution of the Work.

19.9 The Contractor shall install bracing, shoring, sheathing, sheet piling, caissons and any other underground facilities as required for safety and proper execution of the Work, and shall remove this portion of the Work when no longer necessary.

19.10 During cold weather the Contractor shall protect all Work from damage. If low temperature makes it impossible to continue operations safely in spite of cold weather precautions, the Contractor may cease Work upon the written approval of the Commissioner.

ARTICLE 20 **TEMPORARY UTILITIES**

20.1 Unless expressly provided for otherwise in the Contract Documents, the Contractor shall include in the proposed contract bid price as stated on the Bid Proposal Form, the costs of all temporary utilities required for Project completion and protection of the Work. Said temporary utilities include, but are not limited to, lighting, heating, cooling, electrical power, water, telephone, sanitary facilities, and potable water.

ARTICLE 21 **CORRECTION OF WORK**

21.1 The Contractor shall promptly and without expense to the Owner remove from the premises all materials rejected by or unacceptable to the Commissioner as failing to conform to the Contract Documents, whether incorporated in the Work or not.

21.2 The Contractor shall promptly and without expense to the Owner replace any such materials, which do not conform to the Contract Documents, and shall bear the expense of making good all Work of other Contractors or Subcontractors destroyed or damaged by such removal or replacement.

21.3 If the Contractor, after receipt of notice from the Owner, shall fail to remove such rejected or unacceptable materials within a reasonable time as fixed in said notice, the Owner may remove and store such materials at the expense of the Contractor.

21.4 Such action shall not affect the obligation of the Contractor to replace and complete assembly and installation of the Work and to bear the expenses referred to above. Prior to the correction of rejected or unacceptable Work or if the Commissioner deems it inexpedient or undesirable to correct any portion of the Work which was rejected, deemed unacceptable, or not done in accordance with the Contract

Documents, the Contract Sum shall be reduced by such amount as, in the judgment of the Commissioner, shall be equitable.

21.5 No extension of time will be given to the Contractor for correction of rejected or unacceptable Work. All significant punchlist Work shall be completed before Substantial Completion is determined. The remaining minor punchlist Work, as determined by the Commissioner, shall be completed within ninety (90) Days of established Substantial Completion date.

21.6 Final Payment shall not relieve the Contractor of responsibility for the defects in material or workmanship.

21.7 Unless expressly provided for otherwise in the Contract Documents, the Contractor shall remedy any rejected or unacceptable Work, and any Work found to be not conforming to the Contract Documents which is discovered within 18 Months after the date of Substantial Completion. The Contractor shall pay for any damage to other Work caused by such nonconforming Work or any damage created in correcting the nonconforming Work.

ARTICLE 22 **GUARANTEES and WARRANTIES**

22.1 Unless expressly provided for otherwise in the Contract Documents, the Contractor shall provide a Warranty on the Work for an 18-Month period from the date of Substantial Completion. The Contractor shall warrant that the equipment, materials and workmanship are of good quality and new, unless permitted elsewhere by the Contract Documents, and that the Work shall be free from defects not inherent in the quality required or permitted and that the Work conforms to the Contract Documents.

22.2 Disclaimers and limitations from manufactures, Subcontractors, suppliers or installers to the Contractor shall not relieve the Contractor of the Warranty on the Work. The Contract Documents detail the related damages, reinstatement of Warranty, replacement cost and Owner's recourse.

ARTICLE 23 **CUTTING, FITTING, PATCHING, AND DIGGING**

23.1 The Contractor will perform or will cause the Subcontractors to perform all cutting, fitting, or patching of the portion(s) of the Work that may be required to make the several parts thereof joined and coordinated in a manner satisfactory to the Commissioner and in accordance with the Plans and Specifications.

23.2 The responsibility for defective or ill-timed Work shall be with the Contractor, but such responsibility shall not in any way relieve the Subcontractor who performed such Work. Except with the consent of the Commissioner, neither the Contractor nor any of its Subcontractors shall cut or alter the Work of any other Contractor or Subcontractor.

**ARTICLE 24
CLEANING UP**

24.1 The Contractor shall, on a daily basis, keep the premises free from accumulations of waste material or rubbish.

24.2 Prior to Acceptance of the Work, the Contractor shall remove from and about the site of the Work, all rubbish, all temporary structures, tools, scaffolding, and surplus materials, supplies, and equipment which may have been used in the performance of the Work. If the Commissioner in his sole discretion determines that the Contractor has failed to clean the work site, the Owner may remove the rubbish and charge the cost of such removal to the Contractor. A deduct Change Order will be issued by the Owner to recover such cost.

**ARTICLE 25
ALL WORK SUBJECT TO CONTROL OF THE
COMMISSIONER**

25.1 The Commissioner hereby declares that the CT DCS Project Manager is the Commissioner's only authorized representative to act in matters involving the Owner's, and/or Architect's or Engineer's, ability to revoke, alter, enlarge or relax any requirement of the Contract Documents; to settle disputes between the Contractor and the Construction Administrator; and act on behalf of the Commissioner. In all such matters, the provisions of Articles 13 and 14 herein shall guide the CT DCS Project Manager.

25.2 In no event may the Contractor act on any instruction of the Agency without written consent of the Owner. In the event the Contractor acts without such consent, he does so at his own risk and at his own expense, not only for the Work performed, but for the removal of such Work as determined necessary by the Commissioner.

25.3 In the performance of the Work, The Contractor shall abide by all orders, directions, and requirements of the Commissioner at such time and places and by such methods and in such manner and sequence as the Commissioner may require.

25.4 The Commissioner shall determine the amount, quality, acceptability and fitness of all parts of the Work, shall interpret the plans, Specifications, Contract Documents and extra work orders and shall decide all other questions in connection with the Work.

25.5 The Contractor shall employ no plant, equipment, materials, methods, or persons to which the Commissioner objects and shall remove no plant materials, equipment, or other facilities from the site of the Work without the permission of the Commissioner. Upon request, the Commissioner shall confirm in writing any oral order, direction, requirement or determination.

25.6 In accordance with Section 4b-24 of the Connecticut General Statutes, the public auditors of the State of Connecticut and the auditors or accountants of the

Commissioner of Construction Services shall have the right to audit and make copies of the books of any Contractor employed by the Commissioner.

**ARTICLE 26
AUTHORITY OF THE CONSTRUCTION
ADMINISTRATOR**

26.1 The Construction Administrator employed by the Commissioner is authorized to inspect all Work for conformance to the Contract Documents. The Construction Administrator is authorized to reject all Work found to be defective, unacceptable and nonconforming to the Contract Documents. Such inspections and rejections may extend to all or any part of the Work, and to the preparation or manufacture of the material to be used.

26.2 The Construction Administrator is not empowered to revoke, alter, enlarge, or relax any requirements of the Contract Documents, or to issue instructions contrary to the Contract Documents. The Construction Administrator shall in no case act as foreman or perform other duties for the Contractor, nor shall the Construction Administrator interfere with the management of the Work by the Contractor. Any advice, which the Construction Administrator may give the Contractor, shall in no way be construed as binding the Commissioner or Owner in any way, nor releasing the Contractor from the fulfillment of the terms of the Contract.

26.3 In any dispute arising between the Contractor and the Construction Administrator with reference to inspection and rejection of the Work, the Construction Administrator may suspend Work on the non-compliant portion of the Work until the dispute can be referred to and decided by the Commissioner.

**ARTICLE 27
SCHEDULE OF VALUES,
APPLICATION FOR PAYMENT**

27.1 Immediately after the signing of the Contract, the Contractor shall furnish for the use of the Commissioner, as a basis for estimating partial payments, a certified Schedule of Values, totaling the Contract Sum and broken down into quantities and unit costs, as outlined in the Contract Documents and as directed by the Owner. The Schedule of Values must reflect true costs and be in sufficient detail to be an effective tool for monitoring the progress of the Work Upon request of the Commissioner; the Contractor shall supply copies of signed Contracts, vendor quotations, etc. as back up to the Schedule of Values.

27.2 Approval of the Schedule of Values by the Commissioner is required prior to any payment by the Owner.

27.3 The Schedule of Values shall include a breakdown of the Contractor's general condition costs.

27.3.1 Non-recurring costs, (i.e. Mobilization costs, utility hook-ups, temporary heat) will be paid at the time of occurrence.

27.3.2 Reoccurring costs will be paid in proportion to the percent of completion of the Project.

27.3.3 Further detail can be found in the General Requirements 01.29.76; paragraphs 1.3.B.4 for this project.

27.4 The Schedule of Values shall include a breakdown of Contract closeout costs including systems certification testing and acceptance, training, Warranties, Guarantees, As-Built Drawings and attic stock.

27.5 The Contractor shall make periodic applications for payment, which shall be subdivided into categories corresponding with the approved Schedule of Values and shall be in such numbers of copies as may be designated by the Commissioner.

ARTICLE 28 PARTIAL PAYMENTS

28.1 Commissioner will examine the Contractor's Applications For Payments to determine, in the opinion of the Commissioner, the amounts that properly represent the value of the Work completed and the materials suitably stored on the site.

28.2 In making such Application For Payment for the Work, there shall be deducted **seven** and **one-half** percent (7.5%) of the amount of each Application for Payment to be retained by the Owner as Retainage until Final Completion.

28.2.1 The Commissioner has the sole discretion in the determination of reduction in Retainage. At fifty percent (50%) completion of the Work the Owner shall issue a "Contractor's Performance Evaluation". If the Contractor receives a performance evaluation score of "Good" or better, then the Retainage withheld may be reduced to five percent (5%). All subsequent Applications for Payment shall be subject to five percent (5%) Retainage. Upon Substantial Completion, the Retainage may be reduced at the request of the Contractor and recommendation of the CT DCS Project Manager. In the event of a reduction in Retainage to below five percent (5%), the minimum Retainage withheld shall not be less than the CT DCS Project Manager's estimate of the remaining Work or two and one-half percent (2.5%), which ever is greater. All requests for Retainage Reduction shall be done on CT DCS Form 7048 General Contractor Retainage Reduction Request, which can be found at the end of the General Conditions.

28.2.2 Subsequent to Substantial Completion, in limited circumstances, at the sole discretion of the Commissioner, a reduction of Retainage below Two and one-half percent (2.5%) may be considered.

28.2.3 A "Good" Contractor's Performance Evaluation score shall be defined as a minimum total score of sixty percent (60%).

28.3 The decision of the Commissioner to reduce the Retainage rate will be based upon the Contractor's Performance Evaluation score for completed portions of the

Work as set out above and other factors that the Commissioner may find appropriate as follows:

28.3.1 The Contractor's timely submission of an appropriate and complete CPM Schedule or Construction Schedule and Schedule of Values, in compliance with the Contract requirements and the prompt resolution of the Owner's and/or Architect's or Engineer's comments on the submitted material resulting in an appropriate basis for progress of the Work.

28.3.2 The Contractor's timely and proper submission of all Contract Document required submissions: including, but not limited to, Shop Drawings, material certificates and material samples and the prompt resolution of the Owners and/or Architect's or Engineer's comments on the submitted material, resulting in an appropriate progress of the Work.

28.3.3 The Contractor's provision of proper and adequate supervision and home office support of the Project.

28.3.4 The Work completed to date has been installed or finished in a manner acceptable to the Owner.

28.3.5 The progress of the Work is consistent with the approved CPM Schedule or Construction Schedule.

28.3.6 All approved credit change orders have been invoiced.

28.3.7 All Change Order requests for pricing are current.

28.3.8 The Contractor has and is maintaining a clean worksite in accordance with the Contract Documents.

28.3.9 All Subcontractor payments are current at the time of reduction request.

28.3.10 Contractor is compliant with set-aside provisions of the contract.

28.3.2.11 Pursuant to C.G.S. Sec. 4a-101, the General Contractor shall compile evaluation information during the performance of the contract on each of its subcontractors who are performing work with a value in excess of five hundred thousand dollars (\$500,000.00). The General Contractor shall complete and submit to the State of Connecticut Department of Construction Services (CT DCS) evaluations of each such subcontractor upon fifty percent (50%) completion of the project and upon Substantial Completion of the project. The General Contractor acknowledges that its failure to complete and submit these evaluations in a timely manner may, by statute; result in a delay in project funding and, consequently, payment to the General Contractor.

28.4 No payments will be made for improperly stored or protected materials or unacceptable Work.

28.5 At his or her sole discretion, the Commissioner may allow to be included in the monthly requisitions payment requests for materials and equipment stored off the site.

28.5.1 In the event the Commissioner allows the Contractor to include in its requisitions payment requests for materials and equipment stored off the site, the Contractor shall also submit any additional bonds and/or insurance certificates relating to off-site stored materials

and equipment, and follow such other procedures as may be required by the State to obtain the Commissioner's approval of such requests.

28.5.2 The Architect or Engineer, or Construction Administrator shall have inspected said materials and equipment and recommended payment therefore. The Contractor shall pay for the cost of the Architect's or Engineer's, or Construction Administrator's time and expense in performing these inspection services.

ARTICLE 29
DELIVERY OF STATEMENT SHOWING
AMOUNTS DUE FOR WAGES, MATERIALS, AND
SUPPLIES

29.1 For each Application for Payment under this Contract, the Owner reserves the right to require the Contractor and every Subcontractor to submit a written verified statement, in a form satisfactory to the Owner, showing in detail all amounts then due and unpaid by such Contractor or Subcontractor for daily or weekly wages to all laborers employed by it for the performance of the Work or to other persons for materials, equipment or supplies delivered at the site.

29.2 The term "laborers" as used herein shall include workmen, workwomen, and mechanics.

29.3 Failure to comply with this requirement may result in the Owner withholding the Application for Payment pursuant to Article 28.

ARTICLE 30
SUBSTANTIAL COMPLETION AND ACCEPTANCE

30.1 Substantial Completion:

30.1.1 When the Contractor considers that the Work or a portion thereof is Substantially Complete, the Contractor shall request an inspection of said Work in writing to the Construction Administrator. The request shall certify that the Contractor has completed its own inspection prior to the request and that the Contractor is compliant with all requirements of Section 01 77 00 of the General Requirements. The request must also include a statement that a principal or senior executive of the Contractor is ready, willing and able to attend a walk through inspection with the Architect or Engineer.

30.1.2 Upon receipt of the request, the Architect or Engineer, Construction Administrator and Owner, will make an inspection to determine if the Work or designated portion thereof is Substantially Complete. A principal or senior executive of the Contractor shall accompany the Architect or Engineer during each inspection/re-inspection. If the inspection discloses any item, whether or not included on the inspection list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item.

30.1.3 The Contractor shall then submit a request for another inspection. The determination of Substantial Completion is solely within the discretion of the Owner. Any

costs for re-inspection beyond one, shall be at the expense of the Contractor and such costs will be recovered by issuance of a credit Change Order. When the Work or designated portion thereof is determined to be Substantially Complete, the Contractor will be provided a Certificate of Substantial Completion from the Owner. The Certificate of Substantial Completion shall establish the date when the responsibilities of the Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, are transferred to the Owner and shall fix the time within which the Contractor shall finish all items on the inspection list accompanying the Certificate. If the punch list is not complete in 90 Days, the Owner reserves the right to complete the outstanding punch list items with their own forces or by awarding separate contracts and to deduct the cost thereof from the amounts remaining due to the Contractor.

30.1.4 The Certificate of Substantial Completion shall be signed by the Construction Administrator, Owner, and Architect or Engineer. Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Construction Administrator and Architect or Engineer, the Owner shall make payment reflecting adjustment in Retainage, if any, for such Work or portion thereof as provided in the Contract Documents.

30.2 Acceptance:

30.2.1 Upon completion of the Work, the Contractor shall forward to the Construction Administrator a written notice that the Work is ready for inspection and Acceptance.

30.2.2 When the Work has been completed in accordance with terms and conditions of the Contract Document as determined by the Owner a Certificate of Acceptance shall be issued by the Owner.

ARTICLE 31
FINAL PAYMENT

31.1 The Owner reserves the right to retain for a period of thirty (30) Days after filing of the Certificate of Acceptance the amount therein stated less all prior payments and advances whatsoever to or for the account of the Contractor.

31.2 All prior estimates and payments, including those relating to extra or additional Work, shall be subject to correction by the Final Payment.

31.3 No Application for Payment, Final or Partial, shall act as a release to the Contractor or the Contractor's sureties from any obligations under this Contract.

31.4 The Architect or Engineer and Construction Administrator will promptly issue the Certificate for Payment, stating that to the best of their knowledge, information and belief, and on the basis of their observations and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in said Final Payment is due and payable.

31.5 Final Payment shall not be released until a Certificate of Acceptance and a Certificate of Compliance have been issued.

31.6 Neither Final Payment nor any Retainage shall become due until the Contractor submits to the Owner the following:

31.6.1 An affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied.

31.6.2 A certificate evidencing that insurance required by the Contract Documents to remain in force after Final Payment is currently in effect and will not be canceled or allowed to expire without at least 30 Days prior written notice to the Owner.

31.6.3 A written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents.

31.6.4 Written consent of surety, if any, to Final Payment.

31.6.5 If required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorney's fees.

ARTICLE 32

OWNER'S RIGHT TO WITHHOLD PAYMENTS

32.1 The Commissioner may withhold a portion of any Payment due the Contractor that may, in the judgment of the Commissioner, be necessary:

32.1.1 To assure the payment of just claims then due and unpaid to any persons supplying labor or materials for the Work.

32.1.2 To protect Owner from loss due to defective, unacceptable or non-conforming Work not remedied by the Contractor.

32.1 To protect the Owner from loss due to injury to persons or damage to the Work or property of other Contractors, Subcontractors, or others caused by the act or neglect of the Contractor or any of its Subcontractors.

32.2 The Owner shall have the right to apply any amount withheld under this Article as the Owner may deem proper to satisfy protection from claims. The amount withheld shall be considered a payment to the Contractor.

32.3 The Owner has the right to withhold payment if the Contractor fails to provide accurate submissions of Submittals,

up date the status including but not limited to the following: As-Built Drawings, request for information (RFI) log, Schedule, submittal log, Change Order log, certified payrolls and daily reports and all other requirement of the Contract Documents.

32.4 If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorney's fees.

ARTICLE 33

OWNER'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

33.1 The Commissioner shall have the authority to suspend the Work wholly or in part, for such period or periods as the Commissioner considers being in the best interests of the State, or in the interests of public necessity, convenience or safety. During such periods the Contractor shall store all materials and equipment, in such a manner to prevent the materials and equipment from being damaged in any way, and the Contractor shall take precautions to protect the Work from damage.

33.1.1 If the Commissioner, in writing, orders the performance of all or any portion of the Work to be suspended or delayed for an unreasonable period of time (i.e. not originally anticipated, customary, or inherent in the construction industry) and the Contractor believes that additional compensation and/or Contract Time is due as a result of such suspension or delay, the Contractor shall submit to the Commissioner in writing a request for a Contract adjustment within 7 Days of receipt of the notice to resume Work. The request shall set forth the specific reasons and support for said adjustment.

33.1.2 The Commissioner shall evaluate any such requests received. If the Commissioner agrees that the cost and/or time required for the performance of the Contract has increased as a result of such suspension and that the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or Subcontractors, and was not caused by weather, then the Commissioner will make a reasonable adjustment, excluding profit, of the Contract terms. The Commissioner will notify the Contractor of the determination as to what adjustments of the Contract, if any, that the Commissioner deems warranted.

33.1.3 No Contract adjustment will be made unless the Contractor has submitted the request for adjustment within the time prescribed.

33.1.4 No Contract adjustment will be made under this Article to the extent that performance would have been suspended or delayed by any other cause within the Contractor's control or by any factor for which the Contractor is responsible under the Contract; or that such an adjustment is provided for or excluded under other term or condition of this Contract.

33.2 Notwithstanding any provision or language in the

Contract to the contrary, the State may terminate the Contract whenever the Commissioner determines at his sole discretion that such termination is in the best interests of the State. Any such termination shall be effected by delivery to the Contractor of a written Notice of Termination specifying the extent to which performance of Work under the Contract is terminated, and the date upon which such termination shall be effective.

33.2.1 In the event of such termination, the Contractor shall be entitled to reasonable compensation as determined by the Commissioner, however, no claim for lost Overhead or profits shall be allowed.

33.2.2 All Work and materials obtained by the Contractor for the Work, that have been incorporated into the Work, inspected, tested as required, accepted by the Commissioner, and paid for by the State, shall become the property of the State.

33.2.3 Materials obtained by the Contractor for the Work that have been inspected, tested as required, and accepted by the Commissioner, and that are not incorporated into the Work, shall, at the option of the Commissioner, be purchased from the Contractor at actual cost as shown by receipted bills. To this cost shall be added all actual costs for delivery at such points of delivery as may be designated by the Commissioner, as shown by actual cost records.

33.2.4 Termination of the Contract shall not relieve the Contractor or its Surety of their responsibilities for the completed Work, nor shall it relieve the Contractor's Surety of its obligations to ensure completion of the Work and to pay legitimate claims arising out of Work.

ARTICLE 34

SUBLETTING OR ASSIGNING OF CONTRACT

34.1 The Contract or any portion thereof, or the Work provided for therein, or the right, title, or interest of the Contractor therein may not be sublet, sold, transferred, assigned, or otherwise disposed of to any person, firm, or corporation without the written consent of the Commissioner.

34.2 No person, firm, or corporation other than the Contractor to whom the Contract was awarded shall be permitted to commence Work at the site of the Contract until such consent has been granted.

ARTICLE 35

CONTRACTOR'S INSURANCE

35.1 The Contractor shall not start Work under the Contract until they have obtained insurance as stated in SECTIONS 00 62 16 CERTIFICATE OF INSURANCE and 00 40 13 BID PROPOSAL FORM, subsections 4.4.2 and 4.4.3, of the Project Manual and until the insurance has been approved by the Owner. The Contractor shall not allow any Subcontractor to start Work until the same insurance has been obtained by the Subcontractor and approved by the Owner or the Contractor's insurance provides coverage on behalf of the Subcontractor. The Contractor shall send Certificates of Liability Insurance to the Bidding and Contracts Unit, Department of Construction Services, 165 Capitol Avenue, Room G-35, Hartford, CT 06106 unless otherwise directed in

writing. Presented below is a narrative summary of the insurance required.

35.1.1 Commercial General Liability Insurance including contractual liability, products/completed operations, broad form property damage and independent Contractors. The limits shall be no less than \$1,000,000 each occurrence and \$2,000,000 annual aggregate. Coverage for hazards of explosion, collapse and underground (X-C-U) and for asbestos abatement when applicable to this Contract, must also be included when applicable to the Work to be performed. The State of Connecticut, the Department of Construction Services, and their respective officers, agents, and employees shall be named as an Additional Insured. This coverage shall be provided on a primary basis.

35.1.2 Owner's and Contractor's Protective Liability insurance providing a total limit of \$1,000,000 for all damages arising out of bodily injury or death of persons in any one accident or occurrence and for all damages arising out of injury or destruction of property in any one accident or occurrence and subject to a total (aggregate) limit of \$2,000,000 for all damages arising out of bodily injury to or death of persons in all accidents or occurrences and out of injury to or destruction of property during the policy period. This coverage shall be for and in the name of the State of Connecticut.

35.1.3 Automobile Liability The operation of all motor vehicles including those owned, non-owned and hired or used in connection with the Contract shall be covered by Automobile Liability insurance providing for a total limit of \$1,000,000 for all damages arising out of bodily injuries to or death of all persons in any one accident or occurrence and for all damages arising out of injury to or destruction of property in any one accident or occurrence. In cases where an insurance policy shows an aggregate limit as part of the automobile liability coverage, the aggregate limit must be at least \$2,000,000. This coverage shall be provided on a primary basis. Should the Contractor not own any automobiles, the automobile & liability requirement shall be amended to allow the Contractor to maintain only hired and non-owned liability coverage.

35.1.4 Excess Liability (Other than Umbrella Form) insurance in the amount of \$5,000,000 for bids of \$1,000,000 - \$10,000,000 and in the amount of \$10,000,000 for bids of \$10,000,001 - \$20,000,000. Refer to Section 00 92 00 Amendments of the Project Manual for Excess Liability insurance requirements for bids exceeding \$20,000,000.

35.1.5 Workers' Compensation and Employer's Liability as required by Connecticut Law and **Employers' Liability** with a limit of not less than \$100,000 per occurrence, \$500,000 disease policy limit and \$100,000 disease each employee. When Work is on or contiguous to navigable bodies of waterways and ways adjoining, the Contractor shall include the Federal Act endorsement for the U.S. Longshoremen's and Harbor Workers Act.

35.1.6 Special Hazards Insurance, if required, will be stated in SECTION 00 40 13 BID PROPOSAL FORM, subsection 4.4.2 of this Project Manual. This includes coverage for explosion, collapse or underground damage and for asbestos abatement when applicable to this Contract and shall be no less than \$1,000,000 each occurrence.

35.1.7 Builder's Risk Insurance, if required, will be stated in Section 00 40 13 Bid Proposal Form, subsection 4.4.3 of this Project Manual.

35.1.8 Inland Marine/Transit Insurance: With respect to property with values in excess of \$100,000 which is rigged, hauled or situated at the site pending installation, the Contractor shall maintain inland marine/transit insurance provided the coverage is not afforded by a Builder's Risk policy.

35.1.9 When required to be maintained, the Builder's Risk and/or Inland Marine/Transit Insurance policy shall endorse the State of Connecticut as a Loss Payee and the policy shall state it is for the benefit of and payable to the State of Connecticut.

35.2 Satisfying Limits Under an Umbrella Policy: If necessary, the Contractor may satisfy the minimum limits required above for either Commercial General Liability, Automobile Liability, and Employer's Liability coverage under an Umbrella or Excess Liability policy. The underlying limits may be set at the minimum amounts required by the Umbrella or Excess Liability policy provided the combined limits meet at least the minimum limit for each required policy. The Umbrella or Excess Liability policy shall have an Annual Aggregate at a limit not less than two (2) times the highest per occurrence minimum limit required above for any of the required coverages. The State of Connecticut shall be specifically endorsed as an Additional Insured on the Umbrella or Excess Liability policy, unless the Umbrella or Excess Liability policy provides continuous coverage to the underlying policies on a complete "Follow-Form" basis.

35.3 The Contractor shall, at its sole expense, maintain in full force and effect at all times during the life of the Contract or the performance of Work hereunder, insurance coverage as described herein. Certificates shall include a minimum thirty (30)-day endeavor to notify requirement to the Owner prior to any cancellation or non-renewal.

35.4 The Contractor shall be fully and solely responsible for any costs or expenses as a result of a coverage deductible, coinsurance penalty, or self-insured retention, including any loss not covered because of the operation of such deductible, coinsurance penalty, or self-insured retention.

35.5 The requirement contained herein as to types and limits of insurance coverage to be maintained by the Contractor are not intended to and shall not in any manner limit or qualify the liabilities and obligations assumed by the Contractor.

35.6 Hold Harmless Provisions: The Contractor shall at all times indemnify and save harmless the State of Connecticut, the Department of Construction Services, and their respective officers, agents, and employees, on account of any and all claims, damages, losses, litigation, expenses, counsel fees and compensation arising out of injuries (including death) sustained by or alleged to have been sustained by the officers, agents, and employees of said State or Department, or of the Contractor, his Subcontractor, or materialmen and from injuries (including death) sustained by or alleged to have been sustained by the public, any or all persons on or near the Work, or by any other person or property, real or personal (including property of said State or Department) caused in whole or in part by the acts, omissions, or neglect or the Contractor including, but not limited to, any neglect in safeguarding the Work or through the use of unacceptable materials in constructing the Work of the Contractor, any Subcontractor, materialman, or anyone directly employed by them or any of them while engaged in the performance of the Contract, including the entire elapsed time from the date of the Notice to Proceed or the actual Commencement Of The Work whichever occurs first until its completion as certified by the Department of Construction Services.

ARTICLE 36 FOREIGN MATERIALS

36.1 Preference shall be given to articles or materials manufactured or produced in the United States, Canada, and Mexico, (the members of the North American Free Trade Agreement (NAFTA)); and the products shall meet all of the referenced standards and Specifications for conditions of performance, quality, and price with duty being equal.

36.2 Only articles or materials manufactured or produced in the United States, Canada, and Mexico, (the members of the North American Free Trade Agreement (NAFTA)), will be allowed. The foregoing provisions shall not apply to foreign articles or materials required by the Contract Documents.

ARTICLE 37 HOURS OF WORK

37.1 No person shall be employed to work or be permitted to work more than eight (8) hours in any Day or more than forty (40) hours in any week for any Work provided in the Contract, in accordance with Connecticut General Statute Section 31-57.

37.2 The operation of such limitation of hours of work may be suspended during an emergency, upon the approval of the Commissioner, in accordance with Connecticut General Statute Section 31-57.

ARTICLE 38 CLAIMS

38.1 General: When filing a formal claim under Section 4-61 (referred to as "Section 4-61" below) of the Connecticut

General Statutes (as revised), either as a lawsuit in the Superior Court or as a demand for arbitration, the Contractor must follow the procedures and comply with the requirements set forth in this Article. This Section does not, unless so specified, govern informal claims for additional compensation which the Contractor may bring before the Department. The Contractor should understand, however, that the Department may need, before the Department can resolve such a claim, the same kinds of documentation and other substantiation that it requires under this Article. It is the intent of the Department to compensate the Contractor for actual increased costs caused by or arising from acts or omissions on the part of the Department that violate legal or contractual duties owed to the Contractor by the Department.

38.2 Notice of Claim: Whenever the Contractor intends to file a formal claim against the Department under Section 4-61, seeking compensation for additional costs, the Contractor shall notify the Commissioner in writing (in strict compliance with Section 4-61) of the details of said claim. Such written notice shall contain all pertinent information described in Paragraph 38.5 below.

Once formal notice of a claim under Section 4-61(b) (as revised) has been given to the Commissioner, the claimant may not change the claim in any way, in either concept or monetary amount, (1) without filing a new notice of claim and demand for arbitration to reflect any such change, and (2) without the minimum period of six months after filing of the new demand commencing again and running before any hearing on the merits of the claim may be held. The only exception to this limitation will be for damages that continue to accrue after submission of the notice, in ways described and anticipated in the notice.

38.3 Record Keeping: The Contractor shall keep daily records of all costs incurred in connection with its Work on behalf of the Department. The daily records shall identify each aspect of the Project affected by matters related to any claim for additional compensation that the Contractor has filed, intends to file, or has reason to believe that it may file against the Department; the specific Project locations where Project work has been so affected; the number of people working on the affected aspects of the Project at the pertinent time(s); and the types and number of pieces of equipment on the Project site at the pertinent time(s). Any potential or anticipated effect on the Project's progress or Schedule which may result in a claim by the Contractor shall be noted contemporaneously with the cause of the effect, or as soon thereafter as possible.

38.4 Claim Compensation: The payment of any claim, or any portion thereof, that is deemed valid by the Department shall be made in accordance with the following provisions of this Article:

38.4.1 Compensable Items: The liability of the Department for claims will be limited to the following specifically identified items of cost, insofar as they have not otherwise been paid for by the Department, and insofar as they were caused solely by the actions or omissions of the Department or its agents (except that with regard to payment for extra work, the Department will pay to the Contractor the Overhead and profit percentages provided for in Article 13.):

38.4.1.1 Additional Project-site labor expenses.

38.4.1.2 Additional costs for materials.

38.4.1.3 Additional, unabsorbed Project-site Overhead (e.g., for mobilization and demobilization).

38.4.1.4 Additional costs for active equipment.

38.4.1.5 For each Day of Project delay or suspension caused solely by actions or omissions of the Department either:

38.4.1.5.1 an additional ten percent (10%) of the total amount of the costs identified in Subparagraphs 38.4.1.1 through 38.4.1.4 above; except that if the delay or suspension period prevented the Contractor from incurring enough Project costs under Subparagraphs 38.4.1.1 through 38.4.1.4 during that period to require a payment by the Department that would be greater than the payment described in Subparagraph 38.4.1.5.2 below, then the payment for affected home office Overhead and profit shall instead be made in the following *per diem* amount :

38.4.1.5.2 six percent (6%) of the original total Contract amount divided by the original number of Days of Contract Time. Payment under either 38.4.1.5.1 or 38.4.1.5.2 hereof shall be deemed to be complete and mutually satisfactory compensation for any unabsorbed home office overhead and any profit related to the period of delay or suspension.

38.4.1.6 Additional equipment costs. Only actual equipment costs shall be used in the calculation of any compensation to be made in response to claims for additional Project compensation. Actual equipment costs shall be based upon records kept in the normal course of business and in accordance with generally accepted accounting principles. Under no circumstances shall Blue Book or other guide or rental rates be used for this purpose (unless the Contractor had to rent the equipment from an unrelated party, in which case the actual rental charges paid by the Contractor, so long as they are reasonable, shall be used). Idle equipment, for instance, shall be paid for based only on its actual cost to the Contractor.

38.4.1.7 Subcontractor costs limited to, and determined in accordance with, Subparagraphs 38.4.1.1 through 38.4.1.5 above and applicable statutory and case law. Such Subcontractor costs may be paid for by the Department only: (a) in the context of an informal claims settlement; or (b) if the Contractor has itself paid or legally assumed, present unconditional liability for those Subcontractor costs.

38.4.2 Excusable But Not Compensable Items: The Contractor may be allowed Days but the Department will have no liability for the following non-compensable items:

38.4.2.1 Abnormal or unusually severe weather

38.4.2.2 Acts of God

38.4.2.3 Force Majeure

38.4.2.4 Concurrent Delay

38.4.3 Non-Compensable Items: The Department will have no liability for the following specifically-identified non-compensable items:

- 38.4.3.1** Profit, in excess of that provided for herein.
- 38.4.3.2** Loss of anticipated profit.
- 38.4.3.3** Loss of bidding opportunities.
- 38.4.3.4** Reduction of bidding capacity.
- 38.4.3.5** Home office overhead in excess of that provided for in Subparagraph 38.4.1.5 hereof.
- 38.4.3.6** Attorneys fees, claims preparation expenses, or other costs of claims proceedings or resolution.
- 38.4.3.7** Subcontractor failure to perform
- 38.4.3.8** Any other consequential or indirect expenses or costs, such as tort damages, or any other form of expense or damages not provided for in these specifications or elsewhere in the Contract.

38.5 Required Claim Documentation: All claims shall be submitted in writing to the Commissioner, and shall be sufficient in detail to enable the Department to ascertain the basis and the amount of each claim, and to investigate and evaluate each claim in detail. As a minimum, the Contractor must provide the following information for each and every claim and sub-claim asserted:

- 38.5.1** detailed factual statement of the claim, with all dates, locations and items of Work pertinent to the claim.
- 38.5.2** A statement of whether each requested additional amount of compensation or extension of time is based on provisions of the Contract or on an alleged breach of the Contract. Each supporting or breached Contract provision and a statement of the reasons why each such provision supports the claim must be specifically identified or explained.
- 38.5.3** Excerpts from manuals or other texts which are standard in the industry, if available, that support the Contractor's claim.
- 38.5.4** The details of the circumstances that gave rise to the claim.
- 38.5.5** The date(s) on which any and all events resulting in the claim occurred, and the date(s) on which conditions resulting in the claim first became evident to the Contractor.
- 38.5.6** Specific identification of any pertinent document, and detailed description of the substance of any material oral communication, relating to the substance of such claim.
- 38.5.7** If an extension of time is sought, the specific dates and number of Days for which it is sought, and the basis or bases for the extension sought. A critical path method, bar chart, or other type of graphical schedule that supports the extension must be submitted.
- 38.5.8** When submitting any claim over \$50,000, the Contractor shall certify in writing, under oath and in accordance with the formalities required by the contract, as to the following:

- 38.5.8.1** That supporting data is accurate and complete to the Contractor's best knowledge and belief;

- 38.5.8.2** That the amount of the dispute and the dispute itself accurately reflects what the Contractor in good faith believes to be the Department's liability;

- 38.5.8.3** The certification shall be executed by:

- 38.5.8.3.1** If the Contractor is an individual, the certification shall be executed by that individual.

- 38.5.8.3.2** If the Contractor is not an individual, the certification shall be executed by a senior company official in charge at the Contractor's plant or location involved or an officer or general partner of the Contractor having overall responsibility for the conduct of the Contractor's affairs.

38.6 Auditing of Claims: All claims filed against the Department shall be subject to audit by the Department or its agents at any time following the filing of such claim. The Contractor and its Subcontractors and suppliers shall cooperate fully with the Department's auditors. Failure of the Contractor, its Subcontractors, or its suppliers to maintain and retain sufficient records to allow the Department or its agents to fully evaluate the claim shall constitute a waiver of any portion of such claim that cannot be verified by specific, adequate, contemporaneous records, and shall bar recovery on any claim or any portion of a claim for which such verification is not produced. Without limiting the foregoing requirements, and as a minimum, the Contractor shall make available to the Department and its agents the following documents in connection with any claim that the Contractor submits:

- 38.6.1** Daily time sheets and foreman's daily reports.
- 38.6.2** Union agreements, if any.
- 38.6.3** Insurance, welfare, and benefits records.
- 38.6.4** Payroll register.
- 38.6.5** Earnings records.
- 38.6.6** Payroll tax returns.

- 38.6.7** Records of property tax payments.
- 38.6.8** Material invoices, purchase orders, and all material and supply acquisition contracts.
- 38.6.9** Materials cost distribution worksheets.
- 38.6.10** Equipment records (list of company equipment, rates, etc.).
- 38.6.11** Vendor rental agreements.
- 38.6.12** Subcontractor invoices to the Contractor, and the Contractor's certificates of payments to Subcontractors.
- 38.6.13** Subcontractor payment certificates.
- 38.6.14** Canceled checks (payroll and vendors).
- 38.6.15** Job cost reports.
- 38.6.16** Job payroll ledger.
- 38.6.17** General ledger, general journal (if used), and all subsidiary ledgers and journals, together with all supporting documentation pertinent to entries made in these ledgers and journals.
- 38.6.18** Cash disbursements journals.

38.6.19 Financial statements for all years reflecting the operations on the Project.

38.6.20 Income tax returns for all years reflecting the operations on the Project.

38.6.21 Depreciation records on all company equipment, whether such records are maintained by the company involved, its accountant, or others.

38.6.22 If a source other than depreciation records is used to develop costs for the Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all such other source documents.

38.6.23 All documents which reflect the Contractor's actual profit and overhead during the years that the Project was being performed, and for each of the five years prior to the commencement of the Project.

38.6.24 All documents related to the preparation of the Contractor's bid, including the final calculations on which the total proposed Contract bid price as stated in the Bid Proposal Form was based.

38.6.25 All documents which relate to the claim or to any sub-claim, together with all documents that support the amount of damages as to each claim or sub-claim.

38.6.26 Worksheets used to prepare the claim, which indicate the cost components of each item of the claim, including but not limited to the pertinent costs of labor, benefits and insurance, materials, equipment, and Subcontractors' damages, as well as all documents which establish the relevant time periods, individuals involved, and the Project hours and the rates for the individuals.

38.6.27 The name, function, and pertinent activity of each Contractor's or Subcontractor's official, or employee, involved in or knowledgeable about events that give rise to, or facts that relate to, the claim.

38.6.28 The amount(s) of additional compensation sought and a break-down of the amount(s) into the categories specified as payable under Paragraph 38.4 above.

38.6.29 The name, function, and pertinent activity of each Department official, employee, or agent involved in or knowledgeable about events that give rise to, or facts that relate to, the claim.

ARTICLE 39

DIESEL VEHICLE EMISSIONS CONTROL

39.1 The Contractor shall be responsible for compliance with the following provisions:

39.1.1 All Contractor and Subcontractor diesel powered non-road construction equipment with engine horsepower (HP) ratings of 60 HP and above, that are on the Project or are assigned to the Contract for a period in excess of 30 consecutive Days, shall be retrofitted with emission control devices in order to reduce diesel emissions. In addition, all motor vehicles and/or construction equipment (both on-highway and non-road) shall comply with all pertinent State and Federal regulations relative to exhaust emission controls and safety.

39.1.2 Retrofit emission control devices shall consist of oxidation catalysts, or similar retrofit equipment control technology that is:

39.1.2.1 Included on the U.S. Environmental Protection Agency (EPA) "Verified Technology List," as may be amended from time to time
<http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm>
and

39.1.2. Verified by EPA to provide a minimum emissions reduction of 20% particulate matter (PM₁₀), 40% carbon monoxide (CO), and 50% hydrocarbons (HC).

39.1.3 Construction shall not proceed until all diesel powered non-road construction equipment meeting the criteria in provision 39.1.1 have been retrofitted, unless the Commissioner grants a waiver under provision 39.2.

39.1.4 The Contractor shall at least monthly, assess which diesel powered non-road construction equipment are subject to these provisions. The Contractor shall notify the CT DCS Project Manager of any violations of these provisions.

39.1.5 Idling of delivery and/or dump trucks, or other diesel powered equipment shall be limited to three (3) minutes during non-active use in accordance with the Regulations of Connecticut State Agencies Section 22a-74-18(b)(3)(C), which states, in part:

"[N]o person shall cause or allow a Mobile Source to operate for more than three (3) consecutive minutes when such Mobile Source is not in motion, except as follows:

When a Mobile Source is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control,

When it is necessary to operate defrosting, heating or cooling equipment to ensure the safety or health of the driver or passengers,

When it is necessary to operate auxiliary equipment that is located in or on the Mobile Source to accomplish the intended use of the Mobile Source, (To bring the Mobile Source to the manufacturer's recommended)

When a Mobile Source is in queue to be inspected by U.S. military personnel prior to gaining access to a U.S. military installation."

39.1.6 All Work shall be conducted to ensure that no harmful effects are caused to adjacent Sensitive Receptor Sites. Diesel powered engines shall be located away from fresh air intakes, air conditioners, and windows.

39.1.7 If any diesel powered non-road construction equipment is found to be in non-compliance with these provisions by the CT DCS Project Manager, the Contractor will be issued a Non-Conformance Notice and given a 24 hour period in which to bring the equipment into compliance or remove it from the Project. The Contractor's failure to comply with these provisions shall be reason to withhold payment as described in Article 33.

39.1.8 Any costs associated with these provisions shall be included in the general cost of the contract. In addition, there shall be no time granted to the Contractor for compliance with these provisions. The Contractor's compliance with these provisions and any associated regulations shall not be grounds for a Change Order.

39.2 The Commissioner reserves the right to waive all or portions of these provisions at his/her discretion. The Contractor may request a waiver to all or portions of these provisions with written justification to the Commissioner as to why the Contractor cannot comply with these provisions. A waiver, to be effective, must be granted in writing by the Commissioner.

END

Appendix 1



7048
General Contractor
Retainage Reduction Request
(SAMPLE)

To: Allen V. Herring, P.E., CT DCS Chief Engineer
Room 265, 165 Capitol Avenue, Hartford, CT 06106

From: (Insert GC's Name), General Contractor

Subject: Project No. () Reduction of Retainage at ()% project completion

In accordance with the General Conditions, Article 28 Progress Payments, (insert GC's name) hereby requests a reduction of retainage to an amount of insert written percent Percent (insert numerical percent%). The following list of items required under the General Conditions is in compliance with the terms of the contract and has been verified by the General Contractor.

- DAS Contractor Performance Evaluation Score is a minimum of **Sixty (60%) Percent**.
- Timely submission of an appropriate and complete CPM Schedule and Schedule of Values, in compliance with the Contract requirements and the prompt resolution of the Owner's and/or A/E's comments on the submitted material resulting in an appropriate basis for progress of the Work.
- Timely and proper submission of all Contract Document required submissions: including but not limited to Shop Drawings, material certificates and material samples and the prompt resolution of the Owner's and/or Architect's or Engineer's comments on the submitted material resulting in an appropriate progress of the Work.
- Proper and adequate supervision and home office support of the Project.
- The Work completed to date has been installed or finished in a manner acceptable to the Owner.
- The progress of the Work is consistent with the approved CPM Schedule.
- All approved credit Change Orders have been invoiced.
- All Change Order requests for pricing are current.
- The General Contractor has and is maintaining a clean worksite in accordance with the Contract Documents.
- All Subcontractor payments are current at the time of reduction request.
- General Contractor is compliant with set-aside provisions of the contract.

General Contractor Certification: _____
(Written Name) (Signature) (Date)

Project Manager Recommendation: _____
(Written Name) (Signature) (Date)

Approved:
Allen V. Herring, P.E.
CT DCS Chief Engineer

(Signature) (Date)



**Supplementary Conditions of the Contract for Construction
For Design - Bid - Build
Department of Administrative Services ● Construction Services
State of Connecticut**

1.0 Supplementary Conditions:

- 1.1 These Supplementary Conditions modify the State of Connecticut, Department of Construction Services, Section 00 72 13 General Conditions of the Contract for Construction for Design – Bid- Build (Rev. 03.26.12), and other provisions of the Contract Documents as indicated below. All provisions which are not so modified remain in full force and effect.
- 1.2 The terms used in these Supplementary Conditions which are defined in the Section 00 72 13 General Conditions of the Contract for Construction for Design – Bid- Build (Rev. 03.26.12), have the meanings assigned to them in the General Conditions.

2.0 Section 00 72 13 General Conditions Of The Contract For Construction For Design - Bid – Build:

- 2.1 **ADD:** Subsection **3.6** to **ARTICLE 3, CORRELATION OF CONTRACT DOCUMENTS**, as follows:

3.6 In accordance with Public Act No. 13-247 (Effective June 19, 2013), wherever the term "Commissioner of Construction Services" is used in the "Bidding Documents" or "Project Manual" the term "Commissioner of Administrative Services" shall be substituted in lieu thereof; and wherever the term "Department of Construction Services" is used in "Bidding Documents" or "Project Manual", the term "Department of Administrative Services" shall be substituted in lieu thereof.

- 2.2 **DELETE:** Subsection **28.2** in its entirety from **ARTICLE 28, PARTIAL PAYMENTS**.

ADD: Subsection **28.2** to **ARTICLE 28, PARTIAL PAYMENTS**, as follows:

28.2 In making such Application For Payment for the Work, there shall not be more than **seven** and **one-half percent (7.5%)** deducted from the amount of each Application for Payment to be retained by the Owner as Retainage until Final Completion.

28.2.1 At **fifty percent (50%)** completion of the Work the Retainage shall be reduced to **five percent (5%)**. All subsequent Applications for Payment shall be subject to **five percent (5%) Retainage**. Upon Substantial Completion, and in the Commissioner's sole discretion and based upon the factors set forth in **Section 28.3**, the Retainage may be reduced upon the request of the Contractor and recommendation of the CT DAS Project Manager. In the event of a reduction in Retainage to below **five percent (5%)**, the minimum Retainage withheld shall not be less than the CT DAS Project Manager's estimate of the remaining Work or **two and one-half percent (2.5%)**, whichever is greater. All requests for Retainage Reduction shall be done on **CT DAS Form 7048 General Contractor Retainage Reduction Request**, which can be found at the end of the General Conditions.

28.2.2 Subsequent to Substantial Completion, in limited circumstances, at the sole discretion of the Commissioner and based upon factors set forth in **subsection 28.3**, a reduction of Retainage below **two and one-half percent (2.5%)** may be considered.

28.2.3 A "Good" Contractor's Performance Evaluation score shall be defined as a minimum total score of sixty percent (60%).

- 2.3 **ADD** Subsections **Definitions** to **ARTICLE 1 DEFINITIONS**, as follows:

- 2.3.1 **DELETE:** **1.71** in its entirety from **ARTICLE 1 DEFINITIONS**.

ADD: Subsection **1.71** to **ARTICLE 1 PARTIAL DEFINITIONS**, as follows:

1.71 **WORK:** The construction and services required by the Contract Documents, and including all labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project and "Work Phase".

ADD: Subsection **1.72** to **ARTICLE 1 DEFINITIONS**, as follows:

1.72 **WORK PHASE:** Construction of the Project by sequence or time intervals, which may include but not be limited to separate Construction Start Dates, Substantial Completion Dates, Application for Payments, Change Orders, Liquidated Damages, Retainage, and Subcontractors for each Work Phase.



2.4 **DELETE:** Appendix 1 from Section 00 72 13.1 in its entirety.
ADD: New Appendix 1 to Section 00 72 13.1 as follows:

	7048 General Contractor (GC) Retainage Reduction Request <i>(Sample)</i>
Page 2 of 1	

To:	Department of Administrative Services (DAS) Construction Services Office of Legal Affairs, Policy and Procurement 450 Columbus Blvd, Suite 1302 – North Tower Hartford, CT 06103		
From:	<input type="text" value="GC's Name"/>	General Contractor (GC)	
Subject:	DAS Project Number: <input type="text" value="DAS Project Number"/>		
	Reduction of Retainage at: <input type="text" value="Written Percent"/>	Percent (<input type="text" value="##.#"/> %)	
Date:	<input type="text" value="Click or tap to enter a date."/>		

In accordance with the General Conditions, Article 28 Progress Payments,
 ,
 hereby requests a reduction of retainage to an amount of Percent (%)
 The following list of items required under the General Conditions is in compliance with the terms of the contract and has been verified by the General Contractor (GC).

- DAS Construction Services Contractor Performance Evaluation Score is a minimum of **Sixty (60%) Percent**.
- Timely submission of an appropriate and complete CPM Schedule and Schedule of Values, in compliance with the Contract requirements and the prompt resolution of the Owner's and/or A/E's comments on the submitted material resulting in an appropriate basis for progress of the Work
- Timely and proper submission of all required Contract Document submissions including but not limited to Shop Drawings, material certificates, material samples and the prompt resolution of the Owner's and/or A/E's comments on the submitted material resulting in an appropriate progress of the Work.
- Proper and adequate supervision and home office support of the Project.
- The Work completed to date has been installed or finished in a manner acceptable to the Owner.
- The progress of the Work is consistent with the approved CPM Schedule.
- All approved credit Change Orders have been invoiced.
- All Change Order requests for pricing are current.
- The GC has and is maintaining a clean worksite in accordance with the Contract Documents.
- All Subcontractor payments are current at the time of reduction request.
- GC is compliant with set-aside provisions of the contract.

General Contractor Certification:	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>(Written Name)</i>	<i>(Signature)</i>	<i>(Date)</i>
Project Manager Recommendation:	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>(Written Name)</i>	<i>(Signature)</i>	<i>(Date)</i>
DAS Chief Engineer or Authorized Representative:	<input type="text"/>	<input type="text"/>	<input type="text"/>
	<i>(Written Name)</i>	<i>(Signature)</i>	<i>(Date)</i>

END

CT DAS – 7048 (Rev. 05.22.17) 7000 – Construction Phase Forms

END OF SECTION

Set-Aside Contractor Schedule [SAMPLE ONLY]

VIA EMAIL

Contractor Name
Contractor Address
City, State, Zip Code

BID OPENING DATE

Re: DAS Project Description
 DAS Project Number

Date:

Dear Contractor:

Section 00 45 17 Named Subcontractor Bidders Qualification Statement(s) is / (are) required for this project, only for your Named Subcontractors listed in Table 2.7 of your Section 00 41 00 Bid Proposal Form.

No person whose subcontract *exceeds* five hundred thousand dollars in value may perform work as a subcontractor on a project, which project is estimated to cost more than five hundred thousand dollars and is paid for, in whole or in part, with state funds, *unless, at the time of bid submission*, the person is prequalified in accordance with the Connecticut General Statutes Section 4a-100, as amended. This includes the contractor's or substantial subcontractor's prequalification classifications, aggregate work capacity ratings and single project limits.

In accordance with **Subsection 2.9 "Set-Aside Requirements" of Section 00 21 13 Instructions to Bidders**, you are required to *list* below the names of each *currently certified set-aside contractor* to be used for this project, along with the dollar *amount* to be paid each set-aside contractor.

The **responsibility** for listing a qualified and certified set-aside contractor rests solely with the **bidder** and not the State. **Listing a set-aside contractor who does not qualify may be considered the same as not listing one at all and the bid may be considered non-responsive and subject to rejection.**

Name	Address	* Amount	Indicate Whether: Subcontractor, Or Supplier, Or Both	** Class of Work
SAMPLE	SAMPLE	SAMPLE	SAMPLE	SAMPLE

***Amount:** The total dollar amount to be paid to the set aside contractors must not be less than the percentage(s) stated in the Bid Proposal Form.

****Class of Work:** Means the name of the trade work to be provided by the Subcontractor or Supplier.

ATTACHMENTS:

For Each of the Named Subcontractors:

- Attach their Section 00 45 17 Named Subcontractor Bidders Qualification Statement(s)

For Each of the Named Set-Aside SBE/MBE Contractors:

- Attach their DAS Set-Aside Certificate of Eligibility (SBE and/or MBE)

For Each of the Named Subcontractors With Subcontracts Greater Than \$500,000:

- Attach their DAS Prequalification Certificate and Update (Bid) Statement for the Class of Work

 Contractor Authorized Signature & Title _____ Date

This Form Must Be Received No Later Than _____ At:

State of Connecticut
 Department of Administrative Services, Construction Services
 Office of Legal Affairs, Policy, and Procurement
 450 Columbus Boulevard, Suite 1302
 Hartford, CT 06103

Attn:

**State Of Connecticut
Department of Administrative Services
Construction Services**

February 1, 2019

To: All Department of Administrative Services, Construction Services Contractors

Subject: Set-Aside Contract Laws

Dear Sir/Madam:

The administration of Governor Ned Lamont is committed to supporting the subject programs by encouraging all contractors on State projects to improve their efforts in these areas.

State law requires contractors doing business with the State to demonstrate non-discrimination by making "good faith efforts" in both hiring and in sub-contracting practices (Connecticut General Statutes Section [C.G.S. §] 4a-60).

What does "good faith efforts" mean? It means that you, as contractors, must act affirmatively. It is not good enough to say you can't find minorities and women. You must seek them out. That is the law, and the Department of Administrative Services (DAS) / Construction Services (CS) is committed to enforcing the law. At the same time, we are ready to assist you in making "good faith efforts."

DAS is required by C.G.S. § 4a-60g (b) and (c) to set aside projects (amounting to **twenty-five percent (25%)** of its annual contract awards) for small business and **twenty-five percent (25%)** of that amount for minority business enterprises. DAS may require any general contractor to set aside a portion of the contract for subcontractors who are small businesses or minority business enterprises in lieu of setting aside a project or in addition to setting aside a project.

Therefore, unless otherwise specified in the **Bid Proposal Form**, DAS will require contractors to subcontract **twenty-five percent (25%)** of the total contract value to small businesses certified by DAS and further will require contractors to subcontract 25% of that 25% to minority and women small contractors certified as minority business enterprises by DAS. These statutory goals represent the minimum values expected to be achieved by this program.

Together, we can meet the challenge of providing equal opportunity for minority and women-owned businesses and workers in our State. We expect superior results in the areas of affirmative action, equal employment opportunity, and set-aside contracts. The DAS standard in these areas is not just minimal effort. Our goal is to uphold the letter and the spirit of the law.

For more information on Non-Discrimination and Affirmative Action Provisions for State Contracts please visit the Commission on Human Rights and Opportunities (**CHRO**) Website at www.ct.gov/chro.

Sincerely yours,

Josh Geballe
Commissioner

PB:pb

Non-Discrimination and Affirmative Action Provisions for State Contracts

Section 1	CHRO – Contract Compliance Regulations Notification to Bidders:
1.1	<p>The contract to be awarded is subject to contract compliance requirements mandated by:</p> <ul style="list-style-type: none"> 1.1.1 The Connecticut General Statutes (C.G.S.) § 4a-60 and 4a-60a; 1.1.2 C.G.S. § 46a-71(d) and 46a-81i (d) when the awarding agency is the State; and 1.1.3 The Contract Compliance Regulations codified in the Regulations of Connecticut State Agencies (RSCA) §46a-68j-21 through 43, which establish a procedure for awarding all contracts covered by C.G.S. §4a-60 and 46a-71(d).
1.2	<p>According to the Contract Compliance Regulations §46a-68j-30(9), every agency awarding a contract subject to the contract compliance requirements has an obligation to “aggressively solicit the participation of legitimate minority business enterprises as bidders, contractors, subcontractors and suppliers of materials.”</p> <p>“Minority business enterprise” is defined in C.G.S §4a-60-as a small contractor or supplier of materials fifty-one (51%) percent or more of the capital stock or assets of which is owned by a person or persons:</p> <ul style="list-style-type: none"> 1.2.1 who are active in the daily affairs of the enterprise; 1.2.2 who have the power to direct the management and policies of the enterprise; and 1.2.3 who are members of a minority, as such term is defined in subsection (a) of C.G.S. §32-9n.”
1.3	<p>“Minority” groups are defined in C.G.S. §32-9n as:</p> <ul style="list-style-type: none"> 1.3.1 Black Americans, including all persons having origins in any of the Black African racial groups not of Hispanic origin; 1.3.2 Hispanic Americans, including all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race; 1.3.3 Persons who have origins in the Iberian Peninsula, including Portugal, regardless of race; 1.3.4 Women; 1.3.5 Asian Pacific Americans and Pacific Islanders; or 1.3.6 American Indians and persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification. 1.3.7 “Individuals with a disability” is also a minority business enterprise as provided by C.G.S. § 4a-60g (4).
1.4	<p>The above “Minority business enterprise” definitions apply to the contract compliance requirements by virtue of Contract Compliance Regulations §46a-68j-21(11).</p> <p>The awarding agency will consider the following factors when reviewing the bidder’s qualifications under the contract compliance requirements:</p> <ul style="list-style-type: none"> 1.4.1 the bidder’s success in implementing an affirmative action plan; 1.4.2 the bidder’s success in developing an apprenticeship program complying with RSCA §46a-68-1 to 46a-68-17, inclusive; 1.4.3 the bidder’s promise to develop and implement a successful affirmative action plan; 1.4.4 the bidder’s submission of employment statistics contained in the “Employment Information Form”, indicating that the composition of its workforce is at or near parity when compared to the racial and sexual composition of the workforce in the relevant labor market area; and 1.4.5 the bidder’s promise to set aside a portion of the contract for legitimate minority business enterprises. See Contract Compliance Regulations § 46a-68j-30(10) (E).

Note: The Commission on Human Rights and Opportunities (CHRO) “Employment Information Form” shall be submitted to the DAS/CS Office of Legal Affairs, Policy, and Procurement on behalf of the awarding agency, the Department of Administrative Services (DAS).

Section 2	Non-Discrimination and other Contract Compliance Requirements:
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Pursuant to **C.G.S. §4a-60** and **§4a-60a** and **RSCA §46a-68j-21 to §46a-68j-43**, a contractor agrees to the following:

- 2.1** Not to discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, sexual orientation, mental retardation, or physical disability including, but not limited to, blindness (unless it is shown that such disability prevents performance of the work involved) in the performance of a contract, in any manner prohibited by the federal and Connecticut anti-discrimination and contract compliance laws;
- 2.2** To undertake affirmative action which will insure that applicants with job-related qualifications are employed and that employees are treated, when employed, without regard to whether they belong to any of the groups identified in Paragraph # 1) above;
- 2.3** To include a statement that the contractor is an “affirmative action-equal opportunity employer”, in all solicitations or advertisements for employees placed by or on behalf of the contractor;
- 2.4** To provide each labor union or representative of workers with which such contractor has a collective bargaining agreement and each vendor with which such contractor has a contract, a notice advising them of the contractor’s commitments under **C.G.S. §4a-60** and **§4a-60a**. The notice is available by contacting **CHRO**;
- 2.5** To post copies of the notice referred to in item 4) in conspicuous places available to employees and applicants;
- 2.6** To provide **CHRO** with such information requested by said agency, permit access to pertinent books, records, and accounts, concerning the employment practices and procedures of the contractor as relate to the provisions of **C.G.S. §4a-60, §4a-60a** and **§46a-56** and, cooperate fully with **CHRO**; and,
- 2.7** To include the language of **C.G.S. §4a-60 (a)** and **§4a-60a (a)** in every subcontract or purchase order executed to fulfill any obligation of the contract with DAS.

Section 3	Affirmative Action Requirements for Certain Public Works Contracts for Construction:
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Pursuant to **C.G.S. §46a-68c** and **§46a-68d** and **RSCA §46a-68j-21 to §46a-68j-29**, the following must file an affirmative action plan with the Commission:

- 3.1** A successful bidder on a ¹ “**public works contract**” with a value of **\$500,000** or more. The plan must be filed within **thirty (30)** days after a bid has been accepted by an awarding agency but before a contract is awarded. A plan may be filed in advance of, or at the same time as, a bid is submitted.
- 3.2** A contractor with **fifty (50)** or more employees who has been awarded a “**public works contract**” in excess of **\$50,000** in any fiscal year. A plan must be filed within **thirty (30) days** of the date a contract is awarded.

CHRO must review a plan within **sixty (60) days** of receipt and must either approve or reject a plan. Should **CHRO** approve an affirmative action plan, **CHRO** will issue a certificate of compliance. This certificate of compliance shall be proof of a successful bidder’s or a contractor’s eligibility to bid or be awarded contracts for a period of **two (2)** years from the date of the certificate. This certificate does not excuse a successful bidder or contractor from being monitored by the **CHRO** for implementation of its affirmative action plan or, from its reporting requirements under **C.G.S. 46a-68e** and **§ 46a-68f**. (Refer to Section 6) Also, **CHRO** may revoke the certificate if a successful bidder or contractor does not implement its affirmative action plan.

Should **CHRO** opt to disapprove an affirmative action plan, **CHRO** must notify the successful bidder or contractor in writing within **ten (10) days** of the disapproval. The notice will state the reason for disapproval and may provide necessary proposals to bring the plan into compliance. The successful bidder or contractor must then submit a new or amended plan, within **thirty (30) days** of the date the notice of disapproval is mailed by **CHRO**.

Section 3

(Continued):

In addition, **CHRO** may conditionally approve an affirmative action plan for a successful bidder on a public works contract valued at **\$500,000** or more. **CHRO** must notify the successful bidder in writing within **ten (10) days** of the conditional disapproval and state the reason for conditional approval and, may provide necessary proposals to bring the plan into compliance. The successful bidder must then submit a new or amended plan or, provide written assurances that it will amend its plan to conform to affirmative action requirements, within **thirty (30) days** of the date the notice is mailed by **CHRO**.

Note: The awarding agency (DAS) will provide a successful bidder or contractor with a copy of **CHRO**'s Affirmative Action Plan format. All sections of this Affirmative Action Plan format must be completed by the successful bidder or contractor and forwarded to **CHRO**. Also, the awarding agency (DAS) shall withhold **2%** of the total contract price per month from any payment made to a contractor until such time as the contractor has developed an affirmative action plan, which has been approved by **CHRO**.

¹ **“public works contract”** means any agreement between any individual, firm or corporation and the state or any political subdivision of the state other than a municipality for construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, or which is financed in whole or in part by the state, including, but not limited to, matching expenditures, grants, loans, insurance or guarantees.-**C.G.S. §46a-68b**.

Section 4

“Good Faith Efforts” to Include Minority Business Enterprises as Subcontractors”:

In addition to, or in the absence of, any other subcontractor requirements included in this project, contractors are required to make ² **“good faith efforts”** to include minority business enterprises in the work of this project as subcontractors (for services and/or material suppliers). For the purpose of identifying minority business enterprises, a minority business enterprise shall be a subcontractor which has a valid certification as such from DAS and/or a subcontractor for which an affidavit has been submitted by the contractor attesting that the subcontractor named as a minority business enterprise meets the minority business enterprise criteria set out in **C.G.S. §4a-60(b)**.

² **“Good faith efforts”** means *“that **degree of diligence** which a reasonable person would exercise in the performance of legal duties and obligations”* and includes, but is not limited to, the following **factors**: the contractor’s employment and subcontracting policies and practices; affirmative advertising, recruitment, training, technical assistance activities and such other reasonable activities or efforts as **CHRO** may recommend to ensure the participation of minority business enterprises in state projects.

Section 5

Set-Aside Program:

This contract may be subject to the provisions the **Set-Aside Program for Small Contractors** found at **C.G.S. § 4a-60g** and may be awarded only to a contractor certified as a small and/or minority business enterprise by DAS. The notification as to this special provision will be found in the **Bid Proposal Form** for this contract. The listing of eligible "Set-Aside" contractors is found on the [DAS Website for SBE or MBE Certification](#). In the event that the **Set-Aside Program for Small Contractors** applies to this contract, the following special provisions will also apply:

5.1 Amount of Work Required to Be Done by "Set-Aside" Contractors

A contractor awarded a contract on a project pursuant to the provisions of **C.G.S. §4a-60g**, as amended, shall be required to perform not less than **thirty (30)** per cent of the work with his/her own forces and shall ensure that not less than **fifty (50)** per cent of the work be performed by contractors or subcontractors who are certified as small contractors or minority business enterprises pursuant to **C.G.S. §4a-60g**.

The primary product/service performed by contractors working on a contract awarded under **C.G.S. §4a-60g** must be the same as the primary product/service described for the contractors on their "Certificate of Eligibility" which is provided to them by DAS.

5.2 Alternate Bonding Available to "Set Aside" Contractors

In lieu of a performance, bid, labor and materials or other required bond, a contractor or subcontractor awarded a contract under **C.G.S. §4a-60g** may provide to the awarding authority (DAS) and the awarding authority shall accept a "Letter of Credit". Any such "Letter of Credit" shall be in an amount equal to **ten per cent (10%)** of the contract for any contract that is less than **one hundred thousand (\$100,000) dollars**, and in the amount of **twenty-five per cent (25%)** for any contract that is **one hundred thousand (\$100,000) dollars** or more.

5.3 Procedures to Follow Regarding Substitution of Named Project "Set-Aside" Subcontractors.

The awarding authority (DAS) may also require the contractor to set aside a portion of the contract for subcontractors who are eligible for set aside contracts. The awarding authority shall not permit substitution of a subcontractor for one named in accordance with the provisions of **C.G.S. § 4b-95** or substitution of a subcontractor for any designated sub-trade work bid to be performed by the contractor's own forces, except for good cause.

Pursuant to **C.G.S. § 4b-95**, the term "**good cause**" includes but is not limited to a subcontractor's or, where appropriate, a general contractor's:

5.3.1 Death or physical disability, if the listed subcontractor is an individual;

5.3.2 Dissolution, if a corporation or partnership;

5.3.3 Bankruptcy;

5.3.4 Inability to furnish any performance and payment bond shown on the bid form;

5.3.5 Inability to obtain, or loss of, a license necessary for the performance of the particular category of work;

5.3.6 Failure or inability to comply with a requirement of law applicable to contractors and subcontractors, or to subcontracts for construction, alteration, or repair projects;

5.3.7 Failure to perform his/her agreement to execute a subcontract under **C.G.S. § 4b-96**.

Any general contractor who violates any provision of **C.G.S. § 4b-95** shall be disqualified from bidding on other contracts that are subject to the provisions of **Chapter 60 - Construction and Alterations of State Buildings of the C.G.S.**, for a period **not to exceed twenty-four (24) months**, commencing from the date on which the violation is discovered, for each violation.

Section 6	Contract Monitoring and Reporting:
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- 6.1 CHRO** has the authority to monitor state contractors pursuant to **C.G.S. § 46a-68e** and **46a-68f** and **RSCA-§46a-68j-23(3)**. In addition, under the **RSCA §46a-68j-25(e)** and **46a-68j-26 (g)**, **CHRO** has the authority to monitor the implementation of an affirmative action plan regarding:
- 6.1.1** a successful bidder who has been awarded a public works contract valued at **\$500,000 or more** and;
 - 6.1.2** a contractor with **fifty (50)** or more employees who has been awarded a public works contract **in excess of \$50,000 in any fiscal year**.
- 6.2** In order to monitor the implementation of these plans **CHRO** requires that the following contract monitoring reports be compiled and submitted:
- 6.2.1 Monthly Employment Utilization Report (Form CHRO: 257):** A contractor, on behalf of itself and all subcontractors who perform work on the project during a given month, is required to report on the work hour participation of minority male and female workers in each trade category on the project. The report must be submitted to the contract awarding agency (**DAS**) and to the Commission by the 15th day following the end of each calendar month during the term of the on-site construction work of the project.
Website page: <http://www.ct.gov/chro>, then click on **Forms**, then click on **Contract Compliance Forms and Reports**.
 - 6.2.2 Quarterly Small Contractor and Minority Business Enterprise Payment Status Report (Form CHRO: 258).** A contractor is required to report on the participation of small contractors or minority business enterprises identified to participate on the project. The report must be submitted to the contract awarding agency (**DAS**) and to the Commission by the 15th day following the end of each calendar quarter during the term of the on-site construction work of the project.
Website page: <http://www.ct.gov/chro>, then click on **Forms**, then click on **Contract Compliance Forms and Reports**.
 - 6.2.3** In addition, the Commission expects that a contractor will designate an Equal Opportunity/Contract Compliance Officer for its public works project who will compile the above monthly and quarterly reports, as well as, undertake the following responsibilities for implementation of its project Affirmative Action Plan (AAP):
 - .1 Maintain a project Equal Employment Opportunity (EEO) file to include all records, correspondence and other documentation relate to the project AAP.
 - .2 Communicate to and inform all project subcontractors, regardless of tier, and labor referral organizations (if applicable) about project equal employment and AAP commitments and performance requirements.
 - .3 Participate in project job meetings to inform project subcontractors about project equal employment and AAP performance requirements.
 - .4 Track the use of employment recruitment sources identified in the project AAP regarding all employment opportunities with all subcontractors on the project. Also, maintain documentation of all contacts with these recruitment sources and their responses.

The Commission will forward a copy of the monthly and quarterly report to each contractor on a public works project.

NOTES:	Bidders and state contractors may review the full text of the before referenced Connecticut General Statutes by accessing either the State Law Library's web site (http://www.cslib.org/psaindex.htm) or the State Legislatures' web site (http://www.cga.ct.gov).
	The full text of the RSCA 46a-68j-21 through 46a-68j-43 may be reviewed by accessing the Commission's web site: http://www.ct.gov/chro/cwp/view.asp?a=2525&Q=315900&chroPNavCtr=#45679 In the alternative, bidders or state contractors may request a copy of these state statutes and regulations by contacting the Commission at (860) 541-3400 (in Hartford) or 1 (800) 477-5737.

Section 7	CHRO Contract Compliance Forms:
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The following CHRO Contract Compliance Forms are available on the CHRO Website:

7.1 Monthly Employment Utilization Report (Form CHRO-257 and CHRO-257a):

- <http://www.ct.gov/chro/lib/chro/257s.pdf>

7.2 Cumulative Utilization Report (Form CHRO-257b):

- <http://www.ct.gov/chro/lib/chro/257b.pdf>

7.3 Monthly Small Contractor & MBE Payment Status Report (Form CHRO-258a) and Quarterly Small Contractor & MBE Payment Status Report (Form CHRO-258):

- <http://www.ct.gov/chro/lib/chro/258s.pdf>

**End of Section
00 73 38 CHRO / Contract Compliance Regulations**

**Minimum Rates and Classifications
 for Building Construction**

**Connecticut Department of Labor
 Wage and Workplace Standards Division**

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following pages are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or sub-contractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his hourly wage.

Project Number:	BI-RD-299	Project Town:	Danbury
Project: Renovations of Second & Third Floors			
White Hall			
Western Connecticut State University			
181 White Street			
Danbury, CT			

The following pages contain:

Contractors Wage Certification Form	1 page
Notice to all Mason Contractors reference Section 31-53 of C.G.S. (Prevailing Wages)	1 page
Prevailing Wage Rates - English	15 pages
Informational Bulletin - Occupational Classifications	6 pages
Informational Bulletin – The 10-Hour OSHA Construction Safety and Health Course	2 pages
Footnotes	2 pages
Special Notice re: Wage Rate Adjustments	1 pages
Weekly Payroll Certification Form (WWS-CP1)	1 page
Fringe Benefits Explanation (P)	1 page
Weekly Payroll Certification Form (WWS-CP2)	1 page

As of: March 15, 2019



Opportunity * Guidance * Support



THIS IS A PUBLIC WORKS PROJECT

Covered by the

PREVAILING WAGE LAW

CT General Statutes Section 31-53

**If you have QUESTIONS regarding your wages
CALL (860) 263-6790**

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM
Construction Manager at Risk/General Contractor/Prime Contractor

I, _____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

Street

City

and all of its subcontractors will pay all workers on the

Project Name and Number

Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

Signed

Subscribed and sworn to before me this _____ day of _____, _____.

Notary Public

Return to:
Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

November 29, 2006

Notice
To All Mason Contractors and Interested Parties
Regarding Construction Pursuant to Section 31-53 of the
Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.

Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute.

The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders** - operates forklift solely to assist a mason to a maximum height of nine feet only.
- **Power Equipment Operator (Group 9)** - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

(b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) This section shall not apply to employees of public service companies, as defined in section 16-1, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in accordance with Federal Mine Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.

Project: Renovations Of Second And Third Floors White Hall At Western Connecticut State University

**Minimum Rates and Classifications
for Building Construction**

ID# : B 25785

**Connecticut Department of Labor
Wage and Workplace Standards Division**

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number:

Project Town: Danbury

State#: BI-RD-299

FAP#:

Project: Renovations Of Second And Third Floors White Hall At Western Connecticut State University

CLASSIFICATION	Hourly Rate	Benefits
1a) Asbestos Worker/Insulator (Includes application of insulating materials, protective coverings, coatings, & finishes to all types of mechanical systems; application of firestopping material for wall openings & penetrations in walls, floors, ceilings	38.25	27.96
<hr/>		
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
<hr/>		
1c) Asbestos Worker/Heat and Frost Insulator	40.21	29.30

As of: **Friday, March 08, 2019**

Project: Renovations Of Second And Third Floors White Hall At Western Connecticut State University

2) Boilermaker	38.34	26.01
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3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	34.72	32.55 + a
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3b) Tile Setter	34.90	25.87
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3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
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3d) Tile, Marble & Terrazzo Finishers	26.70	21.75
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3e) Plasterer	33.48	32.06
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-----LABORERS-----

4) Group 1: Laborers (common or general), acetylene burners, concrete specialists, wrecking laborers, fire watchers.	30.05	20.10
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4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofers/mixer/nozzleman (Person running mixer and spraying fireproof only).	30.30	20.10
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4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	30.55	20.10
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4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is \$26.80.	30.55	20.10
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4d) Group 5: Air track operator, sand blaster and hydraulic drills.	30.55	20.10
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4e) Group 6: Blasters, nuclear and toxic waste removal. 31.80 20.10

4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped). 31.05 20.10

4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew. 28.38 20.10

4h) Group 9: Top men on open air caisson, cylindrical work and boring crew. 27.86 20.10

4i) Group 10: Traffic Control Signalman 16.00 20.10

5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers. 32.60 25.34

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Project: Renovations Of Second And Third Floors White Hall At Western Connecticut State University

5a) Millwrights 33.14 25.74

6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9) 38.82 26.25+3% of gross wage

7a) Elevator Mechanic (Trade License required: R-1,2,5,6) 53.37 33.705+a+b

-----LINE CONSTRUCTION-----

Groundman 26.50 6.5% + 9.00

Linemen/Cable Splicer 48.19 6.5% + 22.00

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8) Glazier (Trade License required: FG-1,2) 37.18 21.05 + a

9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection 35.47 35.14 + a

----OPERATORS----

Group 1: Crane handling or erecting structural steel or stone, hoisting engineer 2 drums or over, front end loader (7 cubic yards or over), work boat 26 ft. and over and Tunnel Boring Machines. (Trade License Required) 39.55 24.30 + a

Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver (\$3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required) 39.23 24.30 + a

Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar); Grader Operator; Bulldozer Fine Grade. (slopes, shaping, laser or GPS, etc.). (Trade License Required) 38.49 24.30 + a

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Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	38.10	24.30 + a
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Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell)	37.51	24.30 + a
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Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	37.51	24.30 + a
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Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	37.20	24.30 + a
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Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under Mandrell).	36.86	24.30 + a
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Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	36.46	24.30 + a
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Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder). 36.03 24.30 + a

Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc. 33.99 24.30 + a

Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment. 33.99 24.30 + a

Group 12: Wellpoint operator. 33.93 24.30 + a

Group 13: Compressor battery operator. 33.35 24.30 + a

Group 14: Elevator operator; tow motor operator (solid tire no rough terrain). 32.21 24.30 + a

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Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator. 31.80 24.30 + a

Group 16: Maintenance Engineer/Oiler. 31.15 24.30 + a

Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator. 35.46 24.30 + a

Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license). 33.04 24.30 + a

-----PAINTERS (Including Drywall Finishing)-----

10a) Brush and Roller 33.62 21.05

Project: Renovations Of Second And Third Floors White Hall At Western Connecticut State University

10b) Taping Only/Drywall Finishing	34.37	21.05
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10c) Paperhanger and Red Label	34.12	21.05
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10e) Blast and Spray	36.62	21.05
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11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	42.62	31.21
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12) Well Digger, Pile Testing Machine	37.26	24.05 + a
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Roofer: Cole Tar Pitch	41.50	17.00 + a
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Roofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	40.00	17.00 + a
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15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	43.70	42.40
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16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	42.62	31.21
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-----TRUCK DRIVERS-----

17a) 2 Axle	29.13	23.33 + a
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17b) 3 Axle, 2 Axle Ready Mix	29.23	23.33 + a
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17c) 3 Axle Ready Mix	29.28	23.33 + a
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17d) 4 Axle, Heavy Duty Trailer up to 40 tons	29.33	23.33 + a
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17e) 4 Axle Ready Mix	29.38	23.33 + a
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17f) Heavy Duty Trailer (40 Tons and Over)	29.58	23.33 + a
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17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	29.38	23.33 + a
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18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	43.92	15.84 + a
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19) Theatrical Stage Journeyman

25.76

7.34

Project: Renovations Of Second And Third Floors White Hall At Western Connecticut State University

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.*

***Note: Hazardous waste premium \$3.00 per hour over classified rate*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra \$4.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - \$1.50 extra

Crane with 200 ft. boom (including jib) - \$2.50 extra

Crane with 250 ft. boom (including jib) - \$5.00 extra

Crane with 300 ft. boom (including jib) - \$7.00 extra

Crane with 400 ft. boom (including jib) - \$10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

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Project: Renovations Of Second And Third Floors White Hall At Western Connecticut State University

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: Friday, March 08, 2019

Information Bulletin ***Occupational Classifications***

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53(d).

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification. If unsure, the employer should seek guidelines for CTDOL.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**

Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- **ASBESTOS INSULATOR**

Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- **BOILERMAKERS**

Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**

Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**

Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **LABORER, CLEANING**

- The clean up of any construction debris and the general (heavy/light) cleaning, including sweeping, wash down, mopping, wiping of the construction facility and its furniture, washing, polishing, and dusting.

- **DELIVERY PERSONNEL**

- If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

- An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer or tradesman, and not a delivery personnel.

- **ELECTRICIANS**

Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ***License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.**

- **ELEVATOR CONSTRUCTORS**

Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. **License required by Connecticut General Statutes: R-1,2,5,6.*

- **FORK LIFT OPERATOR**

Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

Power Equipment Operator Group 9 - operates forklift to assist any trade, and to assist a mason to a height over nine (9) feet.

- **GLAZIERS**

Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers, which require equal composite workforce.

- **IRONWORKERS**

Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which require equal composite workforce.

- **INSULATOR**

- Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings.

- **LABORERS**

Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), decorative security fence (non-metal)).

installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- **PAINTERS**

Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- **LEAD PAINT REMOVAL**

- Painter's Rate

1. Removal of lead paint from bridges.
2. Removal of lead paint as preparation of any surface to be repainted.
3. Where removal is on a Demolition project prior to reconstruction.

- Laborer's Rate

1. Removal of lead paint from any surface NOT to be repainted.
2. Where removal is on a *TOTAL* Demolition project only.

- **PLUMBERS AND PIPEFITTERS**

Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ****License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- **POWER EQUIPMENT OPERATORS**

Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ****License required, crane operators only, per Connecticut General Statutes.***

- **ROOFERS**

Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (demolition or removal of any type of roofing and or clean-up of any and all areas where a roof is to be relaid.)

- **SHEETMETAL WORKERS**

Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, fascia, louvers, partitions, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers. To include testing and air –balancing ancillary to installation and construction.

- **SPRINKLER FITTERS**

Installation, alteration, maintenance and repair of fire protection sprinkler systems.

****License required per Connecticut General Statutes: F-1,2,3,4.***

- **TILE MARBLE AND TERRAZZO FINISHERS**

Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

~How to pay truck drivers delivering asphalt is under REVISION~

Truck Drivers are requires to be paid prevailing wage for time spent "working" directly on the site. These drivers remain covered by the prevailing wage for any time spent transporting between the actual construction location and facilities (such as fabrication, plants, mobile factories, batch plant, borrow pits, job headquarters, tool yards, etc.) dedicated exclusively, or nearly so, to performance of the contract or project, which are so located in proximity to the actual construction location that it is reasonable to include them. ****License required, drivers only, per Connecticut General Statutes.***

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

➤ *Any questions regarding the proper classification should be directed to:*
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543.

Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

(applicable to public building contracts entered into *on or after July 1, 2007*, where the total cost of all work to be performed is at least \$100,000)

- (1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);
- (2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;
- (3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least \$100,000;
- (4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;
- (5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;
- (6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;
- (7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;
- (8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;
- (9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

- (10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;
- (11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;
- (12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;
- (13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;
- (14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and
- (15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.
- (16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of <http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm>; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTIMATELY ARISE CONCERNING THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES

⇒ Please Note: If the “Benefits” listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the “Benefits” section for the occupation lists only a dollar amount, disregard the information below.

Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)

- a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

- a. Paid Holidays: New Year’s Day, Memorial Day, Independence Day, Labor Day, Veterans’ Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.
- b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

- a. Paid Holidays: Labor Day and Christmas Day.

Power Equipment Operators
(Heavy and Highway Construction & Building Construction)

- a. Paid Holidays: New Year’s Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

- a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

- a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

- a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

STATUTE 31-55a

- SPECIAL NOTICE -

To: All State and Political Subdivisions, Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the **contractor's** responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

[New] In accordance with Section 31-53b(a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

WEEKLY PAYROLL

Connecticut Department of Labor
Wage and Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

In accordance with Connecticut General Statutes, 31-53
Certified Payrolls with a statement of compliance
shall be submitted monthly to the contracting agency.

CONTRACTOR NAME AND ADDRESS:											SUBCONTRACTOR NAME & ADDRESS				WORKER'S COMPENSATION INSURANCE CARRIER				
PAYROLL NUMBER	Week-Ending Date	PROJECT NAME & ADDRESS									POLICY #				EFFECTIVE DATE: EXPIRATION DATE:				
PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE						Total ST Hours	BASE HOURLY RATE	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS				GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
				S	M	T	W	TH	F	S				Total O/T Hours	TOTAL FRINGE BENEFIT PLAN CASH	FICA	FEDERAL WITH- HOLDING		
				HOURS WORKED EACH DAY							\$ Base Rate	1. \$ 2. \$ 3. \$ 4. \$ 5. \$ 6. \$							
											\$ Base Rate	1. \$ 2. \$ 3. \$ 4. \$ 5. \$ 6. \$							
											\$ Base Rate	1. \$ 2. \$ 3. \$ 4. \$ 5. \$ 6. \$							
											\$ Base Rate	1. \$ 2. \$ 3. \$ 4. \$ 5. \$ 6. \$							

12/9/2013 *IF REQUIRED *SEE REVERSE SIDE PAGE NUMBER ____ OF

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker’s compensation, income taxes, etc.).

Please specify the type of benefits provided:

- 1) Medical or hospital care _____ 4) Disability _____
- 2) Pension or retirement _____ 5) Vacation, holiday _____
- 3) Life Insurance _____ 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of _____,

I, _____ of _____, (hereafter known as Employer) in my capacity as _____ (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

- a) The records submitted are true and accurate;
- b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such person to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;
- c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);
- d) Each such person is covered by a worker’s compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;
- e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and
- f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such persons name first appears.

_____ (Signature) _____ (Title) _____ Submitted on (Date)

Weekly Payroll Certification For
Public Works Projects (Continued)

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

Week-Ending Date:
Contractor or Subcontractor Business Name:

WEEKLY PAYROLL

PERSON/WORKER, ADDRESS and SECTION	APPR RATE %	MALE/ FEMALE AND RACE*	WORK CLASSIFICATION Trade License Type & Number - OSHA 10 Certification Number	DAY AND DATE							Total ST Hours Total O/T Hours	BASE HOURLY RATE TOTAL FRINGE BENEFIT PLAN CASH	TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)	GROSS PAY FOR ALL WORK PERFORMED THIS WEEK	TOTAL DEDUCTIONS				GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY			
				S	M	T	W	TH	F	S					FICA	WITH- HOLDING	WITH- HOLDING	OTHER					
														HOURS WORKED EACH DAY									
													\$	Base Rate	1. \$								
													\$	Cash Fringe	2. \$								
													\$	Base Rate	3. \$								
													\$	Cash Fringe	4. \$								
													\$	Base Rate	5. \$								
													\$	Cash Fringe	6. \$								

*IF REQUIRED

Additional Forms to Be Submitted After Bond Commission Funding Approval

DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

Table of Contents	No. of Pages
Performance Bond	2
Labor And Material Bond	2
Surety Sheet	1
Bidder's Certification: Financial Position and Corporate Structure	1

PERFORMANCE BOND
Know All Men by These Presents

THAT [] of the
Town of [], County [] and
State of [], as Principal (hereinafter called the Principal),
and [], []

(Insert place of Business)

(a surety company authorized to transact business in the State Of Connecticut) as Surety(ies) (hereinafter called the Surety) are held and firmly bound unto the State of Connecticut (hereinafter called the Obligee) in the full penal sum of

[]

(\$ []) Dollars, lawful money of the United States, to be paid to said State of Connecticut, to the which payment well and truly to be made and done, the said Principal binds himself, his heirs, executors, administrators and assigns (or itself, its successors and assigns), and the said Surety (ies) binds itself, its successors and assigns jointly and severally firmly by these presents.

Signed, sealed and delivered this [] day of [] 20 [] .

THE CONDITION OF THIS OBLIGATION IS SUCH THAT

WHEREAS said Principal will enter into a certain written contract with said Obligee, to be dated-the

[] day of [] 20 [] , which written , as amended, contract shall provide for the following:

- Project Title:** []
- Project Location:** []
- Contract Number:** []
- Project Number:** []

which contract, including any hereafter made extension, modification or alteration thereof, together with all plans and specifications now made or which may hereafter be made in extension, modification or alteration thereof, is hereby referred to, incorporated in, and made a part of this bond as though herein fully set forth.

NOW, THEREFORE, if the said Principal shall well and truly keep, perform and execute all the undertaking, covenants, terms, conditions, and agreements of said contract, as it may be extended, modified or altered, and during the *period* of any guaranty required under the contract, according to its provisions on his or its part to be kept and performed or shall indemnify and reimburse the Obligee for any loss that it may suffer through the failure of the Principal to faithfully observe and perform each and every obligation and duty imposed upon the Principal by the said contract, as it may be extended, modified or altered, at the time and in the manner therein specified, then this obligation shall be null and void, otherwise it shall remain and be in full force and effect.

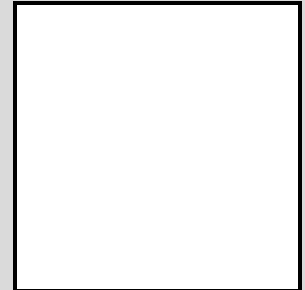
Any alterations which may be made in the terms of the contract, or in the work done or to be done under it, or the giving by the Obligee of any extension of time for the performance of the contract or any other forbearance on the part of either the Obligee or the Principal, one to the other, shall not in any way release the Principal, and/or the Surety(ies) or either of them, their representatives, heirs, executors, administrators, successors or assigns from liability hereunder, and notice to the Surety(ies) of any such alteration, modification, extension or forbearance is hereby specifically and absolutely waived.

In the event that the Surety(ies) assumes the contract or obtains a bid or bids for completion of the contract, the Surety(ies) shall ensure that the contractor chosen to complete the contract is prequalified pursuant to section 4a-100 of the Connecticut General Statutes, in the requisite classification and has the aggregate work capacity rating and single project limit necessary to complete the contract.

IN TESTIMONY WHEREOF, the said Principal has hereunto set his / its hand and seal, and the said Surety(ies) has/have caused this instrument to be signed by its/their attorney in fact and its corporate seal to be hereunto affixed, the day and year first written.

Witness as to Principle

SEAL



(Print Name)

, Its

Duly Authorized

(Print Name)

Witness as to Surety

SEAL



(Print Name)

by

Its attorney in fact

(Print Name)

Note: If more than one surety, add additional lines for additional surety name and address, person signing and title, and two witnesses. Obtain Power of Attorney for each surety.

End Performance Bond

**LABOR AND MATERIAL BOND
Know All Men by These Presents**

THAT [] of the
Town of [], County [] and
State of [], as Principal (hereinafter called the Principal),
and [], []
(Insert place of Business)

(a surety company authorized to transact business in the State Of Connecticut) as Surety(ies) (hereinafter called the Surety) are held and firmly bound unto the State of Connecticut (hereinafter called the Obligee) in the full penal sum of

[]
(\$ []) Dollars, lawful money of the United States, to be paid to said State of Connecticut, to the which payment well and truly to be made and done, the said Principal binds himself, his heirs, executors, administrators and assigns (or itself, its successors and assigns), and the said Surety (ies) binds itself, its successors and assigns jointly and severally firmly by these presents.

Signed, sealed and delivered this [] day of [] 20 [] .

THE CONDITION OF THIS OBLIGATION IS SUCH THAT

WHEREAS said Principal will enter into a certain written contract with said Obligee, to be dated the [] day of [] 20 [] , which written, as amended, contract shall provide for the following:

- Project Title:** []
- Project Location:** []
- Contract Number:** []
- Project Number:** []

which contract, including any hereafter made extension, modification or alteration thereof, together with all plans and specifications now made or which may hereafter be made in extension, modification or alteration thereof, is hereby referred to, incorporated in, and made a part of this bond as though herein fully set forth.

NOW, THEREFORE, if the said Principal shall promptly pay for all materials furnished and labor supplied or performed in the prosecution of the work included in and under the aforesaid contract, as it may be extended, modified or altered, and/or required by the General Statutes of Connecticut, as amended, whether or not the material or labor enters into and becomes a component part of the real asset, then this obligation shall be null and void, otherwise it shall remain and be in full force and effect. This bond is provided pursuant to Section 49-41 et seq. of the General Statutes of Connecticut and shall be governed thereby.

Any party, whether a subcontractor or otherwise, who furnishes materials or supplies or performs labor or services in the prosecution of the work under said contract, as it may be extended, modified or altered, and who is not paid therefor, may bring a suit on this bond in the name of the person suing and prosecute the same to final execution and judgment for such sum or sums as may be justly due.

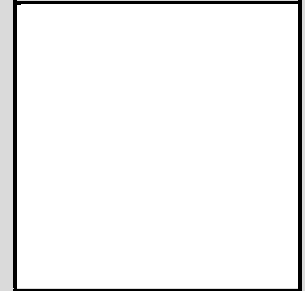
Any alterations which may be made in the terms of the contract, or in the work done or to be done under it, or the giving by the Obligee of any extension of time for the performance of the contract or any other forbearance on the part of either the Obligee or the Principal, one to the other, shall not in any way release the Principal, and/or the Surety(ies) or either of them, their representatives, heirs, executors, administrators, successors or assigns from liability hereunder, and notice to the Surety(ies) of any such alteration, modification, extension or forbearance is hereby specifically and absolutely waived.

In the event that the Surety(ies) assumes the contract or obtains a bid or bids for completion of the contract, the Surety(ies) shall ensure that the contractor chosen to complete the contract is prequalified pursuant to section 4a-100 of the Connecticut General Statutes, in the requisite classification and has the aggregate work capacity rating and single project limit necessary to complete the contract.

IN TESTIMONY WHEREOF, the said Principal has hereunto set his / its hand and seal, and the said Surety(ies) has/have caused this instrument to be signed by its/their attorney in fact and its corporate seal to be hereunto affixed, the day and year first written.

Witness as to Principle

SEAL



(Print Name)

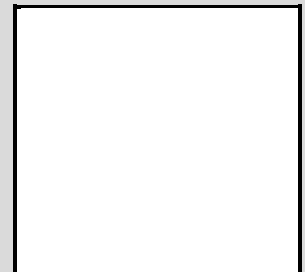
, Its

Duly Authorized

(Print Name)

Witness as to Surety

SEAL



(Print Name)

by

Its attorney in fact

(Print Name)

Note: If more than one surety, add additional lines for additional surety name and address, person signing and title, and two witnesses. Obtain Power of Attorney for each surety.

End Labor and Material Bond

Surety Sheet

State Of Connecticut
Department of Administrative Services, Construction Services
Office of Legal Affairs, Policy, and Procurement
450 Columbus Boulevard, Suite 1302
Hartford, CT 06103

1. Surety Company

Name of Surety Co.:

Address of Home Office:

Telephone Number:

2. Agent

Name of Surety Co.:

Address of Agency:

Telephone Number:

Attorney-In-Fact:

Telephone Number:

DAS Project Number:

Contractor's Name:

End Surety Sheet

**Bidder's Certification:
Financial Position and Corporate Structure**

(Your Name)

(Name Of Company)

Pursuant to C.G.S. § 4b-91(e), as amended, the bidder for this contract (hereinafter "bidder"), certifies under penalty of false statement that the information in the bid is true, that there has been no substantial change in the bidder's financial position or corporate structure since its most recent prequalification certificate was issued or renewed, other than those changes noted in the update statement, and that the bid was made without fraud or collusion with any person.

(Signature)

(Print Name)

(Date)

(DAS Project Number)

End Bidder's Certification: Financial Position and Corporate Structure

**End of Section 00 92 10
Additional Forms To Be Submitted After Bond Commission Funding Approval**

Procedures Regarding Taxation For Nonresident General / Prime Contractor and Subcontractors

DAS | Construction Services | Office of Legal Affairs, Policy, and Procurement

According to [Connecticut General Statutes § 12-430\(7\)](#), there are two types of Nonresident Contractors and Subcontractors (*Verified* or *Unverified*) who are required to furnish security for Connecticut taxes arising from jobs performed in Connecticut.

Detailed information can be found by visiting the Connecticut Department of Revenue Services (DRS) website at www.ct.gov/drs:

- Under the “**For Businesses**” title, click on “**Withholding Tax**”;
- Click on “**Registering**”;
- Click on “**5. What tax types do I need to register for with DRS**”;
- Read the information for “**Out-of-State**” contractors.
- Click on “[SN 2012\(2\)](#)” for the “Procedure Governing Nonresident Contractors”.

Forms can be downloaded from the DRS website (www.ct.gov/drs) as follows:

- Click on “**Forms**” at the top of the page;
- Under “**Current Year Forms**”:
 - Click on “**Miscellaneous Tax Forms**”;
 - Click on “**Bond Forms**”
- Download the appropriate form.

For questions regarding the nonresident contractor bond law, call **DRS** at **860-541-7538**.

1.0 Verified Nonresident Contractors and Subcontractors

Verified Nonresident Contractors are treated just like Resident Contractors. A Verified Nonresident General or Prime Contractor is not required to file a surety bond with DRS. A Verified Nonresident Subcontractor is not required for the General or Prime Contractor to hold back a portion of the amount owed the Subcontractor under the contract.

1.1 Verification Procedure for General/Prime Contractors and Subcontractors:

1.1.1 Register with DRS via REG-1 for all appropriate taxes.

1.1.2 Submit Form AU-960 “Nonresident Contractor Request for Verified Contractor Status” to DRS. If you have a 3 year filing history with DRS and no delinquencies, then just complete **Part I & Part I**, otherwise go to **Part III**.

1.1.3 Submit Form AU-961 “Verification Bond” to DRS.

1.1.4 If Verified by DRS, submit “**Notice of Verified Status**” (Verification Letter issued by DRS) to the Connecticut Department of Administrative Services / Construction Services (DAS/CS) Office of Legal Affairs, Policy, and Procurement as specified in Section 00 41 00 Bid Proposal Form.

**2.0 Unverified Nonresident Contractors and Subcontractors
(for Contracts Greater Than \$250,000):**

The requirements for Unverified Nonresident Contractors and Unverified Nonresident Subcontractors (for Contracts greater than \$250,000) are different for General/Prime Contractors and their Subcontractors:

2.1 Unverified Nonresident General or Prime Contractors:

- 2.1.1** Submit **Form AU-964 “Surety Bond and Release” to DRS**. The Unverified Nonresident General/Prime Contractor is required to file a good and valid surety bond with DRS using Form AU-964 “Surety Bond and Release” for 5% of the contract price to secure payment of required taxes by both the General/Prime Contractor and its Subcontractors.
- 2.1.2** The General/Prime Contractor must provide proof to DAS/CS that they have posted a good and valid surety bond with DRS by providing a copy of **Form AU-965 “Acceptance of Surety Bond”** that verifies acceptance of the bond by DRS*.

2.2 Unverified Nonresident Subcontractors:

- 2.2.1** The Resident or Verified or Unverified Nonresident General/Prime Contractor is required to hold back 5% of its payments to the Unverified Nonresident Subcontractor. The General/Prime Contractor must keep the hold-backs in a special fund in trust for the state.
- 2.2.2** The Unverified Nonresident Subcontractor can request that the money be released from the General/Prime Contractor by submitting **Form AU-967 “Request for Certificate of Compliance” to DRS**. It must be signed by the General/Prime Contractor and the Nonresident Subcontractor and submitted **to DRS within 90 days of the completion date**.
- 2.2.3** If **Form AU-968 “Certificate of Compliance”** is issued by DRS, DRS will instruct the General/Prime Contractor holding back the 5% to release the withheld amount to the Nonresident Subcontractor. If the “Certificate of Compliance” is denied or not requested within **90 days of the completion date of the contract**, the General/Prime Contractor holding back the 5% will remit the withheld amount on their own Sales & Use tax returns.
- 2.2.4** The 5% holdback does not take the place of any tax returns due from the Unverified Nonresident Contractor.
- 2.2.5** The General/Prime Contractor must give the Unverified Nonresident Subcontractor written notice of the hold-back requirements by the time the Subcontractor begins work under the contract.

*Document(s) must be submitted to the DAS/CS Office of Legal Affairs, Policy, and Procurement as specified in Section 00 41 00 “Bid Proposal Form”.

End of Section

**00 92 30 Procedures Regarding Taxation
For Nonresident General/Prime Contractor & Subcontractors**

PART 1 – GENERAL

1.1 DEFINITIONS

- A. Contractor:**
Whenever the term "**Contractor**" is used in these Division 01 General Requirements and the Contract Documents, it may be understood to mean either the **Design-Bid-Build (D-B-B) "General Contractor"** or the **Construction Manager at Risk ("CMR")** as applicable to the specific Project.
- B. Subcontractor:**
Whenever the term "**Subcontractor**" is used, it may be understood to mean either a **Subcontractor** or a **Supplier**, as applicable to the specific Project.
- C. Contract:**
Whenever the term "**Contract**" is used in these Division 01 General Requirements and the Contract Documents, it may be understood to mean either the **D-B-B General Contractor's Contract Sum** as stated in their Contract or the **CMR's Contract Sum** as stated in their CMR Agreement, as applicable to the specific Project.

1.2 RELATED DOCUMENTS

- A.** The Contract Documents are defined in the D-B-B and CMR Division 00 General Conditions, as applicable to the specific Project.
- B.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Delivery Method:** **NOTE: Check applicable Project Delivery Method Below:**
- Design-Bid-Build (DBB);
 - Construction Manager at Risk (CMR)
- B. Project Number:** **BI-RD-299.**
- C. Project Title:** **Western Connecticut State University Renovations to White Hall.**
- D. Project Location:** The **Western Connecticut State University Campus**, located in **Danbury**, Connecticut.
- E. The Project Description:**
- Renovation of the Second and Third Floors of White Hall. of approximately **63,000** gross square feet.
 - The Base Project consists of the renovations of major portions of the Second Floor including the Toilet Rooms, portions of the Third Floor including HVAC equipment suitable for future interior fit-out of those portions not included in this Project. there is also a Supplemental Bid for the renovations of the Third Floor Toilet rooms
 - The Authorities Having Jurisdiction for Threshold Projects, Non-Threshold Projects, and/or Connecticut State University System (CSUS) 2020 Projects, as defined by the Connecticut General Statutes, are the Connecticut Department of Administrative Services (DAS) / Construction Services (CS) Office of State Building Inspector (OSBI) and Office of State Fire Marshal (OSFM).
- F. Owner:**
- Owner's Name:** The Owner is the State of Connecticut, Department of Administrative Services.
 - Authorized Representative for the Owner: DAS/CS Project Manager Name:** **Anthony DeNapoli.**
 - DAS/CS Project Manager's Location:** The DAS/CS Project Manager is located at 450 Columbus Blvd, Suite 1201, Hartford, CT, 06103.
 - Phone:** **860-713-5844;**
 - Fax:** **860-622-2631;**
 - Email(s):** **Anthony.denapoli@ct.gov.**

3. **Authority:** The DAS/CS Project Manager is the only authorized representative for the Department of Administrative Services Commissioner to act in matters involving revoking, altering, enlarging or relaxing any requirement of the Contract Documents.
 - a. **Related Section: Article 25, All Work Subject To Control of the Commissioner,** Division 00 General Conditions of the Contract for Construction.
- G. Agency:**
1. **Agency Name:** The Connecticut State (User) Agency is **Western Connecticut State University**.
 2. **Agency Representative Name and Title:** **Douglas M. Florance**. The Agency Representative's Title is **Interim Director, Facilities Planning & Engineering**.
 - a. **Agency Representative Location:** The Agency Representative is located at **WCSU, White Hall,181 White Street], Danbury, Connecticut**.
 - b. **Phone:** **203-837-8680**;
 - c. **Fax:** **203-837-8723**;
 - d. **Email(s):** **floranced@wcsu.edu**.
 3. **Authority:** The Agency Representative has the administrative authority for the facility and or site where the work is being performed but does not have the authority to change the Contract Documents or direct the Contractor.
- H. Architect and Engineer (A/E):**
1. **Architect's Name:** The Architect representing the firm for this project is **Alan Lagocki AIA**.
 - a. **Architect's Location:** The Architect is located at **[Ames & Whitaker Architects, 31 Liberty Street, Suite 208,[Southington, Connecticut 06489**.
 - b. **Phone:****860-621-8944**;
 - c. **Fax:** **860-621-0957**;
 - d. **Email(s):** **al213@amesandwhitaker.com**.
 2. The Architect and Engineer (A/E) or their accredited representative is referred to in the Contract Documents as "Architect" or "Architects" or "Engineer" or "Engineers" or by pronouns which imply them. As information for the Contractor, the Architect's or Engineer's status is defined as follows:
 - a. The Architect and Engineer will not make interpretations or decisions directly to the Contractor. All interpretations or decisions will be conveyed through the Construction Administrator to the DAS/CS Project Manager.
 - b. As the authorized representative of the Department of Administrative Services Commissioner, the Architect and Engineer is responsible for review of shop drawings, materials, and equipment intended for the work, in accordance with the Division 00 "General Conditions" and "Supplementary Conditions".
 3. Wherever the Architect or Engineer is mentioned in the documents in connection with an administrative function, it shall include the Construction Administrator in that function except for shop drawings.
- I. Construction Administrator (CA):**
1. **Construction Administrator Name:** **Downes Construction Company, LLC**.
 - a. **Construction Administrator Location:** The Construction Administrator is located at **200 Stanley Street, New Britain, Connecticut 06051**.
 - b. **Phone:** **860-229-3755**;
 - c. **Fax:****860-225-3617**;
 - d. **Email(s):** **mmaacdonald@downesco.com**.
 2. **Authority:** As information to the Contractor, the Construction Administrator's status is defined as follows:
 - a. The Construction Administrator (CA) is referred to in the Contract Documents as "Construction Administrator" or by pronouns which imply it. All communications concerning the project will be directed through the Construction Administrator or a designated representative(s).
 - b. The Construction Administrator is the Owner's Agent who will, among other things, monitor and analyze the Contractor's performance, scheduling and construction, process shop drawings,

material, and equipment submittals, review and process periodic billings, review, analyze, and recommend cost changes.

c. **Related Section: Article 26 “Authority of the Construction Administrator”** of Division 00 “General Conditions of the Contract for Construction”.

3. The Construction Administrator will process all requests for information, interpretations and decisions regarding the meaning and intent of the Contract Documents, consulting with appropriate parties prior to rendering the interpretations or decisions for the Project Manager to the Contractor. All such requests and replies shall be in writing.

K. **Work:** The Work Includes but is not limited to the following:

- 1 **Miscellaneous Metals;**
- 2 **Rough Carpentry;**
- 3 **Insulation, , Firestopping, Roof flashings and accessories, Sheet metal, and Joint Sealants;**
- 4 **Doors and Frames, Hardware ;**
- 5 **Drywall, Floor Coverings, Acoustical Ceilings, and Painting;**
- 6 **Toilet Compartments, Louvers and Vents, Wall Surface Protection Systems, Signage, Fire Extinguishers, and Toilet Accessories;**
- 7 **Wet Pipe Sprinkler Modifications;**
- 8 **Plumbing Fixtures;**
- 9 **Domestic Hot & Cold Water Piping Modifications;**
- 10 **Waste & Vent Piping Modifications;**
- 11 **Condensate Drainage Piping;**
- 12 **Floor Drains;**
- 13 **General Duty Valves for HVAC Piping;**
- 14 **Hangers & Supports for HVAC Piping & Equipment;**
- 15 **Testing, Adjusting and Balancing for HVAC;**
- 16 **HVAC Insulation;**
- 17 **DDC Control System for HVAC;**
- 18 **Hot Water Hydronic Piping;**
- 19 **Refrigerant Piping;**
- 20 **HVAC Water Treatment;**
- 21 **HVAC Ducts;**
- 22 **VAV Boxes;**
- 23 **Air Inlets & Outlets;**
- 24 **Dedicated Outdoor Air System;**
- 25 **Variable Refrigerant Volume System;**
- 26 **Convection Heating Units;**
- 27 **Air Duct Accessories;**
- 28 **Lighting & Controls;**
- 29 **Panelboards, Branch Circuits, Electrical Distribution & Feeders;**
- 30 **Fire Alarm Upgrades & Modifications;**
- 31 **Data Network Infrastructure;**
- 32 **Access Control/Security Infrastructure Upgrades & Expansion.**

L. The Contractor will include in their bid, all items required in order to carry out the intent of the Work as described, shown and implied in the Contract Documents.

M. It shall be the Contractor's responsibility upon discovery to immediately notify the Construction Administrator, in writing, of errors, omissions, discrepancies, and instances of noncompliance with

- applicable codes and regulations within the documents, and of any work which will not fit or properly function if installed as indicated on the Contract Documents. Any additional costs arising from the Contractor's failure to provide such notification shall be borne by the Contractor.
- N. The Work will be constructed under the Contractor's Contract as applicable to this Project.
 - O. The Work will be performed in accordance with the Connecticut Department of Energy and Environmental Protection's (DEEP) "**General Permit for the Discharge of Stormwater and Dewatering Wastewater from Construction Activities**" (DEEP-WPED-GP-015) and **Stormwater Pollution Control Plan (SPCP)**, including, but not limited to, implementing, maintaining, and updating the SPCP, performing regular inspections, conducting and reporting stormwater monitoring activities, retaining records for the required period of time, and performing all post-construction measures and inspections. See **Section 01 50 00 "Temporary Facilities and Controls"** and **Section 31 20 05 "Sedimentation and Erosion Control"** for additional information.

1.4 WORK SEQUENCE (PHASES)

- A. **Related Documents:** Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. The entire Project shall be constructed in One Phase(s). Work of these Phase(s) shall be substantially complete, ready for occupancy within 260 Calendar Days of commencement of the Work (the "**Contract Time**"). The Owner will be occupying the Building during construction. Certain portions of the Work can take place with general coordination with the Owner. However, Work within Corridors and Classrooms will require the Contractor to work closely with the Owner to minimize impact to the Owner's occupancy. For these areas, a Proposed Sequence of Work is indicated below. Access to two (2) exits shall be maintained for the Owner and the Contractor's forces. The Contractor shall coordinate with the Owner in designating a Stairway for the main use of the Contractor during normal business hours. Proposed Sequences as follows:
 - 1. **Third Floor West Wing North.**
 - 2. **Third Floor West Wing South.**
 - 3. **Third Floor South Wing.**
 - 4. **Third Floor East Wing North.**
 - 5. **Third Floor East Wing South.**
 - 6. **Second Floor West Wing North.**
 - 7. **Second Floor West Wing South.**
 - 8. **Second Floor South Wing.**
 - 9. **Second Floor East Wing North.**
 - 10. **Second Floor East Wing South.**

1.5 CONTRACTOR'S USE OF PREMISES

- A. **General:** During the construction period the Contractor shall have full use of the newly constructed premises for construction operations, including use of the site. The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.
- B. **Use of the Site:** Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
 - 1. **Owner Occupancy:** Allow for Owner occupancy and use by the public of the existing facility.
 - 2. The Contractor shall confine his operations including storage of materials, supplies, equipment, and apparatus to the areas bounded by the contract limits indicated and as directed in the Contract Documents.
 - 3. Existing roads, drives, walks, and parking areas which are not within the contract limit line are to be kept free and clear at all times. All deliveries for the project are to enter the property from **5th Avenue**. The Contractor shall check all roadways for accessibility and clearances for deliveries of all large material and equipment. The Contractor shall inform the Construction Administrator at least **seventy-two (72)** hours in advance of these deliveries so they can be coordinated with the Agency so appropriate traffic control, etc. can be provided. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

4. The Contractor shall be responsible for keeping the premises clean and shall pick up rubbish and debris and promptly remove from site.
 5. Parking for the Contractor's employees will be limited to an area designated by the Construction Administrator, and the Contractor may be required to provide identification stickers for all employees' cars.
 6. Special precautions shall be taken to protect all wetland areas designated to remain. Prevent any and all sediment, debris, or other materials from getting into these areas. Should any sediment, debris, or other materials get into these areas or if any damage occurs to the vegetation therein, the Contractor shall immediately contact the Construction Administrator for direction.
 7. The Contractor shall comply with local working hour restrictions, unless specifically approved otherwise in writing by the Owner.
 8. No signs, other than those approved by the Construction Administrator, will be visible on the premises.
- C. Use of the Existing Building:** Maintain the existing building in a weather-tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period. Note: Check with Agency special types of conditions. Contractor personnel are not allowed to use the Cafeteria or vending machines within the existing buildings unless authorized in writing by the agency.

1.6 OCCUPANCY REQUIREMENTS

- A. Full Agency Occupancy During Construction:** The Owner reserves the right to allow the Agency to occupy the site and existing building during the entire construction period. Cooperate with the Agency during construction operations to minimize conflicts and facilitate Agency usage. Perform the Work so as not to interfere with the Agency's operations.
1. Provide adequate building and fire code egress from the buildings during the renovation process and/or as indicated on the Contract Documents. The Contractor will be responsible to maintain and protect egress ways during the construction sequence as required and/or indicated in the Contract documents. The Contractor shall be responsible for preparing egress plans for Owner approval and for DAS/CS Office of State Building Official and Office of State Fire Marshal for approval if required.
- B. Partial Agency Occupancy:** The Owner reserves the right to allow the Agency to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.
1. Should it become necessary or advisable, as the work nears final completion, for the Agency to occupy a portion of the building prior to final acceptance, the Contractor shall cooperate in completing such areas and making same accessible.
 2. The Construction Administrator will determine whether such occupancy or use is possible and, if so, will make arrangements for holding a job inspection with the DAS/CS Project Manager, Agency Representative, and Contractor.
 3. A comprehensive list of items to be completed or corrected as issued by the Contractor, together with the status of completion and terms of occupancy, will be forwarded to the DAS/CS Project Manager by the Construction Administrator. A letter will be issued by the DAS/CS Project Manager and Contractor to Construction Administrator granting such occupancy and will state the terms and conditions of occupancy.
 4. Prior to partial Agency occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Agency will operate and maintain mechanical and electrical systems serving occupied portions of the building.
 5. The Architect will prepare a "Certificate of Substantial Completion" for each specific portion of the Work to be occupied prior to Agency occupancy. Use the "Certificate of Substantial Completion" form as required by the Owner and forward the Certificate to the DAS/CS Office of State Building Inspector for a Certificate of Occupancy and obtain the same after his review and approval.
 6. The DAS/CS Project Manager will request a signed "Certificate of Compliance" from Commissioner of the Department of Administrative Services, Architect, and Contractor, if required.
- 6.

7. A letter from the DAS/CS Project Manager to the Agency Representative with copy to the Contractor granting occupancy will state the terms and conditions of occupancy and that fire insurance coverage has been requested, the effective date of which will indicate to the Contractor that they may cancel fire insurance coverage for that portion of the project.
 8. Upon occupancy, the Agency will assume responsibility for maintenance and custodial service for occupied portions of the building.
 9. **Work after Partial Agency Occupancy:**
 - 9.1 For all work to complete the area occupied, warranty work, the balancing and Commissioning (Cx) of systems, repair of latent defects and adjustments after partial occupancy, the Contractor is responsible for all costs associated with working in occupied buildings.
- C. Agency Occupancy:**
1. The Construction Administrator will determine whether such occupancy is possible and, if so, will make arrangements for holding a job inspection with the DAS/CS Project Manager, Agency Representative, and Contractor.
 2. A comprehensive list of items to be completed or corrected as issued by the Contractor, together with the status of completion and terms of occupancy, will be forwarded to the DAS/CS Project Manager and the Contractor by the Construction Administrator. A letter will be issued by the DAS/CS Project Manager and Contractor to Construction Administrator granting such occupancy and will state the terms and conditions of occupancy.
 3. Prior to Agency occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Agency will operate and maintain mechanical and electrical systems serving occupied portions of the building.
 4. The Architect will prepare a "Certificate of Substantial Completion" for the Work to be occupied prior to Agency occupancy. Use the "Certificate of Substantial Completion" form as required by the Owner.
 5. The DAS/CS Project Manager will request a signed "Certificate of Compliance" from Commissioner of the Department of Administrative Services, Architect, and Contractor, if required.
 - 5.
 6. A letter from the DAS/CS Project Manager to the Agency Representative with copy to the Contractor granting occupancy will state the terms and conditions of occupancy and that fire insurance coverage has been requested, the effective date of which will indicate to the Contractor that they may cancel fire insurance coverage for the project.
 7. Upon occupancy, the Agency will assume responsibility for maintenance and custodial service for occupied portions of the building.
 8. **Work after Agency Occupancy:**
 - 8.1 For all work to complete the occupied building, warranty work, the balancing and commissioning of systems, repair of latent defects and adjustments after occupancy, the Contractor is responsible for all costs associated with working in occupied buildings.

1.7 MISCELLANEOUS PROVISIONS

A. Examination of Site:

1. It is not the intent of the Documents to show all existing conditions. All Contractors and Subcontractors are advised to attend the Pre-Bid Meeting prior to submitting their Bid Proposals. This is the only official opportunity to visit and examine the site with the Owner, Agency, Architect, Engineer and Construction Administrator.
2. The Contractor should investigate and satisfy himself as to the conditions affecting the work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, uncertainties of weather, roads or similar physical conditions of the ground, the character of equipment, and facilities needed preliminary to and during the prosecution of the Work. The Contractor should further satisfy himself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the Contract Documents. Any failure by the Contractor to acquaint himself with the available information shall not relieve him from the responsibility for estimating properly the difficulty and cost of successfully performing the Work.

3. If tests have been done for Asbestos Containing Material (ACM), Lead-Based Paint (LBP) Containing Material, Polychlorinated Biphenyls (PCBs) in Building Materials and/or Mold, then the results are referenced in [Section 00 30 00 Available Information and provided in Division 50 00 00 Project-Specific Available Information](#). See [Section 01 35 16 "Alteration Project Procedures"](#) for **removal responsibility** and additional information.
 4. If tests have been done for Contaminated Soils and/or Contaminated Groundwater, then the results are referenced in [Section 00 30 00 Available Information and provided in Division 50 00 00 Project-Specific Available Information](#). See [Section 01 35 16 "Alteration Project Procedures"](#) for **removal responsibility** and additional information.
 5. If tests have been done for Work Involving Hazardous Materials, Wastes, and Items and Universal Wastes (Including Products Containing Persistent Bioaccumulative Toxic Chemicals" [PBTs] such as PCBs, Di-2-ethylhexyl Phthalate [DEHP], and Mercury), the results are referenced in [Section 00 30 00 Available Information and provided in Division 50 00 00 Project-Specific Available Information](#). See [Section 01 35 16 "Alteration Project Procedures"](#) for **exposure limits and removal responsibility**.
 6. **Subsurface Geotechnical Investigations:**
 - a. If Boring logs have been prepared for the site of this work they are in the Contract Documents.
 - b. If Geotechnical Reports(s) have been prepared for this project they are referenced in [Section 00 30 00 Available Information and provided in Division 50 00 00 Project-Specific Available Information](#).
 - 1) The Contractor must interpret the Geotechnical Report (s) according to his own judgement and acknowledges that he is not relying upon the data as accurately describing the subsurface conditions which may be found to exist.
 - 2) The Contractor further acknowledges that he assumes all risk contingents upon the nature of the subsurface conditions, which shall be actually encountered by him in performing the Work of this Contract.
 - 3) The Contractor should visit the site and become acquainted with all existing conditions and may make their own subsurface investigations to satisfy themselves as to the subsurface conditions. Such investigations shall be conducted only under time schedules and arrangements approved in advance by the Owner.
 7. No attempt has been made to locate hazardous material associated with existing site utilities, though it is presumed that at least some asbestos may be discovered associated with underground piping during the course of site and site utilities work. If and when such materials appear, the Contractor shall notify the Owner, who shall direct additional work outside of this Contract to assist in cutting up and disposing of same. The Contractor shall assist the hazardous materials contractor(s) with excavating, heavy lifting, and the like at no additional cost to the Owner.
- B. Pre-Bid Meeting:**
1. A Pre-Bid Meeting and tour of the site will be conducted as scheduled in Division 00 Section 00 11 16 "Invitation to Bid". This scheduled meeting is the only official opportunity for the bidders to tour the site with the Owner, Architect, Engineer, Construction Administrator, and Agency.
- C. Project Documents:**
1. The Specifications and Drawings are intended to describe and illustrate the materials and labor necessary for the work of this Project.
 2. Throughout the Technical Specifications, the Connecticut Department of Transportation Standard Specifications for Roads, Bridges, and Incidental Construction Form 816, current edition including any interim and supplemental specifications are referenced. Where so referenced the requirements set forth therein are applicable and made a part hereof. Copies of Form 816 are available from the Connecticut Department of Transportation at a nominal charge.
- D. Site Logistics Plan(s):** Site Logistics Plan(s) for this Project are in the Contract Documents. The Site Logistics Plan(s) describe in detail the proposed use of the Site and Building, both inside and outside the Contract Limit Area.
1. **Related Section:** Section 01 31 00 "Project Management and Coordination", 1.5 Submittals, A, (4).
 2. The **Site Logistics Plan(s)** include, but are not be limited to the following information:

- a. phasing requirements;
- b. proposed vehicle and equipment access routes;
- c. locations of proposed staging/lay-down and storage areas, utility connections;
- d. utilization of maintaining at least one elevator in use at all times;
- e. occupant access to the elevator during construction;
- f. delivery access of materials, handicap access;
- g. building egress, proposed pedestrian traffic flows in the interior and exterior of the building;
- h. temporary access-ways;
- i. office trailer and dumpster locations;
- j. location of perimeter construction fencing and gates;
- k. other protection measures around and in the building(s);
- l. temporary partitions, proposed pedestrian traffic flows around and in each building;
- m. proposed building access points;
- n. proposed protection measures for trees, shrubs and plantings, interior access-ways;
- o. coordination of activities that relate to building occupants and other field applied measure to protect and coordinate the work including any relocation of utilities.

E. Scope Review:

1. Prior to signing a Contract with the State, DAS/CS will conduct a full scope review with the apparent Low Bidder to ensure that all of the requirements have been included within the bid. This scope review will highlight all of the specific requirements of the project, a review of the DAS/CS procedures and all of the Technical sections of the contract documents.
2. This process will ensure that all of the scope of work included in the contract documents has indeed been included.

F. Specifications, Drawings, and Electronic Data Storage Devices Furnished:

1. The Contractor shall receive **10** sets of the Contract Documents on or about the time of execution of the Contract, free of charge. If additional copies are wanted, they will be available at the direct additional cost of their reproduction, to the Contractor.
2. The Contractor shall receive **one (1)** set of AutoCAD compatible (latest version) Floor Plans on Electronic Data Storage Devices at no cost on or about the time of execution of the Contract from the Architect. Additional sets of AutoCAD compatible (latest version) Floor Plans on Electronic Data Storage Devices from the Architect shall be available at the cost of their reproduction, to the Contractor.

G. Construction Responsibility:

1. The Contractor shall be responsible for his construction means, methods, techniques, sequences, and procedures employed in the performance of his work and shall have full responsibility for his failure to carry out any part of his work in accordance with the Contract Documents.

H. Overtime Requests:

1. The Contractor shall request approval from the Owner to work overtime. Said request shall be made **forty eight (48) hours** in advance. All costs for overtime are included in the Contract Sum as stated in Division 00 Section 00 41 00 "Bid Proposal Form."

I. PMWeb Project Management:

1. DAS/CS is using PMWeb as the project management collaborative software tool for this project.
2. The Contractor is required to utilize PMWeb for the duration of this project and shall provide all project information via this program management software. This includes, but is not limited to contracts, applications for payment, change orders, change order proposals, requests for information, etc.
3. The DAS/CS Project Manager **[or the Construction Administrator (CA)]** shall arrange for training. This training is for the Contractor's Staff, the DAS/CS Project Manager, the Construction Administrator, the A/E, and their representatives.
4. DAS/CS will be establishing a project specific email "file" address for this project. The Contractor shall send an electronic "file" copy of all project documents to this email address, to include but not limited to all project correspondence, project emails, forms, etc.
5. The Contractor is required to scan all documents that contain wet (ink) signatures and send a copy of those documents electronically to the DAS/CS Project Manager and the project specific email "file" address. The hard copy of the wet signature documents shall be transmitted as directed by the

DAS/CS Project Manager. This includes, but is not limited to all contracts, change orders, applications for payment, closeout documentation, etc.

J. Subcontractor Performance Evaluations:

1. Pursuant to C.G.S. Sec. 4a-101, the Contractor shall compile evaluation information during the performance of the contract on each of its subcontractors who are performing work with a value in excess of five hundred thousand dollars (\$500,000.00). The Contractor shall complete and submit to DAS/CS evaluations of each such subcontractor upon fifty percent (50%) completion of the project and upon Substantial Completion of the project. The Contractor acknowledges that its failure to complete and submit these evaluations in a timely manner may, by statute, result in a delay in project funding and, consequently, payment to the Contractor. The Contractor agrees to indemnify and hold the State harmless from any loss, damage, or expense that results from or is caused by the Contractor's failure to complete and submit the evaluations to DAS/CS in accordance with this provision.

K. Reporting and Contracting Requirements for Contractor and Subcontractor Payments:

1. For compliance with **C.G.S. Sec. 4b-95 and 49-41**, DAS/CS requires every Contractor (and its Subcontractors) who has been awarded a DAS/CS construction contract to log on to the State of Connecticut web-based platform, BizNet, **each month** and **enter payments** they have received from the state, from the Contractor, or from a higher tier Subcontractor (as applicable).
2. The process is described as follows: The state will pay the Contractor on a monthly basis for work performed (and purchases made) by it and its Subcontractors. The Contractor will input the payment date and amount they receive from the state on a monthly basis. The Contractor's first-level Subcontractor (Tier 1 Subcontractor) will input the payment they receive from the Contractor. The second-level Subcontractor (Tier 2 Subcontractor) will input the payment they receive from the Tier 1 Subcontractor. And so on.
3. Contractors awarded a DAS/CS construction contract shall contain **a provision in their subcontract agreements** requiring their Subcontractors to enter payment receipt from the Contractor in the State of Connecticut web-based platform, BizNet, for work performed or purchases made in relation to state projects.
4. Detailed instructions can be found in the DAS/CS publication, "**6002 Instructions to Contractors/Subcontractors for Entering Payments in BizNet**", available for download by going to the DAS Homepage (www.ct.gov/DAS) and selecting Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 6000 Series.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 11 00

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. This Section includes administrative and procedural requirements governing Supplemental Bids.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 00 Section 00 41 00 Bid Proposal Form
 - 2. Division 01 Section 01 33 00 Submittal Procedures
 - 3. Division 01 Section 01 60 00 Product Requirements

1.3 DEFINITIONS

- A. **Definition:** "The monetary value stated in the Bid to be added to the amount of the Base Bid if the corresponding Work, as described in the Bidding Documents, is accepted." A Supplemental Bid is an amount proposed by bidders and stated on the Bid Proposal Form for certain work defined in the Bidding Documents that may be added to the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost for each supplemental bid is the net addition to the Contract Sum to incorporate the Supplemental Bid into the Work. Supplemental Bids are only accepted in the numerical order that they are listed on the Bid Proposal Form and never accepted out of numerical sequence. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. **Coordination:** Modify or adjust affected adjacent Work as necessary to completely and fully integrate that Work into the Project.
 - 1. Include as part of each Supplemental Bid, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Supplemental Bid.
 - 2. Consider all work that must be accomplished for complete incorporation of the Supplemental Bids including modifications to Base Bid items.
 - 3. Include in lump sum prices for Supplemental Bids all costs of labor, materials, equipment, permits, fees, insurance, bonds, overhead, and profit.
 - 4. Immediately after award of Contract, advise all necessary subcontractors, vendors, and suppliers as to which Supplemental Bids have been selected by Owner. Use all means necessary to alert those subcontractors, vendors, and suppliers involved as to all changes in the work caused by Owner's selection or rejection of Supplemental Bids.
 - 5. Coordinate related work and modify surrounding work to integrate work of each Supplemental Bid.
- B. Execute accepted Supplemental Bids under the same conditions as other Work of this Contract.
- C. **Schedule:** A "Schedule of Supplemental Bids" is included at the end of this Section. It contains all of Specification Sections, and applicable portions of Drawings and Details that govern the scope, quality, and execution of work that is referenced in the Schedule and contain all of the requirements necessary to achieve the Work described under each Supplemental Bid.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF SUPPLEMENTAL BIDS

- A. **Supplemental Bid No. 1:** Requires the **construction of the complete renovation of the Mens and Womens Toilet Rooms as shown on Architectural Drawings A4.17, A4.18 for Floor Level Three including provision and coordination of all related mechanical, plumbing, and electrical systems, finishes, accessories, etc. in order to fully complete the toilet rooms. The Base Bid has these areas as being left as they currently exist.**

END OF SECTION 01 23 13

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. This Section includes administrative and procedural requirements for handling requests for equals and substitutions made after award of the Contract.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 33 00 "Submittal Procedures" specifies requirements for submitting the Contractor's Construction Schedule and the Submittal Schedule.
 - 2. Division 01 Section 01 42 20 "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.
 - 3. Division 01 Section 01 60 00 "Product Requirements" specifies requirements governing the Contractor's selection of products and product options.

1.3 DEFINITIONS

- A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.
- B. **Equals or Substitutions General:** Changes in products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract.

1.4 SUBMITTALS

- A. **Equals and Substitution Request Submittals:** The Owner will consider requests for equals or substitutions if made prior to the Receipt of the Competitive Bid. The information on all materials shall be consistent with the information herein. After the contract award, substitutions will be considered for materials or systems specified that are no longer available. It will not be considered if the product was not purchased in a reasonable time after award. The Contractor shall submit all equal and substitutions requests on the "**Equal or Substitute Product Request (Form 7001)**", an example of which is shown at the end of this Section. The Form is available from the Construction Administrator (CA). See Article 15 in the General Conditions for further refinement and information.
- B. The Contractor is required to prepare and submit three (3) copies of the required data for the first manufacturer listed or procedure listed in the specifications section with reference to all of the following areas: the substance and function considering quality, workmanship, economy of operation, durability and suitability for purposes intended including the size, rating performance, LEED® compliance, and cost. All submissions must include all the required data for the first listed manufacturer or procedure as specified, as well as the required data for the proposed Equal or Substitution. This will enable the Owner and Architect to determine that the proposed Equal or Substitution is or is not substantially equal to the first listed manufacturer or procedure.
 - 1. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers.
 - 2. Provide complete documentation showing compliance with the requirements for equals or substitutions, and the following information, as appropriate:
 - a. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate contractors that will be necessary to accommodate the proposed Equal or Substitution.
 - b. A detailed comparison chart of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
 - c. Product Data, including Shop Drawings and descriptions of products and fabrication and installation procedures.
 - d. Samples, where applicable or requested.

- e. A statement indicating the effect on the Contractor's Construction Schedule or CPM Schedule compared to the schedule without approval of the Equal or Substitution. Indicate the effect on overall Contract Time.
 - f. Cost information, broken down, including a proposal of the net change, if any in the Contract Sum.
 - g. The Contractor's certification that the proposed Equal or Substitution conforms to requirements in the Contract Documents in every respect and is appropriate for the applications indicated.
 - h. The Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the Equal or Substitution to perform adequately.
3. **Architect's Action:** If necessary, the Architect will request additional information or documentation for evaluation within **seven (7) days** of receipt of the original request for equal or substitution request. The Architect will notify the Construction Administrator who will notify the Owner of recommended acceptance or rejection of the proposed equal or substitution, within **fourteen (14) days** of receipt of the request, or **seven (7) days** of receipt of additional information or documentation, whichever is later. The Construction Administrator will give final acceptance or rejection by the Owner not less than **seven (7) days** after notification.
- a. Any request deemed an "Equal" and accepted by the Construction Administrator, Architect, Owner, and Agency will result in written notification to the Contractor and will not be in the form of a change order for an "Equal".
 - b. Any request deemed a "Substitution" and rejected or approved by Construction Administrator, Architect, and Owner may result in written notification to the Contractor and may be in the form of a change order if the "Substitution" is approved.

PART 2 - PRODUCTS

2.1 EQUAL OR SUBSTITUTIONS

- A. **Conditions:** The Architect will consider the Contractor's request for Equal or Substitution of a product or method of construction when one or more of the following conditions are satisfied, as determined by the Architect. If the following conditions are not satisfied, the Architect will return the requests to the Construction Administrator without action except to record noncompliance with these requirements.
- 1. The proposed request does not require extensive revisions to the Contract Documents.
 - 2. The proposed request is in accordance with the general intent of the Contract Documents.
 - 3. The proposed request is timely, fully documented, and/or properly submitted.
 - 4. The proposed request can be provided within the Contract Time. However, the Architect will not consider the proposed request if it is a result of the Contractor's failure to pursue the Work promptly or coordinate activities properly.
 - 5. The proposed request will offer the Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities the Owner must assume. However, if the proposed request requires the Owner to incur additional responsibilities, including but not limited to, additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or similar considerations, then the Owner will have just cause to reject the request for Equal or Substitution.
 - 6. The proposed request can receive the necessary approvals, in a timely manner, required by governing authorities having jurisdiction.
 - 7. The proposed request can be provided in a manner that is compatible with the Work as certified by the Contractor.
 - 8. The proposed request can be coordinated with the Work as certified by the Contractor.
 - 9. The proposed request can uphold the warranties required by the Contract Documents as certified by the Contractor.
- B. The Contractor's submission and the Architect's review of Submittals, including but not limited to, Samples, Manufacturer's Data, Shop Drawings, or other such items, which are not clearly identified as a request for an Equal or Substitution, will not be considered or accepted as a valid request for an Equal or Substitution, nor does it constitute an approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 25 00



**7001
Equal or Substitute
Product Request**

Page 1 of 2

Request Phase: Pre-Bid Post Bid (See Article 15 Materials: Standards, General Conditions)

(If Pre-bid only) Current Bid Due Date: Request No.: Dated:

To: State of Connecticut
Department of Administrative Services,
Construction Services

DAS Project No.:

Project Name / Location:

References: Specification(s): Section(s): Paragraph(s):

Drawing(s): Drawing(s) No(s): Detail(s) No(s):

Contractually Specified Product:

Contractor Proposed Product:

Proposed Product is: Equal: Substitute: Model No.:

IMPORTANT:
**See Attached Data For Both Specified And Proposed Products
As Required By Article 15 General Conditions.**

Data attached: Drawings: Product Data: Reports: Samples:

Tests: Other:

Reason(s) for not providing the Specified Product:

Similar Installation:

Project Name: Architect's Name:

Project Location: Owner's Name:

Date Installed:



7001
Equal or Substitute
Product Request

Page 2 of 2

Will proposed substitution impact other parts of the Work? No Yes *If Yes Attach An Explanation.*

Will proposed substitution increase Contract Time? No Yes *By Number Of Calendar Days*

Actual Dollar Savings to the State of Connecticut if substitution is accepted: \$

The Undersigned Certifies:
That The Proposed Request For An Equal Or Substitute Product Conforms To All Of The Requirements Of Division 01 General Requirements, Section 01 25 00 Substitution Procedures.

Request Submitted By General Contractor / CMR:
(Firm's Typed Name)

By:
(Typed Name) (Title) (Signature) (Date)

Contractor / CMR Send copies to : DAS PM: CA:

Consultant's Request Received on (Date):

Consultant's Review – This Substitution Request is:

Approved: *(Submittal(s) in accordance with Div. 01 General Requirements, Section 01 33 00 Submittal Procedures.)*

Approved as Noted: *(Submittals in accordance with Div. 01 General Requirements, Section 01 33 00 Submittal Procedures.)*

Rejected: Use Specified Materials.

Rejected: Request Not Received Within Specified Time Period - Use Specified Materials.

Reviewed Issued By:

Name:
(Typed Name)

Title:

Signature:
(Signature) (Date)

CONSULTANT Send copies to: DAS PM CA Chief Architect Chief Engineer

If Approved: As noted by Consultant,
DAS Chief Architect:
(Signature) (Date)

Copies: Project File Red R2

END

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. This Section specifies administrative and procedural requirements for handling and processing contract modifications.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after award of the Contract.
 - 2. Division 01 Section 01 29 76 "Progress Payment Procedures" for administrative procedures governing Applications for Payment.
 - 3. Division 01 Section 01 32 16 "Construction Progress Schedules" for requirements for construction scheduling and reporting progress of work.
 - 4. Division 01 Section 01 33 00 "Submittal Procedures" for requirements for submittal of the Construction Progress Schedule or CPM Schedule.
 - 5. General Conditions "Article 13 - Compensation for Changes in the Work".
- C. All Forms referenced in this Section are available for download from the DAS website (www.ct.gov/DAS)> Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 7000 Series - Construction Phase Forms.

1.3 REQUESTS FOR INFORMATION

- A. In the event that the Contractor or subcontractor, at any tier, determines that some portion of the drawings, specifications, or other contract documents requires clarification or interpretation by the Architect, the Contractor shall submit a "Request for Information" in writing to the Architect via the Construction Administrator. "Requests for Information" may only be submitted by the Contractor and shall only be submitted on the "Request for Information" forms as required by the Owner.
 - 1. In the "Request for Information", the Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed from the Architect.
 - 2. In the "Request for Information", the Contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.
 - 3. The Owner acknowledges that this is a complex project. Based upon the owner's past experience with projects of similar complexity, the Owner anticipates that there will probably be some "Requests for Information" on this project.
 - 4. The Architect will review all "Requests for Information" to determine whether they are valid "Requests for Information". If it is determined that the document is not a valid "Request for Information", it will be returned to the Contractor, unreviewed as to content, for resubmittal on the proper form and in the proper manner.
 - 5. A "Request for Information Response" shall be issued within seven (7) days of receipt of the request from the Contractor unless the Owner determines that a longer time is necessary to provide an adequate response. If a longer time is determined necessary by the Owner, the Owner will, within seven (7) days of receipt of the request, notify the Contractor of the anticipated response time. If the Contractor submits a "Request for Information" on an activity with seven (7) days or less of float on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Architect to respond to the request provided that the Architect responds within the seven (7) days set forth above.
 - 6. A "Request for Information Response" from Architect will not change any requirement of the Contract Documents. In the event the Contractor believes that the "Request for Information Response" will cause a change to the requirements of the Contract Documents, the Contractor shall within five (5) days give written notice to the Construction Administrator stating that the Contractor believes the "Request

for Information Response" will result in a "Change Order" and the Contractor intends to submit a "Change Order Proposal" request. Failure to give such written notice within five (5) days shall waive the Contractor's right to seek additional time or cost under the requirement these Requirements.

1.4 MINOR CHANGES IN THE WORK

- A. The Architect, through the Construction Administrator, will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on the "Supplemental Instructions" form as required by the Owner.

1.5 PROPOSAL REQUEST

- A. Architect/Owner-Initiated Requests For Proposals: The Architect or Owner will issue a detailed description of proposed changes in the Work via the Construction Administrator that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications. Such requests shall be on a "Proposal Request" form as required by the Owner.
1. "Proposal Request" is issued for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
 2. Within **(14) days** of receipt of a "Proposal Request", submit a "Change Order Proposal" with the required information necessary to execute the change to the Construction Administrator for the Architect's/Owner's review.
 - a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
 - d. The Agency is tax exempt. All Contractor and Subcontractor services provided under your Contract with the State of Connecticut may not be exempt from taxes. The Department of Revenue Services can guide you as to which services are exempt and which are not. Please contact the State of Connecticut, Department of Revenue Services at 1-800-382-9463 or 860-541-3280.
 - e. Dollar values shown on the Schedule of Values shall not be the governing (or deciding) final amounts for change orders involving either additional charges or deletions.

1.6 CHANGE ORDER PROPOSAL

- A. When either a "Request for Information" from the Contractor or a "Proposal Request" from the Architect or Owner results in conditions that may require modifications to the Contract, the Contractor may propose changes by submitting a request for a "Change Order Proposal" to the Architect via the Construction Administrator on forms as required by the Owner. These forms shall also include "Change Order Proposal Workbook(s)" as required by the Owner.
1. Include statements outlining the 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 Contract Time.
 2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities as directed by Article 13 of the General Conditions of the Contract for Construction.
 3. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.
 4. Comply with requirements in Division 01 Section 01 25 00 "Substitution Procedures" if the proposed change requires an equal or substitution of one product or system for a product or system specified.
 5. The State of Connecticut construction contract has the following tax exemptions:
 - a. Purchasing of materials which will be physically incorporated and become a permanent part of the project.
 - b. Tools, supplies and equipment used in fulfilling the construction contract are not exempt.
 - c. Services that are resold by the Contractor are exempt, i.e. if a Contractor hires a plumber, carpenter or electrician, a resale certificate may be issued to the subcontractor because these services are considered to be integral and inseparable component parts of the building contract

- C. "Change Order Request" Forms: Use "Change Order Proposal" and "Change Order Proposal Worksheets" forms as required by Owner.
- D. A "Change Order Proposal" cannot be submitted without either prior submission of a "Request for Information" from the Contractor or as a response to a "Proposal Request" submitted by the Architect or Owner.
- E. Any "Change Order Request" submitted without a prior submittal of a "Request for Information" or as a response to a "Proposal Request" will be immediately rejected and returned to the Contractor.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. "Construction Change Directive":

When the Owner and the Contractor disagree on the terms of a "Change Order Proposal" resulting from either a "Request for Information" or "Proposal Request", then the Architect through the Construction Administrator may issue a "Construction Change Directive" on a "Construction Change Directive" form as authorized by the Owner. The "Construction Change Directive" instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a "Change Order".

- 1. The "Construction Change Directive" contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.
 - 2. Contractor must proceed with the Work once a "Construction Change Directive" is issued.
 - 3. The change in the Contract Sum and Contract Time resulting from the issuance of a "Construction Change Directive" will be based on "Time & Material" or "Unit Prices".
 - 4. Issuance of "Construction Change Directive" does not guarantee payment for the Work described in the "Construction Change Directive".
- B. Documentation: The Contractor shall maintain detailed records on a time and material basis of work required by the "Construction Change Directive".
- 1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
 - 2. The final value shall be negotiated based on the supporting data to determine the value of the work.

1.8 CHANGE ORDER PROCEDURES

- A. Upon the Owner's approval of a Contractor's "Change Order Proposal", the Construction Administrator will issue a "Change Order" for signatures of the Architect, Owner and the Contractor on a "Change Order" form as required by the Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 26 00

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. This Section specifies procedures for preparation and submittal of the Contractor's Applications for Payment.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
1. Notice to Bidders: Article 10
 2. General Conditions: Articles: 27 "Schedule of Values, Application for Payment"; 28 "Partial Payments"; 31 "Final Payment"; and 32 "Owner's Right to Withhold Payments".
 3. Division 01 Section 01 32 16 "Construction Progress Schedules" for requirements for construction scheduling and reporting progress of work.
 4. Division 01 Section 01 33 00 "Submittal Procedures".
 5. Division 01 Section 01 77 00 "Closeout Procedures" for requirements for Final Payment.

1.3 SCHEDULE OF VALUES

- A. **Coordination:** Coordinate preparation of the "Schedule of Values" with preparation of the CPM Schedule or Construction Schedule. Use "Schedule of Values" form as required by the Owner
1. Submit the "Schedule of Values" to the Construction Administrator at the earliest possible date but no later than **twenty-one (21)** days after Contract Start Date.
 2. **Sub-schedules:** Where Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- B. **Format and Content:** Use the Project Manual Table of Contents as a guide to establish the format for the "Schedule of Values". Provide at least one line item for each Specification Section on electronic media printout.
1. **Identification:** Project identification on the Schedule of Values shall include, but not be limited to, the following:
 - a. **Owner**
 - b. **Project Number**
 - c. **Project Name**
 - d. **Project Location**
 - e. **Contractor's name and address.**
 2. Arrange the "Schedule of Values" in tabular format as required by the Owner, containing separate columns including, but not limited to, the following Items:
 - a. **Item Number.**
 - b. **Description of Work with Related Specification Section or Division Number.**
 - c. **Scheduled Values broken down by description number, type material, units of each material.**
 - 1) **Include break down of General Condition requirements, i.e. bonds, insurance premiums, taxes, job mobilization, temporary facilities, field supervision and layout, operation and maintenance manuals, punch list activities, project record documents, demonstration and training, overhead, and profit as separate line items.**
 - d. **Name of subcontractor.**
 - e. **Name of manufacturer or fabricator.**
 - f. **Name of supplier.**

- g. Retainage.**
 - h. Contract sum in sufficient detail.**
3. Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 4. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual Table of Contents. Break principal subcontract amounts down into several line items. In addition, the following items listed below must be included.
 - a. **Site Logistics Plan (01 31 00):** a lump sum at 1/20 of one percent of the base bid total project cost at the time of submission of this plan.
 - b. **Coordination Drawings (01 31 00):** a lump sum of this cost for payment at the submittal of this product a minimum cost of 1/10th of one percent of the base bid total project cost or \$5,000 whichever is greater.
 - c. **Photographic Documentation (01 32 33):** a monthly cost of \$1,000 per month to be paid each month upon receipt of the photographs or forfeit of that month's payment.
 - d. **Submittal Schedule (01 33 00):** a lump sum payment calculated at 1/20th of 1% of the base bid total project cost upon receipt of the schedule
 - e. **Waste Collection & Cleaning (01 50 00):** a monthly cost. A minimum payment of \$1,000 to \$3,000 (based on size & complexity of the project) with forfeit of that monthly payment if not done.
 - f. **As-Built Updates (01 31 00):** a monthly cost, a minimum payment of \$1,000 with forfeit of that monthly payment if not done.
 - g. **Start-up and Adjusting (01 75 00):** a lump sum cost upon completion. (to be determined by the DAS/CS Project Manager (PM) with Architect/Engineer and Construction Administrator (CA) advice)

OR

- h. Schedule (01 32 16.13):** a lump sum payment upon receipt of the base line schedule. A payment of 40% of the total amount of the total cost which is to be calculated at 1/8th of one percent of the base bid total project cost. Monthly updates using the remainder of the cost divided evenly over the accepted schedule duration with a forfeit of the monthly payment of the update is not received on time.
- Any forfeited amounts being withheld by the CA for non-performance will be adjusted at the final payment by a credit change order to the owner.
5. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
 6. **General Conditions:** Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin 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 the Contractor's option.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and Construction Administrator and paid for by the Owner.
 1. The initial "Application for Payment", the "Application for Payment" at time of "Substantial Completion", and the final "Application for Payment", involve additional requirements.
- B. **Payment-Application Terms:** The Owner will process monthly progress payments. The Contractor may submit applications for payment on a monthly basis.
- C. **Payment-Application Forms:** Use the "Application for Payment" form as required by the Owner. Present the required information on electronic media printout or Owner approved form; multiple pages should be used if required.
 1. For each item, provide a column including but not limited to the following items:
 - a. Item Number.
 - b. Description of Work and Related Specification Section or Division.

- c. Scheduled Value, break down by units of material and units of labor.
 - d. Work Completed from previous application.
 - e. Work Completed this period.
 - f. Materials presently stored.
 - g. Total Completed and stored to date of application.
 - h. Percentage of Completion.
 - i. Balance to Finish.
 - j. Retainage.
- D. Application Preparation:** Complete every entry on the Application form. At the time of Final Payment only, include an executed Application form by a person authorized to sign legal documents on behalf of the Contractor. The Construction Administrator will return incomplete Applications without action.
- 1. Entries shall match data on the "Schedule of Values".
 - 2. Include amounts of Change Orders issued prior to the last day of the construction period covered by the application.
- E. Transmittal:** Except for final payment, submit to the Construction Administrator by a method ensuring receipt within *forty-eight (48)* hours. *One (1)* complete, signed and notarized original of each Application for Payment, including lien waivers and similar attachments when required, along with *six (6)* copies. For Final Payment, *nine (9)* complete, signed and notarized copies shall be submitted.
- 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information related to the application, in a manner acceptable to the Architect.
- F. Applications for Payment:** Administrative actions and submittals, that must precede or coincide with submittal of the first Application for Payment and all subsequent Application for Payments including, but not limited to, the following items:
- 1. List of subcontractors and suppliers' name, FEIN/Social Security numbers, and Connecticut Tax Registration Numbers.
 - 2. List of principal suppliers and fabricators.
 - 3. Schedule of Values.
 - 4. Contractor's Construction Schedule (preliminary if not final).
 - 5. Schedule of principal products.
 - 6. Submittal Schedule (preliminary if not final).
 - 7. List of Contractor's staff assignments.
 - 8. List of Contractor's principal consultants.
 - 9. Copies of all applicable permits.
 - 10. Copies of authorizations and licenses from governing authorities for performance of the Work.
 - 11. Proof that subcontractors have been paid amounts included on the Contractor's Application for Payment within thirty (30) days after the Owner has paid the Contractor for the particular Application for Payment in accordance with Connecticut General Statute § 49-41a (a)(1).
 - 12. Releases of Lien from subcontractors with amounts included on the Contractor's Application for Payment when Contractor has been paid by the Owner for the particular Application for Payment but the subcontractors have not been paid.
 - 13. Proof that as-built documents are updated as required by Section 01 77 00 "Closeout Procedures.
 - 14. Initial as-built survey and damage report, if required.
 - 15. Update the "Contractor's Master Subcontract Agreement List" and submit copies all recently executed Subcontract Agreements in accordance with CGS § 4b-96.
 - 15.1. The "Contractor's Master Subcontract Agreement List" shall list all Subcontract Agreements in order of Contract Sum magnitude (from high to low) in the following format:

Contractor's Master Subcontract Agreement List

Subcontractor Name	Minority Or Small Business Designation	Trade	Address	Contract Sum

16. In accordance with CGS § 42-158j (b):
 Each payment requisition submitted shall include a statement showing the status of all pending construction change orders, other pending change directives and approved changes to the original contract or subcontract. Such statement shall identify the pending construction change orders and other pending change directives, and shall include the date such change orders and directives were initiated, the costs associated with their performance and a description of any work completed. As used in this section, "pending construction change order" or "other pending change directive" **means an authorized directive for extra work that has been issued to a contractor or a subcontractor and identified by an official Change Order Number or Construction Change Directive Number assigned by the State of Connecticut.**

G. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion submit an Application for Payment form; use the form as required by the Owner. Present the required information on electronic media printout as applicable that include, but are not limited, to the following:

1. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
2. Administrative actions and submittals that shall precede or coincide with this application include, but are not limited to, the following:
 - 2.1 Occupancy permits and similar approvals.
 - 2.2 Warranties (guarantees) and maintenance agreements.
 - 2.3 Test/adjust/balance records.
 - 2.4 Maintenance instructions.
 - 2.5 Meter readings.
 - 2.6 Startup performance reports.
 - 2.7 Changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 2.8 Final cleaning.
 - 2.9 Application for reduction of retainage and consent of surety.
 - 2.10 Advice on shifting insurance coverage.
 - 2.11 Final progress photographs.
 - 2.12 List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

H. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include, but are not limited, to the following:

1. Completion of Project Closeout requirements.
2. Completion of list of items remaining to be completed as indicated on the attachment to the Certificate of Substantial Completion.
3. Ensure that unsettled claims will be settled.
4. Ensure that incomplete Work is not accepted and will be completed in accordance with a schedule prepared by the Contractor which is acceptable to the Owner.
5. Transmittal of required Project construction records to the Owner (including as-built documents specified in Section 01 77 00 "Closeout Procedures").
6. Certified property survey.
7. Proof that taxes, fees, and similar obligations were paid.
8. Removal of temporary facilities and services.
9. Removal of surplus materials, rubbish, and similar elements (Reference Section 01 74 19 "Construction Waste Management & Disposal").

10. Change of door locks to Owner's access.
11. The requirements of the General Conditions and Supplementary Conditions for Final Acceptance, Final Completion, Final Inspection, and Final Payment.
12. Asbestos, lead or other hazardous material manifests.
13. Completion of "Building Contractor Reporting Form" as supplied by Department of Construction Services, for all Contractors, Subcontractors, Vendors, Suppliers, etc. who work on the Contract. The form includes the following information:
 - a. Contractor/Subcontractor name.
 - b. FEIN/Social Security Numbers
 - c. Connecticut Tax Registration Numbers
 - d. Type of work
 - e. Name of business and address
 - f. Remittance address.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 29 76

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. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:
1. General project coordination procedures.
 2. Conservation.
 3. Coordination Drawings, including Site Logistics Plans.
 4. Administrative and supervisory personnel.
 5. Cleaning and protection.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
1. Division 01 Section 01 29 76 "Progress Payment Procedures" for Schedule of Values items
 2. Division 01 Section 01 31 19 "Project Meetings" for progress meetings, coordination meetings, and pre-installation conferences.
 3. Division 01 Section 01 32 16 "Construction Progress Schedules" for requirements for construction scheduling and reporting progress of work.
 4. Division 01 Section 01 50 00 "Temporary Facilities and Controls".
 5. Division 01 Section 01 60 00 "Product Requirements" for coordinating general installation.
 6. Division 01 Section 01 77 00 "Closeout Procedures" for coordinating contract closeout.

1.3 CONSTRUCTION ADMINISTRATOR

A. **Construction Administrator:**

1. The Construction Administrator is identified in Division 01 Section 01 11 00 "Summary of Work".
2. **Construction Mobilization:**
 - a. Cooperate with the Construction Administrator in the allocation of mobilization areas of the site, for field offices and sheds, for agency facility access, traffic, and parking facilities.
 - b. During Construction, coordinate use of site and facilities through the Construction Administrator.
 - c. Comply with Construction Administrator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
 - d. Comply with instructions of the Construction Administrator for use of temporary utilities and construction facilities.
 - e. Coordinate field engineering layout as specified in Division 01 Section 01 71 23 "Field Engineering" for work under the instructions of the Construction Administrator.

1.4 COORDINATION

- A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in the 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 assure maximum accessibility for required maintenance, service, and repair.

3. Make provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
 1. Prepare similar memoranda for the Construction Administrator, Owner and separate contractors where coordination of their work is required.
- C. **Administrative Procedures:** Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of schedules.
 2. Installation and removal of temporary facilities.
 3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Project closeout activities.
 6. As-Builts - coordinate monthly meetings to assure up-dates being performed.

1.5 SUBMITTALS

- A. **Coordination Drawings:** Prepare coordination drawings to complete detailed coordination of systems and components and to integrate information about fabrication and installation.
 1. Thoroughly prepare coordination drawings, as further stipulated in Part 3 "Execution", reviewing all contract documents and consulting with all entities contributing to or involved with each portion of the work under consideration.
 - a. Show the relationship of all components shown on any separate Shop Drawings.
 - b. Indicate required desired installation sequences.
 - c. Comply with requirements contained in Division 01 Section 01 33 00 "Submittal Procedures".
 2. Prepare coordination drawings for installation of all products and materials fabricated by separate entities.
 3. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components, including but not limited to: all site-utility entry points; all ceiling and roof cavities in all areas; all electrical, telecommunications and mechanical rooms; all stage-boundary interface areas; all laboratories, animal-handling rooms and data rooms; all classrooms and seminar rooms; all lecture halls and their support spaces; all video studios, broadcast classrooms and their support facilities; and all such other conditions required to coordinate the work.
 4. **Prepare a Site Logistics Plan(s) showing:** The entire project area and limits; all routes into and out of site; all staging and stockpiling and lay-down areas; all aspects of phasing/staging; all parking, paving and fencing; and all specific provisions to satisfy requirements of Division 01 Sections, including but not limited to Field Engineering and Temporary Facilities and Controls. The Site Logistics Plan shall coincide with and complement the general staging plans and site plans outlined in the contract bidding documents. It is intended that the Contractor shall present this refined plan for approval by the Construction Administrator. The fencing shown on this plan is required for all phases. Exact placement and timing of installations and removals will be reviewed and approved by the Construction Administrator prior to implementation. An additional allotment of various fencing is specified in Division 32, which the Contractor shall provide, install, and relocate at various intervals, for installation and removal by the Contractor per the direction of the project's Construction Administrator. This staging and logistics plan will require refinement and change for each phase/stage of the project. The Site Logistics Plan(s) shall be drawn at a scale no smaller than 1"=40' and shall be submitted as stipulated in Division 01 Section 01 29 76 "Progress Payment Procedures", but in no case later than (30) days after Notice to Proceed.
 5. Prepare coordination drawings showing locations of surface recesses and voids, as well as offsets and breaks, requiring filling and/or feathering, both those initially visible and those discovered during the course of work. Review with Owner and Architect to obtain direction for filling and feathering. Revise drawing(s) to record directions for same for field and record purposes.
- B. **Staff Names:** Prior to the contract start date, submit a list of the Contractor's principal staff assignments, including the superintendent, project safety officer, and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and at each temporary telephone.
2. Provide resumes of each staff member proposed for the Project. This shall include the Project Manager, Project Superintendent and Safety Officer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

- A. **Inspection of Conditions:** The Contractor shall require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed and coordinate such inspections with the Construction Administrator and authorities having jurisdictions. If unsatisfactory conditions exist notify the Construction Administrator immediately. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. The Contractor shall coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.
- C. **Coordination Drawings:** Before construction work can begin, the Contractor shall submit to the Architect coordination drawings in the form of (a) reproducible (vellum) transparencies at not less than 1/4-inch scale and (b) CAD files of the coordination drawings on CDROM. Such drawings will be required throughout all areas for trades as described below. These drawings shall show resolutions of trade conflicts in congested areas. The Architect will supply base drawings (with the title blocks removed), including floor plans, reflected ceiling plans, and structural framing plans, in the form of electronic CAD files on CDROM, using the AutoCAD release edition specified with the files, to the Contractor for distribution to the trades for use in developing the coordination drawings. Each trade contractor shall create separate layers within the CAD files to show the work of their trade. Prepare coordination drawings as follows:
 1. The HVAC subcontractor shall initiate 1/4-inch scale drawings done on AutoCAD (latest version) showing ducts and piping in plan and section. Sheet metal shop drawings must be approved prior to starting coordination drawings.
 2. The Sprinkler subcontractor shall then add layers to superimpose his piping layout on the coordination drawings.
 3. The Electrical subcontractor shall then add layers to superimpose all the electrical information on the coordination drawings. Said information is to include but not necessarily be limited to cable trays, equipment, lighting, conduits, bus duct, etc. Show space allowances reserved for work under other contracts, such as audio-visual wiring and equipment.
 4. The Plumbing subcontractor shall then add layers to complete the coordination drawing by drawing his piping (including pitch) on the coordination drawings.
 5. Subcontractors for specialties, furnishings, equipment and special construction shall add layers to show their work to assure full coordination of all systems.
 6. The Construction Administrator shall review the completed coordination drawings for general compliance and then submit them to the Architect for his review. All subcontractors shall rework the drawings until all systems are properly coordinated.
 7. The Ceiling subcontractor shall utilize the drawings to prepare acoustic panel ceiling drawings and any other suspended ceiling drawings, and shall indicate areas of conflict with the work of other trades by drafting the location of grids, panels and tiles.
 8. The Contractor shall indicate Architectural/Structural conflicts or obstacles and coordinate to suit the overall construction schedule. The Contractor shall locate all precut and prefabricated holes and openings in structural steel on the CAD coordination drawing files as required for HVAC, plumbing, fire protection and electrical work. The Contractor shall coordinate these holes and openings with the structural steel fabricator during the structural steel shop drawing development phase. Coordination to take place on schedule so as to permit shop fabrication of all structural steel holes and openings. The Owner will not be held responsible for the costs associated with field fabrication of structural openings resulting from the lack of timely and thorough coordination.
 9. The Contractor shall expedite all drawing work and coordinate to suit the construction schedule. The Contractor shall then review these drawings and compare them with the Architectural, Structural,

Equipment, and other drawings and determine that all of the work can be installed without undue interference. Prior to the submittal to the Architect, areas of potential conflict shall be brought to the attention of the Contractor who shall convene a coordination meeting of all parties involved, for the purpose of resolving all utility conflicts. The Contractor shall supervise and direct corrective measures and have all trades sign acceptance of the drawings. Submit four (4) hard copies of each drawing to the Architect and two (2) copies to the Construction Administrator for the record, and only after all conflicts have been accommodated.

10. If the coordination meeting fails to resolve coordination conflicts, the Contractor shall indicate the nature of such conflicts in a detailed RFI, proposing the most economical solution.
 11. The Contractor shall not permit work by trades to proceed in a given bay or area until all trade foremen agree on the exact arrangements for each room or area. If a given trade proceeds prior to trades approval, then if necessary, that trade shall revise their work, if necessary, at no extra cost, in order to permit other trades to proceed.
 12. Submit all coordination drawings on CD-ROM, in addition to hard copy.
- D. The Construction Administrator will meet with the Contractor on all major items of coordination.

3.2 CLEANING AND PROTECTION

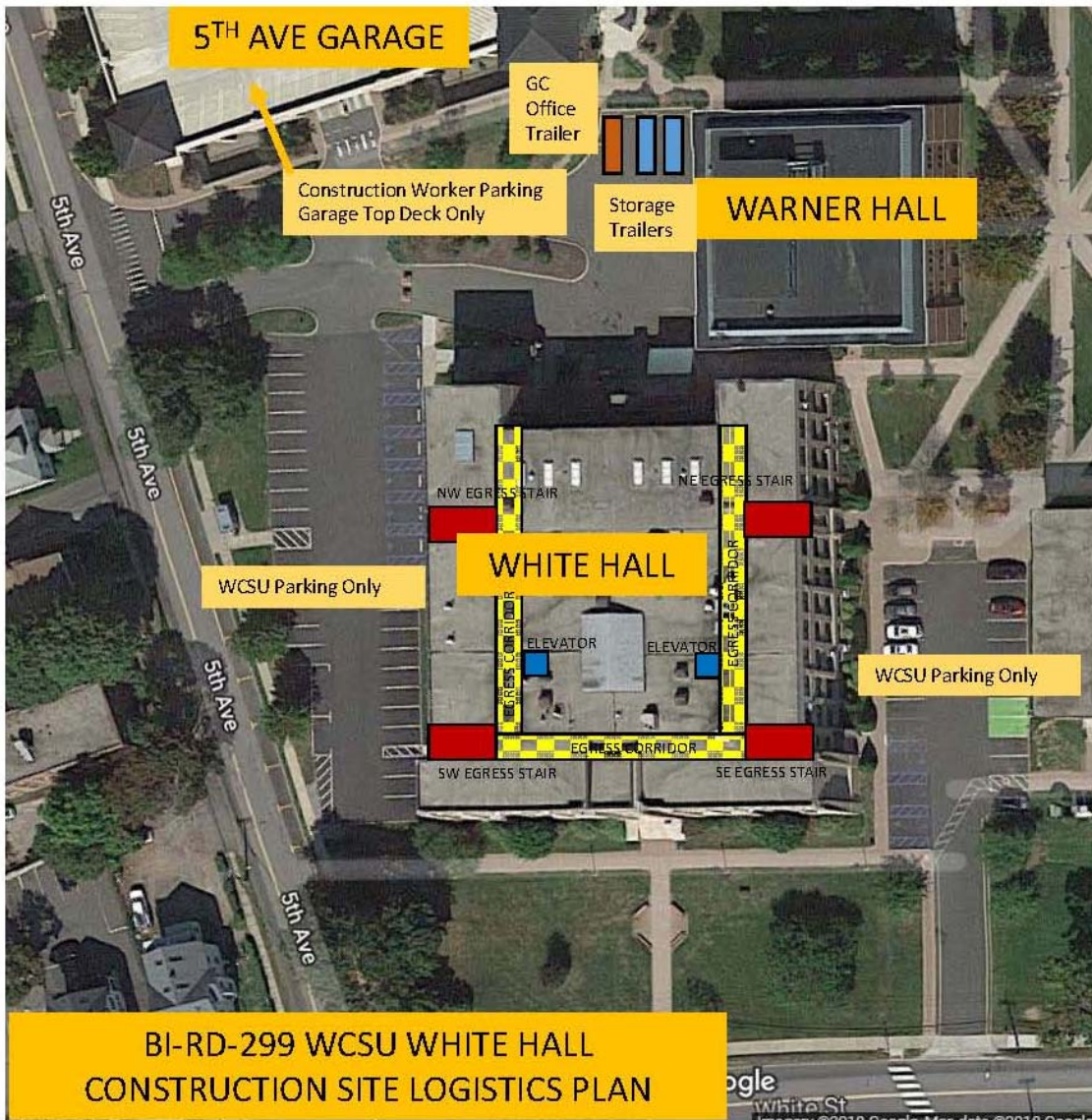
- A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering, where required, to assure protection from damage or deterioration.
- B. Clean and provide maintenance on completed construction as construction per manufacturers requirements through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.
- C. 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. Where applicable, such exposures include, but are not limited to, the following:
 1. Excessive static or dynamic loading.
 2. Excessive internal or external pressures.
 3. Excessively high or low temperatures.
 4. Thermal shock.
 5. Excessively high or low humidity.
 6. Air contamination or pollution.
 7. Water or ice.
 8. Solvents.
 9. Chemicals.
 10. Light.
 11. Radiation.
 12. Puncture.
 13. Abrasion.
 14. Heavy traffic.
 15. Soiling, staining, and corrosion.
 16. Bacteria.
 17. Rodent and insect infestation.
 18. Combustion.
 19. Electrical current.
 20. High-speed operation.
 21. Improper lubrication.
 22. Unusual wear or other misuse.
 23. Contact between incompatible materials.
 24. Destructive testing.

- 25. Misalignment.
- 26. Excessive weathering.
- 27. Unprotected storage.
- 28. Improper shipping or handling.
- 29. Theft.
- 30. Vandalism.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SAMPLE PLAN



END OF SECTION 01 31 00

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. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
 - 1. **Start Date meeting (establishes start date)**
 - 2. **Pre-construction conferences.**
 - 3. **Pre-installation conferences.**
 - 4. **Progress meetings.**
 - 5. **Safety**
 - 6. **Coordination**
 - 7. **As-built drawings review**
 - 8. **And as required**
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 31 00 "Project Management and Coordination" for procedures for coordinating project meetings with other construction activities.
 - 2. Division 01 Section 01 32 16 "Construction Progress Schedules" for requirements for construction scheduling and reporting progress of work.
 - 3. Division 01 Section 01 33 00 "Submittal Procedures" for submitting the Construction Schedule or CPM Schedule.
 - 4. Division 01 Section 01 35 26 "Government Safety Requirements specifies the requirements for safety plans, reports, and investigation submittals.

1.3 PRE-CONSTRUCTION CONFERENCE

- A. The Contractor will attend a pre-construction conference before starting construction, as scheduled by the Construction Administrator convenient to the Owner, the Construction Administrator, Architect, and Contractor. This meeting will take place at least **fourteen (14)** days prior to official Start Date. Hold the conference at the Project Site or another convenient location as directed by the Construction Administrator. The Construction Administrator shall conduct the Pre-construction Conference to review the Contractor and Subcontractor responsibilities and personnel assignments.
- B. **Attendees:** Authorized representatives of the Construction Administrator, Owner, Architect, and their consultants; the Contractor and its superintendent; major subcontractors; agency; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. **Agenda:** Discuss items of significance that could affect progress, including the following:
 - 1. **Tentative construction schedule.**
 - 2. **Critical work sequencing.**
 - 3. **Progress meeting schedule.**
 - 4. **Designation of responsible personnel.**
 - 5. **Procedures for processing field decisions and Change Orders.**
 - 6. **Procedures for processing Applications for Payment.**
 - 7. **Distribution of Contract Documents.**
 - 8. **Submittal of Shop Drawings, Product Data, and Samples.**

9. Preparation of record documents.
10. Use of the premises.
11. Parking availability.
12. Office, work, and storage areas.
13. Equipment deliveries and priorities.
14. Safety procedures.
15. First aid.
16. Security.
17. Housekeeping.
18. Working hours.
19. Coordination with Audio Visual and Telecommunications.

1.4 PRE-INSTALLATION/CONSTRUCTION CONFERENCES

- A. The Contractor will schedule a pre-installation conference(s) at the Project Site before each construction activity that requires coordination with other construction. The Contractor shall be responsible to notify in writing the Construction Administrator and the appropriate Subcontractor(s), etc., of the date and time of all Pre-installation/Construction Conferences. Notification shall be at least seven (7) days, prior to the Conference. The Contractor shall be responsible for coordination and attendance of all Subcontractors, etc., involved in or affected by the installation for all Pre-installation/Construction Conferences.
- B. **Attendees:** The Construction Administrator, Contractor, Subcontractors, Owner and Architect, the 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. The Contractor shall advise all attendees of the scheduled Pre-installation/Construction Conferences dates.
- C. **Agenda:** Review the progress of other construction activities and preparations for the particular activity under consideration at each Pre-installation/Construction Conference, including but not limited to the following requirements:
 1. Contract Documents.
 2. Options.
 3. Related Change Orders.
 4. Purchases.
 5. Deliveries.
 6. Shop Drawings, Product Data, and quality-control samples.
 7. Review of mockups.
 8. Possible conflicts.
 9. Compatibility problems.
 10. Time schedules.
 11. Weather limitations.
 12. Manufacturer's recommendations.
 13. Warranty requirements.
 14. Compatibility of materials.
 15. Acceptability of substrates.
 16. Temporary facilities.
 17. Space and access limitations.
 18. Governing regulations.
 19. Safety.

20. Inspecting and testing requirements.

21. Required performance results.

22. Recording requirements.

23. Protection.

- D. The Construction Administrator will record significant discussions and agreements and disagreements of each Pre-installation/Construction Conference, and the approved schedule. The Construction Administrator will promptly distribute the record of the Pre-installation/Construction Conference to all attendees.
- E. The Contractor shall not proceed with the installation/construction if the conference cannot be successfully concluded. The Contractor shall be responsible to initiate whatever actions are necessary to resolve impediments to performance of Work and schedule and reconvene another Pre-installation/Construction Conference at the earliest feasible date. Failure of the contractor to resolve impediments to the performance of the work will not result in an extension of days.

1.5 PROGRESS MEETINGS

- A. The Construction Administrator will conduct progress meetings, bi-weekly, at the Project Site or at regular intervals as agreed upon at the Pre-construction Conference. The Construction Administrator will notify the Owner, the Architect, and the Contractor of the scheduled Progress Meeting dates. Coordinate dates of Progress Meetings with preparation of Application for Payment requests.
- B. **Attendees:** In addition to representatives of the Contractor, Construction Administrator, Owner and the Architect, subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities may be requested to attend these meetings on an as needed basis. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work. The Contractor shall include the site superintendent as a minimum.
- C. **Agenda:** Progress Meetings shall review and correct or approve minutes of the previous Progress Meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.
 - 1. **Construction Schedule or CPM Schedule:** Review progress since the last Progress Meeting. Determine where each activity is in relation to the required Contractor's "Construction Schedule" or "CPM Schedule" and whether each activity is on time or ahead or behind Schedule. Determine how Work that is behind Schedule will be expedited; secure commitments from parties involved to do so. Discuss whether Schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
 - 2. Review the present and future needs of each entity present, including the following:
 - a. **Interface requirements.**
 - b. **Time.**
 - c. **Sequences.**
 - d. **Status of submittals.**
 - e. **Deliveries.**
 - f. **Off-site fabrication problems.**
 - g. **Access.**
 - h. **Site utilization.**
 - i. **Temporary facilities and services.**
 - j. **Hours of work.**
 - k. **Hazards and risks.**
 - l. **Housekeeping.**
 - m. **Quality and work standards.**
 - n. **Change Orders.**
 - o. **Documentation of information for payment requests.**

- D. **Reporting:** The Construction Administrator will distribute minutes of the meeting to each party present, promptly and before the next scheduled meeting, and to parties who should have been present.

1.6 SUBCONTRACTOR/COORDINATION/SAFETY MEETINGS

- A. The Contractor shall conduct Subcontractor/coordination meetings.
- B. The Contractor shall conduct a separate safety meeting after the safety plan is submitted. The Contractor shall take meeting minutes. These minutes shall be made available upon request. The Contractor shall notify the Construction Administrator of the times and dates of these meetings, who may elect to attend these meetings as an observer when necessary. A minimum of one safety meeting will be held per month.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 31 19

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. This Section includes administrative and procedural requirements for the preparation, submittal, and updating of the Contractor's construction schedules and reporting progress of the Work.
1. Refer to the General Conditions and the Agreement for definitions and specific dates of Contract Time.
- B. This Section includes the following:
1. Format.
 2. Content.
 3. Revisions to schedules.
 4. Submittals.
 5. Distribution.
- C. **Related Sections:** The following Sections contain requirements that relate to this Section:
1. Division 01 Section 01 29 76 "Progress Payment Procedures" specifies requirements for submitting Schedule of Values and Application for Payments.
 2. Division 01 Section 01 31 19 "Project Meetings" specifies requirements for submitting and distributing meeting and conference minutes.
 3. Division 01 Section 01 33 00 "Submittal Procedures" specifies requirements for submitting the Submittal Schedule.
 4. Division 01 Section 01 45 00 "Quality Control" specifies requirements for submitting inspection and test reports.
 5. Division 01 Section 01 60 00 "Product Requirements" specifies requirements for submitting the list of products.

1.3 DEFINITIONS

- A. **Construction Schedule:** A method of planning and scheduling a construction project utilizing a horizontal bar chart with a separate bar for each major portion of the Work or operation to make the schedule an effective tool for planning and monitoring the progress of the work.

1.4 QUALITY ASSURANCE

- A. **The Contractor's Consultant:** Retain a consultant to provide planning, evaluating, and reporting by CPM scheduling.
1. **In-House Option:** The Owner may waive the requirement to retain a consultant if the Contractor can demonstrate that:
 - a. The Contractor has the computer equipment required to produce construction schedules.
 - b. The Contractor employs skilled personnel with experience in construction scheduling and reporting techniques.
 2. **Program:** Use **Microsoft Project** latest version.
 3. **Standards:** Comply with procedures contained in AGC's "Construction Planning & Scheduling."

1.5 PRELIMINARY SCHEDULE

- A. Preliminary Gantt schedule is to be prepared by the Contractor and submitted to the Construction Administrator within **seven (7)** days of award of contract. This schedule is to cover all items of Work from the start of the project up to the completion of the project. This schedule must be revised when the actual schedule of significant items varies more than one week from the proposed schedule.

1.6 CONSTRUCTION SCHEDULE FORMAT

1. **Format:** Utilize a horizontal bar chart (Gantt) with a separate bar for each major portion of the Work or operation, identifying first work day of each week.
2. **Program:** Use **Microsoft Project**, latest version.
3. **Sequence of Listings:** Utilize the Table of Contents of this Project Manual and the chronological order of the start of each item of work.
4. **Scale and Spacing:** Provide space for notations and revisions.
5. **Sheet Size:** To be coordinated with Construction Administrator.
6. **Weather Days Allowance:** The Contractor shall include as a separate identifiable activity on the Critical Path of the Construction Schedule, and activity labeled "Weather Days Allowance." Insert this activity immediately prior to the substantial completion milestone.

6.1 The Contractor shall be fully responsible for determining the number of weather delay days to be included in the Construction Schedule. This determination shall be based on the normal anticipated weather for the project location and the nature of the project work. The Construction Schedule shall be based on the contractor's determined weather delay allowance. The weather delay activity shall be included in the construction schedule immediately prior to the Substantial Completion milestone.

6.2 The minimal allowed duration of the Weather Days Allowance shall be calculated as follows (decimals rounded to nearest whole number):

$$\frac{\text{Contract Time (Calendar Days)}}{365} \text{ multiplied by } 7 \text{ equals Weather Days Allowance (Calendar Days)}$$

6.3 The Contractor shall insert an activity in the Critical Path of the Construction Schedule to reflect weather day occurrences when weather days are experienced and accepted by the Owner. Identify this activity as a weather delay.

6.4 The Contractor shall reduce duration of Weather Days Allowance activity as weather delays are experienced and inserted into the schedule. Remaining weather days in Weather Day Allowance at completion of project is considered float. Weather delay, when justified, are considered allowable, non compensable.

1.7 CONTENT

- A. Show complete sequence of construction by activity, with dates beginning and completion of each element of construction.
- B. Identify each item by specification section numbers.
- C. Identify work of separate phases and other logically grouped activities.
- D. Show accumulated percentages of completion of each item, and total percentage of Work completed, as of the **first** day of each month.
- E. Provide separate schedule of submittal dates for shop drawings, product data, and samples, Owner/Agency furnished products and any products identified as under Allowances, and dates reviewed submittals will be required from Architect/Engineer. Indicate decision dates for selection of finishes.
- F. Indicate delivery dates for Owner/Agency furnished products and any products identified as under Allowances.
- G. Indicate critical path with original baseline indicated.
- H. Coordinate content with Schedule of Values specified in Section 01 29 76 "Progress Payment Procedures."

1.8 SUBMITTALS AND REVISIONS TO SCHEDULES

- A. An initial bar graph schedule is to be prepared by the Contractor and submitted to the Construction Administrator. Refer to Article 1.5.
- B. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- C. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
- D. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

- E. Schedules must be revised monthly and when the actual schedule of significant items varies more than **seven (7) days** from the proposed schedule.
- F. Submit revised Construction Schedules for each Application for Payment.
- G. Submit **four (4)** copies of the Construction Schedule to the Construction Administrator.

1.9 DISTRIBUTION

- A. Distribute copies of the Construction Schedules to Construction Administrator, Architect, Owner, Subcontractors, suppliers, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problem anticipated by projections indicated in schedules.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 32 16

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. This Section includes administrative and procedural requirements for construction photographs.
- B. **Related Sections:** The following Section contains requirements that relate to construction photographs:
 - 1. Division 01 Section 01 33 00 "Submittal Procedures" specifies general requirements for submitting digital construction photographs.

1.3 SUBMITTALS

- A. **Photographs:** Provide a digital camera to take **twenty-four (24)** or more photos each time. Deliver **two (2)** sets of photo files on **one (1)** CD-ROM and **one (1)** set of prints (8x10) to the Construction Administrator for the Department.
- B. **Extra Sets:** When requested by the Owner, the photographer shall prepare extra sets of prints or CD-ROM. The photographer shall distribute these directly to the designated parties who will pay the costs for the extra sets directly to the photographer.

1.4 QUALITY ASSURANCE

- A. Engage a qualified commercial photographer to take photographs during construction.
- B. **Photographer's Qualifications:** Photographer shall be an individual of established reputation who has been regularly engaged as a professional photographer for not less than **three (3) years**.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC COPIES

- A. On the date the work is begun and every **thirty (30) days** thereafter (until the work is at least 95 percent complete), the Contractor shall have digital photographs of the construction taken by a professional photographer.
- B. **Identification:** Label each CD-ROM with project name and date the photographs were taken. With each submittal provide an applied label, rubber-stamped or index sheet with the following information:
 - 1. **Name of the Project.**
 - 2. **Name and address of the photographer.**
 - 3. **Name of the Architect.**
 - 4. **Name of the Contractor.**
 - 5. **Date the photographs were taken.**
 - 6. **Vantage Point: Description of vantage point, in terms of location, direction (by compass point), and elevation or story of construction.**

PART 3 – EXECUTION

3.1 PHOTOGRAPHIC REQUIREMENTS

- A. Take **twenty-four (24)** or more digital photographs monthly, coinciding with the cutoff date associated with each Application for Payment. The Construction Administrator shall select the vantage points for each shot to best show the status of construction and progress since the last photos were taken.

- B. As the digital photographs are a record of the work progress, they shall be taken each month, whether or not they show work done during the preceding month. Deliver the CD-ROMs and prints within **ten (10) days** of their taking.
- C. Provide and coordinate the use of photographic software to assure that the photos are viewable by all interested parties.

D. PART 2 - PRODUCTS (Not Applicable)

E. PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 32 33

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. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including but not limited to the following:
 - 1. **Submittal schedule.**
 - 2. **Shop Drawings.**
 - 3. **Product Data.**
 - 4. **Samples.**
 - 5. **Quality assurance submittals.**
 - 6. **Proposed "Substitutions/Equals".**
 - 7. **Warranty samples.**
 - 8. **Coordination Drawings.**
 - 9. **O & M Manuals**
- B. Administrative Submittals: Refer to other Division 01 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
 - 1. **Permits.**
 - 2. **Applications for Payment.**
 - 3. **Performance and payment bonds.**
 - 4. **Contractor's construction schedule.**
 - 5. **Daily construction reports.**
 - 6. **Construction Photographs.**
 - 7. **Insurance certificates.**
 - 8. **List of subcontractors.**
 - 9. **Subcontractors/Suppliers FEIN number's and Connecticut tax registration number.**
- C. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 25 00 "Substitution Procedures" specifies requirements for submittal of requests for equals and substitutions.
 - 2. Division 01 Section 01 29 76 "Progress Payment Procedures" specifies requirements for submittal of the Schedule of Values.
 - 3. Division 01 Section 01 31 00 "Project Management and Coordination" specifies requirements governing preparation and submittal of required Coordination Drawings.
 - 4. Division 01 Section 01 31 19 "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.
 - 5. Division 01 Section 01 32 16 "Construction Progress Schedules" for requirements for construction scheduling and reporting progress of work.
 - 6. Division 01 Section 01 32 33 "Photographic Documentation" specifies requirements for submittal of periodic construction photographs.
 - 7. Division 01 Section 01 35 26 "Government Safety Requirements" specifies the requirements for safety plans, reports, and investigation submittals.
 - 8. Division 01 Section 01 45 00 "Quality Control" specifies requirements for submittal of inspection and test reports and mockups.

9. Division 01 Section 01 77 00 "Closeout Procedures" specifies requirements for submittal of Project Record Documents and warranties at project closeout.
10. Division 01 Section 01 78 30 "Warranties and Bonds".

1.3 DEFINITIONS

- A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended and as identified in the Specification Divisions 02 through 49.
 1. Preparation of Coordination Drawings is specified in Division 01 Section 01 31 00 "Project Management and Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
- B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.
- C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

1.4 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
 - b. The Architect reserves the right to reject incomplete submitted packages.
 3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for re-submittals.
 - a. Allow **fourteen (14) days** for initial review. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.
 - b. If an intermediate submittal is necessary, process the same as the initial submittal.
 - c. Allow **fourteen (14) days** for reprocessing each submittal.
 - d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
- B. **Submittal Preparation:** Place a permanent label, title block or **8-1/2 inches x 11 inches** cover page approved by the Architect, on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
 1. The minimum number of copies required for each submittal shall be **seven (7)** or as determined otherwise at the pre-construction conference or by the Construction Administrator.
 2. Provide a space approximately **4 inches by 5 inches** on the label, beside the title block or on the cover page on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 3. Include the following information on the label for processing and recording action taken.
 - a. **Project Name and State of Connecticut Project Number.**
 - b. **Date.**
 - c. **Name and address of the Architect, Construction Administrator, and Owner Representative.**
 - d. **Name and address of the Contractor.**
 - e. **Name and address of the subcontractor.**
 - f. **Name and address of the supplier.**
 - g. **Name of the manufacturer.**
 - h. **Number and title of appropriate Specification Section.**

- i. Drawing number and detail references, as appropriate.
 - j. Indicate either initial or resubmittal.
 - k. Indicate deviations from Contract Documents.
 - l. Indicate if "equal" or "substitution".
- C. **Submittal Transmittal:** Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect using a transmittal form. Copy the Construction Administrator on the transmittal. The Architect will return all submittals to the Contractor after action is taken with a complete copy of the submittal package and one complete copy of the submittal package. The Architect will not accept submittals received from sources other than the Contractor.
1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.6 SUBMITTAL SCHEDULE

- A. After development and review by the Owner and Architect acceptance of the Contractor's Construction or CPM schedule prepare a complete schedule of submittals. Submit the schedule to the Construction Administrator within **thirty (30)** days of Contract Award.
1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction or CPM Schedule.
 2. Prepare the schedule in chronological order. Provide the following information:
 - a. Schedule date for the initial submittal.
 - b. Related section number.
 - c. Submittal category (Shop Drawings, Product Data, or Samples).
 - d. Name of Subcontractor.
 - e. Description of the part of Work covered.
 - f. Scheduled date for resubmittal.
 - g. Scheduled date for the Architect's final release of approval.
- B. **Submittal Schedule:** Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's Construction or CPM Schedule.
 2. **Initial Submittal:** Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. **Final Submittal:** Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
- C. **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.

- D. 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 **fifteen 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 with related submittals not yet received. Additional time will be required if processing must be delayed to permit review of related subsequent submittals.
 - 2. Intermediate Review:** If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review:** Allow **fifteen 15** days for review of each resubmittal.
 - 4. Mass Submittals:** **Six (6)** or more submittals in **one (1) day** or **twenty (20)** or more submittals in **one (1) week**. If "Mass Submittals" are received, Architect's review time stated above may be extended as necessary to perform proper review. Architect will review "Mass Submittals based upon priority determined by Architect after consultation with Owner and Contractor.
- E. Distribution:** Following response to the initial submittal, print and distribute copies to the Construction Administrator, Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
- When revisions are made, distribute 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 construction activities.
- A. Schedule Updating:** Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.7 DAILY CONSTRUCTION REPORTS

- A.** Prepare a daily construction report recording the following information concerning events at the site, and submit duplicate copies to the Construction Administrator at weekly intervals:
- 1. List of subcontractors at the site.**
 - 2. Approximate count of personnel at the site.**
 - 3. High and low temperatures, general weather conditions.**
 - 4. Accidents and unusual events.**
 - 5. Meetings and significant decisions.**
 - 6. Stoppages, delays, shortages, and losses.**
 - 7. Meter readings and similar recordings.**
 - 8. List of equipment on site and identify if idle or in use.**
 - 9. Orders and requests of governing authorities.**
 - 10. Change Orders received, start and end dates.**
 - 11. Services connected, disconnected.**
 - 12. Equipment or system tests and startups.**
 - 13. Partial Completion's, occupancies.**
 - 14. Substantial Completion's authorized.**
 - 15. Equals or Substitutions approved or rejected.**

1.8 SHOP DRAWINGS

- A.** Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
- B.** Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:
- Dimensions.
 - Identification of products and materials included by sheet and detail number.

3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
 6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches** but no larger than **36 by 48 inches**.
 7. Submit **one (1)** reproducible media and **seven (7)** prints as directed by the Construction Administrator. The Contractor's submittal shall identify the specification section and/or drawing number applicable to the submittal.
 8. Details shall be large scale and/or full size.
- C. The Contractor shall review the Shop Drawings, stamp with this approval, and submit them with reasonable promptness and in orderly sequence so as to cause no delay in his Work or in the Work of any subcontractor. Shop Drawings shall be properly identified as specified for item, material, workmanship, and project number. At the submission, the Contractor shall inform the Architect, in writing of any deviation in the shop drawings from the requirements of the Contract Documents.
- D. The Architect will review and comment on shop drawings with reasonable promptness so as to cause no delay, but only for conformance with the design concept of the project and with the information given in the Contract Documents. Refer to Article 5 of the General Conditions. Shop Drawings received by the Architect that indicate insufficient study of drawings and specifications, illegible portions or gross errors, will be rejected outright. Such rejections shall not constitute an acceptable reason for granting the Contractor additional time to perform the work.
- E. The Contractor shall make any corrections required by the Architect and shall resubmit the required number of corrected copies of Shop Drawings until fully reviewed.
- F. Upon final review submit **four (4)** additional prints, same as submitted, for use by the Construction Administrator.
- G. The Architect's review and comments on Shop Drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents.
- H. Only final reviewed Shop Drawings are to be used on the Project site.
- I. The Work installed shall be reviewed in accordance with the Shop Drawings and the drawings and specifications. Final Review of the Shop Drawings by the Architect shall constitute acceptance by the State and the Architect of a variation or departure that is **clearly identified**. If the contractor believes notations made by the A/E increases the value or scope of the CD's, the contractor must provide written notice to the CA within **seven (7)** days of this issue. Final reviewed Shop Drawings shall not replace or be used as a vehicle to issue or incorporate change orders or substitutions. Substitutions shall be submitted in accordance with Division 01 Section 01 25 00 "Substitution Procedures".

1.9 SHOP DRAWINGS FOR FIRE PROTECTION SYSTEMS:

- A. Shop drawings for fire protection systems shall comply with all of the requirements in the section above "Shop Drawings". In addition Sprinkler system shop drawings and hydraulic calculations must be stamped by a professional engineer licensed in the state of Connecticut and must include the DAS/CS project number. **Two (2)** sets of information [as noted in this Section 01 33 00 "Submittal Procedures"] shall be submitted to the State's Insurance Carrier (SIC), and **one (1)** set shall be submitted to the Office of the State Fire Marshal (OSFM):
1. **Office of State Fire Marshal:**
CT Department of Administrative Services
Construction Services
Office of State Fire Marshal
450 Columbus Boulevard, Suite 1304
Hartford, Connecticut 06103
Phone: (860) 713-5750
 2. **State Insurance Carrier (SIC):**
FM Global Boston Operations
Plan Review
1175 Boston-Providence Turnpike
PO Box 9102
Norwood, MA 02062
Tel: (781) 440-8241 or FAX (781) 440-8742

bostonleadengineer@fmglobal.com

- B. Before the shop drawings are submitted to SIC or OSFM, the A/E's fire protection consultant must review the sprinkler design for compliance with the code, OSFM, and FM Global requirements.
- C. The State Insurance Carrier requires **two (2)** weeks prior notice of a sprinkler system acceptance test.

1.10 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, schedules, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
 - 1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
 - a. **Manufacturer's printed recommendations.**
 - b. **Compliance with trade association standards.**
 - c. **Compliance with recognized testing agency standards.**
 - d. **Application of testing agency labels and seals.**
 - e. **Notation of dimensions verified by field measurement.**
 - f. **Notation of coordination requirements.**
 - 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
 - 3. **Preliminary Submittal:** Submit a preliminary single copy of Product Data where selection of options is required.
 - 4. **Submittals:** Submit **seven (7)** copies of each required submittal; submit **five (5)** copies where required for maintenance manuals. The Architect will retain **one (1)** and will return the other marked with action taken and corrections or modifications required.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - 5. **Distribution:** Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
 - b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.11 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
 - 1. Store, mount or display Samples on site in the manner to facilitate review of qualities indicated. Prepare Samples to match the Architect's sample. Include the following:
 - a. **Specification Section number and reference.**
 - b. **Generic description of the Sample.**
 - c. **Sample source.**
 - d. **Product name or name of the manufacturer.**
 - e. **Compliance with recognized standards.**
 - f. **Availability and delivery time.**
 - 2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

- a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least **three (3)** multiple units that show approximate limits of the variations.
 - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
 - c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
 - d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.
- 3. Preliminary Submittals:** Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices, unless otherwise noted in specification section.
- a. The Architect will review and return preliminary submittals with the Architects notation, indicating selection and other action.
- 4. Submittals:** Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit **three (3)** sets. The Architect will return **one (1)** set marked with the action taken.
- 5. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.**
- a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples:** Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
1. Field samples are full-size examples erected on-site to illustrate finishes, coatings, or finish materials and to establish the Project standard.
 - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.12 QUALITY ASSURANCE SUBMITTALS

- A.** Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- B. Certifications:** Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
1. **Signature:** Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.
- C. Inspection and Test Reports:** Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 01 Section 01 45 00 "Quality Control."

1.13 ARCHITECT'S ACTION

- A.** Except for submittals for the record or information, where action and return is required, the Architect will review each submittal, mark to indicate action taken, and return promptly.
1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp:** The Architect will stamp each submittal with a uniform, action stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:
1. **Final Unrestricted Release:** When the Architect marks a submittal "Approved for fabrication," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.

2. **Final-But-Restricted Release:** When the Architect marks a submittal "Incorporate Notations," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Submit corrected copies for record. Final payment depends on that compliance.
 3. **Returned for Resubmittal:** When the Architect marks a submittal "Rejected, or Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
 - a. Do not use, or allow others to use, submittals marked "Rejected, or Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.
 4. **Other Action:** Where a submittal is for information or record purposes or special processing or other activity, the Architect will return the submittal marked "Action Not Required."
- C. **Unsolicited Submittals:** The Architect will discard unsolicited submittals without action.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 33 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for performing alteration and renovation Work.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. [Division 00 Section 00 30 00 "General Statements for Available Information"](#) for information that is available in addition to the Bidding Documents for review by bidders. Such information may include an existing conditions survey, contaminated soil reports, contaminated groundwater reports, hazardous building material reports, geotechnical data, etc.
 - 2. Division 01 Section 01 31 00 "Project Management and Coordination" for procedures for coordinating cutting and patching with other construction activities.
 - 3. Division 01 Section 01 73 29 "Cutting and Patching" for procedures for cutting and patching.
 - 4. Division 02 Section 02 41 19 "Selective Structure Demolition" for demolition of selected portions of the building for alterations.
 - 5. [Division 50 00 00 "Project-Specific Available Information"](#) for information that is referenced in [Section 00 30 00 "General Statements for Available Information"](#).
 - 6. Refer to other Sections for specific requirements and limitations applicable to performing alteration Work with individual parts of the Work.
 - 7. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 21, 22, 23 and 26 Sections for other requirements and limitations applicable to renovation Work by mechanical and electrical installations.

PART 2 - PRODUCTS

2.1 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. New materials: As specified in product sections; match existing Products and Work for patching and extending Work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing Products where necessary, referring to existing Work as a standard.

2.2 SALVAGEABLE MATERIALS

- A. The **Contractor** shall be responsible for removing the following salvageable items from premises and transporting said items to [Western Connecticut State University Danbury](#), CT **06810**.
 - 1. **HVAC Equipment as delineated in the Drawings:**
 - 2. **Doors:**
 - 3. **Door Hardware:**
- B. The **Contractor** shall notify the Construction Administrator in writing **seven (7)** days prior to removing all salvageable items from the existing alteration project location and unloading all salvageable items at [Western Connecticut State University, Danbury](#), Connecticut **06810** and store items in the appropriate location as directed by **WCSU** personnel.

PART 3 - EXECUTION

3.1 INSPECTION

A. General:

1. Observe all existing conditions prior to submitting a bid. Include in the bid, existing conditions and their impact, particularly to cost and health and safety of workers and occupants, and proper function and operation of the facility. Be aware of other work being performed. Failure to visit the site shall in no way provide relief from the necessity of furnishing materials or performing any work that may be required to complete the work in accordance with the Contract Documents without additional cost to the Owner. All site visits shall be scheduled with the Owner.
2. The quantities, locations and the extent of work indicated are best estimates, which are limited by the physical constraints imposed by occupancy of the facility. Consider all aspects of the substrates within the identified plan area. Material information and quantities were obtained from site surveys. Accordingly, variations (plus or minus 10 percent) in quantities within the limits of the work area are considered as having no impact on contract sum and contract performance period. Where additional abatement work is required beyond the above variations, the contract sum and contract performance period shall be adjusted under provisions of Division 01 of the Specifications.
3. Verify that demolition is complete and areas are ready for installation of new Work.
4. Beginning of restoration Work means acceptance of existing conditions.

B. Project Procedures for Work Involving Asbestos Containing Material (ACM):

1. The **Owner** is responsible for abating all **Asbestos Containing Material (ACM)** that is visible and accessible. This is to be accomplished through a separate project prior to the start of the renovation project.
2. If testing for asbestos has been conducted at the facility scheduled for renovation, demolition, reconstruction, alteration, remodeling, or repair, then the results of the asbestos testing are summarized in **Division 50 00 00 Project-Specific Available Information, Section 50 30 00 Hazardous Building Materials Inspection and Inventory** at the end of the Technical Specification Sections. Under no circumstance shall this information be the sole means used by the Contractor for determining the extent of asbestos. The Contractor shall be responsible for verification of all field conditions affecting performance of the Work.
4. If the Contractor should encounter any material suspected or known to contain asbestos **not previously identified and assigned as the Contractor's responsibility**, then the Contractor should immediately notify the Construction Administrator **in writing** of same. It is the Owner's responsibility to have the material tested and abated (if necessary). The Owner will respond within **twenty four (24) hours** after receiving the Contractor's written request to the Construction Administrator for testing the suspect material. **The Owner will abate ACM (if necessary) within a reasonable time period, i.e. within seven (7) calendar days.**

C. Project Procedures for Work Involving Lead-Based Paint (LBP):

1. The **Owner** is responsible for abating all **Lead-Based Paint (LBP)** prior to the start of any Work involving renovation, demolition, reconstruction, alteration, remodeling, or repair (if necessary), unless noted differently below or specified differently elsewhere.
2. If testing for LBP has been conducted at the facility scheduled for renovation, demolition, reconstruction, alteration, remodeling, or repair, then the results of the LBP testing are summarized in **Division 50 00 00 Project-Specific Available Information, Section 50 30 00 Hazardous Building Materials Inspection and Inventory** at the end of the Technical Specification Sections. Under no circumstance shall this information be the sole means used by the Contractor for determining the extent of LBP. The Contractor shall be responsible for verification of all field conditions affecting performance of the Work.
4. If the Contractor should encounter any material suspected or known to contain **LBP that was not previously identified and assigned as the Contractor's responsibility**, then the Contractor should immediately notify the Construction Administrator **in writing** of same. It is the State's responsibility to have the material tested and abated (if necessary). The Owner will respond within **four (4) Calendar Days** after receiving the Contractor's written request to the Construction Administrator for testing the suspect material. **The Owner will abate LBP (if necessary) within a reasonable time period, i.e. within ten (10) calendar days.**

- 4.1 When the **Owner** requests the **Contractor** undertake the responsibilities for the **abatement and disposal of the LBP**, then the compensation to the Contractor by Owner for the Work shall be determined by the “**Unit Prices**” stated in **Section 01 20 00 Contract Considerations**.
5. Exposure levels for lead in the construction industry are regulated by 29 CFR 1926.62. Construction activities disturbing surfaces containing lead-based paint (LBP) which are likely to be employed, such as sanding, grinding, welding, cutting and burning, have been known to expose workers to levels of lead in excess of the Permissible Exposure Limit (PEL). Conduct demolition and removal Work specified in the technical sections of this specification in conformance with these regulations. In addition, construction debris/waste may be classified as hazardous waste. Disposal of hazardous waste material shall be in accordance with 40 CFR Parts 260 through 271 and Connecticut Hazardous Waste Management Regulations Section 22a-209-1; 22a-209-8(c); 22a-449(c)-11; and 22a-449(c)-100 through 110.
 6. If this facility was constructed **prior to 1978** it is likely to have painted surfaces containing lead-based paint.
 7. In accordance with the United States Environmental Protection Agency's (EPA) Lead-Based Paint Renovation, Repair, and Painting Program (RRP) issued by the EPA on April 22, 2008, as amended, and regulated by 40 CFR 745, contractors performing renovation, repair and painting projects that disturb lead-based paint in homes, child care facilities, and schools built before 1978 must be certified and must follow specific work practices to prevent lead contamination. EPA requires that firms performing renovation, repair, and painting projects that disturb lead-based paint in pre-1978 homes, child care facilities and schools be certified by EPA and that they use certified renovators who are trained by EPA-approved training providers to follow lead-safe work practices. The Contractor must be a Renovation Firm that has completed an EPA Lead-Safe Certification Program and be certified to conduct lead-based paint activities and renovations under the RRP rule. The Contractor shall have at least one “Certified Renovator” assigned to jobs where LBP is disturbed.

D. Project Procedures for Work Involving Polychlorinated Biphenyls (PCBs) in Building Materials:

1. If this facility was constructed **between 1950 and 1978**, it is likely to have caulk and/or glazing containing PCBs.
2. The **Owner** is responsible for abating all **Polychlorinated Biphenyls (PCBs) in Building Materials** prior to the start of any Work involving construction, renovation or demolition (if necessary), unless noted differently below or specified differently elsewhere.

E. Project Procedures for Work Involving Hazardous Materials, Wastes, and Items and Universal Wastes (Including Products Containing Persistent Bioaccumulative Toxic Chemicals” (PBTs) such as Polychlorinated Biphenols (PCBs), Di-2-ethylhexyl Phthalate (DEHP), and Mercury):

1. The **Owner** is responsible for abating all **Hazardous Materials, Wastes, and Items and Universal Wastes** including products containing Persistent Bioaccumulative Toxic Chemicals” (PBTs) such as Polychlorinated Biphenols (PCBs), Di-2-ethylhexyl Phthalate (DEHP), and Mercury prior to the start of any Work involving renovation, demolition, reconstruction, alteration, remodeling, or repair (if necessary), unless noted differently below or specified differently elsewhere.
2. If the Contractor should encounter any Hazardous Materials, Wastes, and Items and Universal Wastes **that were not previously identified and assigned as the Contractor’s responsibility**, then the Contractor should immediately notify the Construction Administrator **in writing** of same. It is the State’s responsibility to have the material tested and abated (if necessary). The Owner will respond within **four (4) Calendar Days** after receiving the Contractor’s written request to the Construction Administrator for testing the suspect material **The Owner will abate Hazardous Materials, Wastes, and Items and Universal Wastes (if necessary) within a reasonable time period, i.e. within ten (10) calendar days]**
3. Exposure Levels for PBTs such as PCBs, DEHP, and mercury in the construction industry are regulated by 29 CFR 1910.1200 and 29 CFR 1926.28 et. al. Demolition and removal work may expose workers in excess of the respective Permissible Exposure Limit (PEL). Conduct demolition and removal work specified in the technical sections of these specifications in conformance with these regulations.

4. Examples of Hazardous Materials, Wastes, and Items and Universal Wastes include, but are not limited to, fluorescent light fixtures and exit signs, ballasts, high-intensity discharge (HID) lamps, certain types of construction products containing vinyl, mercury containing electrical switches, gauges, and thermostats; PCB Capacitors, refrigerants, pressurized cylinders, smoke/carbon dioxide detectors, used electronics, batteries, transformer/hydraulic fluids/oils, and miscellaneous household hazardous waste.
5. For the purposes of this paragraph, **PCB's in building material such as caulk and glazing or any other type of material not listed above is not applicable to this paragraph.**
6. Construction debris/waste may be classified as hazardous waste. Disposal of all hazardous materials shall be in accordance with but not limited to applicable provisions of 40 CFR Parts 761 Subpart K, 761, and 761.65 and the Connecticut General Hazardous Waste Statute Sec. 22a-454.

3.2 PREPARATION

- A. Cut, move, or remove items as are necessary for access to alteration and renovation Work. Replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.
- E. Close openings in exterior surfaces to protect existing Work **and salvageable items** from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

3.3 INSTALLATION

- A. Coordinate alteration and renovation Work to expedite completion, and if required sequence Work to accommodate Owner occupancy.
- B. Remove, cut and patch Work in a manner to minimize damage and to provide restoring products and finishes to original and or specified condition in accordance with **Section 01 73 29 "Cutting and Patching"**.
- C. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with neat transition to adjacent finishes in accordance with **Section 01 73 29 "Cutting and Patching"**.
- D. In addition to specified replacement of **equipment and fixtures, restore existing plumbing, heating, ventilation, air conditioning, and electrical systems** to full operational condition.
- E. Recover and refinish Work that exposes mechanical and electrical Work exposed accidentally during the Work.
- F. Install products as specified in individual specification sections.

3.4 TRANSITIONS

- A. Where new Work abuts or aligns with existing, perform a smooth and even transition. Patch work to match existing adjacent Work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect/Engineer.

3.5 ADJUSTMENTS

- A. Where removal of partitions or walls result in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- B. Where a change of plane of **1/4-inch** in **(12) inches** or more occurs, request recommendation from Architect/Engineer for providing a smooth transition.
- C. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
- D. Fit Work at penetrations of surfaces as specified in **Section 01 73 29 "Cutting and Patching"**.

3.6 REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing imperfections.

- B. Repair substrate prior to patching finishes.

3.7 FINISHES

- A. Finish surfaces as specified in individual product specification sections.
- B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.8 CLEANING

- A. In addition to cleaning specified in **Section 01 50 00 "Temporary Facilities and Controls"**, clean Agency occupied areas of Work.

END OF SECTION 01 35 16

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Construction Documents 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. This guide specification covers construction safety requirements and requirements for the protection of people, property, and resources. It is intended for use in construction, renovation, and demolition projects for the State of Connecticut Department of Administrative Services (DAS) / Construction Services (CS).
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 1. Division 01 Section 01 33 00 Submittal Procedures specifies the requirements for submittal requirements;
 2. Division 01 Section 01 31 19 "Project Meetings" specifies requirements for submittal and distribution of meeting and conference minutes.

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE) www.asse.org/publications/	
ASSE/SAFE A10.32	(2004) Fall Protection
ASSE/SAFE A10.34	(2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
ASSE/SAFE Z359.1	(2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) www.asme.org/Codes/	
ASME B30.22	(2005) Articulating Boom Cranes
ASME B30.3	(2004) Construction Tower Cranes
ASME B30.5	(2004) Mobile and Locomotive Cranes
ASME B30.8	(2004) Floating Cranes and Floating Derricks
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) www.nfpa.org/	
NFPA 10	(2007) Portable Fire Extinguishers
NFPA 51B	(2009) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 241	(2004) Safeguarding Construction, Alteration, and Demolition Operations
NFPA 70	(2008) National Electrical Code
NFPA 70E	Standard for Electrical Safety in the Workplace
CODE OF FEDERAL REGULATIONS (CFR) www.archives.gov/federal-register/cfr/	
10 CFR	Standards for Protection Against Radiation
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.28	Safety Requirements For Scaffolding.
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910.147	Control Of Hazardous Energy (Lockout/Tagout)
29 CFR 1910.178	Powered industrial trucks.
29 CFR 1915	Confined and Enclosed Spaces and Other
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.500	Fall Protection
29 CFR 1926.550	Cranes and Derricks

US Army Core of Engineers (USACE)	
www.iwr.usace.army.mil	
EM 385-1-1	Safety, and Health Requirements Manual (2008),

1.3 SUBMITTALS

- A.** An "O" followed by "A" indicates that the Owner acceptance; submittals not having an "O" designation are for Contractor Quality Control approval.
- B. Submittal Procedures:**
 - 1. Preconstruction Submittals:**
 - a.** Accident Prevention Plan (APP); "O, A";
 - b.** Activity Hazard Analysis (AHA); "O, A";
 - c.** Crane Critical Lift Plan; "O, A";
 - d.** Proof of qualification for Crane Operators; O, A.
 - 2. Test Reports:** Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports."
 - a.** Accident Reports;
 - b.** Monthly Exposure Reports;
 - c.** Crane Reports;
 - d.** Regulatory Citations and Violations;
 - e.** Gas Protection.
 - 3. Certificates:**
 - a.** Hot work permit;
 - b.** License Certificates.
 - c.** Certificate of Compliance – Crane

1.4 DEFINITIONS

- A. Competent Person.** A competent person is one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
- B. Competent Person for Fall Protection.** A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as their application and use with related equipment, and has the authority to take prompt corrective measures to eliminate the hazards of falling.
- C. Confined Space:** A space which by design has limited openings for entry and exit, unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include, but are not limited to storage tanks, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines.
- D. High Visibility Accident:** Any mishap which may generate publicity and/or high visibility.
- E. Medical Treatment;** Medical treatment includes treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.
- F. Operating Envelope:** The area surrounding any crane. Inside this "envelope" is the crane, the operator, riggers and crane walkers, rigging gear between the hook and the load, the load and the crane's supporting structure (ground, rail, etc.).
- G. Qualified Person for Fall Protection:** A person with a recognized degree or professional certificate and with extensive knowledge, training and experience in the field of fall protection; who is capable of performing design, analysis, and evaluation of fall protection systems and equipment.
- H. Recordable Injuries or Illnesses:** Any work-related injury or illness that results in:
 - 1.** Death, regardless of the time between the injury and death, or the length of the illness;
 - 2.** Days away from work (any time lost after day of injury/illness onset);
 - 3.** Restricted work;
 - 4.** Transfer to another job;

5. Medical treatment beyond first aid;
6. Loss of consciousness; or
7. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

- I. **Weight Handling Equipment (WHE) Accident:** A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered an accident even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.).]

1.5 REGULATORY REQUIREMENTS

- A. In addition to the detailed requirements included in the provisions of this Section see, **Division 01, Section 01 42 20 "Reference Standards and Definitions"** for other state laws, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, regulations, and referenced documents vary, the most stringent requirements govern.

1.6 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

A. **Personnel Qualifications:**

B. **Site Safety and Health Officer (SSHO):**

1. Provide a Site Safety and Health Officer (SSHO) at the work site at all times to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor. The Contractor Quality Control (QC) person **can be the SSHO on this project**. Meet the following requirements within the SSHO:

[Level 4: A minimum of **ten (10)** years safety work of a progressive nature with at least **5** years of experience on similar projects. 30-hour OSHA construction safety class or equivalent within the last **five (5)** years. An average of at least 24 hours of formal safety training each year for the past 5 years with training for competent person status for at least the following areas of competency:**Fall protection; Health hazard recognition, evaluation and control of chemical, physical and biological agents; Personal protective equipment and clothing to include selection, use and maintenance;**

C. **Crane Operators:**

Meet the Crane Operators and Crane Operation requirements of the Connecticut Bureau of License and Permits – Cranes, Department of Administrative Services, Office of State Fire Marshal pursuant to C.G.S § 29-221 through 29-230. Provide proof of current license and qualification. For more information visit the DAS website (www.ct.gov/DAS) > Licensing, Certification, Permitting and Codes > Cranes, or call **(860) 713-5580 or (860) 713-5529**.

D. **Personnel Duties:**

1. **Site Safety and Health Officer (SSHO):**

- a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily **production** report.
- b. Conduct mishap investigations and complete required reports. Maintain the **OSHA Form 300 and Daily Production** reports for prime and sub-contractors. For more information visit the OSHA website at www.osha.gov > Employers > Recordkeeping Requirements and Forms.
- c. Maintain applicable safety reference material on the job site.
- d. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.
- e. Implement and enforce accepted APPS and AHAs.

- f. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. Post a list of unresolved safety and health deficiencies on the safety bulletin board.
- g. Ensure sub-contractor compliance with safety and health requirements.

Failure to perform the above duties will result in dismissal of the superintendent and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.

E. Meetings:

1. Preconstruction Conference:

- a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the **Accident Prevention Plan (APP)**; (including the **Activity Hazard Analyses (AHAs)**, and special plans, program and procedures associated with it).
- b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Owner's Representative(s) as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
- c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

2. Safety Meetings:

Safety meetings shall be conducted to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent safety and health training and motivation.

- a. Meetings shall be conducted at least once a month for all supervisors on the project location and at least once a week for all workers by supervisors or foremen.
- b. Meetings shall be documented, including the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Documentation shall be maintained and copies furnished to the Construction Administrator (CA) on request.
- c. The Construction Administrator (CA) shall be informed of all scheduled meetings in advance and be invited to attend.

1.7 ACCIDENT PREVENTION PLAN (APP):

A. Use a qualified person to prepare the written site-specific APP.

- 1. Prepare the APP in accordance with the format and requirements of **US Army Core of Engineers (USACE), Safety, and Health Requirements Manual, EM 385-1-1**, or as approved by the CA and as supplemented herein. Cover all paragraphs and subparagraph elements in **USACE EM 385-1-1, Appendix A, "Minimum Basic Outline for Accident Prevention Plan"** or as approved by the CA. The USACE Safety, and Health Requirements Manual, EM 385-1-1 is available at the USACE Website www.iwr.usace.army.mil.
- 2. Specific requirements for some of the APP elements are described in "B" below. The APP shall be job-specific and address any unusual or unique aspects of the project or activity for which it is written.

- B.** The APP shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and made site-specific. The Owner considers the Prime General Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer and any designated Certified Safety Professional (CSP) and/or Certified Industrial Hygienist (CIH).

- C. Submit the APP to the DAS/CS Project Manager and Construction Administrator **Fourteen (14) Calendar Days** prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once accepted by the DAS/CS Project Manager and Construction Administrator, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the DAS/CS Project Manager and Construction Administrator, until the matter has been rectified. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the DAS/CS Project Manager and Construction Administrator, project superintendent, Site Safety and Health Officer (SSHO) and quality control manager. Should any hazard become evident, stop work in the area, secure the area, and develop a plan to remove the hazard. Notify the DAS/CS Project Manager and Construction Administrator within **Twenty (24)** hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by **American Society of Safety Engineers, ASSE/SAFE A10.34 - Protection of the Public on or Adjacent to Construction Sites**, see www.asse.org) and the environment.

Copies of the accepted plan will be maintained at the Construction Administrator's office at the job site. Continuously reviewed and amended the APP, as necessary, throughout the life of the contract. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered.

- D. **APP Contents:**
The contents of the Accident Prevention Plan (APP) shall be in accordance with **Appendix A** of the US Army Corps of Engineers, **EM 385-1-1 Safety and Health Requirements Manual**, Appendix A, Minimum Basic Outline for Accident Prevention Plans or as approved by the CA. For more information visit the USACE Website at www.usace.army.mil/Library.

- 1.8 **ACTIVITY HAZARD ANALYSIS (AHA):** Activity Hazard Analyses (AHAs) define the activities being performed and identify the sequences of work, the specific hazards anticipated, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk. The Activity Hazard Analysis (AHA) format shall be in accordance with US Army Corps of Engineers, **EM 385-1-1 Safety and Health Requirements Manual** or as approved by the CA.

- A. Submittals:
1. Submit initial AHA to CA for review at least **15 Calendar Days** prior to the start of each phase. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.
2. The AHA list will be reviewed monthly at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier or subcontractor and provided to the prime contractor for submittal to the CA.

1.9 **DISPLAY OF SAFETY INFORMATION**

Within **one (1) Calendar Days** after commencement of work, erect a safety bulletin board at the job site. Include and maintain information on safety bulletin board as required by US Army Corps of Engineers, **EM 385-1-1 Safety and Health Requirements Manual**, Section 01.A.06 or as approved by the CA. Additional items required to be posted include:

- A. Hot work permit.
B. Crane permit
C. Others (as required)

1.10 **SITE SAFETY REFERENCE MATERIALS**

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturer's manuals.

1.11 **EMERGENCY MEDICAL TREATMENT**

Contractors will arrange for their own emergency medical treatment. The Owner has no responsibility to provide emergency medical treatment.

1.12 **REPORTS**

- A. **Accident Reports**

1. Conduct an accident investigation for recordable injuries and illnesses, and property damage accidents resulting in at least **Two Thousand Dollars (\$2,000)** in damages, to establish the root cause(s) of the accident, complete "Accident Report Form" approved by the CA. Provide the report to the CA within **five (5) Calendar Days** of the accident.

B. Accident Notification

Notify the CA as soon as practical, but not later than **four hours (4)**, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than \$2,000, or any weight handling equipment accident.

1. Within notification include the following:
 - a. contractor name;
 - b. contract title;
 - c. type of contract;
 - d. name of activity;
 - e. installation or location where accident occurred;
 - f. date and time of accident;
 - g. names of personnel injured;
 - h. extent of property damage, if any; extent of injury, if known, and brief description of accident **to include type of construction equipment used, Personal Protective Equipment (PPE) used, etc..** Preserve the conditions and evidence on the accident site until the U.S. Department of Labor, Occupational Safety and Health Administration (USDOL-OSHA) investigation team arrives on-site and USDOL-OSHA investigation is conducted.

C. Monthly Exposure Reports

Monthly exposure reporting to the CA is required to be attached to the monthly Application for Payment request. This report is a compilation of employee-hours worked each month for all site workers, both prime and subcontractor. Provide on a form approved by the CA.

D. Crane Reports

Submit crane inspection reports on a form approved by the CA and as specified herein with Daily Reports of Inspections.

E. HOT WORK

Hot Work shall only be performed in accordance with the requirements of **NFPA 51B "Fire Prevention During Welding, Cutting and Other Hot Work Standard**.

1. **Definitions:**
 - a. **Hot Work:** Work involving burning, welding, or a similar operation that is capable of initiating fires or explosions. Examples listed by NFPA include arc welding, oxygen- fuel gas welding, open-flame soldering, brazing, thermal spraying, oxygen cutting, and arc cutting.
 - b. **Permit Authorizing Individual (PAI).** Means the individual designated by the General Contractor to authorize hot work. The PAI is permitted to be, among others, the General Contractor's project executive, supervisor, foreperson, or designated safety administrator. The PAI CANNOT be the hot work operator, except as permitted in **NFPA 51B**. The PAI is aware of the fire hazards involved and is familiar with the provisions of this standard.
2. **Permit:** Submit and obtain a written permit from the PAI prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, from the PAI. **CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED.** The General Contractor will provide at least **two (2)** twenty (20) pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal.
3. **Fire Watch:** It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with **NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work** and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit. When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the local fire department emergency phone number(s). **ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE LOCAL FIRE DEPARTMENT, GENERAL CONTRACTOR'S AUTHORIZED REPRESENTATIVE, AND OWNER'S CA IMMEDIATELY.**

1.13 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the state User Agency shall not be closed or obstructed without written permission from the CA.

1.14 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

- A. Secure outside equipment and materials and place materials that could be damaged in protected areas.
- B. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.
- C. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

Comply with the Connecticut State Building and Fire Safety Codes, OSHA regulations, and other references regulations. The most stringent standard prevails.

3.1.2 HAZARDOUS MATERIAL EXCLUSIONS

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with **USACE EM 385-1-1** such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint are prohibited. The CA, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials.

3.1.3 UNFORESEEN HAZARDOUS MATERIAL

- A. Related Section: Division 01, Section 01 35 16, Alteration Project Procedures.

3.2 SAFETY LOCKOUT/TAGOUT PROCEDURES

- A. The General Contractor shall ensure that each employee is familiar with and complies with these procedures and **OSHA 29 CFR 1910.147 Control Of Hazardous Energy (Lockout/Tagout)**.
 - 1. The General Contractor's "Authorized Employee" shall apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on.
 - 2. No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section.
 - 3. No person shall work on any equipment that requires a lockout/tagout tag unless he, his immediate supervisor, project leader, or a subordinate has in his possession the stubs of the required lockout/tagout tags. Only qualified personnel shall perform work on electrical circuits.
 - 4. A supervisor who is required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group provided he notifies the holder of the tag stub each time he enters and departs from the protected area.
 - 5. Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions.
 - 6. Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or systems shall be secured in a passive condition with the appropriate vents, pins, and locks. Pressurized or vacuum systems shall be vented to relieve differential pressure completely. Vent valves shall be tagged open during the course of the work. Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.
- B. **Tag Placement**

Lockout/tagout tags shall be completed in accordance with the regulations printed on the back thereof and attached to any device which, if operated, could cause an unsafe condition to exist. If more than

one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached. When it is required that certain equipment be tagged, the State of Connecticut Authority Having Jurisdiction will review the characteristics of the various systems involved that affect the safety of the operations and the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such lockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

C. Tag Removal

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the Contractor. That group's or individual's lockout/tagout tags on equipment may then be removed on authorization by the Contractor.

3.3 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

Establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures.

A. Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection in accordance with **USACE EM 385-1-1**, Section 21.A.16.

B. Fall Protection Equipment and Systems

Enforce use of the fall protection equipment and systems designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards as specified in **USACE EM 385-1-1, section 21**. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to water in accordance with **USACE EM 385-1-1, paragraphs 05.H. and 05.I**. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with **OSHA 29 CFR 1926.500, Fall Protection, Subpart M, and ASSE/SAFE A10.32, Fall Protection**.

1. Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet **ASSE/SAFE Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components**. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Only locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed **1.8 m 6 feet**. The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken

2. Fall Protection for Roofing Work

Implement fall protection controls based on the type of roof being constructed and work being performed. Evaluate the roof area to be accessed for its structural integrity including weight-bearing capabilities for the projected loading.

a. Low Sloped Roofs:

- (i)** For work within 6 feet (6 feet (1.8 m) of an edge, on low-slope roofs, Protect personnel from falling by use of personal fall arrest systems, guardrails, or safety nets.
- (ii)** For work greater than (6 feet (1.8 m) from an edge, erect and install warning lines in accordance with **OSHA 29 CFR 1926.500, Fall Protection**.

b. Steep-Sloped Roofs: Work on steep-sloped roofs requires a personal fall arrest system, guardrails with toe-boards, or safety nets. This requirement also includes residential or housing type construction.

3. Existing Anchorage

Certified (or re-certified) by a qualified person for fall protection existing anchorages, to be used for attachment of personal fall arrest equipment in accordance with **ASSE/SAFE Z359.1, Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components**. Existing horizontal lifeline anchorages must be certified (or re-certified) by a registered professional engineer with experience in designing horizontal lifeline systems.

4. Horizontal Lifelines

Design, install, certify and use under the supervision of a qualified person horizontal lifelines for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (**OSHA 29 CFR 1926.500 Fall Protection**).

5. Guardrails and Safety Nets

Design, install and use guardrails and safety nets in accordance with **29 CFR 1926, Safety and Health Regulations for Construction Subpart M**.

6. Rescue and Evacuation Procedures

When personal fall arrest systems are used, the contractor must ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP).

3.4 SCAFFOLDING

A. The Contractor shall provide all employees with a safe means of access to the work area on the scaffold in accordance with **OSHA 29 CFR 1910.28 Safety Requirements For Scaffolding** and as contained in this section.

1. Climbing of any scaffold braces or supports not specifically designed for access is prohibited.
2. Access scaffold platforms greater than 20 feet (6 m) maximum in height by use of a scaffold stair system.
3. Do not use vertical ladders commonly provided by scaffold system manufacturers for accessing scaffold platforms greater than 20 feet (6 m) maximum in height.
4. The use of an adequate gate is required.
5. Ensure that employees are qualified to perform scaffold erection and dismantling.
6. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan.
7. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward.
8. Give special care to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited.
9. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base. Place work platforms on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

B. Stilts

The use of stilts for gaining additional height in construction, renovation, repair or maintenance work is **PROHIBITED**.

3.5 EQUIPMENT

A. Material Handling Equipment

Material Handling Equipment shall be in accordance with **OSHA 29 CFR 1910.178 Powered Industrial Trucks** and as contained in this section.

1. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.
2. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.
3. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

B. Weight Handling Equipment

1. Equip cranes and derricks as specified in **ASME B30.5** or **ASME B30.22** or **ASME B30.8** as applicable.
2. Comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in **ASME B30.5**). Perform all testing in accordance with the manufacturer's recommended procedures.
3. Comply with **ASME B30.5** for mobile and locomotive cranes, **ASME B30.22** for articulating boom cranes, **ASME B30.3** for construction tower cranes, and **ASME B30.8** for floating cranes and floating derricks.
4. Under no circumstance shall a Contractor make a lift at or above 90% of the cranes rated capacity in any configuration.
5. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and follow the requirements of **ASME B30.5** or **ASME B30.22** as applicable.
6. Do not crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane.
7. Inspect, maintain, and recharge portable fire extinguishers as specified in **NFPA 10, Standard for Portable Fire Extinguishers**.
8. All employees must keep clear of loads about to be lifted and of suspended loads.
9. Use cribbing when performing lifts on outriggers.
10. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.
11. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.
12. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by CA.
13. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by CA.
14. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

3.6 UTILITIES WITHIN CONCRETE SLABS

- A.** Utilities located within concrete slabs or pier structures, bridges, and the like, are extremely difficult to identify due to the reinforcing steel used in the construction of these structures. Whenever contract work involves concrete chipping, saw cutting, or core drilling, the existing utility location must be coordinated with utility company in addition to a private locating service. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the contractor from meeting this requirement.

3.7 ELECTRICAL

A. Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the CA and utility company for identification. The CA will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers will be permitted to enter. When work requires Contractor to work near energized circuits as defined by the **NFPA 70**, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety glasses. In addition, provide electrical arc flash protection for personnel as required by **NFPA 70E**. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA.

B. Portable Extension Cords

Size portable extension cords in accordance with manufacturer ratings for the tool to be powered and protected from damage. Immediately remove from service all damaged extension cords. Portable extension cords shall meet the requirements of **NFPA 70**.

END OF SECTION 01 35 26

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. **General:** Basic contract definitions are included in the General Conditions of the Contract for Construction.
- B. **"Indicated":** The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited to this term.
- C. **"Directed":** Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases.
- D. **"Approved":** The term "approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
- E. **"Regulations":** The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. **"Furnish":** The term "furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. **"Install":** The term "install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. **"Provide":** The term "provide" means to furnish and install, complete and ready for the intended use.
- I. **"Installer":** An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - 1. The term **"experienced,"** when used with the term **"installer,"** means having a minimum of **five (5)** previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of authorities having jurisdiction.
 - 2. **Trades:** Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
 - 3. **Assigning Specialists:** Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
 - a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.
- J. **"Project Site"** is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other Work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- K. **"Testing Agencies":** A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. **Specification Format:** These Specifications are organized into Divisions and Sections based on CSI's "MasterFormat" 49-Division format and numbering system.
- B. **Specification Content:** This Specification uses certain conventions regarding the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 - 1. **Abbreviated Language:** Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated, as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. **Streamlined Language:** The Specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
 - a. The words "**shall be**" are implied where a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

- A. **Applicability of Standards:** Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. **Publication Dates:** Comply with the standards in effect as of the date of the Contract Documents unless a specific date is indicated in the Contract Documents or the governing regulations cited herein.
- C. **Conflicting Requirements:** Where compliance with **two (2)** or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent and highest quality requirement. Request a decision from the Architect before proceeding on requirements that are different but apparently equal, and where it is uncertain which requirement is the most stringent.
 - 1. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum acceptable. 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 the requirements. Request a clarification from the Architect regarding uncertainties before proceeding.
- D. **Copies of Standards:** Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.
- E. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Thompson Gale's "Encyclopedia of Associations," available in most libraries.

1.5 GOVERNING REGULATIONS AND AUTHORITIES

- A. **Copies of Regulations:** Obtain copies of the "**latest applicable State Codes**" and the following regulations and retain at the Project Site to be available for reference by parties who have a reasonable need during submittals, planning, and progress of the Work, until Substantial Completion.
 - 1. Connecticut State Building Code - [2016](#).
 - 1.1 CT Supplement - [2016](#).
 - 1.2 CT Amendments - [2016](#).
 - 1.3 International Building Code - [2012](#).
 - 1.4 International Existing Building Code - [2012](#).
 - 1.5 International Mechanical Code - [2012](#).
 - 1.6 International Plumbing Code - [2012](#).

- 1.7 International Energy Conservation Code - [2012](#).
- 1.8 National Electric Code (NFPA 70) - [2014](#).
- 1.9 ICC/ANSI A117.1-Accessible and Usable Buildings and Facilities - [2009](#).
- 2. Connecticut Fire Safety Code - [2016](#).
 - 2.1 CT Supplement - [2016](#).
 - 2.2 CT Amendments - [2016](#).
 - 2.3 International Fire Safety Code - [2012](#).
 - 2.4 NFPA 101 - [2012](#).
- 3. Connecticut Fire Prevention Code - [2016](#).
 - 3.1 NFPA 1 - [2012](#).
- 4. Occupational Safety and Health Administration (OSHA)
 - 4.1 OSHA 29 CFR Part 1910 Occupational Safety and Health Regulations .
 - 4.2 OSHA 29 CFR Part 1926 Occupational Safety and Health Regulations for Construction .
- B. The “**latest applicable State Codes**” are available for download from the DAS website (www.ct.gov/das) > Doing Business With The State > State Building Construction > Publications and Forms > Office of State Building Inspector *and* Office of State Fire Marshal. Also visit the www.ctdol.state.ct.us Connecticut Department of Labor website.

1.6 SUBMITTALS

- A. **Permits, Licenses, and Certificates:** For the 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.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01 42 20

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. This Section includes administrative and procedural requirements for quality-control services.
- B. Quality-Control services include fire alarm acceptance testing, inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by the Owner.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 - 1. Specific quality-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 inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- E. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 33 00 "Submittal Procedures" specifies requirements for development of a schedule of required tests and inspections.
 - 2. Division 01 Section 01 73 29 "Cutting and Patching" specifies requirements for repair and restoration of construction disturbed by inspection and testing activities.
 - 3. Division 01 Section 01 77 00 "Closeout Procedures", specific requirements for contract closeout procedures.
 - 4. Division 28 Section 28 31 00 "Fire Detection and Alarm" specifies field quality control for the Alarm System.

1.3 RESPONSIBILITIES

- A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, the Owner, through the Construction Administrator, shall provide inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. All tests required by the individual specification sections are required to be scheduled and notification given to the Construction Administrator **24/48** hours in advance of the test/inspection as applicable. Costs for these services are not included in the Contract Sum.
 - 1. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.
 - 2. Where individual Sections specifically indicate that certain inspections, tests, and other quality-control services are the Owner's responsibility, the Owner will employ and pay a qualified independent testing agency to perform those services.
 - a) Such services include Special Inspections as required by the latest edition of the "Connecticut State Building Code".
 - b) Where the Owner has engaged a testing agency for testing and inspecting part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner. The Owner will engage the services of a

- qualified Special Inspector for this project. The Special Inspector, as a representative of the Owner, shall document and confirm compliance with the provisions of the Connecticut State Building Code for Special Inspections.
- c) Materials and assemblies for this project will be tested and construction operations inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the State for final acceptance.
 - d) The Owner's use of testing and inspection services shall in no way relieve the Contractor of the responsibility to furnish materials and finished construction in full compliance with the Contract Documents and the Connecticut State Building Code.
- B. Retesting: The Contractor is responsible for retesting where results of inspections, tests, or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements, regardless of whether the original test was Contractor's responsibility.
- 1. The cost of retesting construction, revised or replaced by the Contractor, is the Contractor's responsibility where required tests performed on original construction indicated non-compliance with Contract Document requirements.
 - 2. The Owner will issue a credit change order to cover all costs incurred related to all re-tests/re-inspections due to non-compliance to the Contract Documents, including but not limited to the Owner's costs and the Consultant's costs.
- C. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the Agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
- 1. *Provide access to the Work.*
 - 2. *Furnish incidental labor and facilities necessary to facilitate inspections and tests.*
 - 3. *Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.*
 - 4. *Provide facilities for storage and curing of test samples.*
 - 5. *Deliver samples to testing laboratories.*
 - 6. *Provide an approved design mix proposed for use for material mixes that require control by the testing agency.*
 - 7. *Provide security and protection of samples and test equipment at the Project Site.*
- D. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Sections shall cooperate with the Construction Administrator, Architect and the Contractor in performance of the testing agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.
- 1. The testing agency shall notify the Construction Administrator and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. The testing agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
 - 3. The testing agency shall not perform any duties of the Contractor.
- E. Owner will pay for the services of an independent testing agency laboratory to perform inspections, tests and other services required by the Specifications except as noted below, listed for which the Owner will issue a deduct change order to cover the cost associated with these tests:
- 1. When the Contractor notifies the Construction Administrator and/or Testing Agency less than 24 hours before the expected time of testing.
 - 2. When the Contractor requires testing for his own convenience.
 - 3. When the Contractor schedules a test and is not ready for the required test.
- F. Submit reports of tests that are part of the submittal requirements which indicate compliance or non-compliance with the specified standard.
- G. See also General Conditions Article 16 "Inspections & Tests".
- H. **Fire Alarm/Acceptance Testing Procedures:**

1. For **all** buildings (exceeding the threshold limit and not exceeding the threshold limit), the fire alarm testing shall be as the authority having jurisdiction shall dictate. This will be as determined by the Office of the State Fire Marshal (OSFM), and shall include, but not be limited to, the requirements as set below:
 - a. Protective Signaling Systems: All protective signaling systems shall meet with acceptance testing requirements of the applicable standards listed in Section 7-6.1.4, NFPA 101/2012 and NFPA 13/2002.
 - b. Prior Test Notification: At least **five (5)** working days prior to testing, the Fire Alarm Contractor shall notify (in writing) the following people of the proposed date the acceptance tests are to be performed (Also, see Part 2 of Certificate of Compliance).
 - Department of Administrative Services – OSFM Representative
 - General Contractor
 - Engineer of Record
 - Equipment Supplier Representative
 - Sprinkler Contractor
 - c. **Certificates of Compliance:**
 - 1) A Fire Alarm System Inspection and Testing Certification and Description form shall be prepared for each system (See NFPA 72/2002 Chapter 7 and Figure 7-5.2.2).
 - 2) Parts 1 and 3 through 9, shall be completed after the system is installed and the installation of the wiring has been checked. Every alarm device must also be pre-tested to ensure proper operation and correct annunciation at each remote annunciator and control panel. Part 1 of the form (Certification of System Installation) shall be signed by the fire alarm contractor. The signed and completed preliminary copies of the Certification form shall be forwarded to all parties along with the Prior Test Notification.
 - 3) Part 2, of each applicable form, shall be completed after the operational tests have been completed.
 - 4) After the completion of the operational acceptance tests and sign-off of test witness (with stipulations noted), final copies of the Certificates shall be forwarded to the Department of Construction Services Representatives.
 - d. **Tests:**
 - 1) All tests shall be conducted in accordance with the Manufacturer's Testing Recommendations.
 - 2) All testing equipment, apparatus (i.e. sound level decibel meter, 2-way radio communication, test devices, ladders, tools, lighting, etc.) and personnel shall be supplied by the Fire Alarm Contractor and Sprinkler Contractor.
 - e. **System Documentation:** Every system shall include the following documentation, which shall be delivered to the Department of Construction Services Representatives upon final acceptance of the system. An owner's manual or manufacturer's installation instructions covering all system equipment, including the following:
 - 1) A detailed narrative description of the system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations.
 - 2) Operator's instructions for basic systems operations including alarm acknowledgment, system reset, interpreting system output (LED's CRT display, and printout), operation of manual evacuation signaling and ancillary function controls, changing printer paper, etc.
 - 3) A detailed description of routine maintenance and testing as required and recommended and as would be provided under a maintenance contract, including testing and maintenance instructions for each type of device installed. This information should include:
 - (a) A listing of individual system components that require periodic testing and maintenance.
 - (b) Step by step instructions detailing the requisite testing and maintenance procedures and the intervals at which those procedures should be performed.

- (c) A schedule that correlates the testing and maintenance procedures required by paragraph (2) above and with the listing required by paragraph (1) above.
 - 4) Detailed troubleshooting instructions for each type of trouble condition recognized by the system, including opens, grounds, parity errors, "loop failures," etc. These instructions should include a list of all trouble signals, and step by step instructions describing how to isolate those problems and correct them (or call for service as appropriate).
 - 5) A service directory, including a list of names and telephone numbers for those who should be called to service the system.
- f. As-Built Drawings:**
- 1) The Contractor will produce two (2) sets of as-built drawings and specifications for the fire alarm system, indicating the location (and programmed address, if applicable) of all devices and appliances, the wiring sequences, wiring methods, connection of the components, and sequence of operation of the protective signaling system as installed, shall be given to the Department of Construction Services representatives. This shall be in Accordance with NFPA 72/. Refer also to Section 01 77 00 "Closeout Procedures".

1.4 SUBMITTALS

- A. Unless the Contractor is responsible for this service, the independent testing agency shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Construction Administrator. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.
- 1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 - 2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making the inspection or test.
 - f. Designation of the Work and test method.
 - g. Identification of product and Specification Section.
 - h. Complete inspection or test data.
 - i. Test results and an interpretation of test results.
 - j. Ambient conditions at the time of sample taking and testing.
 - k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
 - l. Name and signature of laboratory inspector.
 - m. Recommendations on re-testing.

1.5 QUALITY ASSURANCE

- A. Qualifications for Service Agencies:** Engage inspection and testing service agencies, including independent testing laboratories, that are pre-qualified as complying with the National Voluntary Laboratory Accreditation Program and that specialize in the types of inspections and tests to be performed.
- 1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the state where the Project is located.
- B. Mockups:** Provide full-size, physical assemblies that are constructed on-site. Mockups will be used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not samples. **Approved mockups establish the standard by which the Work will be judged.**

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 MOCKUPS

- A. Build site-assembled mockups using installers who will perform same tasks for project.
- B. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect **or Construction Administrator**.
 - 2. Notify Architect **and Construction Administrator** seven (7) days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's **and Construction Administrator's** approval of mockups before starting work, fabrication, or construction.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed, unless otherwise indicated.

3.2 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 01 Section 01 73 29 "Cutting and Patching."
- B. Protect constructions exposed by or for quality-control service activities, and protect repaired construction.
- C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION 01 45 00

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes requirements for identification badges, parking stickers, construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. **Temporary water service and distribution.**
 - 2. **Temporary electric power and lighting services.**
 - 3. **Temporary heating, cooling and ventilation**
 - 4. **Temporary telephone service and data.**
 - 5. **Temporary sanitary facilities, including drinking water.**
- C. Support facilities include, but are not limited to, the following:
 - 1. **Field offices – Contractor, Subcontractor, Owner, and Construction Administrator.**
 - 2. **Storage and fabrication sheds.**
 - 3. **Temporary enclosures.**
 - 4. **Temporary lifts, hoists and elevator use.**
 - 5. **Temporary project identification signs.**
 - 6. **Temporary exterior lighting.**
 - 7. **Collection and disposal of waste and cleaning.**
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. **Temporary fire protection.**
 - 2. **Security for site and Agency.**
 - 3. **Barricades, warning signs, and lights.**
 - 4. **Enclosure fence.**
 - 5. **Security enclosure and lockup.**
 - 6. **Protection.**
 - 7. **Environmental protection.**
 - 8. **Identification badges for Contractor’s personnel & parking stickers.**

1.3 SUBMITTALS

- A. **Temporary Utilities:** Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
- B. **Implementation and Termination Schedule:** Within **twenty-one (21)** days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.4 QUALITY ASSURANCE

- A. **Regulations:** Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. **Building and fire code requirements.**
 - 2. **Health and safety regulations.**
 - 3. **Utility company regulations.**
 - 4. **Police, fire department, and rescue squad rules.**

5. Environmental protection regulations.

6. Americans with Disabilities Act.

- B. Standards:** OSHA. Comply with NFPA 241 "Standard for Safeguarding Construction, Alteration, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA 200 "Recommended Practice for Installing and Maintaining Temporary Electric Power at Construction Sites."
- 1. Electrical Service:** Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
- C. Inspections:** Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Utilities:** Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, the Construction Administrator will direct the change over from use of temporary service to use of permanent service.
- B. Conditions of Use:** Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General:** Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Lumber and Plywood:** Comply with requirements in Division 06 Section 06 10 00 "Rough Carpentry."
- 1.** For signs and directory boards, provide 3/4-inch exterior grade, Grade A-B Fir plywood. Mount sign on preservative treated Fir posts.
- a.** Project sign shall be 4' x 8' painted and supported on 4-inch x 4-inch posts, of a design to be provided by the Owner via the Construction Administrator.
- C. Paint:** Comply with requirements of Division 09 Section 09 91 00 "Painting."
- 1.** For sign and directory boards applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer unless otherwise indicated.
- D. Tarpaulins:** Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- E. Water:** Provide potable water approved by local health authorities.
- F. Enclosure Fencing:** Provide 0.120-inch thick, galvanized 2-inch chain link fabric fencing six (6) feet high galvanized steel pipe posts, 1-1/2 inches knuckle both bottom and top I.D. for line posts and 2-1/2 inches I.D. for corner posts.

2.2 EQUIPMENT

- A. General:** Provide new equipment. If acceptable to the Architect, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- 1.** The Contractor shall furnish tools, apparatus and appliances, hoists and/or cranes and power for same, scaffolding, runways, ladders, temporary supports and bracing and similar work or material necessary to insure convenience and safety in the execution of the Contract except where this is otherwise specified in any Specification Section. All such items shall meet the approval of the Owner but responsibility for design, strength and safety shall remain with the Contractor. All such items shall comply with Federal OSHA regulations and applicable codes,

- statutes, rules and regulations, including compliance with the requirements of the current edition of the "Manual of Accident Prevention in Construction" published by the Associated General Contractors (AGC) and the standards of the State Labor Department.
2. Staging, exterior and interior, required for the execution of this Contract, shall be furnished, erected, relocated if necessary and removed by the Contractor. Staging shall be maintained in a safe condition without charge to and for the use of all trades as needed.
- B. **Water Hoses:** Provide 3/4-inch, heavy-duty, abrasion-resistant, flexible rubber hoses with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge and backflow preventers.
 - C. **Electrical Outlets:** Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
 - D. **Electrical Power Cords:** Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
 - E. **Lamps and Light Fixtures:** Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.
 - F. **Heating Units:** Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
 - G. **Temporary Field Offices:** Provide prefabricated or mobile units with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
 - H. **Temporary Toilet Units:** Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
 - I. **Fire Extinguishers:** Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2

- A. **Temporary Water Service and Distribution:**
 1. Connect to existing facilities, through an approved backflow prevention device; extend branch piping with outlets so that water is available by use of hoses. Owner will pay for water used. The Contractor shall not waste water or use faulty equipment. The Contractor shall provide, at his own expense, all connections, extensions and other apparatus required for use of such services. Upon completion of the Contract, the Contractor shall disconnect temporary extensions and return utility to its original condition.

B. Temporary Electric Power and Lighting Services:

1. **Power Distribution System:** Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, ac 20 Ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
2. **Temporary Lighting:** When overhead floor or roof deck has been installed, provide temporary lighting with local switching. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

C. Temporary Heating, Cooling and Ventilating:

1. Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
 - a. **Heating Facilities:** Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP-gas or fuel oil heaters with individual space thermostatic control.
 - b. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
2. Provide temporary heat during construction for interior areas included in the Contract to counteract low temperatures or excessive dampness. Maintain during said period or periods until final completion of the Contract, unless otherwise approved by the Owner in writing. Windows, doors, ventilators and similar openings shall be temporarily closed. Provide heat and ventilation to maintain specified conditions for construction operations and to protect materials and finishes from damage by temperature or humidity. The permanent heating system is not to be used for temporary heating unless approved, in writing, by the Owner. If approved, use of the permanent heating system by the Contractor does not constitute beneficial use by the Owner. The warranty for said system will not commence until Substantial Completion is granted. Costs shall be paid by the Contractor. See individual Sections for temperature/humidity limits. Temporary heating methods shall comply with OSHA regulations and other applicable codes, statutes, rules and regulations and shall be approved by the Architect/Engineer and Owner.
3. Permanent air handling equipment, when used for temporary heating, shall be equipped with disposable "construction" filters. The construction filters shall have an average efficiency at least equal to the filters specified under Division 23, but not less than 30 percent when tested in accordance with ASHRAE 52.2 "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size." The filters shall have an average arrestance of not less than 90 percent efficiency on one (1) micron size particles. Before turning over the system for final acceptance, the contractor shall remove and dispose of the construction filters; clean the ductwork; spray clean the heating and cooling coils, and drain pans to "like new" condition; and install the filters specified in Division 23 Section 23 81 03 "Packaged Rooftop Air Conditioning Units" and Section 23 81 27 "Variable Refrigerant Volume Mini-Split Systems."
4. The Contractor may use the existing heating system with temporary extensions, radiators or unit heaters, but such use is subject to the Owner's approval. Coordinate use of existing facilities with Owner. Provide additional, temporary extensions and units to satisfy the criteria given in the preceding paragraph. Owner will pay cost of energy used. Take measures to conserve energy. At the termination of construction, return the facilities to their original condition. Before operation of permanent facilities, verify that installation is approved for operation and that filters are in place.

- D. Temporary Telephone Service and Data:** Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities. Install telephone on a separate line for each temporary office and first aid station. Contractor shall provide telephone service in his office and separate telephone service in the DAS/CS Office and Construction Administrator's Office, if provided. It is preferred that the Contractor use a cellular phone. Basic service and local calls will be paid for by the Contractor. Toll calls will be paid for by the respective users.

1. **Separate Telephone Lines:** Provide additional telephone lines for the following:
 - a. Where an office has more than **two (2)** occupants, install a telephone for each additional occupant or pair of occupants.
 - b. Provide dedicated telephone lines for a separate fax machine in both the Contractor's office and the DAS/CS / CA office.
 2. At each telephone, post a list of important telephone numbers.
- E. Temporary Sanitary Facilities, Including Drinking Water:** Temporary sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
1. Provide toilet tissue, wash basins with water, soap and paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material. The Contractor shall maintain the facilities in a sanitary condition.
 2. **Toilets:** The Contractor shall install self-contained chemical toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted. Provide separate facilities for male and female personnel.
 3. **Water Coolers:** Where power is accessible, provide electric hot/cold water coolers to maintain dispensed cold water temperature at 45 to 55 degrees F. Provide bottled water service and cup supplies and maintain in a clean sanitary condition.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General:** Locate field offices, storage sheds, and other temporary construction and support facilities in designated area as shown on the Contract Documents. The location of the trailers on the Drawings is diagrammatic in nature. Final placement of the trailers is to be approved by the Construction Administrator.
1. Maintain support facilities until Final Completion. Remove prior to Final Completion with permission from the Owner.
- B. Field Offices:** Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project Site. Keep all offices clean and orderly, sweep weekly and remove rubbish on a daily basis. Furnish and equip offices as follows:
1. The Contractor shall provide an office for their own use and a method to contact them by e-mail and telephone at any point and time.
 2. **OPTION "A" State User Agency Provided Field Offices:** The State User Agency will furnish, without charge, **one (1)** room for the Contractor's use as an office in an existing building. The Owner and Construction Administrator will share space with the Contractor. The Contractor shall provide and install a 5-lb ABC fire extinguisher and an approved first aid kit. The Contractor shall be responsible for furniture and shall keep this area clean and return it to its original condition after use. The Contractor shall provide the following furniture and Equipment, which will remain his property. The furniture may be used but shall be in good condition as judged by the Owner and Construction Administrator.

2.1	The Contractor shall provide a lockable chemical toilet(s) with toilet tissue for the owners' use. The Contractor shall maintain the facility in a sanitary condition. (See 01 52 19 Temporary Sanitary Facilities).
2.2	One (1) Lockable, double-pedestal, office desks, each with an executive chair.
2.3	One (1) Plan tables.
2.4	One (1) Plan racks.
2.5	Six (6) Conference chairs and a conference table (approx. 5 feet x 12 feet).
2.6	One (1) Side tables (approx. 3 feet x 5 feet).
2.7	One (1) Wall mounted, cork display boards (4 foot x 6 foot).
2.8	One (1) Wall mounted, white, wipe-off board, with markers (3 foot x 4 foot).
2.9	Two (2) File cabinets (lockable four drawer letter size).
2.10	Two (2) Bookshelves each with 10 linear feet x 12 inch wide shelving.

2.11	Two (2) Large capacity waste receptacles.
2.12	One (1) Plain paper, Fax Machine with dedicated telephone line approved by Owner.
2.13	Two (2) Telephones with telephone lines and voice mail.
2.14	One (1) Telephones lines (dedicated to computer use) with high-speed Internet connection (minimum of DSL or cable modem service).
2.15	One (1) laser printer with two (2) hub connections, approved by Owner
2.16	One (1) Copy Machine with automatic stapling, copying capability for letter-sized paper (8-1/2 inches x 11 inches), legal size (8-1/2 inches x 14 inches), and ledger size (11 inches x 17 inches), ability to enlarge or reduce, with collation up to ten (10) sets, duplex copying (both sides)
2.17	One (1) color printer with ink and photo paper supplies equivalent to Epson Stylus Photo 785EPX Inkjet 2880x720 DPI 6 color full bleed.
2.18	Toner Cartridges, Ink Jets, etc., for all copiers and printers, (replenish as needed)
2.19	Paper for all copiers and printers in Letter, Legal and Ledger sizes (replenish as needed).
2.20	Note Pads, Letter sized lined paper (10)
2.21	White Binders in 2", 3". 4" (10 of each).
2.22	Hanging Folders for file cabinets (1 box for each file drawer)
2.23	Three-Tab File Folders with stick-on labels (1 box for each file drawer)
2.24	Staplers (2)
2.25	Scotch-tape dispensers (2)
2.26	Three-hole Punches (2)
2.27	#2 Pencils (2 boxes)
2.28	Blue, Black, and Red pens (2 boxes of each)
2.29	Blue, Black, and Red Permanent Markers (2 boxes of each)
2.30	Yellow, Blue, Green, and Pink Highlighters (2 boxes of each)
2.31	Large, Medium, and Small Binder Clips (5 boxes of each)
2.32	Large and Small Paper Clips, (5 boxes of each)
2.33	Large Garbage Bags (replenish as needed)

3. Field Office Computer System

The Contractor shall provide 2 Field Office Computer System(s) for the Department's exclusive use for each field office specified. The Contractor has the option to provide **either** a desktop **or** a laptop computer system in accordance with the minimum requirements listed below.

3.1 Field Office Desktop Computer System:

.1	Processor:	Intel i5 Processor, 64 Bit
.2	Memory:	8 gb
.3	Hard Drive:	1 TB 7200 RPM
.4	Optical Drive:	DVD-ROM
.5	Ports:	(4) USB 3.0, ext. video, blue tooth
.6	Network/Wireless:	Ethernet or wireless card to be compatible with the selected internet and office network connections;
.7	Graphics:	NVIDIA GeForce GTX Series or Equivalent
.8	Monitor:	22" LED Monitor

.9	Keyboard:	Microsoft Standard Keyboard or Equivalent
.10	Mouse:	Microsoft Mouse or Equivalent

OR:

3.1 Field Office Laptop Computer System:

.1	Processor:	Intel i5 Processor, 64 Bit
.2	Memory:	8 gb
.3	Hard Drive:	1 TB, 7200 RPM
.4	Optical Drive:	DVD-ROM
.5	Ports:	(3) USB 3.0, 1 HDMI, 1 Headset/Microphone
.6	Network/Wireless:	Ethernet or wireless card to be compatible with the selected internet and office network connections;
.7	Graphics:	Intel UHD Graphics 620
.8	Display:	15.6"
.9	Battery:	3 cell, 55.8 Wh Li-ion
.10	External Monitor:	22" LED
.11	External Keyboard	Microsoft Standard Keyboard
.12	External Mouse:	Microsoft Standard Mouse
.13	Miscellaneous:	One compatible port replicator with AC adapter, one additional AC adapter, one DC adapter and one padded carrying case

4. Computer Software:

The Contractor shall provide software for the computer system in accordance with the minimum requirements listed below.

4.1	Operating System Software:	Windows 10 Pro
4.2	Productivity Software:	Microsoft Office
4.3	Security Software:	McAfee
4.4	All software shall include the most current updates and patches at the time the computer system is provided to the Owner. The Construction Manager shall provide for installation of updates and patches for the operating system, productivity and security software during the term of use of the computer system by the Owner. Updates and patches shall be provided by an automatic update method.	
4.5	The Owner may install and maintain proprietary software on the computer in order to run the Owner's construction management programs.	

5. Miscellaneous Computer Requirements

The initial condition of the computer system shall be nearly pristine. All owner installed e-mail accounts, games, spyware, online services, applications, network or other profiles previously set up on the system shall be removed prior to placement in the field office. If the system was provided for a previous DAS/CS contract, all software not specified shall be removed prior to placement in the current field office.

- 5.1 The Contractor shall provide an uninterruptible power supply (UPS), minimum [650](#) VA, [360](#) Watts and full time surge suppression for each field office computer system specified in this Section.
- 5.2 The Contractor shall provide all cables, connections and software required to connect the field office computer system to the printer and the scanner.
- 5.3 When more than one computer system is specified for a field office, the Contractor shall provide either an Ethernet or wireless office network to allow all computer systems in the field office to access the field office internet service, the printer and the scanner.
- 5.4 The Contractor shall provide appropriate dust covers for all field office desktop computer systems.

- 5.5 The Contractor shall provide all manuals necessary for operation of the computer system and software with the system and shall include all documentation normally furnished with the equipment and software when purchased.
 - 5.6 The Owner will be utilizing the computer system to run or access Owner provided construction management software applications. These applications are known to run on Intel and AMD compatible equipment when using the Windows 10 operating system. If the Owner experiences problems running these applications due to hardware or software compatibility, the Contractor shall replace the equipment to ensure compatibility to the satisfaction of the Owner within **five (5)** business days.
 - 5.7 The computer system shall be maintained in good working order. If a portion of the system becomes defective, inoperable, damaged, or stolen, that portion shall be repaired or replaced within **five (5)** business days after the Contractor is notified by the Owner. If the computer system and related accessories are not maintained by the Contractor as required, the Owner may withhold partial payments until the computer system is operational to the Owner's satisfaction.
6. **Field Office Internet Service:**
The Contractor shall provide broadband internet service for the field office. Broadband internet service shall be capable of a minimum average upload speed of 7 mbps unless otherwise approved by the Owner.
7. When the Contractor supplies the trailer(s) they shall equip each trailer with a water cooler for hot and cold water.
- C. **Storage and Fabrication Sheds:** Install storage and fabrication sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on-site.
1. Storage sheds for tools, materials and equipment shall be weathertight with heat, lighting and ventilation for products requiring controlled conditions.
 2. Remove temporary materials, equipment services and construction before Substantial Completion.
 3. Clean and repair damage caused by installation or use of temporary facilities. Restore existing facilities used during construction to specified or original condition.
- D. **Temporary Project Identification Signs:** Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.
1. **Project Sign:** Engage an experienced sign painter to apply graphics. Comply with details to be furnished by the Construction Administrator.
 - a. **Temporary Tripod Frame:** For groundbreaking ceremonies only, provide a temporary tripod for the sign illustrated and described below. Make the tripod of 12 ft long 2" x 4"s (Stud Grade), beveled and bolted at the top. Provide approximately 5-ft between legs at grade. Provide a 6-ft long, 2" x 4" seat for the sign; locate 5-ft above grade and nail in place. Nail sign at four (4) places where edges intersect tripod legs. Drive a 24" long, pointed 2" x 4" stake into the earth next to each leg and nail to legs.
 - b. **Project Sign:** The Contractor shall contact the Construction Administrator for the proper wording for the project sign. Fabricate sign of 3/4" Exterior Grade A-B Fir plywood. Mount sign on preservative treated Fir posts. The Owner shall provide design, color selection and illustration of the Project Sign. Paint both sides and all edges of sign and the posts with two (2) coats of exterior, white, alkyd primer. Paint the border and letters with "bulletin" (sign) paint. Letter sizes, colors and related information are given on the illustration below. A self-adhesive decal of the State seal

will be furnished at the Contract signing. Erect the sign within two (2) weeks after execution of the Contract and remove the sign within one (1) week after completion of the project.

- c. **Project Sign Detail:** Sign letter sizes, fonts, colors and related information are shown in the illustration available for download from the DAS website (www.ct.gov/das) > Doing Business With The State > State Building Construction > Publications and Forms > DAS Construction Services Library > 3000 Series - Design Phase Forms.

E. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

F. Collection and Disposal of Waste and Cleaning:

1. Collect waste within the contract limit line from construction areas daily. Provide separate containers for proper waste recycling. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80 degrees F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.
2. Maintain areas under Contractor's control free of waste materials, debris and rubbish. Maintain in a clean and orderly condition.
3. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces before closing the space.
4. Periodically clean interior areas before start of surface finishing and continue cleaning on an as-needed basis.
5. Control cleaning operations so that dust and other particulates will not adhere to wet or newly coated surfaces.

G. Temporary Environmental Controls: Contractor is to provide the following controls.

1. Rodent and Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be free of pests and their residues at materials.
2. Dust Control (construction and demolition).
3. Noise Control.
4. Erosion and Sediment Control.
5. Pollution Control.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION (listed in Paragraph 1.2 D)

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Owner.

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."

1. Provide and locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

5. The Contractor, during construction, shall be responsible for loss or damage by fire to the work of the Contract until completion. Any fire used within the structure for working purposes shall be extinguished when not in use. Bitumen or tar shall be melted on the ground only. No flammable material shall be stored in the structure in excess of amounts allowed by the authorities. No gasoline shall be stored in or close to the building at any time. The Contractor shall assign a responsible employee to be in charge of fire protection measures.
 6. If an EPDM or other single-ply roof is included in the work that requires cleaning of mating surfaces of laps with gasoline, limit amount of gasoline on roof to two (2) gallons which shall be in UL listed containers. Also provide one 30 B:C fire extinguisher within 75 feet of any point on the roof.
- C. Permanent Fire Protection:** At the earliest feasible date in each area of the Project, complete installation of the permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- D. Security for Site and Agency:**
1. Provide security program and facilities to protect work, existing facilities and the Owner and Agency's operations from unauthorized entry, vandalism and theft. Coordinate with the Owner's and Agency's security program.
 2. The Contractor shall be solely responsible for damage, loss or liability due to theft or vandalism.
- E. Barricades, Warning Signs, and Lights:** Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
1. Provide covered walkways as required by governing authorities for public rights-of-way and for public access to existing buildings.
 2. Provide temporary, insulated, weathertight closures at openings to the exterior to provide acceptable working conditions and protection for materials, to allow for temporary heating and to prevent entry of unauthorized persons. Provide doors with self-closing hardware and locks.
 3. Barriers and enclosures shall be in conformance with code requirements. Do not block egress from occupied buildings unless necessary to further the work of the Contract. In this case, secure the Owners approval of an alternate egress plan.
 4. See also General Conditions Article 19, "Protection of the Work, Persons and Property".
- F. Security Enclosure and Lockup:** Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Provide keys to the Construction Administrator.
1. **Storage:** Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- G. Protection:**
1. Protect buildings, equipment, furnishings, grounds and plantings from damage. Any damage shall be repaired or otherwise made good at no expense to the Owner.
 2. Provide protective coverings and barricades to prevent damage. The Contractor shall be held responsible for, and must make good at his own expense, any water or other type of damage due to improper coverings. Protect the public and building personnel from injury.
 3. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
 4. Provide protective coverings for walls, projections, jambs, sills and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects and storage. Prohibit traffic and storage on waterproofed and roofed surfaces and on lawn and landscaped areas.
 5. Provide temporary partitions and ceilings to separate work areas from Agency-occupied areas to prevent penetration of dust and moisture into Agency-occupied areas and equipment. Erect framing and sheet materials with closed joints and sealed edges at intersections with existing surfaces.

6. See also General Conditions Article 19, "Protection of the Work, Persons and Property".
- H. **Environmental Protection:** Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result.
- I. **Traffic Ways:**
1. The Contractor may use on-site paved roads and parking areas but shall not encumber same or their access. Public highways shall not be blocked by standing trucks, parked cars, material storage, construction operations or in any other manner.
 2. Public roads and existing paved roads, drives and parking areas on Owner's property shall be kept free from scrap or debris due to construction operations and any damage to their surface caused by the Contractor shall be repaired by him at his own expense.
 3. If the work of the Contract affects public use of any street, road, highway or thoroughfare, the Contractor shall confer with the police authority having jurisdiction to determine if and how many police are needed for public safety in addition to any barriers and signals that may be needed. The Contractor will be responsible for payment of any needed police services.
- J. **Identification Badges for Contractor's Personnel, Visitors and Parking Stickers:**
1. The Contractor will provide each person working or visiting at the site with an identification badge, bearing the name of the Contractor and a number. As badges are assigned, a record shall be kept by the Contractor and given to the Construction Administrator and Agency Administrator. Update and correct the records of all badges issued on a semi-monthly basis.
 2. Badges are to be worn on outer garment where visible at all times while at the construction site, return them to the Contractor's field office at the end of each day and pick them up there each morning.
 3. All vehicles parking in the Contractor's parking lot and those used around the site require an ID sticker. They will be issued by the Agency. Each contractor shall apply for parking stickers through the Construction Administrator no more than semi-monthly and shall keep record of all stickers issued.
- 3.5 **OPERATION, TERMINATION, AND REMOVAL**
- A. **Supervision:** Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. **Maintenance:** Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
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.
 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. **Termination and Removal:** Unless the Architect/CA requests that it be maintained longer, remove each temporary facility when the need has ended, when 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 the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
 2. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts subject to unusual operating conditions.
 - c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 01 50 00

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. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 25 00 "Substitution Procedures" specifies administrative procedures for handling requests for substitutions made after award of the Contract.
 - 2. Division 01 Section 01 33 00 "Submittal Procedures" specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.
 - 3. Division 01 Section 01 42 20 "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
 - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, which is current as of the date of the Contract Documents.
 - 2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
 - 3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.4 QUALITY ASSURANCE

- A. **Source Limitations:** To the fullest extent possible, provide products of the same kind from a single source.
- B. **Compatibility of Options:** When the Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
- C. **Nameplates:** Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.

e. Ratings.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A.** Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Store products in accordance with manufacturers' instructions and maintain within temperature and humidity range required by manufacturer.
 4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
 6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
 7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation.
 8. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
 9. Arrange storage to provide access for inspection. Periodically inspect to insure products are undamaged and are maintained under required conditions. Keep log showing date, time and problems, if any.
 10. Materials and equipment shall be delivered, stored and handled to prevent intrusion of foreign matter and damage by weather or breakage. Packaged materials shall be delivered and stored in original, unbroken packages.
 11. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct and products are undamaged.
 12. Packages, materials and equipment showing evidence of damage will be rejected and replaced at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements:** Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures:** The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:
1. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 2. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
 3. Visual Selection: Where specified product requirements include the phrase "*...as selected from manufacturer's standard colors, patterns, textures...*" or a similar phrase, select a product and

manufacturer that complies with other specified requirements. The Architect will select the color, pattern, and texture from the product line selected.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A.** Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
 - 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01 60 00

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. This Section includes administrative and procedural requirements for cutting and patching.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 31 00 "Project Management and Coordination" for procedures for coordinating cutting and patching with other construction activities.
 - 2. Division 01 Section 01 35 16 "Alteration Project Procedures" for procedures for coordinating cutting and patching with other construction activities.
 - 3. Division 02 Section **02 41 19 "Selective Structure Demolition"** for demolition of selected portions of the building for alterations.
 - 4. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 22, 23, and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 SUBMITTALS

- A. **Cutting and Patching Proposal:** Submit a proposal to the Construction Administrator describing procedures well in advance of the time cutting and patching will be performed and if the Owner's Representative and/or Architect/Engineer requires approval of these procedures before proceeding. Request approval to proceed. Include the following information, as applicable, in the proposal:
 - 1. Describe the extent of cutting and patching required. Show how it will be performed and indicate why it cannot be avoided.
 - 2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
 - 3. Describe affects to integrity of weather exposed or moisture resistant element.
 - 4. Describe affects to efficiency, maintenance, or safety of any operational element.
 - 5. Describe affects to Work of Owner or separate contractor.
 - 6. List products to be used and firms or entities that will perform Work.
 - 7. Indicate dates when cutting and patching will be performed.
 - 8. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations sealed by an Engineer registered in the State of Connecticut showing integration of reinforcement with the original structure.
 - 9. Approval by the Construction Administrator to proceed with cutting and patching does not waive the Architect/Engineer of Record's rights to later require complete removal and replacement of unsatisfactory Work.

1.4 QUALITY ASSURANCE

- A. **Requirements for Structural Work:** Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
 - 1. Obtain approval from the Architect/Engineer of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. **Bearing and retaining walls.**
 - b. **Structural concrete.**

- c. **Structural steel.**
 - d. **Lintels.**
 - e. **Structural decking.**
 - f. **Miscellaneous structural metals.**
 - g. **Equipment supports.**
 - h. **Piping, ductwork, vessels, and equipment.**
- B. Operational Limitations:** Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
1. Obtain Architect/Engineer's approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. **Air or smoke barriers.**
 - b. **Water, moisture, or vapor barriers.**
 - c. **Membranes and flashings.**
 - d. **Fire protection systems.**
 - e. **Noise and vibration control elements and systems.**
 - f. **Control systems.**
 - g. **Communication systems.**
 - h. **Electrical wiring systems.**
- C. Visual Requirements:** Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.

1.5 WARRANTY

- A. Existing Warranties:** Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A.** Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.
- B.** The Contractor shall install sleeves, inserts and hangers furnished by the trades needing same.

PART 3 - EXECUTION

3.1 INSPECTION

- A.** Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, notify the Construction Administrator and Architect, before proceeding with corrective action.
- B.** Openings and chases may not be shown on the Drawings. It is the responsibility of the Contractor to examine the Architectural, Electrical, Heating, Cooling, Ventilating and Plumbing Drawings and to provide chases, channels or openings where needed.
1. After installing Work into openings, channels and/or chases, the Contractor shall close same. If finishes are to be restored, the new Work shall match the original and shall be done by the trade customarily responsible for the particular kind of Work.

- C. The Contractor shall verify dimensions for built-in Work and/or Work adjoining that of other trades before ordering any material or doing any Work. Discrepancies shall be submitted to the Construction Administrator before proceeding with the Work.
- D. See also General Conditions Article 23 "Cutting, Fitting, Patching & Digging".

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Work that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

- A. **General:** Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
 - 2. DO perform cutting and patching to integrate elements of Work. Provide penetrations of existing surfaces. Provide samples for testing. Seal penetrations through floors, walls, ceilings and roofs, as applicable; restore or preserve fire-rated and smoke-barrier construction. Construction and finishes shall match original Work.
- B. **Cutting:** Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with the original Installer's recommendations.
 - 1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
 - 4. Comply with requirements of applicable Division 32 Sections where cutting and patching requires excavating and backfilling.
 - 5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. **Patching:** Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area has received primer and second coat.
 - 4. Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.4 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01 73 29

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. This Section includes administrative and procedural requirements for handling requests for building system start up and system demonstration and includes the following:
 - 1. Starting Systems.
 - 2. Demonstration and instructions.
 - 3. Testing, adjusting, and balancing.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 45 00 "Quality Control" specifies quality assurance and inspecting services.
 - 2. Division 01 Section 01 77 00 "Closeout Procedures" specifies requirements for contract close out requirements for system operation and maintenance data and extra materials.

1.3 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Provide written notification to the Construction Administrator **30 days** prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, and control sequence for other conditions that may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components are complete and tested.
- F. Execute the start-up under supervision of manufacturer's representative, in accordance with manufacturer's instructions.
- G. When referenced in individual specification sections, require manufacturer to provide an authorized representative to be present at the site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Division 01 Section 01 45 00 "Quality Control" that the equipment or system has been properly installed and is functioning properly.

1.4 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner and Agency Personnel **fourteen (14)** days prior to substantial completion.
- B. Demonstrate Project equipment and instruct in a classroom environment at location designated by the Construction Administrator and instructed by a qualified manufacturer's representative who is knowledgeable about the Project.
- C. For equipment or systems requiring seasonal operation perform demonstration for season within **six (6)** months.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner and Agency Personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, and maintenance, and shutdown of each item at agreed upon scheduled time and at equipment or designated location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during demonstration.
- G. Starting and adjusting equipment does not constitute acceptance by the owner since commissioning is a requirement of this contract. Additionally, the warrantee does not begin until substantial completion has been granted for that specific item.

1.5 TESTING, ADJUSTING, AND BALANCING

- A.** The Contractor will employ and pay for the testing services of an independent consultant to verify the testing, adjusting, and balancing.
 - 1. Reports will be submitted by the independent testing consultant to the Construction Administrator indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.
- B.** The Owner may employ and pay for the services of an independent consultant to verify testing, adjusting, and balancing which was performed by the Contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 75 00

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. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Operation and maintenance manual submittal.
 - 4. Submittal of warranties.
 - 5. Final cleaning.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 11 00 "Summary of Work".
 - 2. Division 01 Section 01 29 76 "Progress Payment Procedures".
- C. Closeout requirements for specific construction activities may be included in the appropriate Sections in Divisions 02 through 49.

1.3 SUBSTANTIAL COMPLETION

- A. **General:** Basic contract definitions are included in Article 1 of the General Conditions of the Contract for Construction.
- B. **Preliminary Procedures:** Before requesting inspection for Certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete.
 - a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - b. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 2. Advise the Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, certificates of compliance, operating certificates, and similar releases.
 - 5. Submit record drawings, maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra stock, and similar items.
 - 7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
 - 8. Demonstrate, thru operation and testing, the functions of all systems and/or equipment to the satisfaction of the Owner for compliance to the Contract. Complete testing of systems and instruction of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements.
 - 9. Complete final cleanup requirements.
 - 10. Certify that required training of personnel is complete.

- C. **Inspection Procedures:** The Contractor shall be ready and prepared when they request a Substantial Completion inspection. If the inspection reveals that the work is not complete, that there are extensive punchlist items that will take more than **ninety (90)** days to complete and as the items listed in Article 1.3 above are not complete, the Construction Administrator, Architect, and Owner will determine the inspection has failed.
- D. The Contractor is responsible for all costs to re-inspect due to a failed inspection. The Owner will issue a deduct change order to cover all costs for re-inspection.
 - 1. The Architect will repeat inspection when requested and assured that the Work is substantially complete.
 - 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 ACCEPTANCE

- A. **Preliminary Procedures:** Before requesting final inspection for "Certificate of Acceptance" and final payment, complete the following. List exceptions in the request.
 - 1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
 - 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 - 3. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, endorsed and dated by the Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Architect.
 - 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the Work.
 - 5. Submit consent of surety to Final Payment.
 - 6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 7. Touch up and otherwise repair and restore marred, exposed finishes, including touchup painting.
- B. **Re-inspection Procedure:** The Inspection Group will re-inspect the Work upon receipt of notice from the Construction Administrator that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Owner.
 - 1. Upon completion of re-inspection, the Construction Administrator will prepare a Certificate of Acceptance. If the Work is incomplete, the Construction Administrator will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

1.5 AS-BUILT DOCUMENT SUBMITTALS

- A. **General:** The Contractor shall not use As-built Drawings for construction purposes. Protect contractor As-built Drawings from deterioration and loss in a secure, fire-resistant location. Provide access to As-built Drawings for the Architect's reference during normal working hours. Keep documents current; do not permanently conceal any work until required information has been recorded. **IMPORTANT NOTE: Failure to keep As-built Documents current is sufficient cause to withhold progress payments.**
 - 1. The Contractor shall also hire the services of a Surveyor registered in the State of Connecticut to conduct a final survey to determine the location of exterior underground utility lines and to record the results, and update existing electronic media.
 - 2. The record of exterior underground utilities shall be made at the time of installation on Mylar film drawing and AutoCAD (latest version) compatible disks. The drawing shall bear the seal of the Land Surveyor and a statement of accuracy.
- B. **As-built Drawings:** The Contractor shall maintain **one (1)** clean, complete undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Update As-built Drawings on a monthly basis coincident with the submittal of the Application for Payment.
 - 1. Mark record sets with erasable pencil to distinguish between variations in separate categories of the Work.

2. Mark all new information that is not shown on Contract Drawings.
 3. Note related change-order numbers where applicable.
 4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
 5. Upon completion of the work, the Contractor shall submit Record Drawings to the Construction Administrator for the Owner's Records who will pass them on to the Architect or Engineer for transferring the changes to the Record Drawing Mylar Tracings.
 6. Submit electronic format data of all Coordination Drawings as required by the Owner, at no additional cost.
 7. Refer to Section 01 45 00 "Quality Control" Article 1.3 for required as-built drawings and specifications for fire alarm systems.
- C. Record Specifications:** The Contractor shall maintain one (1) complete copy of the Project Manual, including Addenda. Include with the Project Manual one (1) copy of other written construction documents, such as Change Orders and modifications issued in printed form during construction.
1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
 2. Give particular attention to equals and substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
 3. Note related record drawing information and Product Data.
 4. Upon completion of the Work, submit Record Specifications to the Construction Administrator for the Owner's records.
- D. Record Product Data:** The Contractor shall maintain one (1) copy of each Product Data submittal. Note related Change Orders and markup of record drawings and Specifications.
1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
 3. Upon completion of markup, submit complete set of Record Product Data to the Construction Administrator for the Owner's records.
- E. Record Sample Submitted:** Immediately prior to Substantial Completion, the Contractor shall meet with the Construction Administrator, Architect and the Owner's personnel at the Project Site to determine which Samples are to be transmitted to the Owner for record purposes. Comply with the Owner's instructions regarding delivery to the Owner's Sample storage area.
- F. Miscellaneous Record Submittals:** Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to the Construction Administrator for the Owner's records.
- G. Maintenance Manuals:** Organize operation and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual, heavy-duty, **2-inch**, 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder according to Division 01 Section 01 78 23 "Operation & Maintenance Data". Included but not limited to the following types of information:
1. Emergency instructions.
 2. Spare parts list.
 3. Copies of warranties.
 4. Wiring diagrams.
 5. Recommended "turn-around" cycles.
 6. Inspection procedures.
 7. Shop Drawings and Product Data.
 8. Fixture lamping schedule.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Identification systems.
7. Control sequences.
8. Hazards.
9. Cleaning.
10. Warranties and bonds.
11. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Startup.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

3.2 FINAL CLEANING

A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Division 01 Section 01 50 00 "Temporary Facilities and Controls."

B. Cleaning: Employ professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion and Certification of Occupancy.
2. Interior:
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Remove paint spots; wash and polish glass.
 - c. Clean exposed interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

- d. Wash washable surfaces of mechanical, electrical equipment and fixtures and replace filters, clean strainers on mechanical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean and polish finish hardware.
 - f. Clean and polish tile and other glazed surfaces.
 - g. Clean floors; wax and buff resilient tile. Clean vinyl or rubber base.
 - h. Vacuum and/or dust walls, ceilings, lighting fixtures, ceiling diffusers and other wall and ceiling items.
 - i. Remove defacements, streaks, fingerprints and erection marks.
3. Exterior:
- a. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth, even-textured surface.
 - b. Clean exposed exterior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances.
 - c. Clean roofs, gutters and downspouts.
 - d. Remove waste and surplus materials, rubbish and construction equipment and facilities from the site, and deposit it legally elsewhere.
 - e. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Remove paint spots; wash and polish glass.
- C. Pest Control:** Engage an experienced, licensed exterminator to make a final inspection and rid the work of rodents, insects, and other pests. Provide results of final inspection in writing.
- D. Removal of Protection:** Remove temporary protection and facilities installed for protection of the Work during construction.
- E. Compliance:** Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of lawfully.
1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the Construction Administrator.
 2. Leave building clean and ready for occupancy. If the Contractor fails to clean up, the Owner may do so, with the cost charged to the Contractor. The Owner will issue a credit change order to cover the costs.

END OF SECTION 01 77 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for operation and maintenance manuals, including the following:
1. Preparing and submitting operation and maintenance manuals for building operating systems and equipment.
 2. Preparing and submitting instruction manuals covering the care, preservation, and maintenance of architectural products and finishes.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
1. Division 01 Section 01 33 00 "Submittal Procedures" specifies preparation of Shop Drawings and Product Data.
 2. Division 01 Section 01 75 00 "Starting and Adjusting" specifies instruction of the Owner and Agency operating personnel in the operation and maintenance of building systems and equipment and the general requirements for starting-up equipment and systems.
 3. Division 01 Section 01 77 00 "Closeout Procedures" specifies general closeout requirements.
 4. Division 01 Section 01 78 30 "Warranties and Bonds" specifies requirements for submittal of warranties and bonds.
 5. Appropriate Sections of Divisions 02 through 49 specify special operation and maintenance data requirements for specific pieces of equipment or building operating systems.

1.3 QUALITY ASSURANCE

- A. **Maintenance Manual Preparation:** In preparation of maintenance manuals, use personnel thoroughly trained and experienced in operation and maintenance of equipment or system involved.
1. Where maintenance manuals require written instructions, use personnel skilled in technical writing where necessary for communication of essential data.
 2. Where maintenance manuals require drawings or diagrams, use draftsmen capable of preparing drawings clearly in an understandable format.
- B. **Instructions for the Owner and Agency Personnel:** The Construction Manager must use experienced instructors thoroughly trained and experienced in operation and maintenance of equipment or system involved, to instruct the Owner's operation and maintenance personnel.
- C. **Commissioning (Cx) Coordination:** The Commissioning process requires detailed O&M documentation. The Contractor must submit O&M manuals to the Construction Administrator for review and approval by Commissioning Agent (CxA).

1.4 SUBMITTALS

- A. **Submittal Schedule:** Comply with the following schedule for submitting operation and maintenance manuals:
1. Before Substantial Completion, when each installation that requires operation and maintenance manuals is nominally complete, submit **four (4)** draft copies of each manual to the Owner's Representative, Agency Representative, and Architect for review. Include a complete index or table of contents of each manual.
 - a. The Owner's Representative will return **one (1)** copy of the draft with comments within **twenty - one (21)** calendar days of receipt.
 - b. Submit **four (4)** copies of data in final form at least **twenty-one (21)** calendar days before final inspection. The Owner's Representative will return **one (1)** copy within **twenty-one (21)** calendar after final inspection, with comments.

2. After final inspection, make corrections or modifications to comply with the Commissioning Agent's (CxA), Architect's, and Agency Representative's comments. Submit final copies to the Owner's Representative within **twenty-one (21)** calendar days of receipt of the Commissioning Agent's (CxA), Architect's, and Agency Representative's comments.
- B. Form of Submittal:** Prepare operation and maintenance manuals in the form of an instructional manual for use by the Owner's operating personnel. Organize into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder.
1. **Binders:** For each manual, provide heavy-duty, commercial-quality, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to receive **8-1/2-by-11- inch** paper. Provide a clear plastic sleeve on the spine to hold labels describing contents. Provide pockets in the covers to receive folded sheets.
 - a. Where **two (2)** or more binders are necessary to accommodate data, correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-reference other binders where necessary to provide essential information for proper operation or maintenance of the piece of equipment or system.
 - b. Identify each binder on front and spine, with the printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter covered. Indicate volume number for multiple volume sets of manuals.
 2. **Dividers:** Provide heavy paper dividers with celluloid-covered tabs for each separate section. Mark each tab to indicate contents. Provide a typed description of the product and major parts of equipment included in the section on each divider.
 3. **Protective Plastic Jackets:** Provide protective, transparent, plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
 4. **Text Material:** Where maintenance manuals require written material, use the manufacturer's standard printed material. If manufacturer's standard printed material is not available, provide specially prepared data, neatly typewritten, on **8-1/2-by-11-inch, 20-lb/sq ft** white bond paper.
 5. **Drawings:** Where maintenance manuals require drawings or diagrams, provide reinforced, punched binder tabs on drawings and bind in with text.
 - a. Where oversize drawings are necessary, fold drawings to the same size as text pages and use as a foldout.
 - b. If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in front or rear pocket of binder. Insert a typewritten page indicating drawing title, description of contents, and drawing location at the appropriate location in the manual.

1.5 MANUAL CONTENT

- A.** In each manual include information specified in the individual Specification Section and the following information for each major component of building equipment and its controls:
1. **General system or equipment description.**
 2. **Design factors and assumptions.**
 3. **Copies of applicable shop drawings and product data.**
 4. **System or equipment identification, including:**
 - a. **Name of manufacturer.**
 - b. **Model number.**
 - c. **Serial number of each component.**
 5. **Operating instructions.**
 6. **Emergency instructions.**
 7. **Wiring diagrams.**
 8. **Inspection and test procedures.**
 9. **Maintenance procedures and schedules.**
 10. **Precautions against improper use and maintenance.**
 11. **Copies of warranties.**
 12. **Repair instructions including spare parts listing.**

13. Sources of required maintenance materials and related services.

14. Manual index.

- B.** Organize each manual into separate sections for each piece of related equipment. As a minimum, each manual shall contain a title page; a table of contents; copies of product data, supplemented by drawings and written text; and copies of each warranty, bond, and service contract issued.
- 1. Title Page:** Provide a title page in a transparent, plastic envelope as the first sheet of each manual. Provide the following information:
 - a. Subject matter covered by the manual.**
 - b. Name and address of the Project.**
 - c. Date of submittal.**
 - d. Name, address, and telephone number of the Construction Manager.**
 - e. Name and address of the Architect and Owner's Representative.**
 - f. Cross-reference to related systems in other operation and maintenance manuals.**
 - 2. Table of Contents:** After title page, include a typewritten table of contents for each volume, arranged systematically according to the Project Manual format. Include a list of each product included, identified by product name or other appropriate identifying symbol and indexed to the content of the volume.
 - a.** Where a system requires more than one volume to accommodate data, provide a comprehensive table of contents for all volumes in each volume of the set.
 - 3.** Provide a general information section immediately following table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, and telephone number of the subcontractor or Installer and the maintenance subcontractor. Clearly delineate the extent of responsibility of each of these entities. Include a local source for replacement parts and equipment.
 - 4. Product Data:** Where the manuals include manufacturer's standard printed data, include only sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where the Project includes more than one (1) item in a tabular format, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation, and delete references to information that is not applicable.
 - 5. Written Text:** Prepare written text to provide necessary information where manufacturer's standard printed data is not available, and the information is necessary for proper operation and maintenance of equipment or systems. Prepare written text where it is necessary to provide additional information or to supplement data included in the manual. Organize text in a consistent format under separate headings for different procedures. Where necessary, provide a logical sequence of instruction for each operation or maintenance procedure.
 - 6. Drawings:** Provide specially prepared drawings where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems or to provide control or flow diagrams. Coordinate these drawings with information contained in project record drawings to assure correct illustration of the completed installation.
 - a.** Do not use original Record Documents as part of operation and maintenance manuals.
 - 7. Warranties and/or Bonds:** Provide a copy of each warranty and/or bond in the appropriate manual for the information of the Owner's operating personnel. Provide written data outlining procedures to follow in the event of product failure. List circumstances and conditions that would affect validity of warranty or bond.

1.6 MATERIAL AND FINISHES MAINTENANCE MANUAL

- A.** Submit **four (4)** copies of each manual, in final form, on material and finishes to the Owner's Representative for distribution. Provide **one (1)** section for architectural products, including applied materials and finishes. Provide a second section for products designed for moisture protection and products exposed to the weather.
- 1.** Refer to individual Specification Sections for additional requirements on care and maintenance of materials and finishes.
- B. Architectural Products:** Provide manufacturer's data and instructions on care and maintenance of architectural products, including applied materials and finishes.

1. **Manufacturer's Data:** Provide complete information on architectural products, including the following, as applicable:
 - a. Manufacturer's catalog number.
 - b. Size.
 - c. Material composition.
 - d. Color.
 - e. Texture.
 - f. Reordering information for specially manufactured products.
 2. **Care and Maintenance Instructions:** Provide information on care and maintenance, including manufacturer's recommendations for types of cleaning agents to be used and methods of cleaning. Provide information on cleaning agents and methods that could prove detrimental to the product. Include manufacturer's recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Products Exposed to the Weather:** Provide complete manufacturer's data with instructions on inspection, maintenance, and repair of products exposed to the weather or designed for moisture-protection purposes.
1. **Manufacturer's Data:** Provide manufacturer's data giving detailed information, including the following, as applicable:
 - a. **Applicable standards.**
 - b. **Chemical composition.**
 - c. **Installation details.**
 - d. **Inspection procedures.**
 - e. **Maintenance information.**
 - f. **Repair procedures.**

1.7 EQUIPMENT AND SYSTEMS MAINTENANCE MANUAL

- A. Submit **four (4)** copies of each manual, in final form, on equipment and systems to the Owner's Representative for distribution. Provide separate manuals for each unit of equipment, each operating system, and each electric and electronic system.
 1. Refer to individual Specification Sections for additional requirements on operation and maintenance of the various pieces of equipment and operating systems.
- B. **Equipment and Systems:** Provide the following information for each piece of equipment, each building operating system, and each electric or electronic system.
 1. **Description:** Provide a complete description of each unit and related component parts, including the following:
 - a. **Equipment or system function.**
 - b. **Operating characteristics.**
 - c. **Limiting conditions.**
 - d. **Performance curves.**
 - e. **Engineering data and tests.**
 - f. **Complete nomenclature and number of replacement parts.**
 2. **Manufacturer's Information:** For each manufacturer of a component part or piece of equipment, provide the following:
 - a. **Printed operation and maintenance instructions.**
 - b. **Assembly drawings and diagrams required for maintenance.**
 - c. **List of items recommended to be stocked as spare parts.**
 3. **Maintenance Procedures:** Provide information detailing essential maintenance procedures, including the following:
 4. **Operating Procedures:** Provide information on equipment and system operating procedures, including the following:

- a. **Startup procedures.**
 - b. **Equipment or system break-in.**
 - c. **Routine and normal operating instructions.**
 - d. **Regulation and control procedures.**
 - e. **Instructions on stopping.**
 - f. **Shutdown and emergency instructions.**
 - g. **Summer and winter operating instructions.**
 - h. **Required sequences for electric or electronic systems.**
 - i. **Special operating instructions.**
5. **Servicing Schedule:** Provide a schedule of routine servicing and lubrication requirements, including a list of required lubricants for equipment with moving parts.
 6. **Controls:** Provide a description of the sequence of operation and as-installed control diagrams by the control manufacturer for systems requiring controls.
 7. **Identification Drawings:** Provide each Subcontractor's Identification Drawings.
 - a. Provide as-installed, color-coded, piping diagrams, where required for identification.
 8. **Valve Tags:** Provide charts of valve-tag numbers, with the location and function of each valve.
 9. **Circuit Directories:** For electric and electronic systems, provide complete circuit directories of panel boards, including the following:
 - a. Controls.
 - b. Communication.
- C. Electronic Media:**
1. For equipment which requires maintenance by operational personnel, provide a professionally developed **DVD** for the use of maintenance training for the facility. Each **DVD** will be accompanied by a written index which can be utilized to find any specific item of information by time or place on the **DVD**.
 2. The Construction Manager is responsible for this production. This **DVD** will be provided to the Owner's Representative at the same time as the delivery of the other maintenance material.
 3. The **[video tape] [DVD]** must be able to be edited for future changes to the equipment and modifications as they occur.

1.8 COMMISSIONING RECORD AND TESTING DATA MANUAL

The Contractor shall cooperate with Commissioning Agent (CxA) in the preparation of a separate Manual dedicated to documenting the Commissioning process which will include all certifications and testing data and some repeating of O&M data. Description of this Manual is found in Section 01 91 00 Commissioning and shall be prepared by the Commissioning Agent (CxA).

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 78 23

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. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
 - 1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 33 00 "Submittal Procedures" specifies procedures for submitting warranties.
 - 2. Division 01 Section 01 77 00 "Closeout Procedures" specifies contract closeout procedures.
 - 3. Division 01 Section 01 78 23 "Operation and Maintenance Data" specifies required operation and maintenance data.
 - 4. Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.
 - 5. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- C. **Disclaimers and Limitations:** Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 WARRANTY REQUIREMENTS

- A. **Related Damages and Losses:** When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- B. **Reinstatement of Warranty:** When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. **Replacement Cost:** Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. **Owner's Recourse:** Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. **Rejection of Warranties:** The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.
- F. The Contractor shall guarantee all materials and workmanship for a period of **eighteen (18)** months from the date of Substantial Completion of the Work. In addition, the Contractor shall furnish the warranties listed below. Submit four (4) copies of each to the Construction Administrator in the supplier's standard form or in the form given below if there is no standard form available.
- G. **Specification/Warranty Table:** The General Contractor shall provide for all warranties as shown in the Specification/Warranty table:

Specification / Warranty Table

Item No.	Section No.	Specification Product/Warranty
1.	07	<u>6200</u> Metal Flashing and Sheet Metal: 3 year, material and workmanship.
2.	08	<u>1416</u> Solid Wood Core and Mineral Core doors: Lifetime for interior doors
3.	08	<u>7100</u> Closers, Locksets, Exit Bolts . Longest term offered by manufacturer for grade/class of particular item, material and workmanship
4.	08	<u>7113</u> Automatic Door Operators 2 years materials and installation
5.	09	<u>6813</u> Carpet: <u>10 year wear and color fastness, and 3 year installation</u>
6.	23	<u>0516</u> Expansion Fittings 18 months
7.	23	<u>0523</u> Valves 18 months
8.	23	<u>0529</u> Hangers & Supports 18 months
9.	23	<u>0548</u> Vibration & Seismic Controls 18 months
10.	23	<u>0700</u> Insulation 18 months
11.	23	<u>0900</u> DDC Control Systems Parts, Hardware, and Software 18 months
12.	23	<u>2113</u> Hydronic Piping 18 months
13.	23	<u>2116</u> Hydronic Piping Specialties 18 months
14.	23	<u>2300</u> Refrigerant Piping 18 months
15.	23	<u>3100</u> HVAC Ducts 18 months
16.	23	<u>3300</u> Air Duct Accessories 18 months
17.	23	<u>3600</u> VAV Boxes 5 years, material and installation
18.	23	<u>3700</u> Air Inlets & Outlets 5 years, materials
19.	23	<u>8103</u> Rooftop Air Conditioning Units (DOAS): 18 months.
20.	23	<u>8127</u> VRV units: 5 year compressor.
21.	23	<u>8200</u> Radiant Panels & Finned Tube Enclosure: 18 months.
22.	26	<u>0519</u> Building Wire & Cable: 18 months.
23.	26	<u>2416</u> Panelboards: 18 months.
24.	26	<u>5100</u> Interior Lighting: 18 months.
25.	26	<u>1300</u> Data Network: 18 months.
26.	28	<u>1300</u> Security & Access Control: 18 months
27.	28	<u>3100</u> Fire Alarm: 18 months.

- H. Submit certification that finish materials are fire rated as specified.
- I. Form of Warranty: Warranties shall be submitted in following format:

Warranty			
<i>Commissioner: (Insert Commissioner's Name)</i> Department of Administrative Services DAS Commissioner's Office 450 Columbus Boulevard, Suite 1501 Hartford, CT 06103			
<i>Project Number: (Insert DAS/CS Project Number)</i> <i>Project Title: (Insert DAS/CS Project Title)</i>			
I (We) hereby warranty			
the _____ work on the referenced project for a period of _____ years			
from _____, 20 _____ against failures of workmanship and materials in accordance			
with the requirements of Section _____, Page _____, Paragraph _____, of the Specifications.			
Installer <input type="checkbox"/>	Subcontractor <input type="checkbox"/>	Vendor/Suppliers <input type="checkbox"/>	Manufacturer <input type="checkbox"/>
Installer or Subcontractor or Vendor/Suppliers or Manufacturer Name: _____			
Installer or Subcontractor or Vendor/Suppliers or Manufacturer Signature: _____			
General Contractor's Name _____			
General Contractor's Signature: _____			
or			
General Contractor's Authorized Agent Signature: _____			

- J. Bonds shall be by approved Surety Companies, made out to the Commissioner, Department of Administrative Services on companies' standard form.
- K. Warranties, Guarantees, or bonds supplied by the General Contractor's Subcontractors or Vendors/Suppliers or Manufacturers shall reference the project name, number, and location and be certified by the General Contractor to be for the product and installation on the project and must be countersigned by the General Contractor.
- L. Bonds shall be by approved Surety Companies, made out to the Commissioner, Department of Administrative Services, on company's standard form.
- M. Guarantees, warranties or bonds supplied by Subcontractors, Suppliers or Manufacturers shall reference the project name, number, and location and be certified by the Contractor to be for the product and installation on the project and must be countersigned by the Contractor.

1.4 SUBMITTALS

- A. Submit written warranties prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

- B.** Forms for special warranties are included in this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Submit a draft to the Owner, through the Construction Administrator, for approval prior to final execution.
1. Refer to Divisions 02 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Form of Submittal:** At Final Completion compile **two (2)** copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- D.** Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive **8-1/2-by-11-inch** paper.
1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the 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 the Installer.
 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
 3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not applicable)

END OF SECTION 01 78 30

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 use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017000 "Execution and Closeout Requirements" for cutting and patching procedures.
3. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- D. 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 building manager's and other tenants' 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.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- F. 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.

- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 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.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 2. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
 - 3. Asbestos abatement shall be performed by Owner.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. 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.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE 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 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. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video and templates.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. 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.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings 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 and leave in place.
 - 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 and leave in place.

3.4 PROTECTION

- A. Temporary Protection: 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."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 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. 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. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
- B. 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.
- C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. 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.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- F. 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. See Section 075216 "Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing" for new roofing requirements.
 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 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.

3.8 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.

3.9 SELECTIVE DEMOLITION SCHEDULE

- 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.

END OF SECTION 024119

SECTION 040120.63 - MASONRY REPAIR

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. Repairing masonry, including replacing units.
 - 2. Repairing masonry for cutting, patching and infills.

1.3 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).
- B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.
- C. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to brick masonry repair including, but not limited to, the following:
 - a. Verify brick masonry repair specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.
 - c. Quality-control program.
 - d. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

- A. Order sand and gray portland cement for colored mortar immediately after approval of. Take delivery of and store at Project site enough quantity to complete Project.
- B. Work Sequence: Perform brick masonry repair work in the following sequence, which includes work specified in this and other Sections:
 - 1. Remove paint.
 - 2. Clean masonry.
 - 3. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
 - 4. Repair masonry, including replacing existing masonry with new masonry materials.
 - 5. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.
- B. Samples for Initial Selection: For the following:
 - 1. Sand Types Used for Mortar: Minimum 8 oz. (240 mL) of each in plastic screw-top jars.
 - 2. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.
 - 3. Include similar Samples of accessories involving color selection.
- C. Samples for Verification: For the following:
 - 1. Each type of brick unit to be used for replacing existing units. Include sets of Samples to show the full range of shape, color, and texture to be expected. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
 - 2. Each type of patching compound in the form of briquettes, at least 3 inches (75 mm) long by 1-1/2 inches (38 mm) wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
 - 3. Accessories: Each type of accessory and miscellaneous support.

1.7 QUALITY ASSURANCE

- A. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons and protected against impact and chipping.
- B. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- E. Store sand where grading and other required characteristics can be maintained and contamination avoided.
- F. Handle masonry units to prevent overstressing, chipping, defacement, and other damage.

1.9 FIELD CONDITIONS

- A. Temperature Limits, General: Repair masonry units only when air temperature is between 40 and 90 deg F (4 and 32 deg C) and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.
- B. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain each type of material for repairing brick masonry (brick, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MASONRY MATERIALS

- A. Face Brick: As required to complete brick masonry repair work.
 - 1. Brick Matching Existing: Units with colors, color variation within units, surface texture, size, and shape that match existing brickwork and with physical properties
 - 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Glen Gery Brick, Bigler, PA
 - b. Hamar Brick, Cheswick, PA
 - c. KF Brick, South Windsor, CT

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or Type II, except Type III may be used for cold-weather construction; white where required for color matching of mortar.
 - 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Mortar Cement: ASTM C 1329/C 1329M.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Lafarge North America Inc.
 - b. Cemex USA, Inc.
 - c. Quickcrete Company.
- C. Water: Potable.

2.4 ACCESSORY MATERIALS

- A. Setting Buttons and Shims: Resilient plastic, nonstaining to masonry, sized to suit joint thicknesses and bed depths of masonry units, less the required depth of pointing materials unless removed before pointing.

- B. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
- C. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI #23 (surface-tolerant, anticorrosive metal primer).
 - 1. Surface Preparation: Use coating requiring no better than SSPC-SP 2, "Hand Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
 - 2. VOC Limit: Use coating with a VOC content of 400 g/L (3.3 lb/gal.) or less.

2.5 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
- B. Do not use admixtures in mortar unless otherwise indicated.
- C. Mixes: Mix mortar materials in the following proportions:
 - 1. Rebuilding (Setting) Mortar by Type: ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime or mortar cement.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.
 - 1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
 - 2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
 - 3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

3.2 MASONRY REPAIR, GENERAL

- A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet (6 m) away by Architect.

3.3 BRICK REMOVAL AND REPLACEMENT

- A. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single bricks, remove material from center of brick and work toward outside edges.
- B. Support and protect remaining masonry that surrounds removal area.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- D. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole bricks as possible.
 1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 3. Store brick for reuse. Store off ground, on skids, and protected from weather.
 4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 1. Maintain joint width for replacement units to match existing joints.
 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
- H. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with enough mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. (30 g/194 sq. cm per min.) Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 2. Rake out mortar used for laying brick before mortar sets according to Section 040120.64 "Brick Masonry Repointing." Point at same time as repointing of surrounding area.
 3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.
- I. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
 1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.4 MASONRY UNIT PATCHING

- A. Patch the following masonry units unless another type of repair or replacement is indicated:
 - 1. Units indicated to be patched.
- B. Patching Bricks:
 - 1. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of masonry unit.
 - 2. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
 - 3. Rinse surface to be patched and leave damp, but without standing water.
 - 4. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
 - 5. Keep each layer damp for 72 hours or until patching compound has set.

3.5 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.
 - 1. Do not use metal scrapers or brushes.
 - 2. Do not use acidic or alkaline cleaners.
- B. Clean adjacent nonmasonry surfaces. Use detergent and soft brushes or cloths.
- C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Remove masking materials, leaving no residues that could trap dirt.

3.6 FIELD QUALITY CONTROL

- A. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed.

3.7 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property.
- B. Masonry Waste: Remove masonry waste and legally dispose of off Owner's property.

END OF SECTION 040120.63

SECTION 061053 - MISCELLANEOUS 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. Rooftop equipment bases and support curbs.
 - 2. Wood blocking, cants, and nailers.
 - 3. Wood furring.
 - 4. Plywood backing panels.
- B. Related Requirements:
 - 1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater size but less than 5 inches nominal (114 mm actual) size in least dimension.

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.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Preservative-treated wood.
 - 2. Power-driven fasteners.
 - 3. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 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. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal (38-mm actual) thickness or less; no limit for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with 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 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 miscellaneous 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. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

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.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
1. Hem-fir (north); NLGA.
 2. Mixed southern pine or southern pine; SPIB.
 3. Spruce-pine-fir; NLGA.
 4. Hem-fir; WCLIB or WWPA.
 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 6. Northern species; NLGA.
- C. Concealed Boards: 15 percent maximum moisture content of the following species and grades:
1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
 2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, 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.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.6 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. Simpson Strong-Tie Co., Inc.
 - 3. USP Structural Connectors.
- B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for exterior locations and where indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- G. Sort and select lumber so that natural characteristics do 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.
- H. Comply with AWWA 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.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- 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 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- (19-by-63-mm actual-) size furring horizontally at 24 inches (610 mm) o.c.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- (19-by-38-mm actual-) size furring vertically at 16 inches (406 mm) o.c.

3.4 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 miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 072100 - THERMAL INSULATION

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. Extruded polystyrene foam-plastic board.
2. Polyisocyanurate foam-plastic board.
3. Glass-fiber blanket.

B. Related Requirements:

- 1.
2. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.

3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded Polystyrene Board, Type IV: ASTM C 578, Type IV, 25-psi (173-kPa) minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 POLYISOCYANURATE FOAM-PLASTIC BOARD

- A. Polyisocyanurate Board, Glass-Fiber-Mat Faced: ASTM C 1289, glass-fiber-mat faced, Type II, Class 2.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Atlas Roofing Corporation.
 - b. Carlisle Coatings & Waterproofing Inc.
 - c. Firestone Building Products.
 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.3 GLASS-FIBER BLANKET

- A. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. CertainTeed Corporation.
- b. Johns Manville; a Berkshire Hathaway company.
- c. Owens Corning.

- B. Glass-Fiber Blanket, Kraft Faced: ASTM C 665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. CertainTeed Corporation.
- b. Johns Manville; a Berkshire Hathaway company.
- c. Owens Corning.

2.4 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. AGM Industries, Inc.
- b. Gemco.
- c. GLT Products.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation.

2.5 ACCESSORIES

- A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 076200 - SHEET METAL FLASHING AND TRIM

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. Manufactured through-wall flashing with counterflashing.
2. Formed equipment support flashing.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
1. Include plans, elevations, sections, and attachment details.
 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 6. Include details of termination points and assemblies.
 7. Include details of roof-penetration flashing.
 8. Include details of edge conditions and counterflashings as applicable.
 9. Include details of special conditions.
 10. Include details of connections to adjoining work.
 11. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches (1:5).
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification: For each type of exposed finish.
1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
 3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
 4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested and FM Approvals approved.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

- A. 3 years, material and workmanship from date of Substantial Completion..

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

- D. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.
- E. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: 90 mph wind gust.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, of minimum uncoated weight (thickness) indicated; coated on both sides with zinc-tin alloy (50 percent zinc, 50 percent tin).
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Aurubis Buffalo, Inc.
 - b. KME America.
 - c. Revere Copper Products, Inc.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. Owens Corning.
 - c. SDP Advanced Polymer Products Inc.
2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 2. Fasteners for Zinc-Tin Alloy-Coated Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Solder:
 1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 2. For Zinc-Tin Alloy-Coated Copper: ASTM B 32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through-Wall, Ribbed, Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry, with ribs at 3-inch (75-mm) intervals along length of flashing to provide integral mortar bond. Manufacture through-wall flashing with interlocking counterflashing on exterior face, of same metal as flashing.
 - 1. Lead-Coated Copper: **20-oz.** minimum.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cambridge Street Metal.
 - 2) Keystone Flashing Company, Inc.
 - 3) Sandell Manufacturing Co., Inc.
- B. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Cheney Flashing Company.
 - b. Keystone Flashing Company, Inc.
 - c. Sandell Manufacturing Co., Inc.
 - 2. Material: Stainless steel, 0.019 inch (0.48 mm) thick.
 - 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

4. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
6. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
7. Finish: Mill.

2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

- G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.
- K. Do not use graphite pencils to mark metal surfaces.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Base Flashing: Fabricate from the following materials:
 - 1. Copper: 20 oz./sq. ft. (0.68 mm thick).
- B. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Copper: 20 oz./sq. ft. (0.68 mm thick).
- C. Flashing Receivers: Fabricate from the following materials:
 - 1. Copper: 20 oz./sq. ft. (0.68 mm thick).
- D. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Copper: 20 oz./sq. ft. (0.68 mm thick).
- E. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Copper: 20 oz./sq. ft. (0.68 mm thick).

2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
 - 1. Lead Coated Copper: 20 **oz./sq. ft.**

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
1. Copper: 20 oz./sq. ft. (0.68 mm thick).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.
- D. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4

- and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder aluminum sheet.
 2. Do not pre-tin zinc-tin alloy-coated copper.
 3. Do not use torches for soldering.
 4. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 5. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 6. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
 7. Copper-Clad Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for copper-clad stainless steel.
- H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
- C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.6 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.7 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.8 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 077200 - ROOF 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. Roof curbs.
2. Equipment supports.
3. Pipe and duct supports.
4. Pipe portals.
5. Preformed flashing sleeves.

B. Related Sections:

1. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.

1.3 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.
- D. Delegated-Design Submittal: For roof curbs, equipment supports, and walkways indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
 - 2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
 - 1. Size and location of roof accessories specified in this Section.
 - 2. Method of attaching roof accessories to roof or building structure.
 - 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
 - 4. Required clearances.
- B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design roof curbs and equipment supports to comply with wind performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

2.2 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation and mill phosphatized for field painting where indicated.
 - 1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
 - 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
 - 3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 4. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0.05 mm).
 - 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- B. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- C. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- D. Steel Tube: ASTM A 500/A 500M, round tube.
- E. Galvanized-Steel Tube: ASTM A 500/A 500M, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- F. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Glass-Fiber Board Insulation: ASTM C 726, nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C), thickness as indicated.
- C. Polyisocyanurate Board Insulation: ASTM C 1289, thickness and thermal resistivity as indicated.
- D. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- F. Underlayment:
 - 1. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 2. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
 - 3. Slip Sheet: Building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum, rosin sized.
 - 4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 5. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 - 6. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 7. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 8. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- G. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- H. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- I. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- J. Asphalt Roofing Cement: ASTM D 4586/D 4586M, asbestos free, of consistency required for application.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Seal joints with butylsealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 078413 - PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
- 2. Penetrations in horizontal assemblies.
- 3. Penetrations in smoke barriers.

B. Related Requirements:

- 1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 ALLOWANCES

- A. Penetration firestopping Work is part of an allowance.

1.4 UNIT PRICES

- A. Work of this Section is affected by unit prices.

1.5 ACTION SUBMITTALS

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

- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

- 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

- a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

- 1) UL in its "Fire Resistance Directory."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 1. Hilti, Inc.
 2. Nelson Firestop Products.
 3. 3M, Fire Protection division.
 4. W.R. Grace, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 1. Permanent forming/damming/backing materials.
 2. Substrate primers.

3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under "Firestop Systems."
- C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."
- D. Penetration Firestopping Systems with No Penetrating Items:
 - 1. UL-Classified Systems: C-AJ- C-BJ- F-A- W-J- W-L- 0001-0999.
- E. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing:
 - 1. UL-Classified Systems: C-AJ- C-BJ- C-BK- F-A- F-B- F-C- W-J- W-K- W-L- 1001-1999.
- F. Penetration Firestopping Systems for Nonmetallic Pipe, Conduit, or Tubing:
 - 1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-L- 2001-2999.
- G. Penetration Firestopping Systems for Electrical Cables:
 - 1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-L- 3001-3999.
- H. Penetration Firestopping Systems for Cable Trays with Electric Cables:
 - 1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-K- W-L- 4001-4999.
- I. Penetration Firestopping Systems for Insulated Pipes:
 - 1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-C- W-J- W-L- 5001-5999.
- J. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants:
 - 1. UL-Classified Systems: C-AJ- F-A- W-L- 6001-6999.
- K. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrants:
 - 1. UL-Classified Systems: C-AJ- F-C- W-J- W-L- 7001-7999.
- L. Penetration Firestopping Systems for Groupings of Penetrants:
 - 1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-C- W-J- W-L- 8001-8999.

END OF SECTION 078413

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. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Mildew-resistant joint sealants.
 - 4. Butyl joint sealants.
 - 5. Latex joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. 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.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.

- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
 - 1. Joint-sealant location and designation.
 - 2. Manufacturer and product name.
 - 3. Type of substrate material.
 - 4. Proposed test.
 - 5. Number of samples required.
- D. Preconstruction Laboratory Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.
- E. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- F. Field-Adhesion-Test Reports: For each sealant application tested.
- G. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
 - 3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with masonry substrates.
 - 4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.

5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
 7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, 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 kind of sealant and joint substrate.
 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 X1.1 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.

1.7 FIELD 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 (5 deg C).
 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.

1.8 WARRANTY

- A. Special Installer's Warranty: 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: Five years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, 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. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Dow Corning Corporation.
 - b. Pecora Corporation.
 - c. Sherwin-Williams Company (The).

2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Pecora Corporation.
 - b. Sika Corporation; Joint Sealants.
 - c. Tremco Incorporated.
- B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Pecora Corporation.
 - b. Polymeric Systems, Inc.
 - c. Sherwin-Williams Company (The).

2.4 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Bostik, Inc.
 - b. Pecora Corporation.

2.5 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Franklin International.
- b. Pecora Corporation.
- c. Tremco Incorporated.

2.6 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Adfast.
 - b. Alcot Plastics Ltd.
 - c. BASF Corp. - Construction Chemicals.
 - d. Construction Foam Products; a division of Nomaco, Inc.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. 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.

2.7 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 performance of the Work.
- 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. Porcelain enamel.
 - d. 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 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.
- E. 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.

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 one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.
 - 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 complies with sealant manufacturer's field-adhesion hand-pull test criteria.
 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
 5. 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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
 1. Joint Locations:

- a. Control and expansion joints in tile flooring.
 - b. Joints between different materials..
 - c. Other joints as indicated on Drawings.
2. Joint Sealant: Urethane, S, P, 25, T, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of unit masonry walls.
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Acrylic latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Concealed mastics.
1. Joint Locations:
 - a. Aluminum thresholds.
 - b. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081213 - HOLLOW METAL 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. Interior standard steel 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.

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.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:

1. Elevations of each frame type.
 2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 3. Locations of reinforcement and preparations for hardware.
 4. Details of each different wall opening condition.
 5. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 6. Details of anchorages, joints, field splices, and connections.
 7. Details of accessories.
 8. Details of moldings, removable stops, and glazing.
- C. Samples for Initial Selection: For hollow-metal frames with factory-applied color finishes.
- D. Samples for Verification:
1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 127 mm).
- E. Product Schedule: For hollow-metal frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal frame assembly, for tests performed by a qualified testing agency.
- B. Oversize Construction Certification: For assemblies required to be fire-rated and exceeding limitations of labeled assemblies.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal frames 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 frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Ceco Door; ASSA ABLOY.
 2. JR Metal Frames Manufacturing, Inc.
 3. North American Door Corp.
 4. Steelcraft; an Allegion brand.
 5. Stiles Custom Metal, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Smoke- and Draft-Control Assemblies: Provide assemblies with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 STANDARD STEEL FRAMES

- A. Construct hollow-metal frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Interior Frames: SDI A250.8. At locations indicated in the Door and Frame Schedule.
1. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
 2. Construction: Knocked down.
 3. Exposed Finish: Prime.

2.4 FRAME ANCHORS

- A. Jamb Anchors:
1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.

2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
 3. Postinstalled Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.5 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.

2.6 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 2. Door Silencers: Except on weather-stripped frames, 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.

3. Terminated Stops: Terminate stops 6 inches (152 mm) above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- B. Hardware Preparation: Factory prepare hollow-metal frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with BHMA A156.115 for preparing hollow-metal frames for hardware.

2.7 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.

PART 3 - EXECUTION

3.1 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. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. General: Install hollow-metal frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions. Comply with SDI A250.11 or NAAMM-HMMA 840.
- B. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
1. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 2. Install frames with removable stops located on secure side of opening.
- C. Fire-Rated Openings: Install frames according to NFPA 80.

- D. Floor Anchors: Secure with postinstalled expansion anchors.
 - 1. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
- E. Solidly pack mineral-fiber insulation inside frames.
- F. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
- G. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- H. Installation Tolerances: Adjust hollow-metal frames 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 at floor.

3.3 CLEANING AND TOUCHUP

- A. 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.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.
- D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081213

SECTION 081416 - FLUSH WOOD DOORS

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. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.

B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.
2. Section 088813 "Fire-Resistant Glazing" for glass view panels in flush wood doors.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 1. Dimensions and locations of blocking.
 2. Dimensions and locations of mortises and holes for hardware.
 3. Dimensions and locations of cutouts.
 4. Undercuts.
 5. Requirements for veneer matching.
 6. Doors to be factory finished and finish requirements.
 7. Fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide Samples for each species of veneer and solid lumber required.
 - b. Provide Samples for each color, texture, and pattern of plastic laminate required.
 - c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
3. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

1.8 WARRANTY

- A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Marshfield Door Systems, Inc., Rotary Natural Birch in Wine 38-95 or comparable product by one of the following:
 1. ABS- American Building Supply- Doormerica.
 2. Graham Wood Doors; ASSA ABLOY Group company.
 3. Mohawk Flush Doors, Inc.
- B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
 1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
 2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
- B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- C. WDMA I.S.1-A Performance Grade:
 1. Extra Heavy Duty: Classrooms, Offices and public toilets.
- D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
- E. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- F. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-1 or Grade LD-2.
2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
 - b. 5-inch (125-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
3. Provide doors with glued-wood-stave cores instead of particleboard cores for doors indicated to receive exit devices.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: Natural Birch.
3. Cut: Rotary cut.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 10 feet (3 m) or more.
7. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
8. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A.
9. Core: Particleboard.
10. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
11. Construction: Seven plies, either bonded or nonbonded construction.
12. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LIGHT FRAMES AND LOUVERS

- A. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
- B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.
- C. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ASSA ABLOY.
 - b. L & L Louvers, Inc.
 - c. McGill Architectural Products.
2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, factory primed for paint finish.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
 3. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Factory finish doors that are indicated to receive transparent finish.

- D. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: WDMA TR-8, UV-Cured Acrylated Polyester/Urethane.
 - 3. Staining: Match Existing.
 - 4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
 - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - b. 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 2. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 087100 - DOOR HARDWARE

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. Mechanical door hardware for the following:
 - a. Swinging doors.
2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Requirements:

1. Section 081213 "Hollow Metal Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
2. Section 081416 "Flush Wood Doors" for astragals and integral intumescent seals provided as part of labeled fire-rated assemblies.
3. Section 281300 "Security and Access Control" for connections to building fire-alarm system.
4. Section 283100 "Fire Detection and Alarm" for connections to building fire-alarm system.

1.3 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- C. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- D. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.
- B. Keying Conference: Conduct conference at Project site.
 - 1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.
 - 2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - a. Flow of traffic and degree of security required.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For electrified door hardware.
 - 1. Include diagrams for power, signal, and control wiring.
 - 2. Include details of interface of electrified door hardware and building safety and security systems.
- C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.
 - 1. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- D. Samples for Initial Selection: For each type of exposed finish.
- E. Samples for Verification: For each type of exposed product, in each finish specified.
 - 1. Sample Size: Full-size units or minimum 2-by-4-inch (51-by-102-mm) Samples for sheet and 4-inch (102-mm) long Samples for other products.
 - a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

2. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- F. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
 3. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - e. Fastenings and other installation information.
 - f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - g. Mounting locations for door hardware.
 - h. List of related door devices specified in other Sections for each door and frame.
- G. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For each type of electrified door hardware.
 1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.
- C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- D. Field quality-control reports.

- E. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
 - 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC) and an Electrified Hardware Consultant (EHC).

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.

- b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
- a. Electromagnetic Locks: Five years from date of Substantial Completion.
 - b. Exit Devices: Two years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.
 - d. Concealed Floor Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.
1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.
- C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design" and the ABA standards of the Federal agency having jurisdiction ICC A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.
 1. Door hardware is scheduled in Part 3.

2.4 HINGES

- A. Hinges: BHMA A156.1.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. McKinney Products Company; an ASSA ABLOY Group company.
 - b. Allegion plc.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.
- B. Power Transfer Hinges: BHMA A250.13
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 2.
 - a. Securitron; an ASSA ABLOY Group company.
 - b. Allegion plc.
 - c. Stanley Commercial Hardware.

2.5 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
 - 2. Deadbolts: Minimum 1-inch (25-mm) bolt throw.
- C. Lock Backset: 2-3/4 inches (70 mm) unless otherwise indicated.
- D. Lock Trim:
 - 1. Description: As indicated on Schedule.
 - 2. Levers: Satin Chrome.
 - 3. Dummy Trim: Match lever lock trim and escutcheons.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 - 4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Corbin Manufacturing Company; ASSA ABLOY
 - b. Allegion plc.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.6 EMERGENCY DOOR RELEASE

- A. Break Glass Emergency Door Release:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. SDC Security Door Controls.
 - b. Allegion plc.

- c. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.7 CARD READER

A. Keypad/Proximity Card Reader:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Software House Tyco Security Products.
 - b. Schneider Electric.
 - c. HID.

2.8 DOOR CONTACTS

A. Door Contacts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Interlogix UTC Industries.
 - b. Allegion plc.
 - c. Stanley Commercial Hardware, a division of Stanley Security Solutions

2.9 AUDIBLE DEVICE/HORN

A. Audible Device/Horn:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. AlarmGrid Industries.
 - b. Schneider Electric.
 - c. Simplex

2.10 LOW ENERGY POWER OPERATORS

- A. Low Energy Power Operators: BHMA A156.19; electrically powered; push or pull side mounting; obstruction detection on both open and close cycle; operates as a manual surface closer when power is off.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Norton ASSA ABLOY.
 - b. DORMA USA, Inc.
 - c. Hager Companies.

2.11 ELECTROMECHANICAL LOCKS

- A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; with strike that suits frame.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Corbin Manufacturing Company; ASSA ABLOY
 - b. Allegion plc.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.
 2. Type: Bored.

2.12 DOOR CLOSER

- A. Door closers certified to: BHMA A156.4, Grade 1 requirements; fully hydraulic, full rack and pinion action with a high strength R-14 aluminum cylinder, 1-1/2" in diameter,. Hydraulic fluid requiring no seasonal closer adjustment, fireproof passing requirements of UL10C "positive pressure" fire test, spring power shall be continuously adjustable over full range of closer sizes, and allow for reduced opening force as required by accessibility codes and standards, with separate adjustment for latch speed, general speed and backcheck, heavy-duty forged forearms for parallel arm closers.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Norton Manufacturing Company; ASSA ABLOY.
 - b. Allegion plc.
 - c. Yale Security Inc; an ASSA ABLOY Group company.

2.13 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3, Type 28 Grade 1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Corbin Manufacturing Company; ASSA ABLOY.
 - b. DORMA USA, Inc.
 - c. Allegion plc.

2.14 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Corbin Manufacturing Company; ASSA ABLOY.
 - b. Allegion plc.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.
- B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.
 1. Core Type: Interchangeable.
- C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.15 DOOR PUSH – PULLS

- A. Door Push and Pulls: BHMA A156.6, ANSI A117.1 Compliant
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Rockwood Manufacturing Company; ASSA ABLOY.
 - b. Allegion plc.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions

2.16 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.
1. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.
 - b. Re-key Owner's existing master key system into new keying system.
 2. Keyed Alike: Key all cylinders to same change key.
- B. Keys: Brass.
1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."

2.17 OPERATING TRIM

- A. Operating Trim: BHMA A156.6;
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allegion plc.
 - b. Hager Companies.
 - c. Rockwood Manufacturing Company; an ASSA ABLOY Group company.

2.18 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allegion plc.
 - b. SARGENT Manufacturing Company; ASSA ABLOY.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.19 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allegion plc.
 - b. Architectural Builders Hardware Mfg., Inc.
 - c. Rockwood Manufacturing Company; an ASSA ABLOY Group company.

2.20 ELECTROMAGNETIC STOPS AND HOLDERS

A. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single unit with strike plate attached to swinging door; coordinated with fire detectors and interface with fire-alarm system for labeled fire-rated door assemblies.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allegion plc.
 - b. DORMA USA, Inc.
 - c. SARGENT Manufacturing Company; ASSA ABLOY.

2.21 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allegion plc.
 - b. Hager Companies.
 - c. Rockwood Manufacturing Company; an ASSA ABLOY Group company.

2.22 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
 - 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.23 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.
 2. Furnish permanent cores to Owner for installation.
- E. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
1. Configuration: Provide one power supply for each door opening with electrified door hardware.
- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
1. Do not notch perimeter gasketing to install other surface-applied hardware.
- I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.8 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

3.9 DOOR HARDWARE SCHEDULE

- A. See Attached

Door Number	Description/Material	Access Control (Y/N)	Lockset	Door Closer	Cylinder	Special Hardware Options	Card Reader	Power Supply	Door Contact	Hinge/Power Transfer	Toggle switch/button	Audible Device/Horn	Duress Device	Description of door operation
201	Classroom 201	Y	Corbin exit ED5200- N9905-MELR- arm 6670-3- M54-M92-630 (hand confirmed per door)	Norton DO 6070D-689, Norton ext arm 6670-3- 689 (41-6700- 00520578), Norton switch 505	Corbin cyl 2080-05S-626	Break Glass SDC- 491/custom	Softwarehouse e RMZL-P126 ("INDALA)	n/a	(1078) 1" press fit	Securtron EL- CEPT	n/a	0E- IGANGCHIM (WBOX Technologies	N	Lockset has built in request to exit switch- access control head end in WH 232. ADA opener push/pull to be coordinated with openings. Door closers mounted on inside of doors.
202	Classroom 202	Y	Corbin exit ED5200- N9905-MELR- arm 6670-3- M54-M92-630 (hand confirmed per door)	Norton DO 6070D-689, Norton ext arm 6670-3- 689 (41-6700- 00520578), Norton switch 505	Corbin cyl 2080-05S-626	Break Glass SDC- 491/custom	Softwarehouse e RMZL-P126 ("INDALA)	n/a	(1078) 1" press fit	Securtron EL- CEPT	n/a	0E- IGANGCHIM (WBOX Technologies	N	Lockset has built in request to exit switch- access control head end in WH 232. ADA opener push/pull to be coordinated with openings. Door closers mounted on inside of doors.
204	Classroom 204	Y	CL33905-NZD- CL6-24DC- M92-626 (24 volts)	DC 6210xM54x68 9	Corbin cyl 8027	Break Glass SDC- 491/custom	Softwarehouse e RMZL-P126 ("INDALA)	n/a	(1078) 1" press fit	McKinney with Stanley prep- T4A3788CC8- ELC-HINGE 4.5x4.5 QC 26D & wire power transfer hinge	n/a	0E- IGANGCHIM (WBOX Technologies	N	Lockset has built in request to exit switch- access control head end in WH 232.
207A	Classroom 207	Y	CL33905-NZD- CL6-24DC- M92-626 (24 volts)	DC 6210 x M54 x 689	Corbin cyl 8027	Break Glass SDC- 491/custom	Softwarehouse e RMZL-P126 ("INDALA)	n/a	(1078) 1" press fit	McKinney with Stanley prep- T4A3788CC8- ELC-HINGE 4.5x4.5 QC 26D & wire power transfer hinge	n/a	0E- IGANGCHIM (WBOX Technologies	N	Lockset has built in request to exit switch- access control head end in WH 232.
207B	Classroom 207	Y	CL33905-NZD- CL6-24DC- M92-626 (24volts)	DC 6210 x M54 x 689	8027/207A location	fixed to BG at 8027/207A location	operated by reader at 207A door	n/a	(1078) 1" press fit	McKinney with Stanley prep- T4A3788CC8- ELC-HINGE 4.5x4.5 QC 26D & wire power transfer hinge	n/a	fixed to item at 207A door	N	wired into room 207 access control, door contact, electrified lockset and power transfer hinge, tied to break glass and intrusion zone-

208	Classroom 208	Y	CL3390S-NZD- CL6-Z4DC- M92-626 (24 volts)	DC 6210 x M54 x 689	Corbin cyl 8027	Break Glass SDC- 491/custom	n/a	(1078) 1" press fit	McKinney with Stanley prep- T443786CCB- ELC-HINGE 4.5x4.5 OC 26D 8 wire power transfer hinge	n/a	0E- 1GANGCHIM (WBOX) Technologies	N	Lockset has built in request to exit switch- access control head end in WH 232.
215	Women's 215	N	Rockwood Push Plate 73C 626-H, Rockwood pull plate-106-70C- 626	DC 6210 x M54 x 689	8027								Deadbolt- Corbin Russwin DL4117 Classroom E6090 series, 626 finish
220-1	office	N	CL3351 x NZD x 626		8027								
220-2	office	N	CL3351 x NZD x 626		8027								
220-2	office	N	CL3351 x NZD x 626		8027								
220-4	storage	N	CL3357WZDX 626		8027								
220-5	office	N	CL3351 x NZD x 626		8027								
220-6	storage	N	CL3357WZDX 626		8027								
220-7	office	N	CL3351 x NZD x 626		8027								
220-8	office	N	CL3351 x NZD x 626		8027								
220-9	office	N	CL3351 x NZD x 626		8027								
220-10	office	N	CL3351 x NZD x 626		8027								
220-11	office	N	CL3351 x NZD x 626		8027								
220-12	office	N	CL3351 x NZD x 626		8027								
220-13	storage	N	CL3357WZDX 626		8027								
220-14	storage	N	CL3357WZDX 626		8027								
220-15	office	N	CL3351 x NZD x 626		8027								
220-16	office	N	CL3351 x NZD x 626		8027								
220-17	office	N	CL3351 x NZD x 626		8027								
220-18	office	N	CL3351 x NZD x 626		8027								

220-19	office	N	CL3351 x NZD x 626	8027																					
220-20	office	N	CL3351 x NZD x 626	8027																					
220-21	office	N	CL3351 x NZD x 626	8027																					
220-22	office	N	CL3351 x NZD x 626	8027																					
220-23	office	N	CL3351 x NZD x 626	8027																					
220-24	office	N	CL3351 x NZD x 626	8027																					
220-25	office	N	CL3351 x NZD x 626	8027																					
220-27	corridor into 220 office suites	N	CL3310 x NZDX626																						
220-29	corridor into 220 office suites	N	CL3310 x NZDX626																						
221B	office 221B	N	CL3351 x NZD x 626	8027																					
221C	Office suite 221 hall door	N	CL3351 x NZD x 626	8027																					
222	office 222-hall door	N	CL3351 x NZD x 626	8027																					
223	office 223-hall door	N	CL3351 x NZD x 626	8027																					
224	Nursing Lab	Y	Corbin exit ED5200- N9905-MELR- arm 6670-3- M54-M92-630 (hand confirmed per Norton switch door)	Corbin cyl 2080-058-626	Break Glass SDC- 491/custom	Softwarehou se RM2L-P126 (*INDALA)	n/a																		
225A	Nursing Lab	Y	Corbin exit ED5200- N9905-MELR- arm 6670-3- M54-M92-630 (hand confirmed per Norton switch door)	Corbin cyl 2080-058-626	Break Glass SDC- 491/custom	Softwarehou se RM2L-P126 (*INDALA)	n/a																		
225B	Nursing Lab	N	CL3351 x NZD x 626	8027																					
226	Nursing Lab	Y	Corbin exit ED5200- N9905-MELR- arm 6670-3- M54-M92-630 (hand confirmed per Norton switch door)	Corbin cyl 2080-058-626	Break Glass SDC- 491/custom	Softwarehou se RM2L-P126 (*INDALA)	n/a																		
227	Storage	N	CL3351 x NZD x 626	8027																					

226A	Nursing Lab	N	CL3351 x NZD x 626	8027	Break Glass SDC-491/custom	Softwarehouse e RMZL-P126 (*INDALA)	n/a	(1078) 1" PRESS FIT	McKinney with Stanley prep-T443788CC8-ELC-HINGE 4L5K4.3 QC 26D 8 wire power transfer hinge	n/a	0E-IGANGCHIM (WBOX Technologies	wired into room 228 access control, door contact, electrified lockset and power transfer hinge, ties to break glass and intrusion zone	
228B	Nursing Lab	Y	CL33905-NZD-CL6-24DC-M92-626 (24 volts) Rockwood Push Plate 73C 626-H, Rockwood pull plate-106-70C-626	8027	Break Glass SDC-491/custom	Softwarehouse e RMZL-P126 (*INDALA)	n/a	(1078) 1" PRESS FIT	McKinney with Stanley prep-T443788CC8-ELC-HINGE 4L5K4.3 QC 26D 8 wire power transfer hinge	n/a	0E-IGANGCHIM (WBOX Technologies	wired into room 228 access control, door contact, electrified lockset and power transfer hinge, ties to break glass and intrusion zone	
230	Men's 230	N	DC 6210 x M54 x 689 Norton DO 6070D-689, Norton ext arm 6670-3-M54-M92-630 (hand confirmed per door)	8027	Break Glass SDC-491/custom	Softwarehouse e RMZL-P126 (*INDALA)	n/a	(1078) 1" press CEPT	Securtron EL-CEPT	n/a	0E-IGANGCHIM (WBOX Technologies	Deadbolt- Corbin Russwin DL4117 Classroom E6090 series, 626 finish	Lockset has built in request to exit switch-access control head end in WH 232. ADA opener push/pull to be coordinated with openings. Door closers mounted on inside of doors.
231	classroom 231	Y	DC 6210 x M54 x 689 Norton DO 6070D-689, Norton ext arm 6670-3-M54-M92-630 (hand confirmed per door)	8027	Break Glass SDC-491/custom	Softwarehouse e RMZL-P126 (*INDALA)	n/a	(1078) 1" press CEPT	Securtron EL-CEPT	n/a	0E-IGANGCHIM (WBOX Technologies	Deadbolt- Corbin Russwin DL4117 Classroom E6090 series, 626 finish	Lockset has built in request to exit switch-access control head end in WH 232. ADA opener push/pull to be coordinated with openings. Door closers mounted on inside of doors.

Door Number	Description/Material	Access Control (Y/N)	Lockset	Door Closer	Cylinder	Special Hardware Options	Card Reader	Power Supply	Door Contact	Hinge/Power Transfer	Toggle switch/button	Audible Device/Horn	Duress Device	Description of door operation
301	Classroom 301	Y		Norton DO 6070D-689, Norton ext arm 6670-3-N9905-MELR-6700-M54-M92-00520578 630 (hand confirmed switch per door)	Corbin cyl 2080-058-626	Break Glass SDC-491/custom	Softwareho use RM2L-P126 (**INDALA)	n/a	(1078) 1" press fit	Securitron EL-CEPT	n/a	0E-IGANGCHIM (WBOX) Technologies	N	Lockset has built in request to exit switch-access control head end in WH 232. ADA opener push/pull to be coordinated with openings. Door closers mounted on inside of doors.
310	IDF 310	existing	Rockwood Push Plate 73C-626-H, Rockwood pull plate 106-70C-626											
311	Women's 311	N		DC 6210 x M54 x 689	8027									Deadbolt- Corbin Russwin DL4117 Classroom E6090 series, 626 finish
314B	Classroom 314B	Y		Norton DO 6070D-689, Norton ext arm 6670-3-N9905-MELR-6700-M54-M92-00520578 630 (hand confirmed switch per door)	Corbin cyl 2080-058-626	Break Glass SDC-491/custom	Softwareho use RM2L-P126 (**INDALA)	n/a	(1078) 1" press fit	Securitron EL-CEPT	n/a	0E-IGANGCHIM (WBOX) Technologies	N	Lockset has built in request to exit switch-access control head end in WH 232. ADA opener push/pull to be coordinated with openings. Door closers mounted on inside of doors..

325	325 Office suite hall door	Y			Corbin exit ED5200- N9905- MELR- M54-M92- 630 (hand confirmed per door)	Norton DO 6070- 689, Norton ext arm 6670-3- 689 (41- 6700- 00520578) Norton switch 505	Corbin cyl 2080-058- 626	Break Glass SDC- 491/custom	Softwareho use RM2L- P126 (*INDALA)	n/a			(1078) 1" press fit CEPT	Securatron EL- n/a	IGANGCHIM (WBOX Technologies	0E- IGANGCHIM (WBOX Technologies	N	Lockset has built in request to exit switch-access control head end in WH 232. ADA opener push/pull to be coordinated with openings. Door closers mounted on inside of doors.
325A	office 325A	N			CL3351 x NZD x 626		8027											
325B	office 325B	N			CL3351 x NZD x 626		8027											
325C	office 325C	N			CL3351 x NZD x 626		8027											
325D	office 325D	N			CL3351 x NZD x 626		8027											
328	Men's 328	N			Rockwood Push Plate 73C-626- H, Rockwood pull plate 106-70C- 626	DC 6210 x M54 x 689	8027											Deadbolt- Corbin Russwin DL4117 Classroom E6090 series, 626 finish
329	239 office suite hall door	Y			Corbin exit ED5200- N9905- MELR- M54-M92- 630 (hand confirmed per door)	Norton DO 6070D- 689, Norton ext arm 6670-3- 689 (41- 6700- 00520578) Norton switch 505	Corbin cyl 2080-058- 626	Break Glass SDC- 491/custom	Softwareho use RM2L- P126 (*INDALA)	n/a								Lockset has built in request to exit switch-access control head end in WH 232. ADA opener push/pull to be coordinated with openings. Door closers mounted on inside of doors..

SECTION 088000 - GLAZING

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. Glass for interior windows.
 - 2. Glazing sealants and accessories.
- B. Related Requirements:
 - 1. Section 088813 "Fire-Resistant Glazing."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
 - 1. Tempered glass.

- C. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass.
- B. Product Test Reports: For coated glass, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - 2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.

3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

1.11 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. AGC Glass Company North America, Inc.
 2. Guardian Glass.
 3. Pilkington North America.

- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
 - 1. Obtain tinted glass from single source from single manufacturer.
 - 2. Obtain reflective-coated glass from single source from single manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
 - 1. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Glazing Manual."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

- C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Ultraclear Float Glass: ASTM C 1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent.
- C. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 MONOLITHIC GLASS SCHEDULE

- A. Glass Type : Clear fully tempered float glass.
 - 1. Minimum Thickness: 6 mm.
 - 2. Safety glazing required.

END OF SECTION 088000

SECTION 088813 - FIRE-RESISTANT GLAZING

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. Fire-protection-rated glazing.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of glass and glazing product, from manufacturer.
- B. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during the remainder of the construction period.

1.10 WARRANTY

- A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Glazing Manual."
- B. Safety Glazing Labeling: Permanently mark glazing with certification label of the Safety Glazing Certification Council. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.4 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Ultraclear Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.
- C. Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.
- B. Fire-Protection-Rated Tempered Glass: ¼" thickness, fire-protection-rated tempered glass; and complying with 16 CFR 1201, Category II.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. AGC Glass Company North America, Inc.
 - b. SAFTI FIRST Fire Rated Glazing Solutions.
 - c. Technical Glass Products.
 - d. Vetrotech Saint-Gobain.

2.6 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Dow Corning Corporation.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Tremco Incorporated.
 2. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- D. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

- B. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- C. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.

- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial washaway from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.

- D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 FIRE-PROTECTION-RATED GLAZING SCHEDULE

- A. Glass Type : 20-minute fire-protection-rated glazing with hose-stream test; safety filmed wire glass.

END OF SECTION 088813

SECTION 089119 - FIXED LOUVERS

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. Fixed formed-metal louvers.

B. Related Requirements:

- 1. Section 081113 "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.
- 2. Section 081416 "Flush Wood Doors" for louvers in flush wood doors.
- 3. Section 099123 "Interior Painting" for field painting interior louvers.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

- 1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
- 2. Show mullion profiles and locations.

C. Samples: For each type of metal finish required.

- D. Delegated-Design Submittal: For louvers indicated to comply with structural and seismic performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- B. Sample Warranties: For manufacturer's special warranties.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M.
 - 2. AWS D1.3/D1.3M.
 - 3. AWS D1.6/D1.6M.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural and seismic performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
- C. Seismic Performance: As indicated on drawings.
- D. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Component Importance Factor: 1.0.
- E. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- G. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED FORMED-METAL LOUVERS

- A. Horizontal Nondrainable-Blade Louver:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Airolite Company, LLC (The).
 - b. Ruskin Company.
 - c. Vent Products Co., Inc.
 - 2. Louver Depth: 4 inches (100 mm).
 - 3. Blade Profile: Blade with center baffle.
 - 4. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, not less than 0.052 inch (1.32 mm) for frames and 0.040 inch (1.02 mm) for blades.
 - 5. Mullion Type: Exposed.
 - 6. Louver Performance Ratings:

- a. Free Area: Not less than 55 percent net-free opening.

2.4 MATERIALS

- A. Galvanized-Steel Sheet: ASTM A 653/A 653M, G60 (Z180) zinc coating, mill phosphatized.
- B. Fasteners: Use types and sizes to suit unit installation conditions.
 1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
 2. For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless-steel fasteners.
 3. For color-finished louvers, use fasteners with heads that match color of louvers.
- C. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E 488/E 488M conducted by a qualified testing agency.

2.5 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 1. Frame Type: Interior flange unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.6 GALVANIZED-STEEL SHEET FINISHES

- A. Finish louvers after assembly.
- B. Surface Preparation: Clean surfaces with nonpetroleum solvent, so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair according to ASTM A 780/A 780M.

- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 2 mils (0.05 mm).
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089119

SECTION 090190.52 - MAINTENANCE REPAINTING

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 maintenance repainting as follows:
 - 1. Removing existing paint.
 - 2. Patching substrates.
 - 3. Repainting, including staining and varnishing of wood.
- B. Related Requirements:
 - 1. "Section 099123 "Interior Painting," Section 099300 "Staining and Transparent Finishing," for Paint materials and systems for new construction.
 - 2. Wood Stains and Transparent Finishes

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.
- H. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).
- I. Medium-Pressure Spray: 400 to 800 psi (2750 to 5510 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).

1.4 SEQUENCING AND SCHEDULING

- A. Perform maintenance repainting in the following sequence, which includes work specified in this and other Sections:
1. Dismantle existing surface-mounted objects and hardware except items indicated to remain in place. Tag items with location identification and protect.
 2. Verify that temporary protections have been installed.
 3. Examine condition of surfaces to be painted.
 4. Remove existing paint to the degree required for each substrate and surface condition of existing paint.
 5. Apply paint system.
 6. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include recommendations for product application and use.
 2. Include test data substantiating that products comply with requirements.
- B. Samples: For each type of paint system and each pattern, color, and gloss; minimum 6 inches (150 mm) long in least dimension, but not less than whole pattern.
1. Include stepped Samples defining each separate coat, including fillers and primers. Resubmit until each required sheen, color, and texture is achieved.
 2. For each painted color being matched to a standardized color-coding system, include the color chips from the color-coding-system company with Samples.
 3. Include a list of materials for each coat of each Sample.
 4. Label each Sample for location and application.
 5. Sample Size:
 - a. Painted Surfaces: 4-by-8-inch (100-by-200-mm) Samples for each color and material, on hardboard.
 - b. Stained or Natural Wood: 12-by-12-inch (300-by-300-mm) Samples of natural- or stained-wood finish, on representative surfaces.
- C. Product List: For each paint 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 MPI-product category specified in paint systems, with the proposed product highlighted.
 3. VOC content.

1.6 INFORMATIONAL SUBMITTALS

- A. Color Matching Certificate: For computer-matched colors.

- B. Preconstruction Test Reports: For cleaning materials, paint removers and paint coatings and systems.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra paint materials, from the same production run, that match products applied and that are packaged with protective covering for storage and identified with labels describing contents, including material, finish, source, and location on building.
 - 1. Quantity: Furnish Owner with an additional 5 percent, but not less than 1 gal. (3.8 L) or one case, as appropriate, of each material and color applied.

1.8 QUALITY ASSURANCE

- A. Color Matching: Custom computer-match paint colors to colors indicated on Drawings.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing of cleaning materials, paint removers and compatibility of paint coatings and systems for each indicated type of painted surface.
 - 1. Use test areas as indicated and representative of proposed materials and existing construction.
 - 2. Propose changes to materials and methods to suit Project.

1.10 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 (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste daily.

1.11 FIELD CONDITIONS

- A. Weather Limitations: Proceed with maintenance repainting only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.
- B. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- C. Do not apply paint in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer for surface preparation and during paint application and drying periods.

PART 2 - PRODUCTS

2.1 PREPARATORY CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F (60 to 71 deg C).
- C. Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent that contains no ammonia, 5 quarts (5 L) of 5 percent sodium hypochlorite bleach, and 15 quarts (15 L) of warm water for every 5 gal. (20 L) of solution required.
- D. Mildewcide: Commercial proprietary mildewcide or a job-mixed solution prepared by mixing 1/3 cup (80 mL) of household detergent that contains no ammonia, 1 quart (1 L) of 5 percent sodium hypochlorite bleach, and 3 quarts (3 L) of warm water.
- E. Abrasives for Ferrous Metal Cleaning: Aluminum oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.
- F. Rust Remover: Manufacturer's standard phosphoric acid-based gel formulation, also called "naval jelly," for removing corrosion from iron and steel.

2.2 PAINT REMOVERS

- A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methylene chloride.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. American Building Restoration Products, Inc.
 - b. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
 - c. EaCo Chem, Inc.
- B. Covered or Skin-Forming Alkaline Paint Remover: Manufacturer's standard covered or skin-forming alkaline paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methylene chloride.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. American Building Restoration Products, Inc.
 - b. Dumond Chemicals, Inc.
- C. Solvent-Type Paste Paint Remover: Manufacturer's standard water-rinsable, solvent-type paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
 - b. PROSOCO, Inc.
 - c. Shore Corporation.
- D. Low-Odor, Solvent-Type Paste Paint Remover: Manufacturer's standard low-odor, water-rinsable, solvent-type paste, gel, or foamed emulsion formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methanol or methylene chloride.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. American Building Restoration Products, Inc.
 - b. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
 - c. PROSOCO, Inc.
- E. Covered, Solvent-Type Paste Paint Remover: Manufacturer's standard, low-odor, covered, water-rinsable, solvent-type paste or gel formulation for removing paint from masonry, stone, wood, plaster, or metal as required to suit Project; and containing no methanol or methylene chloride.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Dumond Chemicals, Inc.
 - b. PROSOCO, Inc.

2.3 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. Colors: As selected by Architect from full range of industry colors.

2.4 PAINT MATERIALS, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Transition Coat: Paint manufacturer's recommended coating for use where a residual existing coating is incompatible with the paint system.

2.5 PAINT MATERIAL MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Benjamin Moore & Co.
2. Coronado Paint; Benjamin Moore Company.
3. Insl-X Products; Benjamin Moore & Co.

2.6 PAINT MATERIALS

A. Primers and Sealers:

1. Primer Sealer, Latex, Interior: MPI #50.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
2. Primer, Latex, for Interior Wood: MPI #39.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
3. Primer Sealer, Alkyd, Interior: MPI #45.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
4. Stain, Semi-Transparent, for Interior Wood: MPI #90.

- a. Basis-of-Design Product: PPG Pittsburgh Paints.
- B. Metal Primers:
 - 1. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
 - 2. Primer, Rust-Inhibitive, Water Based: MPI #107.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
 - 3. Primer, Epoxy, Anti-Corrosive, for Metal: MPI #101.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
- C. Water-Based Paints:
 - 1. Latex, Interior, Institutional Low Odor/VOC (Gloss Level 3): MPI #145.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
 - 2. Latex, Interior, Institutional Low Odor/VOC, Semigloss (Gloss Level 5): MPI #147.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
- D. Solvent-Based Paints:
 - 1. Alkyd, Interior, (Gloss Level 3): MPI #51.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.
 - 2. Alkyd, Interior, Semigloss (Gloss Level 5): MPI #47.
 - a. Basis-of-Design Product: PPG Pittsburgh Paints.

2.7 PATCHING MATERIALS

- A. Wood-Patching Compound: Two-part, epoxy-resin, wood-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of wood repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be designed for filling voids in damaged wood materials that have deteriorated from weathering and decay. Compound shall be capable of filling deep holes and spreading to feather edge.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Abatron, Inc.
 - b. Polymeric Systems, Inc.

- c. Protective Coating Company.
- B. Metal-Patching Compound: Two-part, polyester-resin, metal-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of metal repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be produced for filling metal that has deteriorated from corrosion. Filler shall be capable of filling deep holes and spreading to feather edge.
- C. Cementitious Patching Compounds: Cementitious patching compounds and repair materials specifically manufactured for filling cementitious substrates and for sanding or tooling prior to repainting; formulation as recommended in writing by manufacturer for type of cementitious substrate indicated, exposure to weather and traffic, the detail of work, and site conditions.
- D. Gypsum-Plaster Patching Compound: Finish coat plaster and bonding compound according to ASTM C 842 and manufacturer's written instructions.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
1. Cover adjacent surfaces with materials that are proven to resist chemical solutions being used unless the solutions will not damage adjacent surfaces. Use protective materials that are UV resistant and waterproof. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 2. Do not apply chemical solutions during winds of sufficient force to spread them to unprotected surfaces.
 3. Neutralize and collect alkaline and acid wastes before disposal.
 4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.2 MAINTENANCE REPAINTING, GENERAL

- A. Maintenance Repainting Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at 10 feet (3 m) away from painted surface.
- B. Execution of the Work: In repainting surfaces, disturb them as minimally as possible and as follows:

1. Remove failed coatings and corrosion and repaint.
 2. Verify that substrate surface conditions are suitable for repainting.
 3. Allow other trades to repair items in place before repainting.
- C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use gentle methods, such as scraping and lightly hand sanding, that will not abrade softer substrates, reducing clarity of detail.
- D. Heat Processes: Do not use torches, heat guns, or heat plates.

3.3 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of painting work. Comply with paint manufacturer's written instructions for inspection.
- B. Maximum Moisture Content of Substrates: Do not begin application of coatings unless moisture content of exposed surface is below the maximum value recommended in writing by paint manufacturer and not greater than the following maximum values when measured with an electronic moisture meter appropriate to the substrate material:
1. Concrete: 12 percent.
 2. Gypsum Board: 12 percent.
 3. Gypsum Plaster: 12 percent.
 4. Masonry (Clay and CMU): 12 percent.
 5. Portland Cement Plaster: 12 percent.
 6. Wood: 15 percent.
- C. Alkalinity: Do not begin application of coatings unless surface alkalinity is within range recommended in writing by paint manufacturer. Conduct alkali testing with litmus paper on exposed plaster, cementitious, and masonry surfaces.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
1. If existing surfaces cannot be prepared to an acceptable condition for proper finishing by using specified surface-preparation methods, notify Architect in writing.
- E. 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.

3.4 PREPARATORY CLEANING

- A. General: Use the gentlest, appropriate method necessary to clean surfaces in preparation for painting. Clean all surfaces, corners, contours, and interstices.

- B. Detergent Cleaning: Wash surfaces by hand using clean rags, sponges, and bristle brushes. Scrub surface with detergent solution and bristle brush until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet. Rinse with water applied by clean rags or sponges.
- C. Solvent Cleaning: Use solvent cleaning to remove oil, grease, smoke, tar, and asphalt from painted or unpainted surfaces before other preparation work. Wipe surfaces with solvent using clean rags and sponges. If necessary, spot-solvent cleaning may be employed just prior to commencement of paint application, provided enough time is allowed for complete evaporation. Use clean solvent and clean rags for the final wash to ensure that all foreign materials have been removed. Do not use solvents, including primer thinner and turpentine, that leave residue.
- D. Mildew: Clean off existing mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. Rinse with water applied by clean rags or sponges.
- E. Chemical Rust Removal:
 - 1. Remove loose rust scale with specified abrasives for ferrous-metal cleaning.
 - 2. Apply rust remover with brushes or as recommended in writing by manufacturer.
 - 3. Allow rust remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing. Do not allow extended dwell time.
 - 4. Wipe off residue with mineral spirits and either steel wool or soft rags, or clean with method recommended in writing by manufacturer to remove residue.
 - 5. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 - 6. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.
- F. Mechanical Rust Removal:
 - 1. Remove rust with specified abrasives for ferrous-metal cleaning. Clean to bright metal.
 - 2. Wipe off residue with mineral spirits and either steel wool or soft rags.
 - 3. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 - 4. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.

3.5 PAINT REMOVAL

- A. General: Remove paint where indicated. Where cleaning methods have been attempted and further removal of the paint is required because of incompatible or unsatisfactory surfaces for repainting, remove paint to extent required by conditions.
 - 1. Application: Apply paint removers according to paint-remover manufacturer's written instructions. Do not allow paint removers to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.
 - a. Apply materials to all surfaces, corners, contours, and interstices, to provide a uniform final appearance without streaks.

- b. After work is complete, remove protection no longer required. Remove tape and adhesive marks.
 2. Brushes: Use brushes that are resistant to chemicals being used.
 - a. Metal Substrates: If using wire brushes on metal, use brushes of same metal composition as metal being treated.
 - b. Wood Substrates: Do not use wire brushes.
 3. Spray Equipment: Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that spray methods do not damage surfaces.
 - a. Equip units with pressure gages.
 - b. Unless otherwise indicated, hold spray nozzle at least 6 inches (150 mm) from surface and apply material in horizontal, back-and-forth sweeping motion, overlapping previous strokes to produce uniform coverage.
 - c. For chemical spray application, use low-pressure tank or chemical pump suitable for chemical indicated, equipped with nozzle having a cone-shaped spray.
 - d. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
 - e. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F (60 and 71 deg C) at flow rates indicated.
- B. Paint Removal with Hand Tools: Remove paint manually using hand-held scrapers, wire brushes, sandpaper, and metallic wool as appropriate for the substrate material.
- C. Paint Removal with Alkaline Paste Paint Remover:
 1. Remove loose and peeling paint using water, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted surface with brushes.
 3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 4. Rinse with cold water applied by low-pressure spray to remove chemicals and paint residue.
 5. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
 6. Repeat process if necessary to remove all paint.
- D. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
 1. Remove loose and peeling paint using water, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted surface with brushes or as recommended in writing by manufacturer.
 3. Apply cover according to manufacturer's written instructions.
 4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
 5. Scrape off paint and remover.

6. Rinse with cold water applied by low-pressure spray to remove chemicals and paint residue.
7. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
8. For spots of remaining paint, apply alkaline paste paint remover according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph.

E. Paint Removal with Solvent-Type Paste Paint Remover:

1. Remove loose and peeling paint using water, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
2. Apply thick coating of paint remover to dry, painted surface with natural-fiber cleaning brush, deep-nap roller, or large paintbrush. Apply in one or two coats according to manufacturer's written instructions.
3. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
4. Rinse with cold water applied by low-pressure spray to remove chemicals and paint residue.
5. Use mechanical methods recommended in writing by manufacturer to remove chemicals and paint residue.
6. Repeat process if necessary to remove all paint.

F. Paint Removal with Covered, Solvent-Type Paste Paint Remover:

1. Remove loose and peeling paint using water, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
2. Apply paint remover to dry, painted surface with natural-fiber cleaning brush, deep-nap roller, or large paint brush or as recommended in writing by manufacturer.
3. Apply cover according to manufacturer's written instructions.
4. Allow paint remover to remain on surface for period recommended in writing by manufacturer or as determined by preconstruction testing.
5. Scrape off paint and remover.
6. Rinse with cold water applied by low-pressure spray to remove chemicals and paint residue.
7. Use mechanical methods recommended in writing by manufacturer to remove remaining chemicals and paint residue.

3.6 SUBSTRATE REPAIR

A. General: Repair substrate surface defects that are inconsistent with the surface appearance of adjacent materials and finishes.

B. Wood Substrate:

1. Repair wood defects including dents and gouges more than 1/8 inch (3 mm) in size and all holes and cracks by filling with wood-patching compound and sanding smooth. Reset or remove protruding fasteners.
2. Where existing paint is allowed to remain, sand irregular buildup of paint, runs, and sags to achieve a uniformly smooth surface.

C. Cementitious Material Substrate:

1. General: Repair defects including dents and chips more than 1/4 inch (6 mm) in size and all holes and cracks by filling with cementitious patching compound and sanding smooth. Remove protruding fasteners.
2. New and Bare Plaster: Neutralize surface of plaster with mild acid solution as recommended in writing by paint manufacturer. In lieu of acid neutralization, follow manufacturer's written instruction for primer or transition coat over alkaline plaster surfaces.
3. Concrete, Cement Plaster, and Other Cementitious Products: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. If surfaces are too alkaline to paint, correct this condition before painting.

D. Gypsum-Plaster and Gypsum-Board Substrates:

1. Repair defects including dents and chips more than 1/4 inch (6 mm) in size and all holes and cracks by filling with gypsum-plaster patching compound and sanding smooth. Remove protruding fasteners.
2. Rout out surface cracks to remove loose, unsound material; fill with patching compound and sand smooth.

E. Metal Substrate:

1. Preparation: Treat repair locations by wire-brushing and solvent cleaning. Use chemical or mechanical rust removal method to clean off rust.
2. Defects in Metal Surfaces: Repair non-load-bearing defects in existing metal surfaces, including dents and gouges more than 1/8 inch (3 mm) deep or 1/2 inch (13 mm) across and all holes and cracks by filling with metal-patching compound and sanding smooth. Remove burrs and protruding fasteners.
3. Priming: Prime iron and steel surfaces immediately after repair to prevent flash rusting. Stripe paint corners, crevices, bolts, welds, and sharp edges. Apply two coats to surfaces that are inaccessible after completion of the Work.

3.7 PAINT APPLICATION, GENERAL

- A. Comply with manufacturers' written instructions for application methods unless otherwise indicated in this Section.
- B. Prepare surfaces to be painted according to the Surface-Preparation Schedule and with manufacturer's written instructions for each substrate condition.
- C. Apply a transition coat over incompatible existing coatings.
- D. Metal Substrate: Stripe paint corners, crevices, bolts, welds, and sharp edges before applying full coat. Apply two coats to surfaces that are inaccessible after completion of the Work. Tint stripe coat different than the main coating and apply with brush.

- E. Blending Painted Surfaces: When painting new substrates patched into existing surfaces or touching up missing or damaged finishes, apply coating system specified for the specific substrate. Apply final finish coat over entire surface from edge to edge and corner to corner.

3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage paint-remover manufacturer's factory-authorized service representative for consultation and Project-site inspection and to provide on-site assistance when requested by Architect.
- B. Paint Material Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for composition and dry film thickness.
 - 1. Paint Composition: The following procedure may be performed at any time and as often as Owner deems necessary during the period when paints are being applied:
 - a. Testing agency will sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - b. Testing agency will perform tests for compliance of paint materials with product requirements.
 - c. 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. Remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.
 - 2. Dry Film Thickness:
 - a. Contractor shall touch up and restore painted surfaces damaged by testing.
 - b. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.9 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.

3.10 SURFACE-PREPARATION SCHEDULE

- A. General: Before painting, prepare surfaces for painting according to applicable requirements specified in this schedule.
 - 1. Examine surfaces to evaluate each surface condition according to paragraphs below.
 - 2. Where existing degree of soiling prevents examination, preclean surface and allow it to dry before making an evaluation.
 - 3. Repair substrate defects according to "Substrate Repair" Article.
- B. Surface Preparation for MPI DSD 0 Degree of Surface Degradation:
 - 1. Surface Condition: Existing paint film in good condition and tightly adhered.
 - 2. Paint Removal: Not required.
 - 3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Roughen or degloss cleaned surfaces to ensure paint adhesion according to paint manufacturer's written instructions.
- C. Surface Preparation for MPI DSD 1 Degree of Surface Degradation:
 - 1. Surface Condition: Paint film cracked or broken but adhered.
 - 2. Paint Removal: Scrape by hand-tool cleaning methods to remove loose paint until only tightly adhered paint remains.
 - 3. Preparation for Painting: Wash surface by detergent cleaning; use other cleaning methods for small areas of bare substrate if required. Roughen, degloss, and sand the cleaned surfaces to ensure paint adhesion and a smooth finish according to paint manufacturer's written instructions.
- D. Surface Preparation for MPI DSD 2 Degree of Surface Degradation:
 - 1. Surface Condition: Paint film loose, flaking, or peeling.
 - 2. Paint Removal: Remove loose, flaking, or peeling paint film by hand-tool or chemical paint-removal methods.
 - 3. Preparation for Painting: Wash surface by detergent cleaning; use solvent cleaning where needed. Use other cleaning methods for small areas of bare substrate if required. Sand surfaces to smooth remaining paint film edges. Prepare bare cleaned surface to be painted according to paint manufacturer's written instructions for substrate construction materials.
- E. Surface Preparation for MPI DSD 3 Degree of Surface Degradation:
 - 1. Surface Condition: Paint film severely deteriorated, surface indicated to have paint completely removed.
 - 2. Paint Removal: Completely remove paint film by hand-tool or chemical paint-removal methods. Remove rust.
 - 3. Preparation for Painting: Prepare bare cleaned surface according to paint manufacturer's written instructions for substrate construction materials.

F. Surface Preparation for MPI DSD 4 Degree of Surface Degradation:

1. Surface Condition: Missing material, small holes and openings, and deteriorated or corroded substrate.
2. Substrate Preparation: Repair, replace, and treat substrate according to "Substrate Repair" Article.
3. Preparation for Painting: Sand substrate surfaces to smooth remaining paint film edges and prepare according to paint manufacturer's written instructions for substrate construction materials. Remove rust.
4. Painting: Paint as required for MPI DSD 2 degree of surface degradation.

3.11 INTERIOR MAINTENANCE REPAINTING SCHEDULE

A. Ferrous Metal Substrates:

1. Latex System: MPI RIN 5.1N system.
 - a. Prime Coat: For MPI DSD 1 degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For MPI DSD 2 degree of surface degradation, spot prime with Primer, Alkyd, Anti-Corrosive for Metal, MPI #79.
 - c. Prime Coat: For MPI DSD 3 degree of surface degradation, fully prime coat with Primer, Rust-Inhibitive, Water Based, MPI #107.
 - d. Intermediate Coat: Latex matching topcoat.
 - e. Topcoat: Latex, interior, semigloss (Gloss Level 5), MPI #54.
 - f. Color: Match existing colors.
2. Alkyd System: MPI RIN 5.1E system.
 - a. Prime Coat: For MPI DSD 1 degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For MPI DSD 2 degree of surface degradation, spot prime with Primer, Alkyd, Anti-Corrosive for Metal, MPI #79.
 - c. Prime Coat: For MPI DSD 3 degree of surface degradation, fully prime coat with Primer, Alkyd, Anti-Corrosive for Metal, MPI #79.
 - d. Intermediate Coat: Alkyd, matching topcoat.
 - e. Topcoat: Alkyd, interior, semigloss (Gloss Level 5), MPI #47.
 - f. Color: Match existing colors.

B. Wood Doors and Moldings:

1. Low-Odor Latex System over Latex Primer: MPI RIN 6.3V system.
 - a. Prime Coat: For MPI DSD 1 degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For MPI DSD 2 degree of surface degradation, spot prime with Primer, Latex, for Interior Wood, MPI #39.
 - c. Prime Coat: For MPI DSD 3 degree of surface degradation, fully prime coat with Primer, Latex, for Interior Wood, MPI #39.
 - d. Intermediate Coat: Latex, interior, matching topcoat.
 - e. Topcoat: Latex, interior, institutional low odor/VOC, semigloss (Gloss Level 5), MPI #147.

- f. Color: Match existing colors.
2. Latex System over Alkyd Primer: MPI RIN 6.3A system.
- a. Prime Coat: For MPI DSD 1 degree of surface degradation, touch up with topcoat.
 - b. Prime Coat: For MPI DSD 2 degree of surface degradation, spot prime with Undercoat, Enamel, Interior, MPI #46.
 - c. Prime Coat: For MPI DSD 3 degree of surface degradation, fully prime coat with Undercoat, Enamel, Interior, MPI #46.
 - d. Intermediate Coat: Latex, interior, matching topcoat.
 - e. Topcoat: Latex, interior, semigloss (Gloss Level 5), MPI #54.
 - f. Color: Match existing colors.

END OF SECTION 090190.52

SECTION 092216 - NON-STRUCTURAL METAL 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. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For embossed steel studs and tracks and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. (239 Pa).

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C 645. Use either steel studs and tracks or embossed steel studs and tracks.
 - 1. Steel Studs and Tracks:
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) CEMCO; California Expanded Metal Products Co.
 - 2) MRI Steel Framing, LLC.
 - 3) Steel Construction Systems.
 - b. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection.
 - c. Depth: As indicated on Drawings.
 - 2. Embossed Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally equivalent to conventional ASTM C 645 steel studs and tracks.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- 1) CEMCO; California Expanded Metal Products Co.
- 2) MarinoWARE.
- 3) SCAFCO Steel Stud Company.

- b. Minimum Base-Metal Thickness: As required by horizontal deflection performance requirements.
- c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch (38-mm) minimum vertical movement.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) ClarkDietrich Building Systems.
 - 2) Fire Trak Corp.
 - 3) SCAFCO Steel Stud Company.
2. Single Long-Leg Track System: ASTM C 645 top track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) CEMCO; California Expanded Metal Products Co.
 - 2) Metal-Lite.
 - 3) Steel Construction Systems.

D. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ClarkDietrich Building Systems.
 - b. SCAFCO Steel Stud Company.
 - c. Steel Construction Systems.

2. Minimum Base-Metal Thickness: 0.0179 inch (0.455 mm).
 3. Depth: As indicated on Drawings.
- E. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: As indicated on Drawings.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch (0.8 mm).
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.
- C. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.367 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 2-1/2 inches (64 mm).
- D. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.0538-inch (1.367-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
 2. Steel Studs and Tracks: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0179 inch (0.455 mm).
 - b. Depth: 1-5/8 inches (41 mm).
 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.
 - a. Minimum Base-Metal Thickness: 0.0179 inch (0.455 mm).
- E. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Armstrong World Industries, Inc.
 - b. Rockfon (Rockwool International).

c. USG Corporation.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
 - 2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
 - 3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

- a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Direct Furring:
1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches (1219 mm) o.c.
 2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
 3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.

6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

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.
 - 2. Tile backing panels.
- B. Related Requirements:
 - 1. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
 - 2. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

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 instructions, 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, 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 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.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Gypsum LLC.
 - c. USG Corporation.
2. Thickness: 5/8 inch (15.9 mm).
3. Long Edges: Tapered.

- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Gypsum LLC.
 - c. USG Corporation.
2. Thickness: 5/8 inch (15.9 mm).
3. Long Edges: Tapered.

2.4 SPECIALTY GYPSUM BOARD

- A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Gypsum LLC.
 - c. USG Corporation.
 2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
 3. Long Edges: Tapered.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CertainTeed Corporation.
 - b. James Hardie Building Products, Inc.
 - c. USG Corporation.
 2. Thickness: 5/8 inch (15.9 mm).
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- 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.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- 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 panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- C. 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.
- D. Form control and expansion joints with space between edges of adjoining gypsum panels.
- E. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- F. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- G. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- H. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
 - 2. Type X: As indicated on Drawings.
- B. Single-Layer Application:
 - 1. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 2. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 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. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. Bullnose Bead: Use at outside corners.
 - 3. LC-Bead: Use at exposed panel edges.
 - 4. U-Bead: Use at exposed panel edges.

- D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 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. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
 - 2. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 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. Ceramic mosaic tile.
2. Glazed wall tile.
3. Tile backing panels.
4. Metal edge strips.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 092900 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile 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 tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Metal edge strips in 6-inch (150-mm) lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as 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.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

1.8 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 tile 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.

1.9 FIELD 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single 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. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Cementitious backer units.
 - 2. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.3 TILE PRODUCTS

A. Ceramic Tile Type CT-1: Factory-mounted unglazed ceramic mosaic tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. American Olean; a division of Dal-Tile Corporation.
 - b. Daltile.
 - c. Lone Star Ceramics; Elgin Butler.
2. Composition: Porcelain.
3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
4. Module Size: 2 by 2 inches (50.8 by 50.8 mm).
5. Thickness: 1/4 inch (6.4 mm).
6. Face: Plain with cushion edges.
7. Surface: Slip resistant, with abrasive admixture.
8. Dynamic Coefficient of Friction: Not less than 0.42.
9. Finish: Mat, clear glaze.
10. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
11. Grout Color: As selected by Architect from manufacturer's full range.
12. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cove: Cove, module size 2 by 1 inch (50.8 by 25.4 mm).
 - b. External Corners for Thinset Mortar Installations: Surface bullnose, module size 2 by 2 inches (50.8 by 50.8 mm).
 - c. Internal Corners: Cove, module size 2 by 1 inch (50.8 by 25.4 mm).
 - d. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from 1/2 to 1/4 inch (12.7 to 6.4 mm) across nominal 4-inch (100-mm) dimension.

B. Ceramic Tile Type CT-3: Glazed wall tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. American Olean; a division of Dal-Tile Corporation.
 - b. Daltile.
 - c. Seneca Tiles, Inc.
2. Module Size: 6 by 6 inches (152 by 152 mm).
3. Face Size Variation: Rectified.
4. Thickness: 5/16 inch (8 mm).

5. Face: Plain with modified square edges or cushion edges.
6. Finish: Bright, opaque glaze.
7. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
8. Grout Color: As selected by Architect from manufacturer's full range.
9. Mounting: Factory, back mounted.
10. Mounting: Pregrouted sheets of tiles are factory assembled and grouted with manufacturer's standard white silicone rubber.
11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
 - b. External Corners for Thinset Mortar Installations: Surface bullnose, same size as adjoining flat tile.
 - c. Internal Corners: Field-buttet square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of 10 according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.
 1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. C-Cure.
 - b. Georgia-Pacific Gypsum LLC.
 - c. USG Corporation.
 2. Thickness: 5/8 inch (15.9 mm).

2.6 SETTING MATERIALS

A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. C-Cure.
 - b. LATICRETE SUPERCAP, LLC.
 - c. Southern Grouts & Mortars, Inc.
2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.7 GROUT MATERIALS

A. Polymer-Modified Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. C-Cure.
 - b. LATICRETE SUPERCAP, LLC.
 - c. Southern Grouts & Mortars, Inc.

2.8 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. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Blanke Corporation.
 - b. Ceramic Tool Company, Inc.
 - c. Schluter Systems L.P.

- C. 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.
- D. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Bonsal American, an Oldcastle company.
 - b. Custom Building Products.
 - c. Southern Grouts & Mortars, Inc.

2.9 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 the Work.
 - 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 concrete substrates for tile floors installed with bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.

- b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 4. 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 adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, 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 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize

the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
2. Glazed Wall Tile: 1/16 inch (1.6 mm).

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

K. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.7 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove 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.

3.8 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.9 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Ceramic Tile Installation: TCNA F113; thinset mortar.
 - a. Ceramic Tile Type: C1.
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: Polymer-modified sanded grout.
- B. Interior Wall Installations, Masonry or Concrete:
 - 1. Ceramic Tile Installation: TCNA W202; thinset mortar.

- a. Ceramic Tile Type: C2.
- b. Thinset Mortar: Modified dry-set mortar.
- c. Grout: Polymer-modified unsanded grout.

C. Interior Wall Installations, Wood or Metal Studs or Furring:

- 1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.
 - a. Ceramic Tile Type: C2.
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: Polymer-modified unsanded grout.

END OF SECTION 093013

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

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 acoustical panels and exposed suspension systems for interior ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

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, 6 inches (150 mm) in size.
- C. Samples for Initial Selection: For components with factory-applied finishes.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch- (150-mm-) square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- (150-mm-) long Samples of each type, finish, and color.
 - 3. Clips: Full-size hold-down, impact, and seismic clips.
- E. Delegated-Design Submittal: For seismic restraints for ceiling systems.
 - 1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension-system members.

2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical panels.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Access panels.
 - e. Perimeter moldings.
7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
8. Minimum Drawing Scale: 1/4 inch = 1 foot (1:48).

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size panels equal to 5 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 5 percent of quantity installed.
3. Hold-Down Clips: Equal to 5 percent of quantity installed.
4. Impact Clips: Equal to 5 percent of quantity installed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.
- B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A according to ASTM E 1264.
 - 2. Smoke-Developed Index: 50 or less.
- D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Armstrong World Industries, Inc.
 2. CertainTeed Corporation.
 3. USG Corporation.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Classification: Provide panels as follows:
1. Type and Form: Type III, mineral base with painted finish; Form 1, nodular.
 2. Pattern: CE (perforated, small holes and lightly textured).
- D. Color: White.
- E. Light Reflectance (LR): Not less than 0.75.
- F. Ceiling Attenuation Class (CAC): Not less than 40.
- G. Noise Reduction Coefficient (NRC): Not less than 0.60.
- H. Edge/Joint Detail: Square.
- I. Thickness: 7/8 inch (22 mm).
- J. Modular Size: 24 by 24 inches (610 by 610 mm).
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Armstrong World Industries, Inc.
 2. CertainTeed Corporation.
 3. USG Corporation.

- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.
- C. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation; with prefinished 9/16-inch- (15-mm-) wide metal caps on flanges.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. End Condition of Cross Runners: Override (stepped) type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Cold-rolled steel or aluminum.
 - 5. Cap Finish: Painted white.

2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B 633, Class SC 1 (mild) service condition.
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316.
 - d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
 - 2. 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 hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- (2.69-mm-) diameter wire.

- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.
- F. Hold-Down Clips: Manufacturer's standard hold-down.
- G. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.
- H. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.
- I. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- J. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Armstrong World Industries, Inc.
 - 2. CertainTeed Corporation.
 - 3. USG Corporation.
- B. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
 - 1. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C 635/C 635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements

for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636/C 636M, seismic design requirements, and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 8. Do not attach hangers to steel deck tabs.
 - 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.

10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 4. Install hold-down and seismic clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
 - a. Hold-Down Clips: Space 24 inches (610 mm) o.c. on all cross runners.
 5. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch (3 mm in 3.6 m), non-cumulative.

- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
 - 1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
 - 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.6 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

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. Thermoset-rubber base.
 - 2. Rubber molding accessories.

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, not less than 12 inches (300 mm) long.
- C. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 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 (10 deg C) or more than 90 deg F (32 deg C).

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following 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 (13 deg C) or more than 95 deg F (35 deg C).
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Flexco.
 - 2. Johnsonite; a Tarkett company.
 - 3. Roppe Corporation, USA.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
 - 1. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient floor coverings.
- C. Thickness: 0.125 inch (3.2 mm).
- D. Height: 4 inches (102 mm).
- E. Lengths: Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.
- F. Outside Corners: Job formed or preformed.
- G. Inside Corners: Job formed or preformed.
- H. Colors: As selected by Architect from Manufacturers standards.

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.
- C. Metal Edge Strips: Extruded aluminum with mill finish, nominal 2 inches (50.8 mm) wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

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 (76 mm) in length.
 - 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 (76 mm) in length.
 - a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 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. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply two coat(s).
- E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE 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:
 - 1. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
 - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples: Full-size units of each color, texture, and pattern of floor tile required.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.
- D. Samples for Initial Selection: For each type of floor tile indicated.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.
- F. Welded-Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch (150-by-230-mm) Sample applied to a rigid backing and prepared by Installer for this Project.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile 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 (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following 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 (13 deg C) or more than 95 deg F (35 deg C).
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, 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.

2.2 VINYL COMPOSITION FLOOR TILE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Armstrong World Industries, Inc.
 2. Johnsonite; a Tarkett company.
 3. Mannington Mills, Inc.
- B. Tile Standard: ASTM F 1066, Class 2, through pattern.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch (3.2 mm).
- E. Size: 12 by 12 inches (305 by 305 mm).
- F. Colors and Patterns: As selected by Architect from Manufacturers standards.

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 floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Seamless-Installation Accessories:
1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - a. Colors: As selected by Architect from manufacturer's full range to contrast with floor tile.
 2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

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 floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- 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 floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- 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 floor tiles 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 floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles 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 welding bead to fuse sections permanently into a seamless flooring installation. Prepare, 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 floor tile.
- B. Perform the following operations immediately after completing floor tile 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 floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coat(s).
- E. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.
- F. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor tile surfaces before applying liquid cleaners, sealers, and finish products.
 - 1. Sealer: Apply two base coats of liquid sealer.
 - 2. Finish: Apply two coats of liquid floor finish.
- G. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096813 - TILE CARPETING

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 modular carpet tile.
- B. Related Requirements:
 - 1. Section 024119 "Selective Demolition" for removing existing floor coverings.
 - 2. Section 096513 "Resilient Base and Accessories" and Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.

5. Pattern of installation.
 6. Pattern type, location, and direction.
 7. Pile direction.
 8. Type, color, and location of insets and borders.
 9. Type, color, and location of edge, transition, and other accessory strips.
 10. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet Tile: Full-size Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.
- D. Samples for Initial Selection: For each type of carpet tile.
1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.
- E. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
1. Carpet Tile: Full-size Sample.
 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.
- F. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
 - B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
 - C. Sample Warranty: For special warranty.
- 1.6 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II or Master II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

1.10 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.

- e. Loss of face fiber.
 - f. Delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Patcraft; Conundrum IO218 or comparable product by one of the following:
- 1. Mannington Mills, Inc.
 - 2. Patcraft; a division of Shaw Industries, Inc.
 - 3. Shaw Contract Group; a Berkshire Hathaway company.
- B. Color: As noted on Room Finish Schedule. "Conundrum #IO218" and "Chess #18361"
- C. Fiber Content: Nylon - 100 percent trilobal, minimum 24 denier per filament DPF nylon 6. Fiber must contain a minimum of 45 percent recycled content 20 percent pre consumer recycled content and 25 percent post consumer recycled content.
- D. Fiber Type: Eco Solution Q Nylon.
- E. Pile Characteristic: Multi-Level Pattern Loop.
- F. Density: 4765.
- G. Pile Thickness: 0.136 inches for finished carpet tile according to ASTM D 6859.
- H. Stitches: 9.5 per inch.
- I. Gage: 1/10 per inch.
- J. Surface Pile Weight: 18 oz./sq. yd..
- K. Primary Backing/Backcoating: Nonwoven synthetic.
- L. Secondary Backing: High performance precoat laminated to a proprietary thermoplastic polyolefin compound with a fiberglass reinforced layer. Backing must contain a minimum of 40 percent recycled content and be SCS NSF 140 Platinum certified. Backing should be recyclable, PVC free, free of 4-PCH, brominated flame retardants, and phthalate plasticizers.
- 1. Total Backing Weight: Not to exceed 80 oz./sq yd (339.1 g/sq m).
- M. Backing System: EcoWorx
- N. Size: 24 by 24 inches (610 by 610 mm).

O. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.
2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:
 - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

P. Performance Characteristics:

1. Critical Radiant Flux Classification, Flooring Radiant Panel ASTM E 648: Not less than 0.45 W/sq. cm.
2. Smoke Density: Less than 450 per ASTM E662.
3. Methanamine Pill Test CPSC FF1-70: Must pass pill test.
4. Tuft Bind: Not less than 8 lbf (36 N) according to ASTM D 1335.
5. Delamination: Not less than 3.5 lbf/in. according to ASTM D 3936.
6. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
7. Dimensional Stability: 0.119 percent or less according to ISO 2551 (Aachen Test).
8. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 129 and AATCC 164.
9. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
10. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.
11. Emissions: Provide carpet tile that complies with testing and product requirements of Carpet & Rug Institute's "Green Label Plus" program.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Metal Subfloors: Verify the following:
 - 1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- E. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.
 - 1. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch (3 mm), protrusions more than 1/32 inch (0.8 mm), and substances that may interfere with adhesive bond or show through surface.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."

- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099113 - EXTERIOR PAINTING

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 surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Galvanized metal.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 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 (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Benjamin Moore & Co.
2. PPG Paints.
3. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 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.

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 the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
 - 1. SSPC-SP 2.
 - 2. SSPC-SP 3.
 - 3. SSPC-SP 7/NACE No. 4.
 - 4. SSPC-SP 11.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. 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 Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Galvanized steel dunnage

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

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 EXTERIOR PAINTING SCHEDULE

A. Galvanized-Metal Substrates:

- 1. Alkyd System MPI EXT 5.3B:
 - a. Prime Coat: Primer, galvanized, cementitious, MPI #26.
 - b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.
 - c. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5), MPI #94.

END OF SECTION 099113

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 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Clay masonry.
 - 2. Concrete masonry units (CMUs).
 - 3. Steel and iron.
 - 4. Galvanized metal.
 - 5. Aluminum (not anodized or otherwise coated).
 - 6. Wood.
 - 7. Gypsum board.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
 - 2. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 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 (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Benjamin Moore & Co.
 2. PPG Paints.
 3. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As indicated in a color schedule.
1. Twenty percent of surface area will be painted with deep tones.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 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.

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 the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Masonry (Clay and CMUs): 12 percent.
 - 2. Wood: 15 percent.
 - 3. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2.

2. SSPC-SP 3.
 3. SSPC-SP 7/NACE No. 4.
 4. SSPC-SP 11.
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Aluminum Substrates: Remove loose surface oxidation.
- I. 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.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
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.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- 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 Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

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. Cement Board Substrates:

- 1. Institutional Low-Odor/VOC Latex System MPI INT 3.3G:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

B. Clay Masonry Substrates:

- 1. Institutional Low-Odor/VOC Latex System MPI INT 4.1M:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

C. CMU Substrates:

- 1. Institutional Low-Odor/VOC Latex System MPI INT 4.2E:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

D. Steel Substrates:

- 1. High-Performance Architectural Latex System MPI INT 5.1R:
 - a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

- c. Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5), MPI #141.
- E. Galvanized-Metal Substrates:
 1. High-Performance Architectural Latex System MPI INT 5.3M:
 - a. Prime Coat: Primer, galvanized, water based, MPI #134.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5), MPI #141.
- F. Wood Substrates: Wood trim.
 1. Institutional Low-Odor/VOC Latex System MPI INT 6.3V:
 - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.
- G. Gypsum Board Substrates:
 1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.

END OF SECTION 099123

SECTION 101423.16 - ROOM-IDENTIFICATION PANEL SIGNAGE

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 room-identification signs that are directly attached to the building.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For room-identification signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, timesteps, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available timesteps and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Room-Identification Signs: Full-size Sample.

2. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
 3. Exposed Accessories: Full-size Sample of each accessory type.
 4. Full-size Samples, if approved, will be returned to Contractor for use in Project.
- E. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer and manufacturer.
 - B. Sample Warranty: For special warranty.
- 1.7 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For signs to include in maintenance manuals.
- 1.8 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Tools: One set(s) of specialty tools for assembling signs and replacing variable sign components.
- 1.9 QUALITY ASSURANCE
- A. Installer Qualifications: Manufacturer of products.
- 1.10 FIELD CONDITIONS
- A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.
- 1.11 WARRANTY
- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.

- c. Separation or delamination of sheet materials and components.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

2.2 ROOM-IDENTIFICATION SIGNS

- A. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ASI Sign Systems, Inc.
 - b. Inpro Corporation.
 - c. Mohawk Sign Systems.
 2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: 0.125 inch (3.18 mm).
 - b. Surface-Applied Graphics: Applied vinyl film.
 - c. Color(s): Match existing WCSU Standards.
 3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Square cut.
 - b. Corner Condition in Elevation: Rounded.
 4. Mounting: Manufacturer's standard method for substrates indicated.
 5. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.

2.3 SIGN MATERIALS

- A. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- B. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as indicated on Drawings.

- C. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened sign unless otherwise indicated.
 - b. Fastener Heads: Use oval countersunk screws and bolts with tamper-resistant Allen-head slots unless otherwise indicated.
 - 3. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
 - b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.
- B. Adhesive: As recommended by sign manufacturer.
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

2.5 PANEL SIGN TYPES

- A. Room Signs:
 - 1. Material: Plastic laminate.
 - 2. Perimeter: Unframed.
 - 3. Copy: Tactile and braille.
 - 4. Character Style: Helvetica.
 - 5. Text: Room numbers as provided by the Owner.
 - 6. Message: Fixed.
 - 7. Sizes:
 - a. Sign: 5 ½ inches x 5 ½ inches
 - b. Character: Minimum 7/8 inch high characters.
 - 8. Colors:
 - a. Character: White
 - b. Background: Brown (match existing)

9. Schedule: Refer to Sign Schedule at end of section.

B. Toilet Room Signs:

1. Material: Plastic laminate.
2. Perimeter: Unframed.
3. Copy: Raised.
4. Character Style: Helvetica.
5. Text: According to requirements in the ADA or of authorities having jurisdiction, whichever are more stringent.
6. International Symbol of Accessibility per Amended Section 703.6.3.1 of ICC/ANSI A117.1/2009.
7. Message: Fixed.
8. Sizes:
 - a. Sign: 8 inch x 8 inch.
 - b. Character: Minimum 7/8 inch high characters.
9. Colors:
 - a. Character: White
 - b. Background: Brown (match existing)
10. Schedule: Refer to Sign Schedule at end of section.

2.6 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

C. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

2.7 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessibility: Install signs in locations on walls as indicated on Drawings and according to the accessibility standard.
- C. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 - 3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
 - 4. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support

weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.2 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

3.3 SIGN SCHEDULE

A. Room Signs:

1. Provide Three-digit Room signs per list provided by Owner.

a. Quantity (120)

2. Provide Toilet Room Signs:

a. Men: Quantity (2)

b. Women: Quantity (2)

END OF SECTION 101423.16

SECTION 102113.19 – SOLID-SURFACE TOILET COMPARTMENTS

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. Solid-surface toilet compartments configured as toilet enclosures, entrance screens and urinal screens.
 - a. Solid-surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

B. Related Requirements:

- 1. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.
- 2. Section 220040 Plumbing Fixtures

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

- 1. Include dimensioned plans, elevations, sections, details, and attachment details.
- 2. Show sample large-scale detail of typical hardware and partition enhancement details to illustrate overall appearance.
- 3. Indicate location of "finished side" of solid surface material on drawings for review and approval by Owner & Architect.
- 4. Show locations of cutouts for compartment-mounted toilet accessories. Coordinate with Architect and accessory supplier to provide sample stall layout for toilet room accessories.
- 5. Show visual example of solid surface color(s) specified.
- 6. Show locations of centerlines of toilet fixtures.
- 7. Show locations of floor drains.

- C. Samples for Initial Selection: For each type of toilet compartment material indicated submit a minimum 2"x2" color sample.
 - 1. Include Samples of hardware and accessories involving material and color selection.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for toilet compartments, prepared on 10-inch- square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.
- E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents and source.
 - 1. Door Hinges: One hinge(s) with associated fasteners.
 - 2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
 - 3. Door Bumper: One bumper(s) with associated fasteners.
 - 4. Door Pull: One door pull(s) with associated fasteners.
 - 5. Fasteners: Ten fasteners of each size and type.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 25 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

C. Performance Characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D638
Tensile Modulus	1.5x10 ⁶ psi	ASTM D638
Tensile Elongation	0.4% min.	ASTM D638
Flexural Strength	10,000 psi	ASTM D790
Flexural Modulus	1.2x10 ⁶ psi	ASTM D790
Hardness	>85 "M" Scale ASTM D785 Barcol Impressor ASTM D2583	Rockwell
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Thermal Expansion	1.80x10 ⁻⁵ in./in./ ⁰ F	ASTM D2583
Gloss (60 ⁰ Gardner)	5-75(matte-highly polished)	ANSI Z124
Light Resistance	(Xenon arc) No effect 3-2000 Method 3.3	NEMA LD
Wear & Cleanability	Passes Z124.6	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes Z124.6	ANSI Z124.3 & Z124.6
Fungus & Bacteria Resistance	Does not support microbial growth	ASTM G21&

G22

Boiling Water Resistance	No visible change 3-2000 Method 3.5	NEMA LD
High Temperature Resistance	No change 3-2000 Method 3.6	NEMA LD
Izod Impact (notched specimen)	0.28 ft.-lbs./in. of notch (Method A)	ASTM D256
Ball Impact Resistance: Sheets 1/4" slab – 36" drop 1/2" slab – 144" drop	No fracture -1/2 lb. ball 3-2000 Method 3.8	NEMA LD
Weatherability	$\Delta E^*_{94} < 5$ in 1,000 hours	ASTM G155
Specific Gravity+	1.7	
Water Absorption 0.4% (3/4") 0.6% (1/2") 0.8% (1/4")	Long-Term	ASTM D570
Toxicity 66 (patterned colors)	99 (Solid colors) Protocol Test ("LC50" Test)	Pittsburg
Flammability (Class I and Class A)	All Colors NFPA 255 & UL 723	ASTM E84

+ Approximate weight per square foot: 1/4" 2.2 lbs.; 1/2" 4.4 lbs. Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories. NEMA results based on the NEMA LD 3-2000.

2.2 SOLID-SURFACE TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. DuPont Corian (basis of design).
 - 2. Gibralter by Wilsonart.
 - 3. Staron by Samsung.
- B. Toilet-Enclosure Style: Floor-Mounted Overhead braced.
- C. Entrance-Screen Style: Floor-Mounted Overhead braced.

- D. Urinal-Screen Style: Wall hung overhead braced.
- E. Door, Panel, Screen, and Pilaster Construction: Solid polymer components: cast, nonporous, filled acrylic polymer, not coated or of composite construction, with through-body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified., not less than 1 inch (25 mm) thick, seamless, with eased edges, no-sightline system.and continuous vertical reinforcement.
1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 2. Superficial damage to a depth of 0.010 inch shall be repairable by sanding and/or polishing.
 3. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
 4. Doors and Partition panels shall be 1" at vertical edges where intersecting with adjacent partition components. Height to be 58" unless specified, some hardware visible from exterior.
 5. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
- F. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- G. Urinal-Screens: Panels shall be 1" thickness, Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.
- H. Brackets (Fittings):
1. Stirrup Type: Ear or U-brackets, stainless steel.
 2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.
1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees. Jacknob 304 stainless steel heavy-duty or approved equal.
 - a. Out-swing doors shall use Sterling Surfaces semi-concealed, continuous, inside-mounted hinge.
 2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless-steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
 3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless-steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
 4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless-steel bumper at out-swinging doors and entrance screen doors. Mount with through-bolts.

5. Door Pull: Manufacturer's heavy-duty cast-stainless-steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible, and additional pull mounted 6" from hinge side, between 26" and 36" above the floor. Mount with through-bolts.
- B. All hardware shall be supplied by fabricator, and shall be integrally mounted into the partitions at the time of manufacture.
- C. Exposed hardware:
 1. All shall be stainless steel type 304, brushed, stamped steel.
 2. Mild steel not acceptable.
- D. Urinal Screens:
 1. Standard: Stainless steel type 304 – all panel-to-wall connections.
 - a. Mild steel is not acceptable.
 2. Premium: no visible mounting hardware is acceptable, concealed only.
- E. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- F. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M).
- C. Brass Castings: ASTM B 584.
- D. Brass Extrusions: ASTM B 455.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless-Steel Castings: ASTM A 743/A 743M.
- G. Zamac: ASTM B 86, commercial zinc-alloy die castings.

2.5 ACCESSORIES

- A. Joint Adhesive: Manufacturer's or Equal one- or two-part adhesive kit to create inconspicuous, nonporous joints.

2.6 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated, in accordance with approved Shop Drawings, Manufacturer's Printed Instructions and Technical Bulletins. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Form joints between components using manufacturer's standard joint adhesive, without conspicuous joints.
 - 1. Provide internal reinforcement. Not allowed: strip of solid polymer material 2" wide as a surface-mounted cleat on large panels.
 - 2. Rout and finish edges with clean, sharp returns.
 - a. Rout cutouts, radii and contours to template.
 - b. Smooth eased 1/16" radiused edges.
 - c. Repair or reject defective or inaccurate work.

2.7 FINISHES

- A. Select color from Manufacturer's standard color chart.
 - 1. DuPont CORIAN (basis of design) – select from full range of available products.
- B. Provide surfaces with a uniform finish.
 - 1. A 4-step random-orbit 60 micron "Matte" finish required on all components (gloss range of 5-20).
 - 2. Darker colors better suited to a 5-step "Satin" (gloss range of 25-30).
- C. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- D. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- E. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb, scribed to adjacent finishes in accordance with approved Shop Drawings and product data. Secure units in position with manufacturer's recommended anchoring devices.
1. Provide product in largest pieces available.
 2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
 - a. Exposed joints/seams shall not be allowed.
 3. Cut and finish component edges with clean, sharp returns.
 4. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 5. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch (13 mm).
 - b. Panels and Walls: 1 inch (25 mm).
 6. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
 7. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
- E. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 REPAIR

- A. Repair or replace damaged work which cannot be repaired, to Architect's satisfaction.

3.4 CLEANING AND PROTECTION

- 1. Keep components clean during installation.
- 2. Remove adhesives, sealants and other stains.

3.5 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.19

SECTION 102800 - TOILET, BATH, AND LAUNDRY 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. Public-use washroom accessories.
 - 2. Underlavatory guards.
- B. Related Requirements:
 - 1. Section 093013 "Ceramic Tiling" for ceramic toilet and bath accessories.

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Include electrical characteristics.
- B. Samples: Full size, for each exposed product and for each finish specified.
 - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, visible silver spoilage defects.
 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.
- B. Grab Bar:
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AJW Architectural Products.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
 2. Mounting: Flanges with concealed fasteners.
 3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.

- a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
 4. Outside Diameter: 1-1/2 inches (38 mm).
 5. Configuration and Length: As indicated on Drawings.
- C. Mirror Unit:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AJW Architectural Products.
 - b. Bobrick Washroom Equipment, Inc.
 - c. Bradley Corporation.
 2. Frame: Stainless-steel channel.
 - a. Corners: Welded and ground smooth.
 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 4. Size: As indicated on Drawings.

2.3 UNDERLAVATORY GUARDS

- A. Underlavatory Guard:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Buckaroos, Inc.
 - b. Plumberex Specialty Products, Inc.
 - c. Truebro by IPS Corporation.
 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
 3. Material and Finish: Antimicrobial, molded plastic, white.

2.4 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.5 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

SECTION 10522 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire protection cabinets for fire extinguishers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Maintenance data.

1.3 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - 1. Sheet: ASTM B 209.
 - 2. Extruded Shapes: ASTM B 221.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

- E. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Available Manufacturers:
 - a. Fire End & Croker Corporation.
 - b. J. L. Industries, Inc., a division of Activar Construction Products Group.
 - c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
 - d. Larsen's Manufacturing Company .
 - e. Modern Metal Products, Division of Technico Inc..
 - f. Moon-American.
 - g. Potter Roemer LLC.
 - h. Watrous Division, American Specialties, Inc..
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Steel sheet.
- D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
 - 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Cabinet Trim Material: Same material and finish as door.
- F. Door Material: **Stainless-steel sheet.**
- G. Door Style: **Fully glazed panel with frame.**
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
 - 3. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Black.
 - 4) Orientation: Vertical.

K. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:
 - a. Interior of cabinet.
2. Stainless Steel: **No. 6.**

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.
- B. Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- F. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10522

SECTION 10523 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and maintenance data.
- C. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire End & Croker Corporation.
 - b. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - c. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - d. Larsen's Manufacturing Company.
 - e. Moon-American.
 - f. Potter Roemer LLC.
 - g. Watrous Division, American Specialities, Inc..
 - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type 4-A:60-B:C: UL-rated **10-lb**> nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 10523

SECTION 122113 - HORIZONTAL LOUVER BLINDS

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. Horizontal louver blinds with aluminum slats.

B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting horizontal louver blinds and accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For horizontal louver blinds, include fabrication and installation details.

C. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long.

D. Samples for Initial Selection: For each type and color of horizontal louver blind.

- 1. Include Samples of accessories involving color selection.

E. Samples for Verification: For each type and color of horizontal louver blind indicated.

- 1. Slat: Not less than 12 inches (300 mm) long.
- 2. Tapes: Full width, not less than 6 inches (150 mm) long.
- 3. Horizontal Louver Blind: Full-size unit, not less than 16 inches (400 mm) wide by 24 inches (600 mm) long.
- 4. Valance: Full-size unit, not less than 12 inches (300 mm) wide.

F. Product Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For horizontal louver blinds with polymer slats that have been tested for compliance with NFPA 701, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Horizontal Louver Blinds: Full-size units equal to 5 percent of quantity installed for each size, color, texture, pattern, and gloss indicated, but no fewer than two units.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. CACO, Inc., Window Fashions.
 2. Hunter Douglas Contract.
 3. Levolor Contract; a Newell Rubbermaid company.
- B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radius corners.
1. Width: 1 inch (25 mm).
 2. Thickness: Not less than 0.006 inch (0.15 mm).
 3. Spacing: Manufacturer's standard.
 4. Finish: Ionized antistatic, dust-repellent, baked polyester finish.
 5. Features:
 - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
- C. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrails fully enclose operating mechanisms on three sides.
1. Capacity: One blind(s) per headrail unless otherwise indicated.
 2. Ends: Capped or plugged.
 3. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within blind full operating range.
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 4. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Tilt: Two-direction, positive stop or lockout limited at an angle of 60 degrees from horizontal, both directions.
 - c. Operator: Clear-plastic wand.
 - d. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
 5. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard.
 6. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard unless otherwise indicated.
 7. Integrated Headrail/Valance: Curved face.

- D. Bottom Rail: Formed-steel or extruded-aluminum tube that secures and protects ends of ladders and lift cords and has plastic- or metal-capped ends.
 - 1. Type: Manufacturer's standard .
- E. Lift Cords: Manufacturer's standard braided cord.
- F. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
 - 1. Type: Braided cord.
- G. Valance: Manufacturer's standard.
- H. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
 - 1. Type: Wall.
 - 2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.
- I. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
- J. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.
- K. Colors, Textures, Patterns, and Gloss:
 - 1. Slats: As selected by Architect from manufacturer's full range.
 - 2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.3 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch (6 mm) per side or 1/2 inch (13 mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.

- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
 - 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Locate so exterior slat edges are not closer than 1 inch (25 mm) from interior faces of glass and not closer than 1/2 inch (13 mm) from interior faces of glazing frames through full operating ranges of blinds.
 - 2. Install mounting and intermediate brackets to prevent deflection of headrails.
 - 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

3.3 ADJUSTING

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

3.4 CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems.

END OF SECTION 122113

SECTION 210500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes pipe, fittings, valves, backflow preventers and connections for sprinkler and standpipe systems.
- B. Related Sections:
 - 1. Section 21 05 16 – Expansion Fittings and Loops for Fire-Suppression Piping.
 - 2. Section 21 05 48 – Vibration and Seismic Controls for Fire-Suppression Piping and Equipment.
 - 3. Section 21 13 13 – Wet-Pipe Sprinkler System.
 - 4. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
 - 2. ASME B16.3 – Malleable Iron Threaded Fittings, Class 150 and 300.
 - 3. ASME B16.4 - Cast Iron Threaded Fittings, Class 125 and 250.
 - 4. ASME B16.5 - Pipe Flanges and Flanged Fittings
 - 5. ASME B16.9 – Factory-made Wrought Steel Butt Welding Fittings.
 - 6. ASME B16.11 - Forged Steel Fittings - Socket-Welding and Threaded.
 - 7. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - 8. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 9. ASME B16.25 – Butt Welding Ends.
 - 10. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.
 - 11. ASME Sec 9 - Welding and Brazing Qualifications.
- B. American Society of Sanitary Engineers:
 - 1. ASSE 1013 – Standard for Reduced Pressure Principal Backflow Preventer
 - 2. ASSE 1015 – Standard for Double Check Backflow Preventer Assembly
 - 3. ASSE 1047 – Standard for Reduced Pressure Detector Backflow Preventer
 - 4. ASSE 1048 – Standard for Double Check Detector Assembly Backflow Preventer.
- C. ASTM International:
 - 1. ASTM A47 – Malleable Iron Castings.
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A135 - Standard Specification for Electric-Resistance-Welded Steel Pipe.
 - 4. ASTM A126 – Standard for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

5. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
 6. ASTM A536 – Standard for Ductile Iron Casting.
 7. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
 8. ASTM B32 - Standard Specification for Solder Metal.
 9. ASTM B75 - Standard Specification for Seamless Copper Tube.
 10. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
 11. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
- D. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
 2. AWS D1.1 - Structural Welding Code - Steel.
 3. AWS D10.9 - Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.
- E. American Water Works Association:
1. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids.
 2. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 3. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 4. AWWA C510 – Standard for Double Check Valve Backflow Prevention Assembly.
 5. AWWA C511 – Standard for Reduced Pressure Principal Backflow Prevention Assembly.
 6. AWWA C606 – Standard for Grooved and Shouldered Joints.
- F. National Fire Protection Association:
1. NFPA 13 - Installation of Sprinkler Systems.
 2. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.
- G. Underwriter Laboratories, Inc.:
1. UL 1887 - Fire Tests of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics.
 2. UL - Fire Resistance Directory.
- H. Factory Mutual:
1. FM - Factory Mutual Approval Guide.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

- C. Product Data: Submit manufacturer's catalogue information. Provide data on valves, and fittings, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- D. Grooved joint couplings and fittings shall be shown on shop drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series designation.
- E. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and all code requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of components and tag numbering.
- C. Operation and Maintenance Data: Submit spare parts lists.

1.5 QUALITY ASSURANCE

- A. Workmanship and Qualifications: All materials and equipment shall be installed in accordance with NFPA and all applicable local codes and ordinances. The Sprinkler Contractor shall be state licensed to install sprinkler systems. The Sprinkler Contractor shall make sure that all work and materials conform to the requirements set forth by this Specification. Fire protection equipment shall be installed to conform to NFPA as applicable, and devices used shall be listed and approved by Underwriters laboratories (UL) and/or Factory Mutual (FM).
- B. Codes and Standards: All work shall be equal or superior to that required by codes, regulations, ordinances, and laws imposed by the jurisdictional authorities, including those of the State of Connecticut, State Fire Marshall, local ordinances and OSHA. Nothing in the Specifications permit violations of such directives, and where conflict occurs, the directive shall govern, except where superior work is specified or indicated.
- C. In addition to complying with the above codes and regulations, comply with the requirements of the following:
 - 1. NFPA Standard 13.
 - 2. NFPA Standard 24.
 - 3. State Building and Fire Codes.
 - 4. Local Jurisdictional Authorities.
- D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
- E. Valves: Bear UL and/or FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.

- F. All items of similar class shall be the products of the same manufacturer. All valves, accessory items, etc., shall be from the same source.
- G. Provide fire sprinkler piping located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with UL 1887.
- H. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum five years documented experience.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver and store valves in shipping containers, with labeling in place.
- C. Furnish cast iron and steel valves with temporary protective coating.
- D. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. All equipment, valves, gages and etc., shall be covered and protected during the execution of the work. All equipment and piping shall be protected from freezing. Labeling to remain in place.
- F. All unloading, hauling, and handling of materials shall be the responsibility of the Sprinkler Contractor.
- G. The Sprinkler Contractor can obtain information on available storage space on site from the Owner when making examination of the site.

1.9 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for basic fire suppression materials and methods.

1.10 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two sets of valve stem packing for each size and type of valve installed.

PART 2 PRODUCTS

2.1 VALVES

- A. Manufacturers:
 - 1. Kennedy Valve Mfg. Co.
 - 2. Victaulic.
 - 3. Stockham.
 - 4. Nibco.
 - 5. Watts.
 - 6. Hammond.
 - 7. Milwaukee.
 - 8. Substitutions: Section 01 26 00 – Substitution Procedures.
- B. Gate Valves:
 - 1. Up to and including 2 inches: Bronze body and trim, 175 lb, cold water non-shock working pressure, rising stem, hand wheel, solid wedge or disc, threaded ends.
 - 2. Over 2 inches: Iron body, bronze trim, 175 lb, cold water non-shock working pressure, rising stem pre-grooved for mounting tamper switch, hand wheel, outside screw and yoke, solid taper bronze or cast iron wedge, grooved or flanged ends.
 - 3. Over 4 inches: Iron body, bronze trim, 175 pound cold water, non-shock working pressure. Valve shall have solid taper wedge; outside screw and yoke, rising stem; flanged bonnet with body and bonnet conforming to ASTM A126 Class B; replaceable bronze wedge facing rings; grooved or flanged ends; and a packing assembly consisting of a cast iron gland flange, brass gland, packing, bonnet and bronze bonnet bushing. Valve shall be capable of being repacked under pressure, with valve wide open.

- C. Globe Valves:
1. Up to and including 2 inches: Class 125, Bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable rubber disc, threaded ends, with back seating capacity, packable under pressure.
 2. Over 2 inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.
- D. Ball Valves:
1. Up to and including 2 inches: Bronze two piece body, standard port, chrome plated brass ball, 316 stainless steel stem, teflon seats brass stem nut, die-cast brass gear box with supervisory switches, threaded or grooved ends.
 2. Over 2 inches: Manufacturers: Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle.
- E. Butterfly Valves:
1. Ductile iron body, ductile iron disc with EPDM disc coating and integrally cast stem, grooved ends.
 2. Cast bronze body, ductile iron disc with EPDM disc coating and integrally cast stem, copper-tubing dimensioned grooved ends.
 3. Cast iron with resilient replaceable EPDM seat, wafer or lug ends, extended neck with 316 stainless steel stem, MSS-SP-67, 200 psi.
 4. Disc: EPDM coated ductile iron or Aluminum bronze.
 5. Operator: Notched plate lever handle. handwheel and weatherproof actuator with supervisory switches.
- F. Check Valves:
1. Up to and including 2 inches: Class 125, Bronze swing disc, screwed ends.
 2. Horizontal Swing Over 2 inches:
 - a. 300 psi CWP, ductile iron body and coupled cap conforming to ASTM A536, Grade 65-45-12; horizontal swing, with stainless steel disc, elastomer seat, and grooved ends.
 - b. Class 175, cast iron body and bolted cap conforming to ASTM A126, Class B; horizontal swing, with a bronze disc or cast iron disc with bronze disc ring, and flanged ends.
 - c. Valve shall be capable of being refitted while the valve remains in line.
 3. Spring Actuated Over 2 inches:
 - a. 300 psi CWP, ductile iron body conforming to ASTM A536, Grade 65-45-12; vertical or horizontal check; with stainless steel spring and shaft.
 - 1) 2-1/2 inches and 3 inches Aluminum bronze disc with disc mounted elastomer seal and PPS (Polyphenylene Sulfide) coated seat.
 - 2) 4 inches and Larger: Elastomer coated ductile iron disc with welded-in nickel seat.
- G. Drain Valves:
1. Compression Stop: Bronze with hose thread nipple and cap.
 2. Ball Valve: Brass with cap and chain, 3/4 inch hose thread.

- H. All valves shall be either UL listed or FM approved for use on fire protection systems, whichever is more stringent.

2.2 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A53; Schedule 40 seamless carbon steel. Schedule 10 pipe shall be allowed for pipe sizes larger than 2" diameter when roll grooved mechanical couplings are used. Plain end joint connections shall not be used.
 - 1. Cast Iron Fittings: ANSI/ASME B16.1, flanges and flanged fittings; ANSI/ASME B16.4, screwed fittings.
 - 2. Malleable Iron Fittings: ANSI/ASME B16.3, screwed Class 300 type. Threads shall conform to ANSI/ASTM A47.
 - 3. Grooved Mechanical Fittings: ANSI A21.10/AWWA C-110 ductile iron; ASTM A536 Grade 65-45-12 ductile iron; ASTM A234 Grade WPB; or factory fabricated from carbon steel pipe conforming to ASTM A53; with grooves or shoulders designed to accept grooved end couplings. Fittings shall be of the same manufacturer as the adjoining couplings. Grooved Mechanical Couplings: ASTM A536 Grade 65-45-12, ductile iron housing, elastomer gasket with nuts and bolts to secure roll grooved pipe and fittings.

Fire Protection Service	Temperature Range	Gasket Recommendation
Water/Wet Systems	Ambient	C-Shape or EZ Style 009

- a. Rigid Type Couplings: Housings cast with offsetting, angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with NFPA-13.
 - 1) 1-1/4" through 4": Factory assembled for direct stab installation without field disassembly. Victaulic Style 009 EZ.
 - 2) 5" through 8": Victaulic FireLock™ Style 005.
 - 3) 10" and larger: Victaulic Zero-Flex® Style 07.
 - b. Flexible Type Couplings: Use in locations where vibration attenuation and stress relief are required, and for seismic considerations in accordance with the manufacturer's instructions. Victaulic Style 75.
- B. Cast Iron Pipe: AWWA C151.
 - 1. Fittings: AWWA C110, standard thickness.
 - 2. Joints: AWWA C111, rubber gasket.
 - 3. Mechanical Grooved Couplings: Ductile iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.3 UNIONS AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Under:
 - 1. Ferrous Piping: 150 psig malleable iron, threaded.
 - 2. Copper Pipe: Bronze, soldered joints.

- B. Dielectric Connections: Union, waterway fitting, or flange with water impervious isolation barrier; Victaulic Style 47 or Watts 3000 Series or approved equal.

2.4 PIPE HANGERS AND SUPPORTS

- A. Conform to NFPA 13.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, Carbon steel, adjustable swivel, split ring.
- C. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
- F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
- G. Vertical Support: Steel riser clamp
- H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- I. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

PART 3 EXECUTION

3.1 PREPARATION

- A. Coordinate work of this Section with other affected work.
- B. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- C. Remove scale and foreign material, from inside and outside, before assembly.
- D. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION – GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. The Contractor shall provide a complete and fully code compliant fire suppression system throughout the entire building.
- C. The Contractor shall maintain a clean and orderly site during the installation of the sprinkler system. Materials shall not be stored in the halls or other public areas.

- D. Cutting, welding and other hot work shall not be permitted without permission from the building owner. Contractor shall provide a fire watch for one hour after all welding.
- E. The required tests shall be witnessed by the Fire Marshall, authority having jurisdiction, Owner's insurance underwriter and Architect/Engineer.
- F. Pipe Hangers and Supports:
 - 1. Install in accordance with NFPA 13
 - 2. Install hangers to with minimum 1/2 inch space between finished covering and adjacent work.
 - 3. Place hangers within 12 inches of each horizontal elbow.
 - 4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 6. Where installing several pipes in parallel and at same elevation, provide multiple or trapeze hangers.
 - 7. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.3 INSTALLATION – PIPE AND FITTINGS

- A. Pipe/insulation: All wet sprinkler piping must be plumbed on the heated side of the building insulation to prevent freezing. The fire protection contractor must install the wet sprinkler piping such that space is provided around all wet piping for insulation to be installed. The space required for insulation is dictated by the insulation R-value for the specific area as specified by the Architect.
- B. Install piping in accordance with NFPA 13 for sprinkler systems, and NFPA 24 for service mains.
- C. Place piping in concealed spaces above finished ceilings unless noted otherwise.
- D. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- E. Install piping to conserve building space, to not interfere with use of space and other work.
- F. Group piping whenever practical at common elevations.
- G. Install pipe sleeve at piping penetrations through footings partitions, walls, and floors. Seal pipe and sleeve penetrations to maintain fire resistance equivalent to fire separation.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Use Victaulic Style 77 or 75 couplings in accordance with Victaulic instructions for expansion and contraction of pipe.

- I. Grooved joint couplings and fittings shall be installed in accordance with the manufacturer's written installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be verified as suitable for the intended service prior to installation. Gaskets shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative shall periodically visit the jobsite and review installation. Contractor shall remove and replace any joints deemed improperly installed.
- J. Pitch piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- K. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 09 90 00.
- L. Do not penetrate building structural members unless indicated.
- M. Provide sleeves when penetrating footings, floors and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- N. Where more than one piping system material is specified, install compatible system components and joints. Install flanges, union, and couplings at locations requiring servicing.
- O. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.
- P. Provide dielectric fittings whenever joining two dissimilar metals.
- Q. Provide surge restrainers on all end of branches and arm overs in excess of 12-inches.

3.4 INSTALLATION – VALVES

- A. Install drain valves at main shut-off valves, low points of piping and apparatus.
- B. All valves shall be accessible for operation and servicing. Provide access panels where required.
- C. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to after installation.
- D. Install gate or butterfly valves for shut-off or isolating service.
- E. Install buried shut-off valves in valve box.

3.5 TESTING

- A. Piping: The complete system shall be subject to a pressure test, and to such other tests as the authorities having jurisdiction may require. The pressure test shall be a hydrostatic pressure of 200 pounds per square inch for a period of two hours. The above ground piping and attached appurtenances shall show no pressure loss or leaks, refer to NFPA Standard 13 Hydrostatic tests. For buried piping refer to NFPA Standard 24 Testing Underground Systems. Before applying specified test pressure, all air must be expelled from the system. All defects of whatever type shall be repaired or replaced to the satisfaction of the Owner and authorities having jurisdiction and at no additional cost to the Owner. Packing rings, special joint bolts, gaskets, and other material required for the proper installation of the pipe and fittings shall be provided. Testing shall be completed prior to permanent sealing of walls and partitions.
- B. Leaks in mechanical joints shall be repaired by dismantling the joint, reassembling it, and tightening the bolts in the correct order. Leaks in screw or grooved joint shall be repaired by dismantling the joint and reassembling it. Attempting to repair leaks in joints by over tightening the bolts or fittings shall not be permitted.
- C. Upon satisfactory completion of all tests, the Contractor shall submit three copies of the Standard Contractors Material and Test Certificate to the Owner.

3.6 INTERFACE WITH OTHER PRODUCTS

- A. Inserts:
 - 1. Install inserts for placement in concrete forms.
 - 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Install hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.7 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean new components and associated existing and relocated branches immediately connected to new components after other construction is complete.

END OF SECTION

SECTION 211313 - WET-PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes wet-pipe sprinkler system, system design, installation, and certification.
- B. Related Sections:
 - 1. Section 21 05 00 - Common Work Results for Fire Suppression: Product and execution requirements for pipe, fittings, valves, hangers, supports, identification and painting for placement by this section.
 - 2. Section 21 05 16 – Expansion Fittings and Loops for Fire-Suppression Equipment.
 - 3. Section 21 05 48 - Vibration and Seismic Controls for Fire-Suppression Piping and Equipment: Product and installation requirements for vibration isolators used in piping systems.
 - 4. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections to equipment specified by this section.
 - 5. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. National Fire Protection Association:
 - 1. NFPA 13 - Installation of Sprinkler Systems.
 - 2. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.
- B. Factory Mutual:
 - 1. FM - Factory Mutual Approval Guide.
- C. Underwriters Laboratory:
 - 1. UL - Fire Resistance Directory.

1.3 SYSTEM DESCRIPTION

- A. Provide a wet pipe system hydraulically designed in accordance with NFPA 13 and all requirements of the local Authority Having Jurisdiction.
- B. System to provide coverage for entire building.
- C. Provide system to NFPA Standard occupancy requirements as noted on the drawings.
- D. Interface system with building fire alarm system.
- E. The sprinkler locations and piping arrangements indicated on the contract documents are diagrammatic. It is the responsibility of the contractor to fully coordinate sprinkler and piping locations with all other trades.

- F. Sprinkler locations indicated on the Contract Documents indicate sprinkler coverage utilizing standard coverage sprinklers maximum 225 square feet per sprinkler for light hazard and 130 square feet per sprinkler for ordinary hazard. Extended coverage sprinklers shall not be installed in any locations unless specifically indicated on the Contract Document drawings.
- G. All sprinklers installed in a light hazard classification occupancy shall be a listed quick response type.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Where the terms “authorities having jurisdiction” is used, within this Specification, it is intended to include the Insurance Underwriter and all regulatory agencies having vested interest in this project.
- C. Shop Drawings:
 - 1. Provide fire protections shop drawings drawn to a minimum scale of $\frac{1}{4}''=1'-0''$. Indicate pipe materials used, joining methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
 - 2. Provide hydraulic calculations, detailed pipe layout, hangers and supports, components and accessories. Indicate system controls.
 - 3. All sprinkler drawings and calculations shall bear the seal of a Professional Engineer licensed in the State of Connecticut. Seal and signature shall not be copied and shall be provided as an original drawing and each calculation.
 - 4. Sprinklers shall be as shown on drawings and submittals and shall be specifically identified with the applicable style or series designation as published in the appropriate agency listing or approval. Trade names or other abbreviated designations are not permitted.
- D. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- E. After successful review by the Engineer, submit sprinkler layout shop drawings, product data, hydraulic calculations to authority having jurisdiction, Fire Marshall, and Owner's insurance underwriter for approval. Submit proof of approval to Architect/Engineer.
- F. Grooved joint couplings and fittings shall be shown on shop drawings and product submittals and shall be specifically identified with the applicable Victaulic style or series designation.
- G. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and all code requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
- C. Operation and Maintenance Data: Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.6 QUALITY ASSURANCE

- A. Workmanship and Qualifications: All materials and equipment shall be installed in accordance with NFPA and all applicable local codes and ordinances. The Sprinkler Contractor shall be state licensed to install sprinkler systems. The Sprinkler Contractor shall make sure that all work and materials conform to the requirements set forth by this Specification. Fire protection equipment shall be installed to conform to NFPA as applicable, and devices used shall be listed and approved by Underwriters laboratories (UL) and/or Factory Mutual (FM). Codes and Standards: All work shall be equal or superior to that required by codes, regulations, ordinances, and laws imposed by the jurisdictional authorities, including those of the State of Connecticut, State Fire Marshall, local ordinances and OSHA. Nothing in the Specifications permit violations of such directives, and where conflict occurs, the directive shall govern, except where superior work is specified or indicated.
- B. In addition to complying with the above codes and regulations, comply with the requirements of the following:
 - 1. NFPA Standard 13.
 - 2. NFPA Standard 24.
 - 3. State Building and Fire Codes.
 - 4. Local Jurisdictional Authorities.
- C. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
- D. Valves: Bear UL and/or FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- E. All items of similar class shall be the products of the same manufacturer. All valves, accessory items, etc., shall be from the same source.
- F. Maintain one copy of each applicable NFPA standard on site.
- G. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

- H. Installer: Company specializing in performing work of this Section with minimum five years experience.
- I. Design sprinkler system under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State where the project is located.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver and store products in shipping containers, with labeling in place.
- C. All equipment, valves, gages and etc., shall be covered and protected during the execution of the work. All equipment and piping shall be protected from freezing. Labeling to remain in place.
- D. All unloading, hauling, and handling of materials shall be the responsibility of the Sprinkler Contractor.
- E. The Sprinkler Contractor can obtain information on available storage space on site from the Owner when making examination of the site.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for

1.11 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish extra sprinklers under provisions of NFPA 13.

- C. Furnish suitable wrenches for each sprinkler type.
- D. Provide metal storage cabinet adjacent to the sprinkler riser.

PART 2 PRODUCTS

2.1 SPRINKLERS

- A. Manufacturers:
 - 1. Viking.
 - 2. Tyco.
 - 3. Victaulic.
 - 4. Grinnell Corp.
 - 5. Reliable Sprinkler Corp.
 - 6. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. All sprinklers shall be adjustable, glass bulb, automatic sprinklers with ½ inch orifice and 5.6 K-factor unless noted otherwise. Type of sprinkler head shall be as indicated on the plans and in accordance with the following.
- C. Sprinkler bodies shall be die-cast brass, with hex shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation.
- D. Unless noted otherwise, ordinary temperature rated sprinkler heads shall be used throughout the building.
- E. Where sprinklers will be installed in close proximity to heat sources and special locations, as identified in NFPA 13, temperature ratings shall be in accordance with the requirements of NFPA 13
- F. Where plans call for extended coverage sprinkler heads coordinate coverage requirements with required pressure and K-factor.
- G. Spare Sprinklers: The Sprinkler Contractor shall furnish spare automatic sprinklers in accordance with the requirements of NFPA for stock of extra sprinklers. The sprinklers shall be packed in a suitable container and shall be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. The Sprinkler Contractor shall furnish no less than two special sprinkler wrenches, or at least one wrench for each container or sprinkler box, whichever is greater.
- H. In areas where sprinkler heads are subject to physical damage, provide sprinkler guard assembly over head, finish to match sprinkler finish. This shall include but not limited to the following locations.
 - 1. Heads under lower rakes of stairways.
 - 2. Heads in electrical rooms, boiler rooms and other mechanical rooms.
 - 3. Heads installed 7'-0" or less above finished floors.

I. Sprinklers shall be in accordance with the following table:

Sprinkler Type	Sprinkler Finish	Manufacturer/Model Number
Quick-response Pendant and Upright Type Sprinklers	Chrome plated finish with chrome plated, adjustable, semi-recessed escutcheon.	Victaulic Model V2708 and V2704.
Quick-response Concealed Type Sprinklers	Brass finish with factory painted white cover plate.	Victaulic Model V3802.

2.2 ALARM CHECK VALVES

A. Manufacturers:

1. Viking.
2. Tyco.
3. Victaulic.
4. Grinnell Corp.
5. Reliable Sprinkler Corp.
6. Substitutions: Section 01 25 00 – Substitution Procedures.

B. Wet Pipe Alarm Valve:

1. Check type valve with Nitrile seat o-ring aluminum bronze clapper with EPDM seal to automatically actuate electrically and hydraulically operated alarms, with pressure retard chamber and variable pressure trim. Valve internal components shall be replaceable without removing valve from the installed position. Valve shall be Series 751 as manufactured by Victaulic Co or engineer approved equal.
2. Provide retard chamber as part of wet alarm valve trim to allow for pressure fluctuations. Retard chamber shall be Victaulic Series 752 or engineer approved equal by manufacturers listed above. Provide all other trim as recommended by the manufacturer.
3. Alarm check valve assembly shall allow discharge of one or more sprinklers to activate electric and hydraulic alarms.

2.3 PIPING SPECIALTIES

A. Manufacturers:

1. Potter.
2. Potter-Roemer.
3. System Sensor.
4. Victaulic.
5. Viking.

B. Electric Alarm: Electrically operated red enameled chrome plated gong with pressure alarm switch, 120 volt with weatherproof back box.

- C. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two form C contacts; rated 10 amp at 120 volt.
- D. Valve Tamper Supervisory Switch: Two form C contacts; rated 10 amp at 120 volt. UL listed and FM approved. Up to 2" – Potter Model PCVS-1. Over 2" switch shall be Potter Model OSYSU-2.
- E. Pressure Switch: ½ inch male pressure connection to alarm valve riser and actuated by any flow of water in excess of one sprinkler. Maximum pressure rating 175 psi, weather-proof with tamper resistant screws, rated 10 amps at 120 volt.
- F. Pressure Gage: Rated for 300 psi use, 3-1/2" in diameter.

2.4 FIRE DEPARTMENT CONNECTION

- A. Fire department connection shall be 4" storz, polished brass, single clapper type connection. Provide with polished brass identification plate.
- B. Clapper design shall allow for one or both inlets to be pressurized during operation.
- C. Provide polished brass cast aluminum alloy caps and chains for protection of the inlets.
- D. The fire department connection shall be constructed of cast brass with brass clapper, brass swivel couplings and a brass hinge pin. The words "AUTO SPKR" and "F.D. Conn" shall be cast in raised letters on the body.
- E. Fire department connection threads shall match the local fire departments standard.
- F. Drain: 3/4 inch automatic drip, install at low point after check valve, pipe to building exterior.
- G. Label: "Sprinkler System" - Fire Department Connection".
- H. Provide a 90-degree elbow with drain connection at each fire department connection to allow for drainage in areas exposed to the building exterior to prevent freezing. Elbow shall be Victaulic #10-DR.

PART 3 EXECUTION

3.1 PREPERATION

- A. Coordinate work of this Section with other affected work.
- B. Prepare piping connections to equipment with grooved joint couplings, flanges, or unions.

3.2 INSTALLATION

- A. Install equipment in accordance with manufacturers instructions.
- B. Install fire protection systems in accordance with NFPA 13 for sprinkler systems, and NFPA 24 for service mains.
- C. The Contractor shall provide a complete and fully code compliant fire suppression system throughout the entire building.
- D. The Contractor shall notify the owner's representative before impairing any fire protection equipment.
- E. The Contractor shall maintain a clean and orderly site during the installation of the sprinkler system. Materials shall not be stored in the halls or other public areas.
- F. Cutting, welding and other hot work shall not be permitted without permission from the building owner. Contractor shall provide a fire watch for one hour after all welding
- G. The required tests shall be witnessed by the Fire Marshall, authority having jurisdiction, Owner's insurance underwriter and Architect/Engineer.
- H. Provide reduced pressure backflow preventer assembly Double check valve assembly at with detector check assembly sprinkler system water source connection. Install a drain line from the air gap fitting and terminate at the nearest floor drain. The backflow preventer shall be installed at a minimum height to allow installation of the air gap fitting, but shall not be installed at more than 5'0" above finished floor for maintenance.
- I. Locate fire department connection with sufficient clearance from walls, obstructions, etc., to allow full swing of fire department wrench handle. Coordinate the exact location of the fire department connection with the local fire officials. Installation shall conform to the local fire official's requirements.
- J. Installation of Alarm Valves: Install a drain line from the drain connection to the nearest floor drain. Install a test line from the test connection to the exterior of the building. Provide a splash block. Provide gate valves at each line. Minimum alarm valve riser shall be 4-inch.
- K. Locate outside alarm bell on building wall.
- L. Center heads in two directions in ceiling tile and provide piping offsets as required. one direction only in ceiling tile with location in other direction variable, dependent upon spacing and coordination with ceiling elements.
- M. Where ceilings or ceiling features permit the passage of heat from one plane or elevation to another, the contractor shall provide sprinklers both at the lower ceiling level and above the lower ceiling or feature level or plane. Refer to architectural drawings for ceiling types and locations.

- N. Sprinkler Bulb protector must remain in place until the sprinkler is completely installed. Remove the bulb protector by hand after installation and before the system is placed in service. (Do not use any tools to remove the bulb protector.)
- O. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.
- P. Coordinate flow switches, tamper switches, and all other sprinkler devices with the fire alarm system.
- Q. Provide wire guards on sprinklers as indicated on drawings.
- R. Place pipe runs to minimize obstruction to other work.
- S. Install piping in concealed spaces above finished ceilings.
- T. Hydrostatically test entire system in accordance with the requirements of NFPA 13 (?).
- U. Require test be witnessed by Fire Marshall. Authority having jurisdiction. Owner's insurance underwriter. Architect/Engineer.

3.3 INTERFACE WITH OTHER PRODUCTS

- A. Verify signal devices are installed and connected to fire alarm system.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Flush entire piping system of foreign matter.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish. Remove after painting. Replace painted sprinklers with new.

3.6 IDENTIFICATION

- A. Provide and apply signs to control, drain, test and alarm valves to identify their purpose and function. Provide and permanently attach hydraulic calculations data nameplate at the controlling valve for the sprinkler system. Provide lettering size and style from NFPA's suggested styles.

3.7 TESTING

- A. Section 21 05 00 - Common Work Results for Fire Suppression.

END OF SECTION

SECTION 220503 - PIPES AND TUBES FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Pipe and pipe fittings for the following systems:
1. Domestic water piping, within 5 feet of building.
 2. Sanitary sewer piping, within 5 feet of building.
 3. Unions and flanges.
- B. Related Sections:
1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
 2. Section 08 31 13 - Access Doors and Frames
 3. Section 09 90 00 - Painting and Coating
 4. Section 22 05 00 – Common work results for Plumbing
 5. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping
 6. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 7. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 8. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
 9. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 10. Section 22 07 00 - Plumbing Insulation
 11. Section 22 30 00 – Plumbing Specialties
 12. Section 22 40 00 – Plumbing Fixtures
 13. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
 2. ASME B16.3 - Malleable Iron Threaded Fittings.
 3. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 4. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 5. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings (DWV).
 6. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
 7. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
 8. ASME B31.9 - Building Services Piping.
 9. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.
 10. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- B. ASTM International:
1. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.
 2. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
 3. ASTM A536 - Standard Specification for Ductile Iron Castings.

4. ASTM B32 - Standard Specification for Solder Metal.
 5. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
 6. ASTM B75 - Standard Specification for Seamless Copper Tube.
 7. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
 8. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
 9. ASTM B302 - Standard Specification for Threadless Copper Pipe, Standard Sizes.
 10. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV).
 11. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
 12. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 13. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 14. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 15. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
- C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
 2. AWS D1.1 - Structural Welding Code - Steel.
- D. American Water Works Association:
1. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 2. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
 3. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
 4. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 5. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
- E. Cast Iron Soil Pipe Institute:
1. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
 2. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- F. NSF International:
1. NSF 61 - Standard for Drinking Water System Components - Health Effects.
- G. Safe Drinking Water Act.
1. SDWA 1417 - Standard for Lead Free Drinking Water.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate layout of piping systems, including equipment, critical dimensions, and sizes. Submit shop drawings sealed by registered professional engineer.
- C. Product Data: Submit data on pipe materials and fittings. Submit manufacturers catalog information. Clearly indicate on submittal "Lead Free" where required.
- D. Design Data: Indicate pipe sizes. Indicate pipe sizing methods. Indicate calculations used. Submit sizing methods calculations sealed by registered professional engineer.
- E. Welders' Certificate: Include welders' certification of compliance with ASME Section IX. AWS D1.1.
- F. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
 - 1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
 - 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- B. All cast iron soil pipe and fittings shall be marked with the collective trademark of the cast iron soil pipe institute.
- C. All couplings for hubless cast iron soil pipe and fittings shall meet the requirements of CISPI 310 and be certified by NSF International.

- D. All components of the potable domestic water system shall meet the requirements of SDWA-1417 & NSF 372 for compliance to Low Lead Content law
- E. To assure uniformity and compatibility of piping components in grooved end piping systems, all grooved products utilized shall be supplied by Victaulic or an Engineer Approved Equal. Grooving tools shall be supplied by the same manufacturer as the grooved components
- F. The International Association of Plumbing and Mechanical Officials
- G. Maintain one copy of each document on site.
- H. High Performance Building Requirements:
 - 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 - 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 - 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum years documented experience.
- C. Design piping systems pipe hangers and supports under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

- C. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install underground piping when bedding is wet or frozen.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate installation of buried piping with trenching.

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, drawn.
 - 1. Fittings: ASME B16.18, cast bronze, or ASME B16.22, wrought copper and bronze or extruded tee connections conforming to ASTM F2014-00.
 - 2. Joints: ASTM B32, solder, Grade 95TA or extruded tee connections brazed in compliance with the manufacturer's written instructions.
 - 3. Other Acceptable Joining Methods:
 - a. Press Fitting: Copper and copper alloy press fittings conforming to ASME B16.18 or ASME B16.22. Sealing elements for press fittings shall be EPDM and factory installed. Press ends shall have SC feature design (leakage path) to assure detection and easy identification of leakage of liquids from inside the system past the sealing element of an unpressed connection.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hub-less, service weight.
 - 1. Fittings: Cast iron, CISPI 301.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.3 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
 - 1. Ferrous Piping: Class 150, malleable iron, threaded.
 - 2. Copper Piping: Class 150, bronze unions with soldered brazed joints.

3. Dielectric Connections: Union or waterways with galvanized or plated steel or copper-silicon casting with threaded end, copper solder end, grooved end, lead free, water impervious isolation barrier.
- B. Flanges for Pipe 2-1/2 inches and Larger:
1. Ferrous Piping: Class 150, forged steel, slip-on flanges or grooved joint flange adapters.
 2. Gaskets: 1/16 inch thick preformed neoprene gaskets.
 3. Dielectric Connections: Waterways with galvanized or plated steel or copper-silicon casting with grooved end, lead free, water impervious isolation barrier

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify excavations are to required grade, dry, and not over-excavated.
- C. Verify trenches are ready to receive piping.

3.2 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 flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - ABOVE GROUND PIPING

- A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- B. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.
- C. Group piping whenever practical at common elevations.
- D. Sleeve pipe passing through partitions, walls and floors. Refer to Section 22 05 29.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.

- F. 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.
- G. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Section 08 31 13.
- H. Install non-conducting dielectric connections wherever jointing dissimilar metals.
- I. Establish invert elevations, slopes for drainage to $\frac{1}{4}$ inch per foot for piping 2 $\frac{1}{2}$ " and smaller or $\frac{1}{8}$ inch per foot minimum for piping 3" and larger. Maintain gradients.
- J. Slope piping and arrange systems to drain at low points.
- K. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
- L. Install piping penetrating roofed areas to maintain integrity of roof assembly.
- M. Install valves in accordance with Section 22 05 23.
- N. Install piping specialties in accordance with Section 22 30 00.
- O. Insulate piping. Refer to Section 22 07 00.
- P. Install pipe identification in accordance with Section 22 05 53.
- Q. The plumbing contractor shall furnish and install hot and cold water supplies to all plumbing fixtures and equipment throughout the project. All piping shall be supplied from the water source, mains, and branch piping.
- R. Shut off valves shall be provided on all supply piping where more than two fixtures are provided. Valve type shall be as determined by the engineer or as indicated on the drawings and specifications.
- S. Provide line sized balance valves at all connections between domestic hot water system and hot water recirculation system.

3.4 INSTALLATION - DOMESTIC WATER PIPING SYSTEMS

- A. Install domestic water piping system in accordance with SDWA - 1417.
- B. Install domestic water piping system in accordance with ASME B31.9.

3.5 INSTALLATION – PRESS STYLE FITTINGS

- A. Press connections: Copper and copper alloy press connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s)

recommended by the manufacturer. Contractor shall be trained on the use and installation of the system by manufacturer's representative.

3.6 INSTALLATION - SANITARY WASTE AND VENT PIPING SYSTEMS

- A. Install sanitary waste and vent piping systems in accordance with ASME B31.9.
- B. Install sanitary waste and vent piping systems in accordance with local plumbing code.
- C. Install bell and spigot pipe with bell end upstream.
- D. Support cast iron drainage piping at every joint.
- E. Sanitary and vent piping shall be provided for all plumbing fixtures, devices and equipment throughout the project. All piping shall be installed in compliance with the adopted edition of the international Plumbing Code and State of Connecticut Amendments and Supplements.
- F. Vents from individual fixtures shall be combined and extend through the roof in multiple locations. Vent terminations at the roof shall not be installed within 25' of fresh air intakes for mechanical equipment.
- G. Sanitary piping from individual fixtures, devices and equipment shall combine into multiple buried laterals and exit the building below finished grade and connect to the one site piping network.
- H. Furnish and install cleanouts at all changes in direction greater than 45 degrees and not more than 75' foot intervals for horizontal runs. Provide finished grade cleanouts at lateral exiting the building.
- I. The project includes multiple approved techniques for venting, including but not limited to wet venting, circuit venting, combination drain and vent and island fixture vents. The contractor shall install the vent system accordingly to comply with the adopted edition of the International Plumbing Code.

3.7 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test domestic water piping system in accordance with applicable code local authority having jurisdiction
- C. Pressure test to identify un-pressed fittings: Utilizing air or water, the system shall be pressurized, not to exceed 85 psi. If there is a significant drop in pressure, the system shall be walked to check for un-pressed fittings. Should an un-pressed fitting be located, the pressure should be released from the system and the un-pressed fitting shall be pressed. If no un-pressed fitting is identified the system shall be pressurized to test pressures required by code, not to exceed 600 psi.

- D. Pressure test sanitary waste and vent piping system: Utilizing water the system will be tested in sections; each opening shall be tightly plugged except the highest openings of the section under test, and each section shall be filled with water, but no section shall be tested with less than 10-foot (3048 mm) head of water. In testing successive sections, at least the upper 10 feet (3048 mm) of the next preceding section shall be tested so that no joint or pipe in the building, except the uppermost 10 feet (3048 mm) shall have been submitted to a test of less than 10-foot (3048 mm) head of water. This pressure shall be held for not less than 15 minutes in each section tested. The system shall be tight at all points.
- E. Pressure test storm drainage system: Utilizing water the system will be tested in sections; each opening shall be tightly plugged except the highest openings of the section under test, and each section shall be filled with water, but no section shall be tested with less than 10-foot (3048 mm) head of water. In testing successive sections, at least the upper 10 feet (3048 mm) of the next preceding section shall be tested so that no joint or pipe in the building, except the uppermost 10 feet (3048 mm) shall have been submitted to a test of less than 10-foot (3048 mm) head of water. This pressure shall be held for not less than 15 minutes in each section tested. The system shall be tight at all points.

3.8 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean and disinfect domestic new water distribution systems in accordance with IPC 2012, local AHJ

END OF SECTION

SECTION 220516 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Each Contractor, Subcontractor and/or supplier providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. Section Includes:
 - 1. Flexible pipe connectors.
 - 2. Expansion joints.
 - 3. Expansion compensators.
 - 4. Pipe alignment guides.
 - 5. Swivel joints.
 - 6. Pipe anchors.
- B. Related Sections:
 - 1. Section 22 05 00 – Common work results for Plumbing
 - 2. Section 22 05 03 – Pipes and Tubes for Plumbing Piping and Equipment
 - 3. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 4. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 5. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
 - 6. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 - 7. Section 22 07 00 - Plumbing Insulation
 - 8. Section 22 30 00 – Plumbing Specialties
 - 9. Section 22 40 00 – Plumbing Fixtures
 - 10. Refer to Division 01 for General Conditions required for this section.

1.3 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B31.9 - Building Services Piping.
 - 2. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- B. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.

1.4 DESIGN REQUIREMENTS

- A. Provide structural work and equipment required for expansion and contraction of piping. Verify anchors, guides, and expansion joints provide and adequately protect system.

- B. Expansion Compensation Design Criteria:
 - 1. Installation Temperature: 50 degrees F.
 - 2. Domestic Hot Water: 140 degrees F.
 - 3. Safety Factor: 30 percent.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets and swing joints. Submit shop drawings sealed by a registered professional engineer.
- C. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- D. Design Data: Indicate criteria and show calculations. Submit sizing methods and calculations sealed by a registered professional engineer.
- E. Manufacturer's Installation Instructions: Submit special procedures.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- G. Welders' Certificate: Include welders' certification of compliance with ASME Section IX. AWS D1.1.
- H. Manufacturer's Field Reports: Indicate results of inspection by manufacturer's representative.
- I. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
 - 1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of flexible pipe connectors, expansion joints, anchors, and guides.
- C. Operation and Maintenance Data: Submit adjustment instructions.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- B. Maintain one copy of each document on site.
- C. High Performance Building Requirements:
 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- C. Design expansion compensating system under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.9 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept expansion joints on site in factory packing with shipping bars and positioning devices intact. Inspect for damage.
- C. Protect equipment from exposure by leaving factory coverings, pipe end protection, and packaging in place until installation.

1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for leak free performance of packed expansion joints.

1.12 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Supply two 12 ounce containers of packing lubricant and cartridge style grease gun.

PART 2 PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS

- A. Manufacturers:
 - 1. Metroflex
 - 2. Mason
 - 3. Vibration Eliminator
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Copper Piping:
 - 1. Inner Hose: Bronze.
 - 2. Exterior Sleeve: Braided bronze.
 - 3. Pressure Rating: 200 psig WOG and 250 degrees F.
 - 4. Joint: As specified in Section 22 05 03.
 - 5. Size: Use pipe sized units.
 - 6. Maximum offset: 3/4 inch on each side of installed center line.

2.2 EXPANSION JOINTS

- A. Manufacturers:
1. Metroflex
 2. Mason
 3. Vibration Eliminator
 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Stainless Steel Bellows Type:
1. Pressure Rating: 200 psig WOG and 250 degrees F.
 2. Maximum Compression: 1-3/4 inch.
 3. Maximum Extension: 1/4 inch.
 4. Joint: As specified in Section 22 05 03.
 5. Size: Use pipe sized units.
 6. Application: Steel piping 3 inch and smaller.
- C. External Ring Controlled Stainless Steel Bellows Type:
1. Pressure Rating: 200 psig WOG and 250 degrees F.
 2. Maximum Compression: 1-1/4 inch.
 3. Maximum Extension: 3/8 inch.
 4. Maximum Offset: 5/16 inch.
 5. Joint: Flanged.
 6. Size: Use pipe sized units.
 7. Accessories: Internal flow liner.
 8. Application: Steel piping 3 inch and larger.
- D. Double Sphere, Flexible Compensators:
1. Body: Teflon Neoprene and nylon
 2. Working Pressure: 200 psi.
 3. Maximum Temperature: 250 degrees F.
 4. Maximum Compression: 1 inch.
 5. Maximum Elongation: 5/8 inch.
 6. Maximum Offset: 3/4 inch.
 7. Maximum Angular Movement: 30 degrees.
 8. Joint: Tapped steel flanges Galvanized flanges Galvanized unions.
 9. Size: Use pipe sized units.
 10. Accessories: Control rods Control cables.
 11. Application: Steel piping 2 inch and larger.
- E. Two-ply Bronze Bellows Type:
1. Construction: Bronze with anti-torque device, limit stops, internal guides.
 2. Pressure Rating: 200 psi WOG and 250 degrees F.
 3. Maximum Compression: 1-3/4 inch.
 4. Maximum Extension: 1/4 inch.
 5. Joint: As specified in Section 22 05 03.
 6. Size: Use pipe sized units.
 7. Application: Copper piping.

- F. Low Pressure Compensators with two-ply Bronze Bellows:
 - 1. Working Pressure: 80 psig.
 - 2. Maximum Temperatures: 250 degrees F.
 - 3. Maximum Compression: 1/2 inch.
 - 4. Maximum Extension: 5/32 inch.
 - 5. Joint: Soldered.
 - 6. Size: Use pipe sized units.
 - 7. Application: Copper or steel piping 2 inch and smaller.

- G. Copper with Packed Sliding Sleeve:
 - 1. Maximum Temperature: 250 degrees F.
 - 2. Joint: As specified in Section 22 05 03.
 - 3. Size: Use pipe sized units.
 - 4. Copper or steel piping 2 inches and larger.
 - 5. Application: Copper or steel piping 2 inch and larger.

2.3 ACCESSORIES

- A. Manufacturers:
 - 1. Metroflex
 - 2. Mason
 - 3. Vibration Eliminator
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Pipe Alignment Guides: Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.

- C. Swivel Joints: Fabricated steel Cast steel body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install Work in accordance with ASME B31.9

- B. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.

- C. Rigidly anchor pipe to building structure. Provide pipe guides to direct movement only along axis of pipe. Erect piping so strain and weight is not on cast connections or apparatus.

- D. Provide support and anchors for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required as indicated on Drawings. Refer to Section 22 05 29 for pipe hanger installation requirements.

- E. Provide grooved piping systems with minimum one joint per inch pipe diameter instead of flexible connector supported by vibration isolation. Grooved piping systems need not be anchored.
- F. Provide expansion loops throughout building for all plumbing systems at expansion joints as indicated on structural and architectural Drawings. All assemblies provided for vibration, and expansion shall be listed for such use.

3.2 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Manufacturers' field services.
- B. Furnish inspection services by flexible pipe manufacturer's representative for final installation and certify installation is in accordance with manufacturer's recommendations and connectors are performing satisfactorily.

END OF SECTION

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ball valves.
 - 2. Balancing valves.

- B. Related Sections:
 - 1. Section 22 05 00 – Common work results for Plumbing
 - 2. Section 22 05 03 – Pipes and Tubes for Plumbing Piping and Equipment
 - 3. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping
 - 4. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
 - 5. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 - 6. Section 22 07 00 - Plumbing Insulation
 - 7. Section 22 30 00 – Plumbing Specialties
 - 8. Section 22 40 00 – Plumbing Fixtures
 - 9. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. Manufacturers Standardization Society of the Valve and Fittings Industry:
 - 1. MSS SP 67 - Butterfly Valves.
 - 2. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
 - 3. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 - 4. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
 - 5. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
 - 6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

- B. Safe Drinking Water Act:
 - 1. SDWA 1417 - Reduction of Lead in Drinking Water.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.
- C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
 - 1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
 - 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of valves.
- C. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

- A. For drinking water service, provide valves complying with NSF 61.
- B. All valves installed on the domestic water distribution system shall comply with SDWA 1417. Exception shall be main shut-off valve at domestic water service entrance that is 2-inches or larger.
- C. All valve manufacturers shall demonstrate that valve products have been certified per NSF/ANSI Standard 372.
- D. All valves installed on the domestic water system shall have labeling of lead content engraved on the valve body.
- E. Maintain one copy of document on site.
- F. To assure uniformity and compatibility of piping components in grooved end piping systems, all grooved products utilized shall be supplied by Victaulic or an Engineer Approved Equal
- G. High Performance Building Requirements:
 - 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 - 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 - 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum years documented experience.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install valves underground when bedding is wet or frozen.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish five year manufacturer warranty for valves excluding packing.

1.11 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for extra materials.
- B. Furnish two packing kits for each size valve.

PART 2 PRODUCTS

2.1 BALL VALVES

- A. Manufacturers:
 - 1. Apollo
 - 2. Milwaukee Valve Co.
 - 3. NIBCO, Inc.
 - 4. American Valve Co.
 - 5. Watts
 - 6. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. 2 inches and Smaller: MSS SP 110, 600 psi WOG, two piece bronze body, lead free, type 316 stainless steel ball, full port, teflon seats, stainless steel blow-out proof stem, solder ends with lever handle, Milwaukee Valve Company Model #UPBA450S.
- C. 2 inches and Smaller: MSS SP 110, Class 600, bronze, three piece body, lead free, type 316 stainless steel ball, full port, teflon seats, blow-out proof stem, solder ends, lever handle, Milwaukee Valve Company Model #UPBA350S.

2.2 BALANCING VALVES

- A. Bell & Gossett CB Series:
 - 1. Construction: Brass or bronze body with union on inlet, temperature and pressure test plug on inlet and outlet.
 - 2. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify piping system is ready for valve installation.

3.2 INSTALLATION

- 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 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, and at bases of vertical risers,
- D. Install valves with clearance for installation of insulation and allowing access.
- E. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Section 08 31 13.
- F. Refer to Section 22 05 29 for pipe hangers.
- G. Refer to Section 22 07 00 for insulation requirements for valves.
- H. Refer to Section 22 05 03 for piping materials applying to various system types.

3.3 VALVE APPLICATIONS

- A. Install shutoff and drain valves at locations indicated on Drawings in accordance with this Section.
- B. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- C. Provide line sized isolation valves on all domestic water branches greater than 3/4" when more than two fixtures are supplied.

END OF SECTION

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe hangers and supports.
 - 2. Hanger rods.
 - 3. Inserts.
 - 4. Flashing.
 - 5. Sleeves.
 - 6. Mechanical sleeve seals.
 - 7. Formed steel channel.
 - 8. Firestopping relating to plumbing work.
 - 9. Firestopping accessories.

- B. Related Sections:
 - 1. Section 03 10 00 - Concrete Forming and Accessories: Execution requirements for placement of inserts sleeves in concrete forms specified by this section.
 - 2. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for placement of concrete housekeeping pads specified by this section.
 - 3. Section 22 05 00 – Common work results for Plumbing
 - 4. Section 22 05 03 – Pipes and Tubes for Plumbing Piping and Equipment
 - 5. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping
 - 6. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 7. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
 - 8. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 - 9. Section 22 07 00 - Plumbing Insulation
 - 10. Section 22 30 00 – Plumbing Specialties
 - 11. Section 22 40 00 – Plumbing Fixtures
 - 12. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B31.1 - Power Piping.
 - 2. ASME B31.5 - Refrigeration Piping.
 - 3. ASME B31.9 - Building Services Piping.

- B. ASTM International:
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. ASTM E814 - Standard Test Method for Fire Tests of Through Penetration Fire Stops.

4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
 5. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- C. American Welding Society:
1. AWS D1.1 - Structural Welding Code - Steel.
- D. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.
- E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
 2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
 3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- F. Underwriters Laboratories Inc.:
1. UL 263 - Fire Tests of Building Construction and Materials.
 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
 3. UL 1479 - Fire Tests of Through-Penetration Firestops.
 4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
 5. UL - Fire Resistance Directory.
- G. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

1.3 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

- A. Firestopping Materials: ASTM E119 ASTM E814 UL 263 UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.
- B. Firestopping Materials: ASTM E119, ASTM E814, UL 263, UL 1479, to achieve fire ratings of adjacent construction noted in Schedule at end of this section. in accordance with FM UL WH noted in Schedule at end of this section.
- C. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

- A. Firestopping: Conform to applicable code FM UL WH for fire resistance ratings and surface burning characteristics.

- B. Firestopping: Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.
- C. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
 - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- E. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers. Submit sizing methods calculations sealed by a registered professional engineer.
- F. Manufacturer's Installation Instructions:
 - 1. Hangers and Supports: Submit special procedures and assembly of components.
 - 2. Firestopping: Submit preparation and installation instructions.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- H. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.
- I. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
 - 1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.7 QUALITY ASSURANCE

- A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
 2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - a. Floor Penetrations within Wall Cavities: T-Rating is not required.
- B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
- D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- F. Perform Work in accordance with applicable authority AWS D1.1 for welding hanger and support attachments to building structure.
- G. Maintain one copy of each document on site.
- H. High Performance Building Requirements:
 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.

2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum years documented experience.

1.9 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.
- D. Provide ventilation in areas to receive solvent cured materials.

1.12 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.13 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for pipe hangers and supports.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers:
 - 1. Nibco
 - 2. Empire
 - 3. Flex-Weld, Inc.
 - 4. Glope Pipe Hanger Products Inc.
 - 5. Michigan Hanger Co.
 - 6. Superior Valve Co.
 - 7. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Plumbing Piping - DWV:
 - 1. Conform to ASME B31.9 ASTM F708 MSS SP58 MSS SP69 MSS SP89.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
 - 6. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
 - 7. Vertical Support: Steel riser clamp.
 - 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 9. Copper Pipe Support: Copper-plated, carbon-steel adjustable, ring.
- C. Plumbing Piping - Water:
 - 1. Conform to ASME B31.9 ASTM F708 MSS SP58 MSS SP69 MSS SP89.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Cold Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
 - 4. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
 - 5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 6. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
 - 7. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
 - 8. Vertical Support: Steel riser clamp.
 - 9. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

10. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
11. Copper Pipe Support: Copper-plated, Carbon-steel ring.

2.2 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

- A. Manufacturers:
 1. Thunderline
 2. Link Seal
 3. Fernco
 4. BWM
 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

- A. Metal Flashing: 26 gage thick galvanized steel.
- B. Metal Counterflashing: 22 gage thick galvanized steel.
- C. Lead Flashing:
 1. Waterproofing: 5 lb./sq. ft sheet lead.
 2. Soundproofing: 1 lb./sq. ft sheet lead.
- D. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
- E. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.5 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
- C. Sealant: Acrylic; refer to Section 07 90 00.

2.6 MECHANICAL SLEEVE SEALS

- A. Manufacturers:
 1. Thunderline Link-Seal, Inc.
 2. NMP Corporation

3. Fernco
4. BWM Model
5. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.7 FORMED STEEL CHANNEL

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. B-Line Systems
3. Midland Ross Corporation, Electrical Products Division
4. Unistrut Corp.
5. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Product Description: Galvanized 12 gage) thick steel. With holes 1-1/2 inches on center.

2.8 FIRESTOPPING

A. Manufacturers:

1. Dow Corning Corp.
2. Fire Trak Corp.
3. Hilti Corp.
4. International Protective Coating Corp.
5. 3M fire Protection Products
6. Specified Technology, Inc.
7. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.

1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
2. Foam Firestopping Compounds: Single component foam compound.
3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
4. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
7. Firestop Pillows: Formed mineral fiber pillows.

- C. Color: As selected from manufacturer's full range of colors.

2.9 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Dam Material: Permanent:
 - 1. Mineral fiberboard.
 - 2. Mineral fiber matting.
 - 3. Sheet metal.
 - 4. Plywood or particle board.
 - 5. Alumina silicate fire board.
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- D. General:
 - 1. Furnish UL listed products or products tested by independent testing laboratory.
 - 2. Select products with rating not less than rating of wall or floor being penetrated.
- E. Non-Rated Surfaces:
 - 1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.
 - 2. For exterior wall openings below grade, furnish mechanical sealing device to continuously fill annular space between piping and cored opening or water-stop type wall sleeve.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.
- C. Verify openings are ready to receive firestopping.

3.2 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.
- C. Install damming materials to arrest liquid material leakage.
- D. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- E. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.3 INSTALLATION - INSERTS

- A. Install inserts for placement in concrete forms.
- B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above flush with top of recessed into and grouted flush with slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install in accordance with ASME B31.1 ASME B31.5 ASME 31.9 ASTM F708 MSS SP 58 MSS SP 69 MSS SP 89.
- B. Support horizontal piping as scheduled.
- C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Use hangers with 1-1/2 inch minimum vertical adjustment.
- F. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.
- G. Support vertical piping at every other floor. Support vertical cast iron pipe at each floor at hub.
- H. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- I. Support riser piping independently of connected horizontal piping.
- J. Provide copper plated hangers and supports for copper piping sheet lead packing between hangers or support and piping.
- K. Design hangers for pipe movement without disengagement of supported pipe.
- L. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

- M. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.
- N. Design hangers so that pipes are supported by building structure; no pipe to pipe hangers, supports, or anchoring.

3.5 INSTALLATION - FLASHING

- A. Provide flexible flashing and metal counterflashing where piping penetrates weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor, shower, mop sink drains watertight to adjacent materials.
- E. 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.

3.6 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with mechanical sleeve seals.
- B. Set sleeves in position in forms. Provide reinforcing around sleeves.
- C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- E. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- F. Install chrome plated steel or stainless steel escutcheons at finished surfaces.

3.7 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, and other items, requiring firestopping. Refer to Section 07 84 13

3.8 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.9 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.10 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

3.11 SCHEDULES

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HANGER SPACING Feet	HANGER ROD DIAMETER Inches
Cast Iron (All Sizes)	5	5/8
Cast Iron (All Sizes) with 10 foot length of pipe	10	5/8
Copper Tube, 1-1/4 inches and smaller	6	1/2
Copper Tube, 1-1/2 inches and larger	10	1/2
Polybutylene	2.67	3/8
Polypropylene	4	3/8
PVC (All Sizes)	4	3/8
Steel, 3 inches and smaller	12	1/2
Steel, 4 inches and larger	12	5/8

END OF SECTION

SECTION 220548 - VIBRATION AND SEISMIC CONTROLS
FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 INTENT

- A. All plumbing equipment and piping as noted on the equipment schedule or in the specification shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
- B. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.
- C. It is the intent of the seismic portion of this specification to keep all mechanical and electrical building system components in place during a seismic event.
- D. All such systems must be installed in strict accordance with seismic codes, component manufacturer's recommendations and building construction standards. Whenever a conflict occurs between the manufacturer's recommendations or construction standards, the most stringent shall apply.
- E. This specification is considered to be minimum requirements for seismic consideration and is not intended as a substitute for legislated, more stringent, national, state or local construction requirements.
- F. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.

1.2 SUMMARY

- A. Section Includes:
 - 1. Certification of seismic restraint designs and installation supervision.
 - 2. Certification of seismic attachment of housekeeping pads.
 - 3. NOTE: For all mechanical and electrical systems. Equipment buried underground is excluded but entry of services through the foundation wall is included.
 - 4. Seismic restraint products
 - a. Vibration isolation elements.
 - b. Equipment isolation bases.
 - c. Piping flexible connections.
 - d. Seismic restraints for isolated and non-isolated mechanical and electrical items.
 - 5. Inertia bases.

- B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for placement of isolators in floating floor slabs specified by this section and product requirements for concrete for placement by this section.
 2. Section 07 90 00 - Joint Protection: Product requirements for joint sealers specified for placement by this section.
 3. Section 22 05 00 – Common work results for Plumbing
 4. Section 22 05 03 – Pipes and Tubes for Plumbing Piping and Equipment
 5. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping
 6. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 7. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 8. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 9. Section 22 07 00 - Plumbing Insulation
 10. Section 22 30 00 – Plumbing Specialties
 11. Section 22 40 00 – Plumbing Fixtures
 12. Refer to Division 01 for General Conditions required for this section.

1.3 REFERENCES

- A. American National Standards Institute:
1. ANSI S1.4 - Sound Level Meters.
 2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
 3. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.
- B. Air-Conditioning and Refrigeration Institute:
1. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.
- C. American Society of Heating, Refrigerating and:
1. ASHRAE Handbook - HVAC Applications.

1.4 RELATED WORK

- A. Supplementary Support Steel
1. Contractor shall supply supplementary support steel for all equipment, piping, ductwork, etc. including roof mounted equipment, as required or specified.
- B. Attachments
1. Contractor shall supply restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, etc. in accordance with the requirements of the vibration vendor's calculations.

1.5 SEISMIC FORCE LEVELS

- A. Installations shall be designed to safely accept external forces determined in accordance with the International Building Code –2012, Section 16 in any direction for all rigidly supported equipment without failure and permanent displacement of the equipment. Seismic restraints shall not short circuit vibration isolation systems or transmit objectionable vibration or noise.

1.6 PERFORMANCE REQUIREMENTS

- A. Provide vibration isolation on motor driven equipment over 0.5 hp, plus connected piping.
- B. Provide minimum static deflection of isolators for equipment as follows:
 - 1. Basement, Under 20 hp
 - a. 400 - 600 rpm: 1 inch
 - b. 600 - 800 rpm: 0.5 inch
 - c. 800 - 900 rpm: 0.2 inch
 - d. 1100 - 1500 rpm: 0.14 inch
 - e. Over 1500 rpm: 0.1 inch
 - 2. Basement, Over 20 hp
 - a. 400 - 600 rpm: 2 inch
 - b. 600 - 800 rpm: 1 inch
 - c. 800 - 900 rpm: 0.5 inch
 - d. 1100 - 1500 rpm: 0.2 inch
 - e. Over 1500 rpm: 0.15 inch
- C. Maintain sound level of spaces at levels not to exceed those listed below by utilizing acoustical devices.
- D. Maintain rooms at following maximum sound levels, in Noise Criteria (NC) Room Criteria (RC) as defined by ASHRAE Handbook., HVAC Applications, ANSI S1.8.
 - 1. Offices
 - a. Executive: 30
 - b. Conference rooms: 30
 - c. Private: 35
 - d. Open-plan areas: 40
 - e. Computer/business machine areas: 45
 - f. Public circulation: 45
 - 2. Schools
 - a. Lecture and classrooms: 30
 - b. Open-plan classrooms: 35
 - 3. Libraries: 35

1.7 DEFINITIONS

- A. Life Safety Systems:
 - 1. All systems involved with and/or connected to emergency power supply including all generators, transfer switches, transformers and all flow paths to fire protection and/or emergency lighting systems.
 - 2. All medical and life support systems.
- B. Positive Attachment:
 - 1. A positive attachment is defined as a cast-in anchor, a drill-in wedge anchor, a double sided beam clamp loaded perpendicular to a beam, or a welded or bolted connection to structure. Single sided "C" type beam clamps for support rods of overhead piping, ductwork, fire protection, electrical conduit, bus duct, or cable

trays, or any other equipment are not acceptable on this project as seismic anchor points.

- C. Transverse Bracing:
 - 1. Restraint(s) applied to limit motion perpendicular to the centerline of the pipe, duct or conduit.
- D. Longitudinal Bracing:
 - 1. Restraint(s) applied to limit motion parallel to the centerline of the pipe, duct or conduit.
- E. Failure
 - 1. For the purposes of this project, failure is defined as the discontinuance of any attachment point between equipment or structure, vertical permanent deformation greater than 1/8" (3mm) and/or horizontal permanent deformation greater than 1/4" (6mm).

1.8 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings:
 - 1. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
 - 2. Provide Drawings showing methods of suspension and support guides for conduit, piping and ceiling hung equipment.
 - 3. Record actual locations and installation of vibration isolators and seismic restraints including attachment points.
 - 4. Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.
 - 5. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.
 - 6. Drawings showing methods for isolation of conduits and pipes penetrating walls and floor slabs.
 - 7. Specific details of restraints including anchor bolts for mounting and maximum loading at each location, for each piece of equipment and/or pipe locations.
- C. Product Data: Submit schedule of vibration isolator type with location and load on each. Submit catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.
- D. Seismic Certification and Analysis:
 - 1. Seismic restraint calculations must be provided for all connections of equipment to the structure. Calculations must be stamped by a registered professional engineer with at least five years of seismic design experience, licensed in the state of the job location.

2. All restraining devices shall have a preapproval number from some other recognized government agency showing maximum restraint ratings. Preapprovals based on independent testing are preferred to preapprovals based on calculations. Where preapproved devices are not available, submittals based on independent testing are preferred. Calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered professional engineer with at least five years of seismic design experience and licensed in the state of the job location. Testing and calculations must include both shear and tensile loads as well as one test or analysis at 45 degrees to the weakest mode.
 3. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length. All seismic restraint devices shall be designed to accept, without failure, the forces detailed in section 1.06 acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.
- E. Design Data: Submit calculations indicating maximum room sound levels are not exceeded. Use sound power levels of actual equipment to be installed on project. Analysis shall include breakout noise calculations. In the absence of specified background sound level criteria, the guidelines as express in Table 34 of Chapter 47, "Sound and Vibration Control" of the 2015 ASHRAE Handbook – HVAC Applications, shall be used.
- F. Test Reports: Indicate dynamic insertion loss and noise generation values of silencers. Acoustic housings meet or exceed specified sound transmission loss values.
- G. Manufacturer's Installation Instructions: Submit special procedures and setting dimensions. Indicate installation requirements maintaining integrity of sound isolation.
- H. Manufacturer's Certificate: Certify isolators meet or exceed specified requirements.
- I. Manufacturer's Field Reports: Indicate sound isolation installation is complete and in accordance with instructions.
- J. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.9 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of hangers including attachment points.

1.10 QUALITY ASSURANCE

- A. Perform Work in accordance with ARI 575 ANSI S12.36.
- B. Maintain one copy of each document on site.
- C. High Performance Building Requirements:
 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.11 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.
- C. Design application of seismic bracing under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.12 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

- B. Convene minimum one week prior to commencing work of this section.

1.13 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.14 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall have the following responsibilities:
 1. Determine vibration isolation and seismic restraint sizes and locations per specifications.
 2. Provide and install isolation systems and seismic restraints as scheduled or specified.
 3. Guarantee specified isolation system deflection.
 4. Provide installation instructions, drawings and field supervision to assure proper installation and performance.
 5. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.
 6. Substitution of "Internally Isolated" mechanical equipment in lieu of the specified isolation of this section is acceptable

1.15 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for inertia bases.

PART 2 PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Manufacturers:
 1. Mason
 2. Vibration Eliminator
 3. Amber Booth
 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Open Spring Isolators:
 1. Spring Isolators:
 - a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
 - b. Code: Color code springs for load carrying capacity.
 2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
 3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
 4. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.

- C. Restrained Spring Isolators:
1. Spring Isolators:
 - a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
 - b. Code: Color code springs for load carrying capacity.
 2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
 3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
 4. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.
 5. Restraint: Furnish mounting frame and limit stops.
- D. Closed Spring Isolators:
1. Spring Isolators:
 - a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
 - b. Code: Color code springs for load carrying capacity.
 2. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
 3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
 4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch clearance.
- E. Restrained Closed Spring Isolators:
1. Spring Isolators:
 - a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
 - b. Code: Color code springs for load carrying capacity.
 2. Type: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.
 3. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
 4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators, and neoprene side stabilizers with minimum 0.25 inch clearance and limit stops.
- F. Spring Hanger:
1. Spring Isolators:
 - a. For Exterior and Humid Areas: Furnish hot dipped galvanized housings and neoprene coated springs.
 - b. Code: Color code springs for load carrying capacity.
 2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
 3. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators rubber hanger with threaded insert.
 4. Misalignment: Capable of 20 degree hanger rod misalignment.
- G. Neoprene Pad Isolators:

1. Rubber or neoprene-waffle pads.
 - a. 30 durometer.
 - b. Minimum 1/2 inch thick.
 - c. Maximum loading 40 psi.
 - d. Height of ribs: not to exceed 0.7 times width.
 2. Configuration: Single layer.
- H. Rubber Mount or Hanger: Molded rubber designed for 0.5 inches deflection with threaded insert.
- I. Glass Fiber Pads: Neoprene jacketed pre-compressed molded glass fiber.
- J. Seismic Snubbers:
1. Type: Non-directional and double acting unit consisting of interlocking steel members restrained by neoprene elements.
 2. Neoprene Elements: Replaceable, minimum of 0.75 inch thick.
 3. Capacity: 4 times load assigned to mount groupings at 0.4 inch deflection.
 4. Attachment Points and Fasteners: Capable of withstanding 3 times rated load capacity of seismic snubber.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify equipment and piping is installed before work in this section is started.

3.2 INSTALLATION

- A. Install spring hangers without binding.
- B. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.
- C. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- D. Provide pairs of horizontal limit springs on fans with more than 6.0 inch static pressure, and on hanger supported, horizontally mounted axial fans.
- E. Provide resiliently mounted equipment and piping with seismic snubbers. Provide each inertia base with minimum of four seismic snubbers located close to isolators. Snub equipment designated for post disaster use to 0.05 inch maximum clearance. Provide other snubbers with clearance between 0.15 inch and 0.25 inch.
- F. Support piping connections to isolated equipment resiliently to nearest flexible pipe connector. as follows:

1. Up to 4 inch Diameter: First three points of support.
2. 5 to 8 inch Diameter: First four points of support.
3. 10 inch Diameter and Over: First six points of support.
4. Select three hangers closest to vibration source for minimum 1.0 inch static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 1.0 inch static deflection or 1/2 static deflection of isolated equipment.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect isolated equipment after installation and submit report. Include static deflections.
- C. After start-up, final corrections and balancing of systems take octave band sound measurements over full audio frequency range in areas adjacent to plumbing equipment rooms, duct and pipe shafts, and other critical locations. Provide one-third octave band measurements of artificial sound sources in areas indicated as having critical requirements. Submit complete report of test results including sound curves.
- D. Furnish services of testing agency to take noise measurement. Use meters meeting requirements of ANSI S1.4.

3.4 SCHEDULES

- A. Pipe Isolation Schedule:

Pipe Size Inch	Isolated Distance from Equipment
1	120 diameters
2	90 diameters
3	80 diameters
4	75 diameters
6	60 diameters
8	60 diameters
10	54 diameters
12	50 diameters

3.5 VIBRATION ISOLATION AND SEISMIC RESTRAINT INSTALLATION

- A. Horizontal pipe isolation: The first three pipe hangers in the main lines near the mechanical equipment shall be as described in specification 11. Specification 11 hangers must also be used in all transverse braced isolated locations. Brace hanger rods with SRC clamps specification 14. Horizontal runs in all other locations throughout the building shall be isolated by hangers as described in specification 10. Floor supported piping shall rest on isolators as described in specification 6. Heat exchanger's and expansion tanks are

considered part of the piping run. The first three isolators from the isolated equipment will have the same static deflection as specified for the mountings under the connected equipment. If piping is connected to equipment located in basements and hangs from ceilings under occupied spaces the first three hangers shall have 0.75" (19mm) deflection for pipe sizes up to and including 3" (75mm), 1 1/2" (38mm) deflection for pipe sizes up to and including 6" (150mm), and 2 1/2" (64mm) deflection thereafter. Hangers shall be located as close to the overhead structure as practical. Where piping connects to mechanical equipment install specification 23 expansion joints or specification 24 stainless hoses if 23 is not suitable for the service.

- B. Riser isolation: Risers shall be suspended from specification 10 hangers or supported by specification 5 mountings, anchored with specification 25 anchors, and guided with specification 26 sliding guides. Steel springs shall be a minimum of 0.75" (19mm) except in those expansion locations where additional deflection is required to limit load changes to $\pm 25\%$ of the initial load. Submittals must include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.
- C. Seismic Restraint of Piping
1. Seismically restrain all piping listed as a, b or c below. Use specification 12 cables if isolated. Specification 12 or 13 restraints may be used on unisolated piping.
 - a. Fuel oil piping, gas piping, medical gas piping, and compressed air piping that is 1" (25mm) I.D. or larger.
 - b. Piping located in boiler rooms, mechanical equipment rooms, and refrigeration equipment rooms that is 1 1/4" (32mm) I.D. and larger.
 - c. All other piping 2 1/2" (64mm) diameter and larger.
 2. Transverse piping restraints shall be at 40' (12m) maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
 3. Longitudinal restraints shall be at 80' (24m) maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
 4. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.
 5. For fuel oil and all gas piping transverse restraints must be at 20' (6m) maximum and longitudinal restraints at 40' (12m) maximum spacing.
 6. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24" (600mm) of the elbow or TEE or combined stresses are within allowable limits at longer distances.
 7. Hold down clamps must be used to attach pipe to all trapeze members before applying restraints in a manner similar to clevis supports.
 8. Branch lines may not be used to restrain main lines.
 9. Cast iron pipe of all types, glass pipe and any other pipes joined with a four band shield and clamp assembly in Zones 2B, 3 and 4 shall be braced as in sections 3.2.D.2 and 3. For Zones 0, 1 and 2A, 2 band clamps may be used with reduced spacings of 1/2 of those listed in sections 3.2.D.2 and 3.

3.6 SEISMIC RESTRAINT EXCLUSIONS

- A. General: All mechanical and electrical components and systems that are considered exempt from the requirement for seismic restraint, in accordance with The International Building Code – 2012, Section.16 and all related State of Connecticut Supplements, shall not require seismic restraint.
- B. Piping
 - 1. Piping in boiler and mechanical rooms less than 1 1/4" (32mm) inside diameter.
 - 2. All other piping less than 2 1/2" (64mm) inside diameter.
 - 3. All piping suspended by individual hangers 12" (300mm) or less as measured from the top of the pipe to the bottom of the support where the hanger is attached. However, if the 12" (300mm) limit is exceeded by any hanger in the run, seismic bracing is required for the run.
 - 4. The 12" (300mm) exemption applies for trapeze supported systems if the top of each item supported by the trapeze qualifies.

3.7 INSPECTION

- A. Examine systems under provisions of Division 1.
- B. On completion of installation of all vibration isolation devices herein specified, the local representative shall inspect the completed system and report in writing any installation error, improperly elected isolation devices, or other faults in the system that could affect the performance of the system. Contractor shall submit a report to the Owner, including the manufacturers representatives' final report, indicating all isolation reported as properly installed or requiring correction, and include a report by the Contractor on steps taken to properly complete the isolation work.

END OF SECTION

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nameplates.
 - 2. Tags.
 - 3. Pipe markers.
 - 4. Ceiling tacks.
 - 5. Labels.
 - 6. Lockout devices.

- B. Related Sections:
 - 1. Section 09 90 00 - Painting and Coating: Execution requirements for painting specified by this section.
 - 2. Section 22 05 00 – Common work results for Plumbing
 - 3. Section 22 05 03 – Pipes and Tubes for Plumbing Piping and Equipment
 - 4. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping
 - 5. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 6. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 7. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
 - 8. Section 22 07 00 - Plumbing Insulation
 - 9. Section 22 30 00 – Plumbing Specialties
 - 10. Section 22 40 00 – Plumbing Fixtures
 - 11. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturers catalog literature for each product required.
- C. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

- F. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.5 QUALITY ASSURANCE

- A. Conform to NFPA 99 requirements for labeling and identification of medical gas piping systems and accessories.
- B. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.
- C. Maintain one copy of each document on site.
- D. High Performance Building Requirements:
 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.

3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two containers of spray-on adhesive

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 1. Craftmark Identification Systems
 2. Safety Sign Co.
 3. Seton Identification Products
 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS

- A. Metal Tags:
 1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Substitutions: Section 01 25 00 – Substitution Procedures.

2. Stainless Steel with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges.
- B. Information Tags:
1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Section 01 25 00 – Substitution Procedures.
 2. 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: Typewritten letter size list of applied tags and location plastic laminated.

2.3 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
- B. Plastic Pipe Markers:
1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Section 01 25 00 – Substitution Procedures.
 2. 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:
1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Section 01 25 00 – Substitution Procedures.
 2. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Plastic Underground Pipe Markers:
1. Manufacturers:
 - a. Seton
 - b. Northtown
 - c. Kolbi
 - d. Section 01 25 00 – Substitution Procedures.
 2. Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.4 CEILING TACKS

- A. Manufacturers:
1. Seton
 2. Northtown

3. Kolbi
4. Section 01 25 00 – Substitution Procedures..

B. Description: Steel with 3/4 inch diameter color-coded head.

- C. Color code as follows:
1. Plumbing valves: Green.

2.5 LABELS

A. Manufacturers:

1. Seton
2. Northtown
3. Kolbi
4. Section 01 25 00 – Substitution Procedures.

B. Description: Aluminum, size 1.9 x 0.75 inches, adhesive backed with printed identification and bar code.

2.6 LOCKOUT DEVICES

A. Lockout Hasps:

1. Manufacturers:
 - a. Seton
 - b. Brady
 - c. Omark
 - d. Section 01 25 00 – Substitution Procedures.
2. Reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

B. Valve Lockout Devices:

1. Manufacturers:
 - a. Seton
 - b. Brady
 - c. Omark
 - d. Section 01 25 00 – Substitution Procedures.
2. Nylon device preventing access to valve operator, accepting lock shackle.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 90 00 for stencil painting.

3.2 INSTALLATION

- 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. Install tags using corrosion resistant chain. Number tags consecutively by location.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify valves in main and branch piping with tags.
- G. Identify piping, concealed or exposed, with plastic pipe markers plastic tape pipe markers stenciled painting. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- H. Provide ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 220700 - PLUMBING INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plumbing piping insulation, jackets and accessories.
 - 2. Plumbing equipment insulation, jackets and accessories.
- B. Related Sections:
 - 1. Section 07 84 13 – Penetration Fireproofing: Product requirements for firestopping for placement by this section.
 - 2. Section 22 05 03 – Pipes and Tubes for Plumbing Piping and Equipment
 - 3. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping
 - 4. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 5. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 6. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
 - 7. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 - 8. Section 22 30 00 – Plumbing Specialties
 - 9. Section 22 40 00 – Plumbing Fixtures
 - 10. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
 - 5. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - 6. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
 - 7. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
 - 8. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - 9. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
 - 10. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - 11. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

12. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
13. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
14. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
15. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
16. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
17. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
18. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
19. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
20. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
21. IECC 2012 – Insulation Thickness.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.
- C. Manufacturer's Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
 1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and

coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.4 QUALITY ASSURANCE

- A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 450 50 in accordance with ASTM E84.
- B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.
- C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.
- D. Maintain one copy copies of each document on site.
- E. High Performance Building Requirements:
 - 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 - 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 - 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.
- C. Maintain temperature before, during, and after installation for minimum period of 24 hours.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for man made fiber.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Manufacturers for Glass Fiber and Mineral Fiber Insulation Products:
 - 1. CertainTeed.
 - 2. Knauf.
 - 3. Johns Manville.
 - 4. Owens-Corning.
 - 5. Section 01 25 00 – Substitution Procedures.
- B. Manufacturers for Closed Cell Elastomeric Insulation Products:
 - 1. Aeroflex. Aerocell.
 - 2. Armacell, LLC. Armaflex.
 - 3. Nomaco. K-flex.
 - 4. Section 01 25 00 – Substitution Procedures.

2.2 PIPE INSULATION

- A. TYPE P-1: ASTM C547, molded glass fiber pipe insulation. Conform to ASTM C795 for application on Austenitic stainless steel.

1. Thermal Conductivity: 0.23 at 75 degrees F.
 2. Operating Temperature Range: 0 to 850 degrees F.
 3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
 4. Jacket Temperature Limit: minus 20 to 150 degrees F.
- B. TYPE P-5: ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
1. Thermal Conductivity: 0.27 at 75 degrees F.
 2. Operating Temperature Range: Range: Minus 70 to 180 degrees F.

2.3 PIPE INSULATION JACKETS

- A. Vapor Retarder Jacket:
1. ASTM C921, white Kraft paper with glass fiber yarn, bonded to aluminized film.
 2. Water Vapor Permeance: ASTM E96/E96M; 0.02 perms.
- B. PVC Plastic Pipe Jacket:
1. Product Description: ASTM D1785, One piece molded type fitting covers and sheet material, off-white color.
 2. Thickness: 15 mil.
 3. Connections: Brush on welding adhesive Tacks Pressure sensitive color matching vinyl tape.

2.4 PIPE INSULATION ACCESSORIES

- A. Vapor Retarder Lap Adhesive: Compatible with insulation.
- B. Covering Adhesive Mastic: Compatible with insulation.
- C. Piping 1-1/2 inches diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.
- D. Piping 2 inches diameter and larger: Wood insulation saddle, hard maple. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.
- E. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum stainless steel jacket single piece construction with self adhesive closure. Thickness to match pipe insulation.
- F. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.
- G. Insulating Cement: ASTM C195; hydraulic setting on mineral wool.
- H. Adhesives: Compatible with insulation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify piping and equipment has been tested before applying insulation materials.
- C. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING SYSTEMS

- A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.
- 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. Refer to Section 07 84 00 for penetrations of assemblies with fire resistance rating greater than one hour.
- C. Piping Systems Conveying Fluids Below Ambient Temperature:
 - 1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
 - 2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
 - 3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.
- D. Glass Fiber Board Insulation:
 - 1. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
 - 2. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.
 - 3. Cover wire mesh or bands with cement to a thickness to remove surface irregularities.
- E. Hot Piping Systems less than 140 degrees F:
 - 1. Furnish factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
 - 3. Do not insulate unions and flanges at equipment, but bevel and seal ends of insulation at such locations.

- F. Hot Piping Systems greater than 140 degrees F:
1. Furnish factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
 3. Insulate flanges and unions at equipment.
- G. Inserts and Shields:
1. Piping 1-1/2 inches Diameter and Smaller: Install galvanized steel shield between pipe hanger and insulation.
 2. Piping 2 inches Diameter and Larger: Install insert between support shield and piping and under finish jacket.
 - a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
 - b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.
 3. Piping Supported by Roller Type Pipe Hangers: Install galvanized steel shield between roller and inserts.
- H. Insulation Terminating Points:
1. Coil Branch Piping 1 inch and Smaller: Terminate hot water piping at union upstream of the coil control valve.
 2. Chilled Water Coil Branch Piping: Insulate chilled water piping and associated components up to coil connection.
 3. Condensate Piping: Insulate entire piping system and components to prevent condensation.
- I. Closed Cell Elastomeric Insulation:
1. Push insulation on to piping.
 2. Miter joints at elbows.
 3. Seal seams and butt joints with manufacturer's recommended adhesive.
 4. When application requires multiple layers, apply with joints staggered.
 5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.
- J. High Temperature Pipe Insulation:
1. Install in multiple layers to meet thickness scheduled.
 2. Attach each layer with bands. Secure first layer with bands before installing next layer.
 3. Stagger joints between layers.
 4. Finish with canvas jacket sized for finish painting.
 5. Cover with aluminum jacket stainless steel jacket with seams located on bottom side of horizontal piping.
- K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting PVC jacket and fitting covers ABS jacket and fitting covers aluminum jacket stainless steel jacket.

3.3 SCHEDULES

A. Water Supply Services Piping Insulation Schedule:

PIPING SYSTEM	INSULATION TYPE	PIPE SIZE	INSULATION THICKNESS inches
Domestic Hot Water Supply and Recirculation	P-1	1-1/4 inches and smaller	0.5
		1-1/2 inches and larger	1.0
Domestic Hot Water Supply and Recirculation systems with domestic water temperature maintenance cable	P-1	1 inch and smaller	1.0
		1-1/4 inches to 2 inches	1.5
		2-1/2 inches and larger	2.0
Domestic Cold Water	P-1 or P-5	1-1/4 inches and smaller	0.5
		1-1/2 inches and larger	1.0

B. Drainage Services Piping Insulation Schedule:

PIPING SYSTEM	INSULATION TYPE	PIPE SIZE	INSULATION THICKNESS inches
Storm Piping (above ground within building)	P-1 or P-5	All sizes	1.0
Storm Piping (horizontal and vertical above ground within building when PVC pipe is used)	P-1 or P-5	All sizes	1.0
Sanitary Sewer Piping (horizontal and vertical above ground within building when PVC or plastic piping is used)	P-1 or P-5	All sizes	1.0

END OF SECTION

SECTION 223000 - PLUMBING SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hose bibs.
 - 2. Wall hydrants.
 - 3. Water hammer arrestors.
 - 4. Trap primers.
 - 5. Thermostatic mixing valves.
 - 6. Floor drains.

- B. Related Sections:
 - 1. Section 07 92 00 - Joint Sealants: Product requirements for calking between fixtures and building components for placement by this section.
 - 2. Section 22 05 00 – Common work results for Plumbing
 - 3. Section 22 05 03 – Pipes and Tubes for Plumbing Piping and Equipment
 - 4. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping
 - 5. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 6. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 7. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
 - 8. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 - 9. Section 22 07 00 - Plumbing Insulation
 - 10. Section 22 40 00 – Plumbing Fixtures
 - 11. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.
 - 2. ANSI/ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
 - 3. ANSI A112.26.1 - Water Hammer Arrestors.
 - 4. ASME A112.21.1 - Floor Drains.

- B. Plumbing Drainage institute:
 - 1. PDI WH-201 – Water Hammer Arresters.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

- B. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

- C. Product Data: Provide component sizes, rough-in requirements, service sizes, capacities and finishes.

- D. Manufacturer's Installation Instructions: Submit installation methods and procedures. Indicate assembly and support requirements.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- F. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
- G. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
- H. Hangers and Supports: Submit manufacturers catalog information including load capacity.
- I. Storm Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
- J. Sanitary Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
- K. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
 - 1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
 - 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit fixture, trim, exploded view and replacement parts lists.

- C. Project Record Documents: Record actual locations of equipment and clean-outs.

1.5 QUALITY ASSURANCE

- A. Record actual locations of equipment, cleanouts, etc.
- B. Provide products requiring electrical connections listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.
- C. Provide plumbing fixture fittings in accordance with ASME A112.18.1 that prevent backflow from fixture into water distribution system.
- D. Maintain one copy of each document on site.
- E. High Performance Building Requirements:
 - 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 - 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 - 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept specialties on site in factory packaging. Inspect for damage.
- C. Protect installed specialties from damage by securing areas.

1.9 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

1.10 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Provide two loose keys for hose bibs and wall hydrants

PART 2 PRODUCTS

2.1 HOSE BIBS

- A. Manufacturers:
 - 1. Woodford.
 - 2. JR Smith.
 - 3. Watts.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. ANSI/ASSE 1011 Bronze or brass with integral mounting flange, vacuum breaker.

2.2 WALL HYDRANTS

- A. Manufacturers:
 - 1. Woodford.
 - 2. JR Smith.
 - 3. Watts.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Wall Hydrant: ANSI/ASSE 1019; self-draining type, freeze proof with removable key and integral vacuum breaker.

2.3 WATER HAMMER ARRESTORS

- A. Manufacturers:
 - 1. Precision Plumbing Products.
 - 2. JR Smith
 - 3. Zurn.
 - 4. Watts.
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. ANSI A112.26.1; sized in accordance with PDI, precharged, suitable for operation in temperature range -100 to 300 degrees F (-73 to 149 degrees C) and maximum 250 psig (1700 kPa) working pressure.

2.4 TRAP PRIMERS

- A. Manufacturers:
1. Precision Plumbing Products.
 2. JR Smith.
 3. Zurn.
 4. Watts.
 5. PPP.
 6. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. ASSE 1018: Corrosion resistant brass, temperature range –40 to 450 degrees, ½” male inlet and ½” female outlet, pressure operating range 35 to 75 psig.

2.5 THERMOSTATIC MIXING VALVES

- A. Manufacturers: Powers model as scheduled on the drawings.
- B. Other acceptable manufacturers offer equivalent products:
1. Lawler
 2. Acorn
 3. Bradley
 4. Watts
- C. Accessories:
1. Check valves on inlets.
 2. Volume control shut-off valve on outlet.
 3. Stem thermometer on outlet.
 4. Strainer stop checks on inlets.
- D. Cabinet: 16 gage (1.5 mm) prime coated steel, for recessed mounting with keyed lock.
1. Mixing Valves installed in mechanical rooms may be exposed. Valves installed in finished space shall be installed in box.

2.6 FLOOR DRAINS

- A. Manufacturers:
1. JR Smith
 2. Watts
 3. Zurn
 4. Mifab
 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Floor Drain: ASME A112.21.1; cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, trap primer connection and round, adjustable round nickel-bronze strainer with maximum ½”grate spacing, removable perforated sediment bucket.

2.7 CLEANOUTS

- A. Manufacturers:
 - 1. JR Smith
 - 2. Watts
 - 3. Zurn
 - 4. Mifab
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Exterior Surfaced Areas: Round Square cast nickel bronze access frame and non-skid cover.
- C. Exterior Unsurfaced Areas: Line type with lacquered cast iron body and round epoxy coated cover with gasket.
- D. Interior Finished Floor Areas: Lacquered Galvanized cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round scored cover with gasket in service areas and round square depressed cover with gasket to accept floor finish in finished floor areas.
- E. Interior Finished Wall Areas: Line type with lacquered cast iron body and round epoxy coated cover with gasket, and round stainless steel access cover secured with machine screw.
- F. Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify walls and floor finishes are prepared and ready for installation of fixtures.
- C. Verify electric power is available and of correct characteristics.

3.2 PREPARATION

- A. Coordinate cutting and forming of roof and floor construction to receive drains to required invert elevations.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cleanouts at storm and sanitary piping changes of direction and at the locations that storm and sanitary piping exits the building.

- C. Cleanouts shall be same size as the pipes served, up to 4 inches; 5 and 6 inch pipes shall have 4 inch cleanouts; 8 inch pipes shall have 6 inch cleanouts; 10 inch pipes and larger shall have 8 inch cleanouts.
- D. Install components level and plumb.
- E. Install water hammer arrestors with isolation valve in accessible locations, provide with access doors, size, color and exact location to be coordinated by plumbing contractor with architect and architectural drawings.
- F. Trap primers shall be provided and installed to serve all floor drains floor sinks and indirect drains, provide distribution units as required for all drains.
- G. Trap primer connections shall be installed on cold water piping 1 ½ inch diameter or less.
- H. When floor finish includes tile, floor drain strainers and cleanout covers shall be provided to match tile shape to best extend possible. Square shall be used when square tiles are provided. When tile is a different shape, the contractor shall confirm with architect what shape shall be provided.

3.4 INTERCEPTORS

- A. Provide sediment interceptors for all art room sinks, maintain clearances as required by the manufacturer.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Review millwork shop-drawings. Confirm location and size of drains before rough in and installation.

3.6 ADJUSTING

- A. Section 01 77 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

3.7 CLEANING

- A. Section 01 77 00 - Execution and Closeout Requirements: Final cleaning.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 77 00 - Execution and Closeout Requirements: Protecting installed construction.

3.9 COMMISSIONING OF EQUIPMENT

- A. Engage a factory-authorized service representative, who is familiar with this project, to participate and assist, if necessary, in the functional performance testing of this equipment with the Commissioning Agent.

END OF SECTION

SECTION 224000 - PLUMBING FIXTURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Water closets.
 - 2. Urinals.
 - 3. Lavatory.

- B. Related Sections:
 - 1. Section 07 92 00 - Joint Sealant: Product requirements for calking between fixtures and building components for placement by this section.
 - 2. Section 22 05 03 – Pipes and Tubes for Plumbing Piping and Equipment
 - 3. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping
 - 4. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 5. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 6. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment
 - 7. Section 22 05 53 – Identification for Plumbing Piping and Equipment
 - 8. Section 22 07 00 - Plumbing Insulation
 - 9. Section 22 30 00 – Plumbing Specialties
 - 10. Refer to Division 01 for General Conditions required for this section.

1.2

- A. All system programming and labeling utilizing room numbers shall follow the room numbering plans provided by the Architect. Room numbers shown on contract documents for individual trades are not to be considered final numbers and shall not be utilized.

1.3 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

- B. American Society of Mechanical Engineers:
 - 1. ASME A112.6.1 - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.
 - 2. ASME A112.18.1 - Plumbing Fixture Fittings.
 - 3. ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures.
 - 4. ASME A112.19.2M - Vitreous China Plumbing Fixtures.
 - 5. ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use).
 - 6. ASME A112.19.4 - Porcelain Enameled Formed Steel Plumbing Fixtures.
 - 7. ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks and Urinals.

- C. ICC:
 - 1. IECC - 2012

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Installation Instructions: Submit installation methods and procedures.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. High Performance Building Submittal Requirements: The contractor or subcontractor shall submit the following High Performance Building certification items:
 - 1. A Connecticut High Performance Building Compliance letter shall be provided verifying agreement with relevant High Performance requirements. Information to be supplied includes, but is not limited to:
 - a. The percentage by weight of recycled content in the product(s). Identify post-consumer and/or pre-consumer recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials of this Section that meet High Performance Building Requirements.
 - 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC content, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC content).

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit fixture, trim, exploded view and replacement parts lists.

1.6 QUALITY ASSURANCE

- A. Provide products requiring electrical connections listed and classified by Underwriters Laboratories Inc., testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.
- B. Provide plumbing fixture fittings in accordance with ASME A112.18.1 that prevent backflow from fixture into water distribution system.

- C. Maintain one copy of each document on site.
- D. High Performance Building Requirements:
 - 1. Adhesives, sealants, paints or coatings used for work in this section for interior applications shall meet the requirements of Division 1, Section 018113: "Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings", where applicable.
 - 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the High Performance Building Requirements of this Section.
 - 3. Materials that contain recycled content shall be documented in accordance with the High Performance Building Requirements of this Section.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept fixtures on site in factory packaging. Inspect for damage.
- C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for plumbing fixtures.

1.11 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.

- B. Furnish two sets of faucet washers flush valve service kits sink/lavatory supply fittings shower heads toilet seats

PART 2 PRODUCTS

2.1 FLUSH VALVE WATER CLOSETS

- A. Manufacturers:
 - 1. Kohler Co.
 - 2. American Standard Plumbing
 - 3. Zurn
 - 4. Sloan
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Bowl: ASME A112.19.2M; wall hung, siphon jet vitreous china closet bowl, with elongated rim, 1-1/2 inch top or back spud, china bolt caps.
- C. Sensor Operated Flush Valve: ASME A112.18.1; concealed rough brass, diaphragm type with low voltage operated solenoid operator, infrared sensor and over-ride button in chrome plated plate, wheel handle stop and vacuum breaker; maximum 1.28 gallon flush volume.
- D. Seat: Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover.
- E. Wall Mounted Carrier: ASME A112.6.1; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.2 WALL HUNG URINALS

- A. Manufacturers:
 - 1. Kohler Co.
 - 2. American Standard Plumbing
 - 3. Sloan
 - 4. Zurn
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Urinal: ASME A112.19.2M or ANSI Z124.9, vitreous; vitreous china, wall hung washout siphon jet urinal with shields, integral trap, removable stainless steel strainer, 3/4 inch top or back spud, steel supporting hanger.
- C. Sensor Operated Flush Valve: ASME A112.18.1; concealed rough brass, diaphragm type with battery operated solenoid operator, infrared sensor and over-ride button in chrome plated plate, wheel handle stop and vacuum breaker; maximum 1/8 gallon flush volume.
- D. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

- E. Provide elastomeric gasket complying with ASME A112.4.3, or approved setting compound, for fixture to flange connection.

2.3 LAVATORIES

- A. Manufacturers:
 - 1. Kohler Co.
 - 2. American Standard Plumbing
 - 3. Eljer Plumbingware
 - 4. Crane
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Vitreous China Basin: ASME A112.19.2M; vitreous china lavatory, drillings on 4 inch centers, round basin with splash lip, front overflow, and soap depression.
- C. Supply Fitting: ASME A112.18.1; low flow, chrome plated supply fitting with open grid strainer, water economy aerator with maximum 1.0 gpm flow rate.
- D. Waste Fittings: ASME A112.18.2 or ASTM F 409.
- E. For public hand washing facilities, provide tempered water through regulating device conforming to ASSE 1070.
- F. Accessories:
 - 1. Chrome plated 17 gage brass P-trap and arm with escutcheon.
 - 2. Offset waste with perforated open strainer.
 - 3. Screwdriver stops.
 - 4. Flexible supplies.
 - 5. Trap and waste insulated and offset to meet ADA compliance.
- G. Wall Mounted Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

2.4 LAVATORY INSULATION KIT

- A. Manufacturers:
 - 1. McGuire
 - 2. Truebro
 - 3. Plumerex
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Where Lavatories are noted to be insulated for ADA compliance, furnish the following: Safety Covers conforming to ANSI A177.1 and consisting of insulation kit of molded closed cell vinyl construction, 3/16 inch thick, white gray color, for insulating tailpiece, P-trap, valves, and supply piping. Furnish with weep hole and angle valve access covers.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify walls and floor finishes are prepared and ready for installation of fixtures.
- C. Verify electric power is available and of correct characteristics.
- D. Confirm millwork is constructed with adequate provision for installation of counter top lavatories and sinks.

3.2 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key screwdriver stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 00, color to match fixture.
- F. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.
- G. For ADA accessible water closets, install flush valve with handle to wide side of stall.
- H. Contractor shall furnish and install faucet aerators as required to comply with CT high performance building water conservation requirements.

3.4 INTERFACE WITH OTHER PRODUCTS

- A. Review millwork shop-drawings. Confirm location and size of fixtures and openings before rough in and installation.
- B. Review kitchen, finish, and equipment plans and specifications for additional work and materials to be furnished or installed by the plumbing contractor.

3.5 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean plumbing fixtures and equipment.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Do not permit use of fixtures before final acceptance.

3.8 SCHEDULES

- A. Fixture Rough-In:

Fixture	Hot inches	Cold inches	Waste inches	Vent inches
Water Closet (Flush Valve):		1	4	2
Urinal (Flush Valve):		3/4	2	1-1/2
Lavatory:	1/2	1/2	1-1/2	1-1/2

END OF SECTION

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes single- and three-phase motors for application on equipment provided under other sections.
- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
 - 3. Section 26 05 53 - Identification for Electrical Systems.

1.2 REFERENCES

- A. American Bearing Manufacturers Association:
 - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.
- C. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit catalog data for each motor furnished loose. Indicate nameplate data, standard compliance, electrical ratings and characteristics, and physical dimensions, weights, mechanical performance data, and support points.
- C. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Testing Agency: Company member of International Electrical Testing Association and specializing in testing products specified in this section with minimum three years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

PART 2 PRODUCTS

2.1 PRODUCT REQUIREMENTS FOR MOTORS FURNISHED WITH EQUIPMENT

- A. Manufacturers:
1. Cooper Industries Inc.
 2. Eaton Corp.
 3. General Electric Co.
 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Motors 3/4 hp and Larger: Three-phase motor as specified below.
- C. Motors Smaller Than 3/4 hp: Single-phase motor as specified below, except motors less than 250 watts or 1/4 hp may be equipment manufacturer's standard.
- D. Three-Phase Motors: NEMA MG 1, Design B, energy-efficient squirrel-cage induction motor, with windings to accomplish starting methods and number of speeds as indicated on Drawings.
1. Voltage: As indicated on Drawings.
 2. Service Factor: 1.15.
 3. Enclosure: Meet conditions of installation unless specific enclosure is indicated on Drawings.
 4. Design for continuous operation in 40 degrees C environment, with temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
 5. Insulation System: NEMA Class F.
 6. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
 7. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay with wiring to terminal box.
 8. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 200,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
 9. Sound Power Levels: Conform to NEMA MG 1.
- E. Single Phase Motors:
1. Permanent split-capacitor type where available, otherwise use split-phase start/capacitor run or capacitor start/capacitor run motor.
 2. Voltage: As specified on drawings.
- F. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

2.2 SOURCE QUALITY CONTROL

- A. Test motors in accordance with NEMA MG 1, including winding resistance, no-load speed and current, locked rotor current, insulation high-potential test, and mechanical alignment tests.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install engraved plastic nameplates in accordance with Section 26 05 53.
- B. Ground and bond motors in accordance with Section 26 05 26.

3.2 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.15.

END OF SECTION

SECTION 230516 - EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flexible pipe connectors.
 - 2. Expansion joints.
 - 3. Expansion compensators.
 - 4. Pipe alignment guides.
 - 5. Swivel joints.
 - 6. Pipe anchors.

- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product and installation requirements for piping hangers and supports.
 - 3. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product and installation requirements for vibration isolators used in piping systems.
 - 4. Section 23 21 13 - Hydronic Piping: Product and installation requirements for piping used in hydronic heating and cooling systems.
 - 5. Section 23 23 00 - Refrigerant Piping: Product and installation requirements for piping used in refrigeration systems.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B31.5 - Refrigeration Piping.
 - 2. ASME B31.9 - Building Services Piping.
 - 3. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

- B. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.

1.3 DESIGN REQUIREMENTS

- A. Provide structural work and equipment required for expansion and contraction of piping. Verify anchors, guides, and expansion joints provide and adequately protect system.

- B. Expansion Compensation Design Criteria:
 - 1. Installation Temperature: 50 degrees F.
 - 2. Hot Water Heating System Temperature: 210 degrees F.
 - 3. Safety Factor: 30 percent.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets and swing joints. Submit shop drawings sealed by a registered professional engineer.
- C. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - a. On Victaulic installations, provide specific locations and style number of intended flexible couplings to be used in lieu of each flexible connector
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- D. Design Data: Indicate criteria and show calculations. Submit calculations sealed by a registered professional engineer.
- E. Manufacturer's Installation Instructions: Submit special procedures.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- G. Welders' Certificate: Include welders' certification of compliance with ASME Section IX and AWS D1.1.
- H. Manufacturer's Field Reports: Indicate results of inspection by manufacturer's representative.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of flexible pipe connectors, expansion joints, anchors, and guides.
- C. Operation and Maintenance Data: Submit adjustment instructions.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ASME B31.5 or ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

1.7 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.
- C. Design expansion compensating system under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Connecticut.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept expansion joints on site in factory packing with shipping bars and positioning devices intact. Inspect for damage.
- C. Protect equipment from exposure by leaving factory coverings, pipe end protection, and packaging in place until installation.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS

- A. Manufacturers:
 - 1. Mason
 - 2. Metraflex
 - 3. Vibration Elimination
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Steel Piping:
 - 1. Inner Hose: Carbon Steel.
 - 2. Exterior Sleeve: Double braided, stainless steel.
 - 3. Pressure Rating: 125 psig WSP and 450 degrees F.
 - 4. Joint: As specified for pipe joints.
 - 5. Size: Use pipe-sized units.
 - 6. Maximum offset: 3/4 inch on each side of installed center line.

- C. Copper Piping:
 - 1. Inner Hose: Bronze.
 - 2. Exterior Sleeve: Braided bronze.
 - 3. Pressure Rating: 125 psig WSP and 450 degrees F.
 - 4. Joint: As specified for pipe joints.
 - 5. Size: Use pipe sized units.
 - 6. Maximum offset: 3/4 inch on each side of installed center line.

2.2 EXPANSION JOINTS

- A. Manufacturers:
 - 1. Mason
 - 2. Metraflex
 - 3. Vibration Elimination
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Stainless Steel Bellows Type:
 - 1. Pressure Rating: 125 psig WSP and 400 degrees F.
 - 2. Maximum Compression: 1-3/4 inch.
 - 3. Maximum Extension: 1/4 inch.
 - 4. Joint: As specified for pipe joints.
 - 5. Size: Use pipe sized units.
 - 6. Application: Steel piping 3 inch and smaller.
- C. External Ring Controlled Stainless Steel Bellows Type:
 - 1. Pressure Rating: 125 psig WSP and 400 degrees F.
 - 2. Maximum Compression: 15/16 inch.
 - 3. Maximum Extension: 5/16 inch.
 - 4. Maximum Offset: 1/8 inch.
 - 5. Joint: Flanged.
 - 6. Size: Use pipe sized units.
 - 7. Accessories: Internal flow liner.
 - 8. Application: Steel piping 3 inch and larger.
- D. Two-ply Bronze Bellows Type:
 - 1. Construction: Bronze with anti-torque device, limit stops, internal guides.
 - 2. Pressure Rating: 125 psig WSP and 400 degrees F.
 - 3. Maximum Compression: 1-3/4 inch.
 - 4. Maximum Extension: 1/4 inch.
 - 5. Joint: As specified for pipe joints.
 - 6. Size: Use pipe sized units.
 - 7. Application: Copper piping.
- E. Copper with Packed Sliding Sleeve:
 - 1. Maximum Temperature: 250 degrees F.
 - 2. Joint: As specified for pipe joints.
 - 3. Size: Use pipe sized units.

4. Copper or steel piping 2 inches and larger.
5. Application: Copper or steel piping 2 inch and larger.

2.3 ACCESSORIES

- A. Manufacturers:
 1. Mason
 2. Metraflex
 3. Vibration Elimination
 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Pipe Alignment Guides: Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel.
- C. Swivel Joints: Ductile Iron body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install Work in accordance with ASME B31.5 or ASME B31.9.
- B. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Refer to Section 23 05 48. Provide line size flexible connectors.
- C. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- D. Rigidly anchor pipe to building structure. Provide pipe guides to direct movement only along axis of pipe. Erect piping so strain and weight is not on cast connections or apparatus.
- E. Provide support and anchors for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required and as indicated on Drawings. Refer to Section 23 05 29 for pipe hanger installation requirements.
- F. Provide expansion loops as indicated on Drawings. Rigid couplings shall not be permitted on any loop.

3.2 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Manufacturers' field services.
- B. Furnish inspection services by flexible pipe manufacturer's representative for final installation and certify installation is in accordance with manufacturer's recommendations and connectors are performing satisfactorily.

END OF SECTION

SECTION 230523 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gate valves.
 - 2. Globe valves.
 - 3. Ball valves.
 - 4. Butterfly valves
 - 5. Check valves.

- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product and installation requirements for pipe hangers and supports.
 - 3. Section 23 07 00 - HVAC Insulation: Product and installation requirements for insulation for valves.
 - 4. Section 23 21 13 - Hydronic Piping: Product and installation requirements for piping used in hydronic piping systems.
 - 5. Section 23 21 16 - Hydronic Piping Specialties: Product and installation requirements for piping specialties used in hydronic piping systems.

1.2 REFERENCES

- A. Manufacturers Standardization Society of the Valve and Fittings Industry:
 - 1. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
 - 2. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 - 3. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
 - 4. MSS SP 85 - Cast Iron Globe & Angle Valves, Flanged and Threaded.
 - 5. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.

- C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.

- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of valves.
- C. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.5 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.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.

1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 GATE VALVES

- A. Manufacturers:
 - 1. Crane Valve, North America
 - 2. Victaulic
 - 3. Milwaukee Valve Company
 - 4. Stockham Valves & Fittings
 - 5. Watts

6. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. 2 inches and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, union bonnet, non-rising stem, hand-wheel, inside screw with back-seating stem, solid wedge disc, alloy seat rings, solder or threaded ends.
- C. 2-1/2 inches and Larger: MSS SP 70, Class 125, cast iron body, bronze trim, bolted bonnet, non-rising stem, hand-wheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.2 GLOBE VALVES

- A. Manufacturers:
 - 1. Crane Valve, North America
 - 2. Milwaukee Valve Company
 - 3. Stockham Valves & Fittings
 - 4. Watts
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. 2 inches and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, union bonnet, hand wheel, Buna-N composition disc, solder or threaded ends.
- C. 2-1/2 inches and Larger: MSS SP 85, Class 125, cast iron body, bronze trim, hand wheel, outside screw and yoke, flanged ends. Furnish chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.3 BALL VALVES

- A. Manufacturers:
 - 1. Crane Valve, North America
 - 2. Milwaukee Valve Company
 - 3. Stockham Valves & Fittings
 - 4. Watts
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. 2 inches and Smaller: MSS SP 110, Class 150, bronze, three piece body, chrome plated bronze ball, full port, teflon seats, blow-out proof stem, solder or threaded ends, extended lever handle with balancing stops.

2.4 BUTTERFLY VALVES

- A. Manufacturers:
 - 1. Crane Valve, North America
 - 2. Milwaukee Valve Company
 - 3. NIBCO, Inc.
 - 4. Victaulic
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. 2-1/2 inches and Larger: MSS SP 67, Class 150 .
 - 1. Body: Cast or ductile iron, lug or grooved ends, stainless steel stem, extended neck.
 - 2. Disc: Chrome plated ductile iron
 - 3. Seat: Resilient replaceable EPDM
 - 4. Handle and Operator: 10 position lever handle. Furnish gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.5 CHECK VALVES

- A. Horizontal Swing Check Valves:
 - 1. Manufacturers:
 - a. Crane Valve, North America
 - b. Milwaukee Valve Company
 - c. Stockham Valves & Fittings
 - d. Victaulic
 - e. Watts
 - f. Substitutions: Section 01 25 00 – Substitution Procedures.
 - 2. 2 inches and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, solder or threaded ends.
 - 3. 2-1/2 inches and Larger: MSS SP 71, Class 125, cast iron body, bolted cap, bronze or cast iron disc, renewable disc seal and seat, flanged ends.
 - 4. 2 inches through 4 inches: 300 psi CWP, ductile iron body, stainless steel clapper, synthetic rubber bonnet and bumper seals, stainless steel wetted parts, grooved ends.
- B. Spring Loaded Check Valves:
 - 1. Manufacturers:
 - a. Crane Valve, North America
 - b. Milwaukee Valve Company
 - c. Stockham Valves & Fittings
 - d. Victaulic
 - e. Watts
 - f. Substitutions: Section 01 25 00 – Substitution Procedures.
 - 2. 2 inches and Smaller: MSS SP 80, Class 250, bronze body, in-line spring lift check, silent closing, Buna-N disc, integral seat, solder or threaded ends.
 - 3. 2-1/2 inches and Larger: MSS SP 71, Class 125, wafer style, cast iron body, bronze seat, center guided bronze disc, stainless steel spring and screws, flanged ends.
 - 4. 2-1/2 inches through 12 inches: 300 psi CWP, ductile iron body, aluminum bronze or elastomer encapsulated ductile iron disc, stainless steel spring and shaft, PPS coated or welded-in nickel seat, grooved ends. Venturi taps located on both sides may be provided for flow measurement accuracy.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify piping system is ready for valve installation.

3.2 INSTALLATION

- 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 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
- D. Install valves with clearance for installation of insulation and allowing access.
- E. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Section 08 31 13.
- F. Refer to Section 23 05 29 for pipe hangers.
- G. Refer to Section 23 07 00 for insulation requirements for valves.
- H. For installation of valves in hot water Section 23 22 13.

3.3 VALVE APPLICATIONS

- A. Install shutoff and drain valves at locations indicated on Drawings in accordance with this Section.
- B. Install ball or gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- C. Install globe valves for throttling, bypass, or manual flow control services.

END OF SECTION

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe hangers and supports.
 - 2. Hanger rods.
 - 3. Inserts.
 - 4. Flashing.
 - 5. Equipment curbs.
 - 6. Sleeves.
 - 7. Mechanical sleeve seals.
 - 8. Formed steel channel.
 - 9. Equipment bases and supports.

- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
 - 3. Section 07 90 00 - Joint Protection: Product requirements for sealant materials for placement by this section.
 - 4. Section 09 90 00 - Painting and Coating: Product and execution requirements for painting specified by this section.
 - 5. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product and execution requirements for vibration isolators.
 - 6. Section 23 21 13 - Hydronic Piping: Execution requirements for placement of hangers and supports specified by this section.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B31.5 - Refrigeration Piping.
 - 2. ASME B31.9 - Building Services Piping.

- B. ASTM International:
 - 1. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

- C. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.

- D. Manufacturers Standardization Society of the Valve and Fittings Industry:
 - 1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
 - 2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
 - 3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.
- C. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
- D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers. Submit calculations sealed by a registered professional engineer.
- E. Manufacturer's Installation Instructions:
 - 1. Hangers and Supports: Submit special procedures and assembly of components.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.6 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.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers:
 - 1. Nibco
 - 2. Empire
 - 3. Flex-Weld, Inc.
 - 4. Glope Pipe Hanger Products Inc.
 - 5. Michigan Hanger Co.
 - 6. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Hydronic Piping:
 - 1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69 and MSS SP89.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
 - 6. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
 - 7. Vertical Support: Steel riser clamp.
 - 8. Floor Support for Hot Pipe Sizes 4 Inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 9. Copper Pipe Support: Copper-plated, carbon steel ring.
- C. Refrigerant Piping:
 - 1. Conform to ASME B31.5, ASTM F708, MSS SP58, MSS SP69 and MSS SP89.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.

4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.
6. Vertical Support: Steel riser clamp.
7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
8. Copper Pipe Support: Copper-plated carbon-steel ring.

2.2 ACCESSORIES

- A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS

- A. Manufacturers:
 1. Thunderline Link Seal
 2. Fernco
 3. BWM
 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

- A. Metal Flashing: 26 gage thick galvanized steel.
- B. Metal Counterflashing: 22 gage thick galvanized steel.
- C. Lead Flashing:
 1. Waterproofing: 5 lb./sq. ft sheet lead.
 2. Soundproofing: 1 lb./sq. ft sheet lead.
- D. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
- E. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.5 EQUIPMENT CURBS

- A. Manufacturers:
 1. Trimco
 2. Cambridgeport
 3. Pate
 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Fabrication: Welded 18 gage galvanized steel shell and base, mitered 3 inch cant, variable step to match root insulation, factory installed wood nailer.

2.6 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
- C. Sleeves for Round Ductwork: Galvanized steel.
- D. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- E. Sealant: Acrylic; refer to Section 07 90 00.

2.7 MECHANICAL SLEEVE SEALS

- A. Manufacturers:
 - 1. Thunderline Link-Seal, Inc.
 - 2. NMP Corporation
 - 3. Fernco
 - 4. BWM
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.8 FORMED STEEL CHANNEL

- A. Manufacturers:
 - 1. Allied Tube & Conduit Corp.
 - 2. B-Line Systems
 - 3. Midland Ross Corporation, Electrical Products Division
 - 4. Unistrut Corp.
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.
- C. Verify openings are ready to receive firestopping.

3.2 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.
- C. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- D. Do not drill or cut structural members.

3.3 INSTALLATION - INSERTS

- A. Install inserts for placement in concrete forms.
- B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install in accordance with ASME B31.5, ASME 31.9, ASTM F708, MSS SP 58, MSS SP 69 and MSS SP 89.
- B. Support horizontal piping as scheduled.
- C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Use hangers with 1-1/2 inch minimum vertical adjustment.
- F. Support vertical piping at every floor.
- G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide copper plated hangers and supports for copper piping.
- J. Design hangers for pipe movement without disengagement of supported pipe.

- K. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 23 07 00 Provide supplemental angles, channels and formed steel supports to support piping, ductwork, equipment, etc. from building's structure. Piping, ductwork, equipment, etc. shall not be supported from the roof deck.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- B. Construct supports of formed steel channel. Brace and fasten with flanges bolted to structure.
- C. Provide rigid anchors for pipes after vibration isolation components are installed. Refer to Section 23 05 48.

3.6 INSTALLATION - FLASHING

- A. Provide flexible flashing and metal Counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms for sound control.
- C. 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.
- D. 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.

3.7 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with mechanical sleeve seals.
- B. Set sleeves in position in forms. Provide reinforcing around sleeves.
- C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- E. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with firestopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- F. Install chrome plated steel escutcheons at finished surfaces.

3.8 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.9 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.10 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

3.11 SCHEDULES

- A. Copper and Steel Pipe Hanger Spacing:

PIPE SIZE Inches	COPPER TUBING MAXIMUM HANGER SPACING Feet	STEEL PIPE MAXIMUM HANGER SPACING Feet	COPPER TUBING HANGER ROD DIAMETER Inches	STEEL PIPE HANGER ROD DIAMETER Inches
1/2	5	7	3/8	3/8
3/4	5	7	3/8	3/8
1	6	7	3/8	3/8
1-1/4	7	7	3/8	3/8
1-1/2	8	9	3/8	3/8
2	8	10	3/8	3/8
2-1/2	9	11	1/2	1/2
3	n/a	12	n/a	1/2
4	n/a	14	n/a	5/8
5	n/a	16	n/a	5/8
6	n/a	17	n/a	3/4

END OF SECTION

SECTION 230548 - VIBRATION AND SEISMIC CONTROLS
FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 INTENT

- A. All mechanical equipment, piping and ductwork as noted on the equipment schedule or in the specification shall be mounted on vibration isolators to prevent the transmission of vibration and mechanically transmitted sound to the building structure. Vibration isolators shall be selected in accordance with the weight distribution so as to produce reasonably uniform deflections.
- B. All isolators and isolation materials shall be of the same manufacturer and shall be certified by the manufacturer.
- C. It is the intent of the seismic portion of this specification to keep all mechanical and electrical building system components in place during a seismic event.
- D. All such systems must be installed in strict accordance with seismic codes, component manufacturer's recommendations and building construction standards. Whenever a conflict occurs between the manufacturer's recommendations or construction standards, the most stringent shall apply.
- E. This specification is considered to be minimum requirements for seismic consideration and is not intended as a substitute for legislated, more stringent, national, state or local construction requirements (i.e. California Title 24, California OSHPD, Canadian Building Codes, or other requirements).
- F. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner.

1.2 SUMMARY

- A. Section Includes:
 - 1. Certification of seismic restraint designs and installation supervision.
 - 2. NOTE: For all mechanical and electrical systems. Equipment buried underground is excluded but entry of services through the foundation wall is included.
 - 3. Seismic restraint products
 - a. Vibration isolation elements.
 - b. Equipment isolation bases.
 - c. Piping flexible connections.
 - d. Seismic restraints for isolated and non-isolated mechanical and electrical items.

- e. Related Sections:
- 4. Division 01 – General Conditions Section 23 05 16 - Expansion Fittings and Loops for HVAC Piping: Product requirements for anchors and piping expansion compensation.
- 5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports.

1.3 REFERENCES

- A. Air Movement and Control Association International, Inc.:
 - 1. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
- B. American National Standards Institute:
 - 1. ANSI S1.8 - Reference Quantities for Acoustical Levels.
 - 2. ANSI S1.13 - Methods for the Measurement of Sound Pressure Levels in Air.
 - 3. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.
- C. Air-Conditioning and Refrigeration Institute:
 - 1. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.
- D. American Society of Heating, Refrigerating and:
 - 1. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.
 - 2. ASHRAE Handbook - HVAC Applications.
- E. ASTM International:
 - 1. ASTM E477 - Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials.
- F. Sheet Metal and Air Conditioning Contractors':
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.4 RELATED WORK

- A. Supplementary Support Steel
 - 1. Contractor shall supply supplementary support steel for all equipment, piping, ductwork, etc. including roof mounted equipment, as required or specified.

1.5 SEISMIC FORCE LEVELS

- A. Installations shall be designed to safely accept external forces determined in accordance with the Connecticut State Building Code in any direction for all rigidly supported equipment without failure and permanent displacement of the equipment. Seismic restraints shall not short circuit vibration isolation systems or transmit objectionable vibration or noise.

1.6 PERFORMANCE REQUIREMENTS

- A. Provide vibration isolation on motor driven equipment over 0.5 hp, plus connected piping and ductwork.
- B. Consider upper floor locations critical unless otherwise indicated.
- C. Maintain sound level of spaces at levels not to exceed those listed below by utilizing acoustical devices.
- D. Maintain rooms at following maximum sound levels, in Noise Criteria (NC) as defined by ANSI S1.8.
 - 1. Offices
 - a. Executive: 25
 - b. Conference rooms: 25
 - c. Private: 35
 - d. Open-plan areas: 40
 - e. Computer/business machine areas: 45
 - f. Public circulation: 45

1.7 DEFINITIONS

- A. Life Safety Systems:
 - 1. All systems involved with and/or connected to emergency power supply including all generators, transfer switches, transformers and all flow paths to fire protection and/or emergency lighting systems.
 - 2. All medical and life support systems.
 - 3. Fresh air relief systems on emergency control sequence including air handlers, conduit, duct, dampers, etc.
- B. Positive Attachment:
 - 1. A positive attachment is defined as a cast-in anchor, a drill-in wedge anchor, a double sided beam clamp loaded perpendicular to a beam, or a welded or bolted connection to structure. Single sided "C" type beam clamps for support rods of overhead piping, ductwork, fire protection, electrical conduit, bus duct, or cable trays, or any other equipment are not acceptable on this project as seismic anchor points.
- C. Transverse Bracing:
 - 1. Restraint(s) applied to limit motion perpendicular to the centerline of the pipe, duct or conduit.
- D. Longitudinal Bracing:
 - 1. Restraint(s) applied to limit motion parallel to the centerline of the pipe, duct or conduit.

- E. Failure
 - 1. For the purposes of this project, failure is defined as the discontinuance of any attachment point between equipment or structure, vertical permanent deformation greater than 1/8" (3mm) and/or horizontal permanent deformation greater than 1/4" (6mm).

1.8 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings:
 - 1. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
 - 2. Provide Drawings showing methods of suspension and support guides for conduit, piping, ductwork and ceiling hung equipment.
 - 3. Record actual locations and installation of vibration isolators and seismic restraints including attachment points.
 - 4. Where walls, floors, slabs or supplementary steel work are used for seismic restraint locations, details of acceptable attachment methods for ducts, conduit and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads and seismic loads at all attachment and support points.
 - 5. Provide specific details of seismic restraints and anchors; include number, size and locations for each piece of equipment.
 - 6. Drawings showing methods for isolation of conduits, pipes and ductwork penetrating walls and floor slabs.
 - 7. Specific details of restraints including anchor bolts for mounting and maximum loading at each location, for each piece of equipment and/or pipe and duct locations.
- C. Product Data: Submit schedule of vibration isolator type with location and load on each. Submit catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.
- D. Seismic Certification and Analysis:
 - 1. Seismic restraint calculations must be provided for all connections of equipment to the structure. Calculations must be stamped by a registered professional engineer with at least five years of seismic design experience, licensed in the state of the job location.
 - 2. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length. All seismic restraint devices shall be designed to accept, without failure, the forces detailed in section 1.06 acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.
- E. Manufacturer's Installation Instructions: Submit special procedures and setting dimensions. Indicate installation requirements maintaining integrity of sound isolation.

- F. Manufacturer's Certificate: Certify isolators meet or exceed specified requirements.
- G. Manufacturer's Field Reports: Indicate sound isolation installation is complete and in accordance with instructions.

1.9 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of hangers including attachment points.

1.10 QUALITY ASSURANCE

- A. Perform Work in accordance with AMCA 300, ANSI S1.13, ARI 575 and ANSI S12.36 standards and recommendations of ASHRAE 68.

1.11 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.

1.12 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.13 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.14 CONTRACTOR'S RESPONSIBILITIES

- A. Contractor shall have the following responsibilities:
 1. Determine vibration isolation and seismic restraint sizes and locations per specifications.
 2. Provide and install isolation systems and seismic restraints as scheduled or specified.
 3. Guarantee specified isolation system deflection.
 4. Provide installation instructions, drawings and field supervision to assure proper installation and performance.
 5. Provide installation instructions, drawings and trained field supervision to insure proper installation and performance.
 6. Substitution of "Internally Isolated" mechanical equipment in lieu of the specified isolation of this section is acceptable

1.15 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Mason Industries Inc. models listed below.
- B. Other approved manufacturers providing equivalent products include:
 - 1. Vibration Eliminator Co.
 - 2. Vibro-Acoustics Ltd.

2.2 PRODUCT DESCRIPTIONS

- A. Vibration Isolators and Seismic Restraint Specifications – Products used are listed in table at the end of this section.
 - 1. Specification 1 - Neoprene Pad
 - a. Two layers of 3/4" (19mm) thick neoprene pad consisting of 2" (50mm) square waffle modules separated horizontally by a 16 (1.5mm) gauge galvanized shim. Load distribution plates shall be used as required.
 - b. Pads shall be Type Super "W" as manufactured by Mason Industries, Inc.
 - 2. Specification 2 - Bridge-Bearing Neoprene Mountings
 - a. Bridge-bearing neoprene mountings shall have a minimum static deflection of 0.2" (5mm) and all directional seismic capability. The mount shall consist of a ductile iron casting containing two separated and opposing molded neoprene elements. The elements shall prevent the central threaded sleeve and attachment bolt from contacting the casting during normal operation. The shock absorbing neoprene materials shall be compounded to bridge-bearing specifications.
 - b. Mountings shall be Type BR as manufactured by Mason Industries, Inc.
 - 3. Specification 3 – Bushing Assemblies
 - a. Sheet metal panels shall be bolted to the walls or supporting structure by assemblies consisting of a neoprene bushing cushioned between 2 steel sleeves. The outer sleeve prevents the sheet metal from cutting into the neoprene. Enlarge panel holes as required. Neoprene elements pass over the bushing to cushion the back panel horizontally. A steel disc covers the inside neoprene element and the inner steel sleeve is elongated to act as a stop so tightening the anchor bolts does not interfere with panel isolation in 3 planes. Bushing assemblies can be applied to the ends of steel cross members where applicable. All neoprene shall be bridge bearing quality.
 - b. Bushing assemblies shall be type PB as manufactured by Mason Industries, Inc.

4. Specification 4 - Neoprene Bushing
 - a. A one piece molded bridge bearing neoprene washer/bushing. The bushing shall surround the anchor bolt and have a flat washer face to avoid metal to metal contact.
 - b. Neoprene bushings shall be type HG as manufactured by Mason Industries, Inc.
5. Specification 5 – Spring Isolators
 - a. Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup or 1/4" (6mm) neoprene acoustical friction pad between the baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflection, compressed spring height and solid spring height.
 - b. Mountings shall be Type SLF as manufactured by Mason Industries, Inc.
6. Specification 6 – Restrained Spring Mountings
 - a. Restrained spring mountings shall have an SLF mounting as described in Specification 5, within a rigid housing that includes vertical limit stops to prevent spring extension when weight is removed. The housing shall serve as blocking during erection. A steel spacer shall be removed after adjustment. Installed and operating heights are equal. A minimum clearance of 1/2" (12mm) shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Limit stops shall be out of contact during normal operation. Since housings will be bolted or welded in position there must be an internal isolation pad. Housing shall be designed to resist all seismic forces.
 - b. Mountings shall be SLR as manufactured by Mason Industries, Inc.
7. Specification 7 – Spring Mountings
 - a. Spring mountings as in specification 5 built into a ductile iron or steel housing to provide all directional seismic snubbing. The snubber shall be adjustable vertically and allow a maximum of 1/4" (6mm) travel in all directions before contacting the resilient snubbing collars.
 - b. Mountings shall be SSLFH as manufactured by Mason Industries, Inc.
8. Specification 10 – Hangers
 - a. Hangers shall consist of rigid steel frames containing minimum 1 1/4" (32mm) thick neoprene elements at the top and a steel spring with general characteristics as in specification 5 seated in a steel washer reinforced neoprene cup on the bottom. The neoprene element and the cup shall have neoprene bushings projecting through the steel box. To maintain stability the boxes shall not be articulated as clevis hangers nor the neoprene element stacked on top of the spring. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30o arc from side to side before contacting the rod bushing and short circuiting the spring. Submittals shall include a hanger drawing showing the 30o capability.
 - b. Hangers shall be type 30N as manufactured by Mason Industries, Inc.

9. Specification 11 – Hangers
 - a. Hangers shall be as described in 10, but they shall be precompressed and locked at the rated deflection by means of a resilient seismic upstop to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be clearly indicated by means of a scale. Submittals shall include a drawing of the hanger showing the 30o capability.
 - b. Hangers shall be type PC30N as manufactured by Mason Industries, Inc.
10. Specification 12 - Seismic Cable Restraints
 - a. Seismic Cable Restraints shall consist of galvanized steel aircraft cables sized to resist seismic loads with a minimum safety factor of two and arranged to provide all-directional restraint. Cables must be prestretched to achieve a certified minimum modulus of elasticity. Cable end connections shall be steel assemblies that swivel to final installation angle and utilize two clamping bolts to provide proper cable engagement. Cables must not be allowed to bend across sharp edges.
 - b. Cable assemblies shall be Type SCB at the ceiling and at the clevis bolt, SCBH between the hanger rod nut and the clevis or SCBV if clamped to a beam all as manufactured by Mason Industries, Inc.
11. Specification 13 – Seismic Solid Braces
 - a. Seismic solid braces shall consist of steel angles or channels to resist seismic loads with a minimum safety factor of 2 and arranged to provide all directional restraint. Seismic solid brace end connectors shall be steel assemblies that swivel to the final installation angle and utilize two through bolts to provide proper attachment.
 - b. Solid seismic brace assemblies shall be type SSB as manufactured by Mason Industries, Inc.
12. Specification 14 – Rod Clamp Assemblies
 - a. Steel angles, sized to prevent buckling, shall be clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable.
 - b. Rod clamp assemblies shall be Type SRC as manufactured by Mason Industries, Inc.
13. Specification 15 – Clevis Hanger Cross Brace
 - a. Pipe clevis cross bolt braces are required in all restraint locations. They shall be special purpose preformed channels deep enough to be held in place by bolts passing over the cross bolt.
 - b. Clevis cross brace shall be type CCB as manufactured by Mason Industries, Inc.
14. Specification 16 - All-Directional Seismic Snubbers – Small Neoprene
 - a. All-directional seismic snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and a minimum of 1/4" (6mm) thick. Rated loadings shall not exceed 1000 psi (.7kg/mm2). A minimum air gap of 1/8" (3mm) shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances.

- b. Snubber shall be Type Z-1225 as manufactured by Mason Industries, Inc.
- 15. Specification 17 - All-Directional Seismic Snubbers – Large Rubber
 - a. All directional seismic snubbers shall consist of interlocking steel members restrained by shock absorbent rubber materials compounded to bridge bearing specifications. Elastomeric materials shall be replaceable and a minimum of 3/4" (19mm) thick. Rated loadings shall not exceed 1000 psi (.7kg/mm²). Snubbers shall be manufactured with an air gap between hard and resilient material of not less than 1/8" (3mm) nor more than 1/4" (6mm). Snubbers shall be installed with factory set clearances. The capacity of the seismic snubber at 3/8" (9mm) deflection shall be equal or greater than the load assigned to the mounting grouping controlled by the snubber multiplied by the applicable "G" force. Submittals shall include the load deflection curves up to 1/2" (12mm) deflection in the x, y and z planes.
 - b. Snubbers shall be series Z-1011 as manufactured by Mason Industries, Inc.
- 16. Specification 18 – Stud Wedges
 - a. Stud wedge anchors shall be manufactured from full diameter wire, not from undersized wire that is "rolled up" to create the thread. The stud anchor shall also have a safety shoulder which fully supports the wedge ring under load. The stud anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying its allowable loads.
 - b. Drill-in stud wedge anchors shall be type SAS as manufactured by Mason Industries, Inc.
- 17. Specification 19 – Female Wedge Anchors
 - a. Female wedge anchors are preferred in floor locations so isolators or equipment can be slid into place after the anchors are installed. Anchors shall be manufactured from full diameter wire, and shall have a safety shoulder to fully support the wedge ring under load. Female wedge anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying to its allowable loads.
 - b. Drill-in female wedge anchors shall be type SAB as manufactured by Mason Industries, Inc.
- 18. Specification 20 – Equipment Bases
 - a. Vibration isolation manufacturer shall furnish integral structural steel bases. Rectangular bases are preferred for all equipment. Centrifugal refrigeration machines and pump bases may be T or L shaped where space is a problem. Pump bases for split case pump shall include supports for suction and discharge elbows. All perimeter members shall be steel beams with a minimum depth equal to 1/10 of the longest dimension of the base. Base depth need not exceed 14" (350mm) provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer. Height saving brackets shall be employed in all mounting locations to provide a base clearance of 1" (25mm).
 - b. Bases shall be type WF as manufactured by Mason Industries, Inc.
- 19. Specification 21 – Inertia Foundations
 - a. Vibration isolation manufacturer shall furnish rectangular steel concrete pouring forms for floating and inertia foundations. Bases for split case pumps shall be large enough to provide for suction and discharge elbows. Bases shall be a minimum of 1/12 of the longest dimension of the base but

not less than 6" (150mm). The base depth need not exceed 12" (300mm) unless specifically recommended by the base manufacturer for mass or rigidity. Forms shall include minimum concrete reinforcing consisting of 1/2" (12mm) bars welded in place on 6" (150mm) centers running both ways in a layer 1 1/2" (38mm) above the bottom. Forms shall be furnished with steel templates to hold the anchor bolts sleeves and anchors while concrete is being poured. Height saving brackets shall be employed in all mounting locations to maintain a 1" (25mm) clearance below the base. Wooden formed bases leaving a concrete rather than a steel finish are not acceptable.

- b. Base shall be type BMK or K as manufactured by Mason Industries, Inc.
20. Specification 22 – Curbs
- a. Curb mounted rooftop equipment shall be mounted on spring isolation curbs. The lower member shall consist of a sheet metal Z section containing adjustable and removable steel springs that support the upper floating section. The upper frame must provide continuous support for the equipment and must be captive so as to resiliently resist wind and seismic forces. All directional neoprene snubber bushings shall be a minimum of 1/4" (6mm) thick. Steel springs shall be laterally stable and rest on 1/4" (6mm) thick neoprene acoustical pads. Hardware must be plated and the springs provided with a rust resistant finish. The curbs waterproofing shall consist of a continuous galvanized flexible counter flashing nailed over the lower curbs waterproofing and joined at the corners by EPDM bellows. All spring locations shall have access ports with removable waterproof covers. Lower curbs shall have provision for 2" (50mm) of insulation. The roof curbs shall be built to seismically contain the rooftop unit. The unit must be solidly fastened to the top floating rail, and the lower Z section anchored to the roof structure.
 - b. Curb shall be type RSC as manufactured by Mason Industries, Inc.
21. Specification 23 – Expansion Joints
- a. Flexible spherical expansion joints shall employ peroxide cured EPDM in the covers, liners and Kevlar7 tire cord frictioning. Any substitutions must have equal or superior physical and chemical characteristics. Solid steel rings shall be used within the raised face rubber flanged ends to prevent pullout. Flexible cable bead wire is not acceptable. Sizes 2" (50mm) and larger shall have two spheres reinforced with a ductile iron external ring between spheres. Flanges shall be split ductile iron or steel with hooked or similar interlocks. Sizes 16" (400mm) to 24" (600mm) may be single sphere. Sizes 3/4" (19mm) to 1 2" (38mm) may have threaded two piece bolted flange assemblies, one sphere and cable retention. Connectors shall be rated at 250 psi (1.72MPa) up to 170o F (77oC) with a uniform drop in allowable pressure to 215 psi (1.48MPa) at 250o F (121oC) in sizes through 14"(350mm). 16" (400mm) through 24" (600mm) single sphere minimum ratings are 180 psi (1.24MPa) at 170o F (77oC) and 150 psi (1.03 MPa) at 250o F (121oC). Higher rated connectors may be used to accommodate service conditions. All expansion joints must be factory tested to 150% of rated pressure for 12 minutes before shipment. Safety factors to burst and flange pullout shall be a minimum of 3/1. Concentric reducers to the above ratings may be substituted for equal ended expansion joints.

- b. Expansion joints shall be installed in piping gaps equal to the length of the expansion joints under pressure. Control rods need only be used in unanchored piping locations where the manufacturer determines the installation exceeds the pressure requirement without control rods. If control rods are used, they must have 2" (12mm) thick Neoprene washer bushings large enough in diameter to take the thrust at 1000 psi (.7 kg/mm²) maximum on the washer area.
- c. Submittals shall include two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at typical blade passage frequencies on this or a similar product by the same manufacturer. All expansion joints shall be installed on the equipment side of the shut off valves.
- d. Expansion joints shall be SAFEFLEX SFDEJ, SFEJ, SFDCR or SFU and Control Rods CR as manufactured by Mason Industries, Inc.

22. Specification 24 – Flexible Stainless Steel Hoses

- a. Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3" (75mm) and larger shall be flanged. Smaller sizes shall have male nipples. Minimum lengths shall be as tabulated:

Flanged		Male Nipples	
3 x 14	10 x 26	1/2 x 9	1 1/2 x 13
4 x 15	12 x 28	3/4 x 10	2 x 14
5 x 19	14 x 30	1 x 11	2 1/2 x 18
6 x 20	16 x 32	1 1/4 x 12	
8 x 22			

- b. Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible.
- c. Hoses shall be type BSS as manufactured by Mason Industries, Inc.

23. Specification 25 - All-Directional Acoustical Pipe Anchor

- a. All-directional acoustical pipe anchor, consisting of two sizes of steel tubing separated by a minimum 1/2" (12mm) thick 60 durometer neoprene. Vertical restraint shall be provided by similar material arranged to prevent vertical travel in either direction. Allowable loads on the isolation material should not exceed 500 psi (.35 kg/mm²) and the design shall be balanced for equal resistance in any direction.
- b. All-directional anchors shall be type ADA as manufactured by Mason Industries, Inc.

24. Specification 26 – Pipe Guides

- a. Pipe guides shall consist of a telescopic arrangement of two sizes of steel tubing separated by a minimum 1/2" (12mm) thickness of 60 durometer neoprene. The height of the guides shall be preset with a shear pin to allow vertical motion due to pipe expansion or contraction. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of + 1 5/8" (41mm) motion, or to meet location requirements.
- b. Pipe guides shall be type VSG as manufactured by Mason Industries, Inc.

25. Specification 27 - Split Wall Seals
 - a. Split Wall Seals consist of two bolted pipe halves with minimum 3/4" (19mm) thick neoprene sponge bonded to the inner faces. The seal shall be tightened around the pipe to eliminate clearance between the inner sponge face and the piping. Concrete may be packed around the seal to make it integral with the floor, wall or ceiling if the seal is not already in place around the pipe prior to the construction of the building member. Seals shall project a minimum of 1" (25mm) past either face of the wall. Where temperatures exceed 240o F (115oC), 10# (4.5kg) density fiberglass may be used in lieu of the sponge.
 - b. Seals shall be Type SWS as manufactured by Mason Industries, Inc.
26. Specification 28 - Horizontal Thrust Restraint
 - a. The horizontal thrust restraint shall consist of a spring element in series with a neoprene molded cup as described in specification 5 with the same deflection as specified for the mountings or hangers. The spring element shall be designed so it can be preset for thrust at the factory and adjusted in the field to allow for a maximum of 1/4" (6mm) movement at start and stop. The assembly shall be furnished with 1 rod and angle brackets for attachment to both the equipment and the duct work or the equipment and the structure. Horizontal restraints shall be attached at the centerline of thrust and symmetrical on either side of the unit.
 - b. Horizontal thrust restraints shall be type WBI/WBD as manufactured by Mason Industries, Inc.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify equipment, ductwork and piping is installed before work in this section is started.

3.2 EXISTING WORK

- A. Provide access to existing piping and ductwork and other installations remaining active and requiring access.

3.3 INSTALLATION OF VIBRATION ISOLATORS

- A. Vibration isolators and seismic restraint systems shall control excessive noise and vibration in the buildings due to the operation of machinery or equipment, and/or due to interconnected piping, ductwork, or conduit. The installation of all vibration isolators and seismic restraint units, and associated hangers and bases, shall be under the direct supervision of the vibration isolation manufacturer's representative.
- B. All vibration isolators and seismic restraint systems must be installed in strict accordance with the manufacturers written instructions and all certified submittal data.

- C. Installation of vibration isolators and seismic restraints must not cause any change of position of equipment, piping or ductwork resulting in stresses or misalignment.
- D. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.
- E. The contractor shall not install any equipment, piping, duct or conduit that makes rigid connections with the building unless isolation is not specified. "Building" includes, but is not limited to, slabs, beams, columns, studs and walls.
- F. Coordinate work with other trades to avoid rigid contact with the building.
- G. Any conflicts with other trades that will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractors expense.
- H. Bring to the architects/engineers attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractors expense.
- I. Correct, at no additional cost, all installations that are deemed defective in workmanship and materials at the contractor's expense.
- J. Overstressing of the building structure must not occur because of overhead support of equipment. Contractor must submit loads to the structural engineer of record for approval. Generally bracing may occur from:
 - 1. Flanges of structural beams.
 - 2. Upper truss cords in bar joist construction.
 - 3. Cast in place inserts or wedge type drill-in concrete anchors.
- K. Specification 12 cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.
- L. Specification 12 cable assemblies are installed taut on non-isolated systems. Specification 13 seismic solid braces may be used in place of cables on rigidly attached systems only.
- M. At locations where specification 12 or 13 restraints are located, the support rods must be braced when necessary to accept compressive loads with specification 14 braces.
- N. At all locations where specification 12 or 13 restraints are attached to pipe clevis's, the clevis cross bolt must be reinforced with specification type 15 braces.
- O. Drill-in concrete anchors for ceiling and wall installation shall be specification type 18, and specification type 19 female wedge type for floor mounted equipment.
- P. Vibration isolation manufacturer shall furnish integral structural steel bases as required. Independent steel rails are not permitted on this project. Each fan and motor assembly shall be supported on a single structural steel frame.

- Q. Hand built elastomeric expansion joints may be used when pipe sizes exceed 24" or specified movements exceed specification 23 capabilities.
- R. Where piping passes through walls, floors or ceilings the vibration isolation manufacturer shall provide specification 27 wall seals.
- S. Air handling equipment and centrifugal fans shall be protected against excessive displacement which results from high air thrust in relation to the equipment weight. Horizontal thrust restraint shall be specification type 28 (see selection guide).
- T. Install isolation for motor driven equipment.
- U. Adjust equipment level and install spring hangers without binding. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions. Locate isolation hangers as near to the overhead support structure as possible.
- V. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- W. Provide resiliently mounted equipment, piping, and ductwork with seismic snubbers. Provide each inertia base with minimum of four seismic snubbers located close to isolators. Snub equipment designated for post disaster use to 0.05 inch maximum clearance. Provide other snubbers with clearance between 0.15 inch and 0.25 inch.
- X. Support piping connections to isolated equipment resiliently as follows:
 - 1. Up to 4 inch Diameter: First three points of support.
 - 2. 5 to 8 inch Diameter: First four points of support.
 - 3. 10 inch Diameter and Over: First six points of support.
 - 4. Select three hangers closest to vibration source for minimum 1.0 inch static deflection or static deflection of isolated equipment. Select remaining isolators for minimum 1.0 inch static deflection or 1/2 static deflection of isolated equipment.

3.4 INSTALLATION OF ACOUSTIC PRODUCTS

- A. Lag ductwork, where indicated by wrapping with insulation and covering. Apply covering to be airtight. Do not attach covering rigidly to ductwork. Coordinate with vapor barrier(s) requirements in other specification sections and as scheduled on drawings.

3.5 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect isolated equipment after installation and submit report. Include static deflections.

3.6 EQUIPMENT ISOLATION SCHEDULES

SPECIFICATION SELECTION GUIDE	ISOLATION, DEFLECTION AND SEISMIC RESTRAINT CRITERIA FOR SOLID CONCRETE FLOORS 4" AND THICKER (NOTE 7)									
	Ground Supported Slab or Basement		20' Floor Span Possible Floor Defl. – 0.67"		30' Floor Span Possible Floor Defl. – 1.0"		40' Floor Span Possible Floor Defl. – 1.33"		50' Floor Span Possible Floor Defl. – 1.67"	
	Isol. & Seismic Spec.	Isol. Defl.	Isol. & Seismic Spec.	Isol. Defl.	Isol. & Seismic Spec.	Isol. Defl.	Isol. & Seismic Spec.	Isol. Defl.	Isol. & Seismic Spec.	Isol. Defl.
REFRIG. MACHINES										
Centrifugal Chillers or Heat Pumps										
Cooler Condenser Mounted Hermetic Compressors	2-20-23	0.35	6-20-23	0.75	6-20-23	1.5	6-23	1.5	6-20-23	2.5
Cooler Condenser Alongside Hermetic Compressor	2-23	0.35	6-23	0.75	6-23	1.5	6-23	1.5	6-23	2.5
FACTORY ASSEMBLED H & V UNITS										
Curb Mounted Roof Top Units			22	1.0	22	2.5	22	2.5	22	2.5

3.8 VIBRATION ISOLATION AND SEISMIC RESTRAINT INSTALLATION

- A. Horizontal pipe isolation: The first three pipe hangers in the main lines near the mechanical equipment shall be as described in specification 11. Specification 11 hangers must also be used in all transverse braced isolated locations. Brace hanger rods with SRC clamps specification 14. Horizontal runs in all other locations throughout the building shall be isolated by hangers as described in specification 10. Floor supported piping shall rest on isolators as described in specification 6. Heat exchanger's and expansion tanks are considered part of the piping run. The first three isolators from the isolated equipment will have the same static deflection as specified for the mountings under the connected equipment. If piping is connected to equipment located in basements and hangs from ceilings under occupied spaces the first three hangers shall have 0.75" (19mm) deflection for pipe sizes up to and including 3" (75mm), 1 1/2" (38mm) deflection for pipe sizes up to and including 6" (150mm), and 2 1/2" (64mm) deflection thereafter. Hangers shall be located as close to the overhead structure as practical. Where piping connects to mechanical equipment install specification 23 expansion joints or specification 24 stainless hoses if 23 is not suitable for the service.

- B. Riser isolation: Risers shall be suspended from specification 10 hangers or supported by specification 5 mountings, anchored with specification 25 anchors, and guided with specification 26 sliding guides. Steel springs shall be a minimum of 0.75" (19mm) except in those expansion locations where additional deflection is required to limit load changes to $\pm 25\%$ of the initial load. Submittals must include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on the building structure, spring deflection changes and seismic loads. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist in the proposed design.
- C. Seismic Restraint of Piping
1. Seismically restrain all piping listed as a, b or c below. Use specification 12 cables if isolated. Specification 12 or 13 restraints may be used on unisolated piping.
 - a. All piping 2 1/2" (64mm) diameter and larger.
 2. Transverse piping restraints shall be at 40' (12m) maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
 3. Longitudinal restraints shall be at 80' (24m) maximum spacing for all pipe sizes, except where lesser spacing is required to limit anchorage loads.
 4. Where thermal expansion is a consideration, guides and anchors may be used as transverse and longitudinal restraints provided they have a capacity equal to or greater than the restraint loads in addition to the loads induced by expansion or contraction.
 5. Transverse restraint for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24" (600mm) of the elbow or TEE or combined stresses are within allowable limits at longer distances.
 6. Hold down clamps must be used to attach pipe to all trapeze members before applying restraints in a manner similar to clevis supports.
 7. Branch lines may not be used to restrain main lines.
- D. Vibration Isolation of Ductwork
1. All discharge runs for a distance of 50' (15m) from the connected equipment shall be isolated from the building structure by means of specification 10 hangers or specification 5 floor isolators. Spring deflection shall be a minimum of 0.75" (19mm).
 2. All duct runs having air velocity of 1000 fpm (5 m/s) or more shall be isolated from the building structure by specification 11 hangers or specification 5 floor supports. Spring deflection shall be a minimum of 0.75" (19mm).
 3. Flexible duct connections shall be provided at inlet and discharge ducts. Refer to Section 23 33 00.
- E. Seismic Restraint of Ductwork
1. Seismically restrain all duct work with specification 12 or 13 restraints as listed below:
 - a. Restrain rectangular ducts with cross sectional area of 6 sq.ft. (.5 m²) or larger.
 - b. Restrain round ducts with diameters of 28" (700mm) or larger.

- c. Restrain flat oval ducts the same as rectangular ducts of the same nominal size.
 2. Transverse restraints shall occur at 30' (9m) intervals or at both ends of the duct run if less than the specified interval. Transverse restraints shall be installed at each duct turn and at each end of a duct run.
 3. Longitudinal restraints shall occur at 60' (18m) intervals with at least one restraint per duct run. Transverse restraints for one duct section may also act as a longitudinal restraint for a duct section connected perpendicular to it if the restraints are installed within 4' (1.2m) of the intersection of the ducts and if the restraints are sized for the larger duct. Duct joints shall conform to SMACNA duct construction standards.
 4. The ductwork must be reinforced at the restraint locations. Reinforcement shall consist of an additional angle on top of the ductwork that is attached to the support hanger rods. Ductwork is to be attached to both upper angle and lower trapeze.
 5. A group of ducts may be combined in a larger frame so that the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected.
 6. Walls, including gypsum board non bearing partitions, which have ducts running through them may replace a typical transverse brace. Provide channel framing around ducts and solid blocking between the duct and frame.
- F. Vibration Isolation and Seismic Restraint of Mechanical Equipment
1. All mechanical equipment shall be vibration isolated and seismically restrained as per the schedules in part 3.6 of this specification.

3.7 SEISMIC RESTRAINT EXCLUSIONS

- A. General: All mechanical and electrical components and systems that are considered exempt from the requirement for seismic restraint, in accordance with the Connecticut State Building Code shall not require seismic restraint.
- B. Ductwork
1. Rectangular and square ducts that are less than 6 square feet in cross sectional area.
 2. Oval ducts that are less than 6 square feet ($.5m^2$) in cross sectional area based on nominal size.
 3. Round duct less than 28" ($.5m^2$) in diameter.
 4. All duct suspended by hangers 12" (300mm) or less in length as measured from the top of the duct to the point of attachment to the structure. Hangers must be attached within 2" (50mm) of the top of the duct with a minimum of two #10 sheet metal screws. If the 12" (300mm) limit is exceeded by any hanger in the run, seismic bracing is required for the run.

3.8 INSPECTION

- A. Examine systems under provisions of Division 1.
- B. On completion of installation of all vibration isolation devices herein specified, the local representative shall inspect the completed system and report in writing any installation error, improperly elected isolation devices, or other faults in the system that could affect the performance of the system. Contractor shall submit a report to the Owner, including the manufacturers representatives' final report, indicating all isolation reported as properly installed or requiring correction, and include a report by the Contractor on steps taken to properly complete the isolation work.

END OF SECTION

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nameplates.
 - 2. Tags.
 - 3. Pipe markers.
 - 4. Ceiling tacks.
 - 5. Labels.
 - 6. Lockout devices.

- B. Related Sections:

1.2 Division 01 – General Conditions REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturers catalog literature for each product required.
- C. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.5 QUALITY ASSURANCE

- A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

1.6 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.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 - 1. Craftmark Identification Systems
 - 2. Safety Sign Co.
 - 3. Seton Identification Products
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS

- A. Plastic Tags:
 - 1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Substitutions: Section 01 25 00 – Substitution Procedures.
 - 2. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches diameter.
- B. Metal Tags:
 - 1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Substitutions: Section 01 25 00 – Substitution Procedures.
 - 2. Brass with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges.
- C. Information Tags:
 - 1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.

- c. Seton Identification Products
- d. Substitutions: Section 01 25 00 – Substitution Procedures.
- 2. 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: Typewritten letter size list of applied tags and location in anodized aluminum frame.

2.3 PIPE MARKERS

A. Color and Lettering: Conform to ASME A13.1.

B. Plastic Pipe Markers:

- 1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Substitutions: Section 01 25 00 – Substitution Procedures.
- 2. 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:

- 1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Substitutions: Section 01 25 00 – Substitution Procedures.
- 2. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.4 CEILING TACKS

A. Manufacturers:

- 1. Craftmark Identification Systems
- 2. Safety Sign Co.
- 3. Seton Identification Products
- 4. Substitutions: Section 01 25 00 – Substitution Procedures.

B. Description: Steel with 3/4 inch diameter color-coded head.

C. Color code as follows:

- 1. HVAC equipment: Yellow.
- 2. Fire dampers/smoke dampers: Red.
- 3. Plumbing valves: Green.
- 4. Heating/cooling valves: Blue.

2.5 LABELS

- A. Manufacturers:
 - 1. Craftmark Identification Systems
 - 2. Safety Sign Co.
 - 3. Seton Identification Products
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Description: Laminated Mylar, size 1.9 x 0.75 inches, adhesive backed with printed identification and bar code.

2.6 LOCKOUT DEVICES

- A. Lockout Hasps:
 - 1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Substitutions: Section 01 25 00 – Substitution Procedures.
 - 2. Reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.
- B. Valve Lockout Devices:
 - 1. Manufacturers:
 - a. Craftmark Identification Systems
 - b. Safety Sign Co.
 - c. Seton Identification Products
 - d. Substitutions: Section 01 25 00 – Substitution Procedures.
 - 2. Nylon device preventing access to valve operator, accepting lock shackle.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- 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. Install tags using corrosion resistant chain. Number tags consecutively by location.

- E. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Identify in-line pumps and other small devices with tags.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- H. Identify air terminal units and radiator valves with numbered tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.
- J. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- K. For exposed natural gas lines other than steel pipe, attach yellow pipe labels with "GAS" in black lettering, at maximum 5 foot () spacing.
- L. Identify ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- M. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing adjusting, and balancing of air systems.
 - 2. Testing adjusting, and balancing of hydronic and refrigerating systems.
 - 3. Measurement of final operating condition of HVAC systems.
- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 09 00 - Direct-Digital Control System for HVAC: Requirements for coordination between DDC system and testing, adjusting, and balancing work.
 - 3. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation for HVAC equipment.

1.2 REFERENCES

- A. Testing Adjusting and Balancing Bureau
 - 1. TABB- ANSI Accredited HVAC testing, adjusting and balancing certification program which conforms to ISO/IEC 17024 and endorsed by SMACNA.
- B. Associated Air Balance Council:
 - 1. AABC MN-1 - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.
- C. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems.
- D. Natural Environmental Balancing Bureau:
 - 1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Prior to commencing Work, submit proof of latest calibration date of each instrument.
- C. Test Reports: Indicate data on forms containing information indicated in Schedules.
- D. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

- E. Prior to commencing Work, submit report forms or outlines indicating adjusting, balancing, and equipment data required. Include detailed procedures, agenda and sample report forms.
- F. Submit draft copies of report for review prior to final acceptance of Project.
- G. Furnish reports in soft cover, letter size, 3-ring binder manuals, complete with table of contents page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of flow measuring stations, balancing valves and rough setting.
- C. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with appropriate standard.
- B. Prior to commencing Work, calibrate each instrument to be used.

1.6 QUALIFICATIONS

- A. Agency: Company specializing in testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience certified by AABC, certified by NEBB or certified by TABB (Testing, Adjusting, and Balancing Bureau).
- B. Perform Work under supervision of AABC Certified Test and Balance Engineer, NEBB Certified Testing, Balancing and Adjusting Supervisor or personnel certified by TABB (Testing, Adjusting, and Balancing Bureau).

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 SEQUENCING

- A. Section 01 10 00 - Summary: Work sequence.
- B. Sequence balancing between completion of systems tested and Date of Substantial Completion.

1.9 SCHEDULING

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify systems are complete and operable before commencing work. 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. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.
 12. Hydronic systems are flushed, filled, and vented.
 13. Pumps are rotating correctly.
 14. Proper strainer baskets are clean and in place or in normal position.
 15. Service and balancing valves are open.

3.2 PREPARATION

- A. Furnish instruments required for testing, adjusting, and balancing operations.
- B. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

3.3 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 10 percent of design.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.4 ADJUSTING

- A. Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Verify recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.
- E. Report defects and deficiencies noted during performance of services, preventing system balance.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities.
- B. Make air quantity measurements in main ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts.
- E. Use volume control devices to regulate air quantities only to extent adjustments do not create objectionable air motion or sound levels. Effect volume control by using volume dampers located in ducts.
- F. Vary total system air quantities by adjustment of fan speeds. Provide quantity of 2 sheave drive changes to vary fan speed for each fan. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. At modulating damper locations, take measurements and balance at extreme conditions. Balance variable volume systems at maximum airflow rate, full cooling, and at minimum airflow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to obtain required relationship between each to maintain approximately 0.05 inches positive static pressure near building entries.
- M. Where available fan capacity is less than total flow requirements or individual system parts, simulate full flow in one part by temporary restriction of flow to other parts.
- N. See section 233100-3.5 for duct leakage testing requirements.

3.6 WATER SYSTEM PROCEDURE

- A. Adjust water systems, after air balancing, to obtain design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in system.
- C. Adjust systems to obtain specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open or in normal position to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, simulate full flow in one part by temporary restriction of flow to other parts.
- G. All piping systems installed under this contract shall be pressure tested with clean water, unless noted otherwise, to insure tightness. Hydrostatic testing shall be made at not less than a duration of two hours. Care must be taken to expel all entrapped air and have the

pipng completely full of water. HVAC hydronic piping shall be tested to 100 psig. Refrigerant piping shall be tested to 200 psig with nitrogen.

3.7 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing:
 - 1. Air Cooled Refrigerant Condensers.
 - 2. Packaged Roof Top Heating/Cooling Units.
 - 3. Air Coils.
 - 4. Terminal Heat Transfer Units.
 - 5. Air Handling Units.
 - 6. Fans.
 - 7. Air Terminal Units.
 - 8. Air Inlets and Outlets.

- B. Report Forms
 - 1. Title Page:
 - a. Name of Testing, Adjusting, and Balancing Agency
 - b. Address of Testing, Adjusting, and Balancing Agency
 - c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
 - d. Project name
 - e. Project location
 - f. Project Architect
 - g. Project Engineer
 - h. Project Contractor
 - i. Project altitude
 - j. Report date
 - 2. Summary Comments:
 - a. Design versus final performance
 - b. Notable characteristics of system
 - c. Description of systems operation sequence
 - d. Summary of outdoor and exhaust flows to indicate building pressurization
 - e. Nomenclature used throughout report
 - f. Test conditions
 - 3. Instrument List:
 - a. Instrument
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Range
 - f. Calibration date
 - 4. Electric Motors:
 - a. Manufacturer
 - b. Model/Frame
 - c. HP/BHP and kW
 - d. Phase, voltage, amperage; nameplate, actual, no load
 - e. RPM
 - f. Service factor

- g. Starter size, rating, heater elements
- h. Sheave Make/Size/Bore
- 5. V-Belt Drive:
 - a. Identification/location
 - b. Required driven RPM
 - c. Driven sheave, diameter and RPM
 - d. Belt, size and quantity
 - e. Motor sheave diameter and RPM
 - f. Center to center distance, maximum, minimum, and actual
- 6. Air Cooled Condenser:
 - a. Identification/number
 - b. Location
 - c. Manufacturer
 - d. Model number
 - e. Serial number
 - f. Entering DB air temperature, design and actual
 - g. Leaving DB air temperature, design and actual
 - h. Number of compressors
- 7. Cooling Coil Data:
 - a. Identification/number
 - b. Location
 - c. Service
 - d. Manufacturer
 - e. Air flow, design and actual
 - f. Entering air DB temperature, design and actual
 - g. Entering air WB temperature, design and actual
 - h. Leaving air DB temperature, design and actual
 - i. Leaving air WB temperature, design and actual
 - j. Saturated suction temperature, design and actual
 - k. Air pressure drop, design and actual
- 8. Heating Coil Data:
 - a. Identification/number
 - b. Location
 - c. Service
 - d. Manufacturer
 - e. Air flow, design and actual
 - f. Water flow, design and actual
 - g. Water pressure drop, design and actual
 - h. Entering water temperature, design and actual
 - i. Leaving water temperature, design and actual
 - j. Entering air temperature, design and actual
 - k. Leaving air temperature, design and actual
 - l. Air pressure drop, design and actual
- 9. Air Moving Equipment:
 - a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Arrangement/Class/Discharge

- f. Air flow, specified and actual
 - g. Return air flow, specified and actual
 - h. Outside air flow, specified and actual
 - i. Total static pressure (total external), specified and actual
 - j. Inlet pressure
 - k. Discharge pressure
 - l. Sheave Make/Size/Bore
 - m. Number of Belts/Make/Size
 - n. Fan RPM
10. Return Air/Outside Air Data:
- a. Identification/location
 - b. Design air flow
 - c. Actual air flow
 - d. Design return air flow
 - e. Actual return air flow
 - f. Design outside air flow
 - g. Actual outside air flow
 - h. Return air temperature
 - i. Outside air temperature
 - j. Required mixed air temperature
 - k. Actual mixed air temperature
 - l. Design outside/return air ratio
 - m. Actual outside/return air ratio
11. Exhaust Fan Data:
- a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Air flow, specified and actual
 - f. Total static pressure (total external), specified and actual
 - g. Inlet pressure
 - h. Discharge pressure
 - i. Sheave Make/Size/Bore
 - j. Number of Belts/Make/Size
 - k. Fan RPM
12. Duct Traverse:
- a. System zone/branch
 - b. Duct size
 - c. Area
 - d. Design velocity
 - e. Design air flow
 - f. Test velocity
 - g. Test air flow
 - h. Duct static pressure
 - i. Air temperature
 - j. Air correction factor
13. Duct Leak Test:
- a. Description of ductwork under test
 - b. Duct design operating pressure

- c. Duct design test static pressure
 - d. Duct capacity, air flow
 - e. Maximum allowable leakage duct capacity times leak factor
 - f. Test apparatus
 - 1) Blower
 - 2) Orifice, tube size
 - 3) Orifice size
 - 4) Calibrated
 - g. Test static pressure
 - h. Test orifice differential pressure
 - i. Leakage
14. Terminal Unit Data:
- a. Manufacturer
 - b. Type, constant, variable, single, dual duct
 - c. Identification/number
 - d. Location
 - e. Model number
 - f. Size
 - g. Minimum static pressure
 - h. Minimum design air flow
 - i. Maximum design air flow
 - j. Maximum actual air flow
 - k. Inlet static pressure
15. Air Distribution Test Sheet:
- a. Air terminal number
 - b. Room number/location
 - c. Terminal type
 - d. Terminal size
 - e. Area factor
 - f. Design velocity
 - g. Design air flow
 - h. Test (final) velocity
 - i. Test (final) air flow
 - j. Percent of design air flow

END OF SECTION

SECTION 230700 - HVAC INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. HVAC piping insulation, jackets and accessories.
 - 2. HVAC ductwork insulation, jackets, and accessories.
- B. Related Sections:
 - 1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.

1.2 Division 01 – General Conditions REFERENCES

- A. ASTM International:
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
 - 3. ASTM C450 - Standard Practice for Prefabrication and Field Fabrication of Thermal Insulating Fitting Covers for NPS Piping, Vessel Lagging, and Dished Head Segments.
 - 4. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - 5. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
 - 6. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
 - 7. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 8. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
 - 9. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
 - 10. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
 - 11. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
 - 12. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 13. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - 14. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
- B. Sheet Metal and Air Conditioning Contractors' National Association':
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.
- C. Manufacturer's Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.
- B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.
- C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.
- D. Duct insulation, Coverings, and Linings: Maximum 25/50 flame spread/smoke developed index, when tested in accordance with ASTM E84, using specimen procedures and mounting procedures of ASTM E 2231.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years experience.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.
- C. Maintain temperature before, during, and after installation for minimum period of 24 hours.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Section 01 ~~770~~ 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Manufacturers for Glass Fiber and Mineral Fiber Insulation Products:
 - 1. CertainTeed.
 - 2. Knauf.
 - 3. Johns Manville.
 - 4. Owens-Corning.
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Manufacturers for Closed Cell Elastomeric Insulation Products:
 - 1. Aeroflex. Aerocell.
 - 2. Armacell, LLC. Armaflex.
 - 3. Nomaco. K-flex.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.

2.2 PIPE INSULATION

- A. TYPE P-1: ASTM C547, molded glass fiber pipe insulation.
 - 1. Thermal Conductivity: 0.23 at 75 degrees F.
 - 2. Operating Temperature Range: 0 to 850 degrees F.
 - 3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
 - 4. Jacket Temperature Limit: minus 20 to 150 degrees F.

- B. TYPE P-2: ASTM C547, molded glass fiber pipe insulation.
 - 1. Thermal Conductivity: 0.23 at 75 degrees F.
 - 2. Operating Temperature Range: 0 to 850 degrees F.
- C. TYPE P-5: ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
 - 1. Thermal Conductivity: 0.27 at 75 degrees F.
 - 2. Operating Temperature Range: Range: Minus 70 to 180 degrees F.

2.3 PIPE INSULATION JACKETS

- A. Vapor Retarder Jacket:
 - 1. ASTM C921, white Kraft paper with glass fiber yarn, bonded to aluminized film.
 - 2. Water Vapor Permeance: ASTM E96/E96M; 0.02 perms.
- B. Aluminum Pipe Jacket:
 - 1. ASTM B209.
 - 2. Thickness: 0.020 inch thick sheet.
 - 3. Finish: Smooth.
 - 4. Joining: Longitudinal slip joints and 2 inch laps.
 - 5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 6. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.]

2.4 PIPE INSULATION ACCESSORIES

- A. Vapor Retarder Lap Adhesive: Compatible with insulation.
- B. Piping 1-1/2 inches diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.
- C. Piping 2 inches diameter and larger: Wood insulation saddle, hard maple. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.
- D. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum single piece construction with self-adhesive closure. Thickness to match pipe insulation.
- E. Insulating Cement: ASTM C195; hydraulic setting on mineral wool.
- F. Adhesives: Compatible with insulation.

2.5 DUCTWORK INSULATION

- A. TYPE D-1: ASTM C1290, Type III, flexible glass fiber, commercial grade with factory applied reinforced aluminum foil jacket meeting ASTM C1136, Type II.
 - 1. Thermal Conductivity: 0.27 at 75 degrees F.
 - 2. Maximum Operating Temperature: 250 degrees F.
 - 3. Density: 1.0 pound per cubic foot.

- B. TYPE D-2: ASTM C612, Type IA or IB, rigid glass fiber, with factory applied reinforced aluminum foil facing meeting ASTM C1136, Type II.
 - 1. Thermal Conductivity: 0.23 at 75 degrees F.
 - 2. Density: 3.0 pound per cubic foot.
- C. TYPE D-4: ASTM C1071, Type I, flexible, glass fiber duct liner with coated air side.
 - 1. Thermal Conductivity: 0.25 at 75 degrees F.
 - 2. Density: 2.75 pound per cubic foot.
 - 3. Maximum Operating Temperature: 250 degrees F.
 - 4. Maximum Air Velocity: 6,000 feet per minute.
- D. TYPE D-5: ASTM C1071, Type II, rigid, glass fiber duct liner with coated air side.
 - 1. Thermal Conductivity: 0.23 at 75 degrees F.
 - 2. Density: 3.0 pound per cubic foot.
 - 3. Maximum Operating Temperature: 250 degrees F.
 - 4. Maximum Air Velocity: 4,000 feet per minute.

2.6 DUCTWORK INSULATION JACKETS

- A. Vapor Retarder Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Water Vapor Permeance: ASTM E96/E96M; 0.02 perms.
 - 3. Secure with pressure sensitive tape.

2.7 DUCTWORK INSULATION ACCESSORIES

- A. Vapor Retarder Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- B. Vapor Retarder Lap Adhesive: Compatible with insulation.
- C. Adhesive: Waterproof, ASTM E162 fire-retardant type.
- D. Liner Fasteners: Galvanized steel, impact applied with press-on head.
- E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- F. Lagging Adhesive: Fire retardant type with maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- G. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.
- H. Adhesives: Compatible with insulation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify piping and ductwork has been tested before applying insulation materials.
- C. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - PIPING SYSTEMS

- A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.
- 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. Piping Systems Conveying Fluids Below Ambient Temperature:
 - 1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
 - 2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory-applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
 - 3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.
- D. Hot Piping Systems:
 - 1. Furnish factory-applied or field-applied standard jackets. Secure with outward clinch expanding staples or pressure sensitive adhesive system on standard factory-applied jacket and butt strips or both.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
 - 3. Insulate flanges and unions at equipment.
- E. Inserts and Shields:
 - 1. Piping 1-1/2 inches Diameter and Smaller: Install steel shield between pipe hanger and insulation.
 - 2. Piping 2 inches Diameter and Larger: Install insert between support shield and piping and under finish jacket.
 - a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
 - b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.
 - 3. Piping Supported by Roller Type Pipe Hangers: Install steel shield between roller and inserts.

- F. Insulation Terminating Points:
1. Coil Branch Piping 1 inch and Smaller: Terminate hot water piping at union upstream of the coil control valve.
 2. Condensate Piping: Insulate entire piping system and components to prevent condensation.
- G. Closed Cell Elastomeric Insulation:
1. Push insulation on to piping.
 2. Miter joints at elbows.
 3. Seal seams and butt joints with manufacturer's recommended adhesive.
 4. When application requires multiple layers, apply with joints staggered.
 5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.
- H. Piping Exterior to Building: Provide vapor retarder jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor retarder cement. Cover with aluminum jacket with seams located at 3 or 9 o'clock position on side of horizontal piping with overlap facing down to shed water or on bottom side of horizontal piping.

3.3 INSTALLATION - DUCTWORK SYSTEMS

- A. Duct dimensions indicated on Drawings are finished inside dimensions.
- B. Insulated ductwork conveying air below ambient temperature:
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.
- C. External Glass Fiber Duct Insulation:
1. Secure insulation with vapor retarder with wires and seal jacket joints with vapor retarder adhesive or tape to match jacket.
 2. Secure insulation without vapor retarder with staples, tape, or wires.
 3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
 4. Seal vapor retarder penetrations by mechanical fasteners with vapor retarder adhesive.
 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
 6. Provide additional insulation to pitch top surface at least an 1/8" per foot from the center to each side to minimize standing water.
- D. External Elastomeric Duct Insulation:
1. Adhere to clean oil-free surfaces with full coverage of adhesive.
 2. Seal seams and butt joints with manufacturer's recommended adhesive.
 3. When application requires multiple layers, apply with joints staggered.

4. Insulate standing metal duct seams with insulation of like material and thickness as adjacent duct surface. Apply adhesive at joints with flat duct surfaces.
 5. Lift ductwork off trapeze hangers and insert spacers.
- E. Duct Liner:
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. Cut insulation for tight overlapped corner joints. Support top pieces of liner at edges with side pieces.

3.4 SCHEDULES

A. Cooling Services Piping Insulation Schedule:

PIPING SYSTEM	INSULATION TYPE	PIPE SIZE	INSULATION THICKNESS inches
Refrigerant	P-5	Less than 1-1/2 inch 1-1/2 inches and larger	1 inch 1-1/2 inches

B. Heating Services Piping Insulation Schedule:

PIPING SYSTEM	INSULATION TYPE	PIPE SIZE	INSULATION THICKNESS inches
Heating Water Supply and Return	P-1	1-1/4 inches and smaller 1-1/2 inches inch and larger	1-1/2inches 2 inches

C. Ductwork Insulation Schedule:

DUCTWORK SYSTEM	INSULATION TYPE	INSULATION THICKNESS inches
Supply Ducts (internally insulated for 10' downstream of roof-top units and VRF units)	D-4, D-5	1.0
Return Ducts (internally insulated for 10' upstream of roof-top units and VRF units)	D-4, D-5	1.0

Supply Ducts (externally insulated REGARDLESS OF ANY INTERNAL LINING REQUIREMENTS) Thickness indicated is installed thickness.	D-1, D-2, D-6	1.0
Return Ducts (externally insulated REGARDLESS OF ANY INTERNAL LINING REQUIREMENTS) Thickness indicated is installed thickness.	D-1, D-2, D-6	1.0
Exhaust Ducts Within 10 feet of Exterior Openings Thickness indicated is installed thickness.	D-1, D-2	1.0
Exhaust Ducts Exposed to Outdoor Air	D-1, D-2	2.0
Transfer Air Ducts (internally insulated)	D-4, D-5	1.0

END OF SECTION

SECTION 230900 - DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Control panel enclosures.
 - 2. Thermostats.
 - 3. Control air dampers.
 - 4. Electric damper actuators.
 - 5. Control valves.
 - 6. Electric valve actuators.
 - 7. Direct digital control system components.

- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 05 13 - Common Motor Requirements for HVAC Equipment: Product requirements for electric motors.
 - 3. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation implemented using products specified in this section.
 - 4. Section 23 21 16 - Hydronic Piping Specialties: Product requirements for thermometer sockets and gage taps for placement by this section. Installation requirements for piping products furnished in this section.
 - 5. Section 23 33 00 - Air Duct Accessories: Product requirements for duct mounted thermometers. Installation requirements for dampers and other duct mounted products furnished in this section.
 - 6. Division 26: Execution requirements for electric connections specified by this section.

1.2 WORK INCLUDED

- A. The control contractor shall utilize, and expand as necessary, the existing Building Automation System to control the proposed mechanical systems.

- B. Provide all necessary LonTalk and/or BACnet-compliant hardware and software to meet the system's functional specifications. Provide Protocol Implementation Conformance Statement (PICS) for Windows-based control software and the System Controller

- C. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.

- D. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.

- E. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.

- F. Provide and install all interconnecting cables between supplied cabinets, Programmable controllers, and input/output devices.
- G. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.
- H. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.
- I. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.
- J. Provide a comprehensive operator and technician training program as described herein.
- K. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.
- L. Provide new sensors, dampers, valves, and install only new electronic actuators. No used components shall be used as any part or piece of installed system.
- M. All work associated with this project shall seamlessly tie into Johnson Controls BMS system currently installed at WCSU. New graphics will be provided on Operator Workstations for new systems installed on this project.

1.3 SYSTEM DESCRIPTION

- A. A distributed logic control system complete with all software and hardware functions shall be provided and installed. The Enterprise wide network will be provided by the owner and supports the Internet Protocol (IP). Local connections of the Building Controller shall be on ISO 8802-3 (Ethernet). Each Building Controller shall perform communications to a network of Custom Application and Application Specific Controllers using LonTalk FTT-10 and LonMark profiles and/or use BACnet MSTP as prescribed by the BACnet standard to perform communications to a network of Custom Application and Application Specific Controllers. This system is to control all mechanical equipment, including all unitary equipment such as VAV boxes, heat pumps, fan-coils, AC units, etc. and all air handlers, and any other listed equipment using LonTalk FTT-10 and LonMark profiles and/or use BACnet MSTP as prescribed by the BACnet standard. Proprietary equipment or systems (including gateways) shall not be acceptable and are specifically prohibited.
- B. Building controllers shall include complete energy management software, including scheduling building control strategies with optimum start and logging routines. All energy management software and firmware shall be resident in field hardware and shall not be dependent on the operator's terminal. Operator's terminal software is to be used for access to field-based energy management functions only. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage. E.

- C. Room sensors shall be provided with digital readout that allow the user to view room temperature, adjust the room setpoint within preset limits and allow occupied override set by OWS. User shall also be able to start and stop unit from the digital sensor. Include all necessary wiring and firmware such that room sensor includes field service mode. Field service mode shall allow technician to balance VAV zones and access any parameter in zone controller.
- D. Plate sensors shall be provided as shown on drawings. Include all necessary wiring and firmware such that plate sensor can include a field service mode (by removing plate). Field service capability shall allow technician to balance VAV zones and access any parameter in zone controller.

1.4 APPROVED MANUFACTURERS

- A. Provide bid based on one of the following manufacturers
- B. Johnson Controls
- C. Above listed manufacturers must meet all portions of the specifications. Listed vendors cannot assume they are acceptable without meeting all requirements.

1.5 QUALITY ASSURANCE

- A. The BAS system shall be designed and installed, commissioned and serviced by factory trained personnel. Manufacturer shall have an in-place support facility within 1 hour response time of the site with technical staff, spare parts inventory and necessary test and diagnostic equipment.
- B. The Bidder shall be regularly engaged in the installation and maintenance of BAS systems and shall have demonstrated technical expertise and experience in the manufacture, installation and maintenance of BAS systems similar in size and complexity to this project. Bidders shall provide a list of at least 10 projects, similar in size and scope to this project completed within the past 3 years.
- C. The BAS system manufacturer must have a Dealer or Customer Support call-in Center located at the corporate headquarters or corporate manufacturing facilities. The Customer Support call-in Center will be staffed by fully trained and certified technicians.
- D. Materials and equipment shall be the catalogued products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements.
- E. All BAS peer-to-peer network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX.
- F. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.

- G. Control system shall be engineered, programmed and supported completely by representative's local office that must be within 50 miles of project site.

1.6 REFERENCE STANDARDS

- A. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections thereof, shall govern design and selection of equipment and material supplied:
1. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).
 2. ANSI/ASHRAE Standard 135-2010, BACnet.
 3. ANSI/EIA/CEA-709.1 (LonTalk)
 4. ANSI MC85.1 - Terminology for Automatic Control
 5. Uniform Building Code (UBC), including local amendments.
 6. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
 7. National Electrical Code (NEC).
 8. FCC Part 15, Subpart J, Class A
 9. EMC Directive 89/336/EEC (European CE Mark)
 10. UL-864 UUKL listing for Smoke Controls for any equipment used in smoke control sequences
- B. City, county, state, and federal regulations and codes in effect as of contract date.
- C. Except as otherwise indicated the system supplier shall secure and pay for all permits, inspections, and certifications required for his work and arrange for necessary approvals by the governing authorities.

1.7 SUBMITTALS

- A. Drawings
1. The system supplier shall submit engineered drawings, control sequence, and bill of materials for approval.
 2. Drawings shall be submitted in the following standard sizes: 11" x 17" (ANSI B).
 3. Eight complete sets (copies) of submittal drawings shall be provided.
 4. Drawings shall be available on CD-ROM.
- B. System Documentation
- C. Include the following in submittal package:
1. System configuration diagrams in simplified block format.
 2. All input/output object listings and an alarm point summary listing.
 3. Electrical drawings that show all system internal and external connection points, terminal block layouts, and terminal identification.
 4. Complete bill of materials, valve schedule and damper schedule.
 5. System graphics showing monitored systems, data (connected and calculated) point addresses, and operator notations. [Submit demonstration diskette containing graphics.]
 6. System configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.

7. Manufacturer's instructions and drawings for installation, maintenance, and operation of all purchased items.
8. Overall system operation and maintenance instructions—including preventive maintenance and troubleshooting instructions.
9. For operator's workstation(s) and building controller(s) provide BACnet Protocol Implementation Conformance Statements (PICS) as per ANSI/ASHRAE Standard 135-2010.
10. Provide complete description and documentation of any proprietary services and/or objects used in the system.
11. A list of all functions available and a sample of function block programming that shall be part of delivered system.
12. System communication riser detailing network architecture and front end hardware delivery

D. Project Management

1. The vendor shall provide a detailed project design and installation schedule with time markings and details for hardware items and software development phases. Schedule shall show all the target dates for transmission of project information and documents and shall indicate timing and dates for system installation, debugging, and commissioning.

1.8 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
 1. Revise shop drawings to reflect actual installation and operating sequences.
 2. Submit data specified in "Submittals" in final "Record Documents" form.
- C. Operation and Maintenance Data:
 1. Submit interconnection wiring diagrams complete field installed systems with identified and numbered system components and devices.
 2. Submit keyboard illustrations and step-by-step procedures indexed for each operator function.
 3. Submit inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

1.9 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.11 WARRANTY

- A. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of eighteen months from completion of system acceptance.
- B. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor. The maximum acceptable response time to provide this service at the site shall be 24 hours Monday through Friday, 48 hours on Saturday and Sunday.
- C. This warranty shall apply equally to both hardware and software.

PART 2 PRODUCTS

2.1 BUILDING CONTROLLER

- A. General Requirements
- B. Building Controller shall consist of a power supply, BACnet Ethernet-MS/TP, BACnet MS/TP, and LonTalk FTT-10 as a minimum. Special interfaces may use Modbus modules as needed. However, all Ethernet communications and all controllers including central plant controllers, advanced Programmable controllers and unitary controllers supplied by BMS manufacturer shall utilize the LonTalk or BACnet protocol standards.
- C. All communication with operator workstation shall be via BACnet Ethernet. All communication with Programmable controllers shall be LonTalk FTT-10 or BACnet MS/TP Controller shall route BACnet messages between the high-speed LAN (Ethernet 10/100MHz) and MS/TP, FTT-10 LANS. Ethernet – MS/TP, FFT module shall also route messages from all other Building Controller modules onto the BACnet Ethernet network.
 - 1. MS/TP LAN must be software configurable from 9.6 to 76.8Kbps.
 - 2. The RJ-45 Ethernet connection must accept either 10Base-T or 100Base-TX BACnet over twisted pair cable (UTP).
- D. The Building Controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN. Must support interoperability on wide area networks (WANs) and campus area networks (CANs) and function as a BACnet Broadcast Management Device (BBMD).
- E. Building Controller MS/TP module communications shall be via BACnet master slave token passing (MS/TP) LAN. Building Controller FFT-10 module communications shall be via LONtalk FFT-10 LAN using transceivers to all advanced Programmable and Programmable specific controllers. MS/TP module shall also route messages to Ethernet-MS/TP module for communication over WAN.
 - 1. MS/TP LAN must be software configurable from 9.6 to 76.8Kbps
 - 2. Configuration shall be via RS-232 connection.

- F. All controllers shall be capable of providing global control strategies for the system based on information from any objects in the system regardless if the object is directly monitored by a building controller. The software program implementing these strategies shall be completely flexible and user definable. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site, via a wide area network or downloaded via remote communications are not acceptable. Changing global strategies via firmware changes is also unacceptable.
- G. Programming shall be object-oriented using control function blocks, supporting DDC functions, 1000 Analog Values and 1000 Binary Values. All flowcharts shall be generated and automatically downloaded to controller.
- H. Provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed via the operator's workstation or field computer.
- I. Controller shall have a memory needed to ensure high performance and data reliability. Battery shall provide power for orderly shutdown of controller and storage of data in nonvolatile flash memory. Battery back up shall maintain real-time clock functions for a minimum of 20 days.
- J. Global control algorithms and automated control functions shall execute via 32-bit processor.
- K. Schedules
1. Each building controller module shall support a minimum of 80 BACnet Schedule Objects and 80 BACnet Calendar Objects.
 2. Building controller modules shall provide normal 7 day scheduling, holiday scheduling and event scheduling.
- L. Logging Capabilities
1. Each building controller shall log as minimum 320 values. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
 2. Logs may be viewed both on-site or off-site via WAN or remote communication.
 3. Building controller shall periodically upload trended data to networked operator's workstation for long term archiving if desired.
 4. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.
- M. Alarm Generation
1. Alarms may be generated within the system for any object change of value or state either real or calculated. This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
 2. Each alarm may be dialed out as noted elsewhere.
 3. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site via remote communications.
 4. Controller must be able to handle up to 320 alarm setups stored as BACnet event enrollment objects – system destination and actions individually configurable.

- N. Demand Limiting
1. Demand limiting of energy shall be built a built in function that shall be user configurable. Each controller module shall support shedding of up to 200 loads using a minimum of two types of shed programs.
 2. Load shedding programs in Building Controller Modules shall operate as defined in section 2.1.J of this specification.
 3. Monitor total power consumption for each power meter and shed associated loads automatically to reduce power consumption to an operator set maximum demand level.
 4. Input: Pulse count from incoming power meter connected to pulse accumulator in control unit.
 5. Forecast demand (kW): Predicted by sliding window method.
 6. Automatically shed loads throughout the demand interval selecting loads with independently adjustable on and off time of between one and 255 minutes.
 7. Demand Target: Minimum of 3 for each demand meter; change targets based upon (1) time, (2) status of pre-selected points, or (3) temperature.
 8. Load: Assign load shed priority, minimum "ON" time and maximum "OFF" time.
 9. Limits: Include control band (upper and lower limits).
 10. Output advisory when loads are not available to satisfy required shed quantity, advise shed requirements [and requiring operator acknowledgment].
- O. Duty Cycling:
1. Periodically stop and start loads, based on space temperature, and according to various On/Off patterns.
 2. Modify off portion of cycle based on operator specified comfort parameters. Maintain total cycle time by increasing on portion of cycle by equal quantity off portion is reduced.
 3. Set and modify following parameters for each individual load.
 - a. Minimum and maximum off time.
 - b. On/Off time in one-minute increments.
 - c. Time period from beginning of interval until cycling of load.
 - d. Manually override the DDC program and place a load in an On or Off state.
 - e. Cooling Target Temperature and Differential.
 - f. Heating Target Temperature and Differential.
 - g. Cycle off adjustment.
- P. Automatic Time Scheduling:
1. Self-contained programs for automatic start/stop/scheduling of building loads.
 2. Support up to seven (7) normal day schedules, seven (7) "special day" schedules and two (2) temporary day schedules.
 3. Special day's schedule supporting up to 30 unique date/duration combinations.
 4. Number of loads assigned to time program; with each load having individual time program.
 5. Each load assigned at least 16 control actions for each day with 1 minute resolution.
 6. Furnish the following time schedule operations:
 - a. Start.
 - b. Optimized Start.

- c. Stop.
 - d. Optimized Stop.
 - e. Cycle.
 - f. Optimized Cycle.
7. Capable of specifying minimum of 30 holiday periods up to 100 days in length for the year.
 8. Create temporary schedules.
 9. Broadcast temporary "special day" date and duration.
- Q. Start/Stop Time Optimization:
1. Perform optimized start/stop as function of outside conditions, inside conditions, or both.
 2. Adaptive and self-tuning, adjusting to changing conditions unattended.
 3. For each point under control, establish and modify:
 - a. Occupancy period.
 - b. Desired temperature at beginning of occupancy period.
 - c. Desired temperature at end of occupancy period.
- R. Night Setback/Setup Program: Reduce heating space temperature set point or raise cooling space temperature set-point during unoccupied hours; in conjunction with scheduled start/stop and optimum start/stop programs.
- S. Calculated Points: Define calculations and totals computed from monitored points (analog/digital points), constants, or other calculated points.
1. Employ arithmetic, algebraic, Boolean, and special function operations.
 2. Treat calculated values like any other analog value; use for any function where a "hard wired point" might be used.
- T. Event Initiated Programming: Any data point capable of initiating event, causing series of controls in a sequence.
1. Define time interval between each control action between 0 to 3600 seconds.
 2. Output may be analog value.
 3. Provide for "skip" logic.
 4. Verify completion of one action before proceeding to next action. When not verified, program capable of skipping to next action.
- U. Direct Digital Control: Furnish with each control unit Direct Digital Control software so operator is capable of customizing control strategies and sequences of operation by defining appropriate control loop algorithms and choosing optimum loop parameters.
1. Control loops: Defined using "modules" are analogous to standard control devices.
 2. Output: Paired or individual digital outputs for pulse width modulation, and analog outputs.
 3. Firmware:
 - a. PID with analog or pulse-width modulation output.
 - b. Floating control with pulse-width modulated outputs.
 - c. Two-position control.
 - d. Primary and secondary reset schedule selector.
 - e. Hi/Low signal selector.
 - f. Single pole double-throw relay.

- g. Single pole double throw time delay relay with delay before break, delay before make and interval time capabilities.
 - 4. Direct Digital Control loop: Downloaded upon creation or on operator request. On sensor failure, program executes user defined failsafe output.
 - 5. Display: Value or state of each of lines interconnecting DDC modules.
 - V. Fine Tuning Direct Digital Control PID or floating loops:
 - 1. Display information:
 - a. Control loop being tuned.
 - b. Input (process) variable.
 - c. Output (control) variable.
 - d. Set-point of loop.
 - e. Proportional band.
 - f. Integral (reset) Interval.
 - g. Derivative (rate) Interval.
 - 2. Display format: Graphic, with automatic scaling; with input and output variable superimposed on graph of "time" versus "variable".
 - W. Trend logging:
 - 1. Each control unit capable of storing samples of control unit's data points.
 - 2. Update file continuously at operator assigned intervals.
 - 3. Automatically initiate upload requests and then stores data on hard disk.
 - 4. Time synchronize sampling at operator specified times and intervals with sample resolution of one minute.
 - 5. Co-ordinate sampling with specified on/off point- state.
 - 6. Display trend samples on workstation in graphic format. Automatically scale trend graph with minimum 60 samples of data in plot of time versus data.
 - X. Tenant Activity Logging
 - 1. Tenant Activity logging shall be supported by Building Controller Module. Each independent module shall support a minimum of 80 zones.
 - 2. Tenant Activity logging shall functions as defined in section 2.1.K of this specification.
- 2.2 CENTRAL PLANT AND AIR HANDLER PROGRAMMABLE CONTROLLERS
 - A. Provide one or more Programmable controllers for each air handler and provide programmable controllers as needed for central plant control that adequately cover all objects listed in object list. All controllers shall interface to building controller via MS/TP or FTT-10 LAN using BACnet or LonTalk protocol.
 - B. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of units. Controllers shall be fully programmable using graphical programming blocks. No auxiliary controllers shall be used.
 - C. Communication Conformance
 - 1. Programmable controllers shall communicate using LonTalk or BACnet MSTP, ANSI/ASHRAE Standard 135-2010 (BACnet). Controllers communicating using

- LonTalk shall use FTT-10 transceivers and communicate using LonMark-approved SNVTs
- a. Files Functional Group
 - b. Reinitialize Functional Group
 - c. Device Communications Functional Group
2. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
 3. Standard BACnet or LonMark object types supported shall include as a minimum—Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File, and Program object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
- D. Programmable controllers shall include universal inputs with 10-bit resolution that accept 3K and 10K thermistors, 0–10VDC, 0–5 VDC, 4–20 mA and dry contact signals. Any input on a controller may be either analog or digital with a minimum of 3 inputs that accept pulses. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall include binary and analog outputs on board. Analog outputs shall be switch selectable as either 0–10VDC or 0–20mA. Software shall include scaling features for analog outputs. Programmable controller shall include 24VDC voltage supply for use as power supply to external sensors.
- E. All program sequences shall be stored on board Programmable controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and capable of multiple PID loops for control of multiple devices. All calculations shall be completed using floating-point math and system shall support display of all information in floating-point nomenclature at operator's terminal. Programming of Programmable controller shall be completely modifiable in the field over installed BACnet and LonTalk LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Programmable controller shall be programmed using programming tools.
- F. Programmable controller shall include support for intelligent room sensor (see section 2.9.B.) Display on intelligent room sensor shall be programmable at Programmable controller and include an operating mode and a field service mode. See sequence of operation for specific display requirements at intelligent room sensor.
- 2.3 TERMINAL UNIT PROGRAMMABLE CONTROLLERS (Heat Pumps, AC Units, Fan Coils)
- A. Provide one controller for each piece of unitary mechanical equipment that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet or FTT-10 using LonTalk protocols. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of unit.

- B. Communication Conformance
1. Programmable controllers shall communicate using LonTalk or BACnet MSTP, ANSI/ASHRAE Standard 135-2010 (BACnet). Controllers communicating using LonTalk shall use FTT-10 transceivers and communicate using LonMark-approved SNVTs
 - a. Files Functional Group
 - b. Reinitialize Functional Group
 - c. Device Communications Functional Group
 2. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
 3. Standard BACnet or LonMark object types supported shall include as a minimum—Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
- C. Programmable controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, 4–20 mA, dry contact signals and a minimum of 3 pulse inputs. Any input on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board with analog outputs as needed.
- D. All program sequences shall be stored on board controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of Programmable controller shall be completely modifiable in the field over installed BACnet and LonTalk LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen.
- E. Programmable controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at controller and include an operating mode and a field service mode. See sequence of operation for specific display requirements at intelligent room sensor.

2.4 VAV BOX CONTROLLERS—SINGLE DUCT

- A. Provide one controller for each VAV box that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller via MS/TP LAN using BACnet or FTT-10 using LonTalk protocol. No gateways shall be used. Controllers shall include on board CFM flow sensor, inputs, outputs and programmable, self-contained logic program as needed for control of units.
- B. Programmable controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5 VDC, and dry contact signals. Inputs on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall

also include binary outputs on board. For applications using variable speed parallel fans, provide a single analog output selectable for 0-10 V or 0-20 mA control signals. Programmable controller shall include microprocessor driven flow sensor for use in pressure independent control logic. All boxes shall be controlled using pressure independent control algorithms and all flow readings shall be in CFM (LPS if metric).

- C. All program sequences shall be stored on board Programmable controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of Programmable controller shall be completely modifiable in the field over installed BACnet or LonTalk LANs or remotely via modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Programmable controller shall be programmed using the same programming tool as Building Controller and as described in operator workstation section. All programming tools shall be provided as part of system.
- D. Programmable controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at Programmable controller and include an operating mode and a field service mode. See sequence for specific display requirements for intelligent room sensor.
- E. On board flow sensor shall be microprocessor driven and precalibrated at the factory. Precalibration shall be at 16 flow points as a minimum. All factory calibration data shall be stored in EEPROM. Calibration data shall be field adjustable to compensate for variations in VAV box type and installation.
- F. Provide duct temperature sensor at discharge of each VAV box that is connected to controller for reporting back to operator workstation.

2.5 SENSORS and MISCELLANEOUS DEVICES

- A. Temperature Sensors
 - 1. All temperature sensors to be solid state electronic, factory-calibrated to within 0.5°F, totally interchangeable with housing appropriate for application. Wall sensors to be installed as indicated on drawings. Mount 48 inches about finished floor. Duct sensors to be installed such that the sensing element is in the main air stream. Immersion sensors to be installed in wells provided by control contractor, but installed by mechanical contractor. Immersion wells shall be filled with thermal compound before installation of immersion sensors. Outside air sensors shall be installed away from exhaust or relief vents, not in an outside air intake and in a location that is in the shade most of the day.
- B. Intelligent Room Sensor with LCD Readout
 - 1. Sensor shall contain a backlit LCD digital display and user function keys along with temperature sensor. Controller shall function as room control unit, and shall allow occupant to raise and lower setpoint, and activate terminal unit for override use—all within limits as programmed by building operator.
 - 2. The Intelligent Room Sensor shall display room setpoint, room temperature, and fan status (if applicable) at each controller. This unit shall be programmable,

allowing site developers the flexibility to configure the display to match their application. Unit must have the capability to show temperatures in Fahrenheit or Centigrade.

3. Override time count down shall be automatic, but may be reset to zero by occupant from the sensor. Time remaining shall be displayed. Display shall show the word "OFF" in unoccupied mode unless a function button is pressed.
4. See sequence of operation for specific operation of LCD displays and function keys in field service mode and in normal occupant mode. Provide intelligent room sensors as specified in point list.

C. Wall Sensor

1. Standard wall sensor shall use solid-state sensor identical to intelligent room sensor and shall be packaged in aesthetically pleasing enclosure. Sensor shall provide override function, warmer/cooler lever for set point adjustment and port for plug-in of Field Service Tool for field adjustments or be capable of using Bluetooth compatible. Override time shall be stored in Operator Workstation and be adjustable on a zone-by-zone basis. Adjustment range for warmer/cooler lever shall also be stored in EEPROM on controller.

D. Network Connection Tool

1. Network connection tool shall allow technician to connect a laptop to any MS/TP or FFT-10 network or device and view and modify all information throughout the entire network. Laptop connection to tool shall be via Ethernet or PTP.
2. Provide quick connect to MS/TP or FFT-10 LAN at each controller. Tool shall be able to adjust to all MS/TP and FFT-10 baud rates specified in the BACnet and LonMark standards.
3. Provide one (1) Network Connection Tools for this project.

2.6 Electronic Actuators and Valves

A. Quality Assurance for Actuators and Valves

1. UL Listed Standard 873 and C.S.A. Class 4813 02 certified.
2. NEMA 2 rated enclosures for inside mounting, provide with weather shield for outside mounting.
3. Five-year manufacturers warranty. Two-year unconditional and three-year product defect from date of installation.

B. Execution Details for Actuators and Valves

1. Furnish a Freeze-stat and install "Hard Wire" interlock to disconnect the mechanical spring return actuator power circuit for fail-safe operation. Use of the control signal to drive the actuators closed is not acceptable.
2. Each DDC analog output point shall have an actuator feedback signal, independent of control signal, wired and terminated in the control panel for true position information and troubleshooting. Or the actuator feedback signal may be wired to the DDC as an analog input for true actuator position status.
3. VAV box damper actuation shall be Floating type or Analog (2-10vdc, 4-20ma).
4. Booster-heat valve actuation shall be Floating type or Analog (2-10vdc, 4-20ma).
5. Primary valve control shall be Analog (2-10vdc, 4-20ma).

- C. Actuators for Damper and Control Valves ½" to 6" shall be Electric unless otherwise specified, provide actuators as follows:
1. UL Listed Standard 873 and Canadian Standards association Class 481302 shall certify Actuators.
 2. NEMA 2 rated actuator enclosures are. Use additional weather shield to protect actuator when mounted outside.
 3. 5 year Manufacturers Warranty. Two-year unconditional + Three year product defect from date of installation.
 4. Mechanical spring shall be provided when specified. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
 5. Position indicator device shall be installed and made visible to the exposed side of the Actuator. For damper short shaft mounting, a separate indicator shall be provided to the exposed side of the Actuator.
 6. Overload Protection: Actuators shall provide protection against actuator burnout by using an internal current limiting circuit or digital motor rotation sensing circuit. Circuit shall insure that actuators cannot burn out due to stalled damper or mechanical and electrical paralleling. End switches to deactivate the actuator at the end of rotation are acceptable only for Butterfly Valve actuators.
 7. A push button gearbox release shall be provided for all non-spring actuators.
 8. Modulating actuators shall be 24Vac and consume 10VA power or less.
 9. Conduit connectors are required when specified and when code requires it.
- D. Damper Actuators:
1. Outside Air and Exhaust Air Damper Actuators shall be Mechanical Spring Return. Capacitors or other non-mechanical forms of fail-safe are not acceptable. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the damper as required.
 2. Economizer Actuators shall utilize Analog control 2-10 VDC, Floating control is not acceptable.
 3. Electric damper actuators (including VAV box actuators) shall be direct shaft mounted and use a V-bolt and toothed V-clamp causing a cold weld effect for positive gripping. Single bolt or setscrew type fasteners are not acceptable.
 4. One electronic actuator shall be direct shaft mounted per damper section. No connecting rods or jackshafts shall be needed. Small outside air and return air economizer dampers may be mechanically linked together if one actuator has sufficient torque to drive both and damper drive shafts are both horizontal installed.
 5. Multi-section dampers with electric actuators shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per damper section. (See below execution section for more installation details.)
- E. Valve Actuators ½" to 6"
1. Mechanical spring shall be provided on all actuators for pre-heat coil and actuators for AHU heating or cooling coil when units are mounted outside. See plans for fail save flow function: Normal Open or Normal Closed. Capacitors or other non-mechanical forms of fail-safe are not acceptable.
 2. All zone service actuators shall be non-spring return unless otherwise specified.
 3. The valve actuator shall be capable of providing the minimum torque required for proper valve close off for the required application.

4. All control valves actuators shall have an attached 3-foot cable for easy installation to a junction box.
 5. Override handle and gearbox release shall be provided for all non-spring return valve actuators.
- F. Control Valves ½” to 6”:
- The BAS contractor shall furnish all specified motorized control valves and actuators. BAS contractor shall furnish all control wiring to actuators. The mechanical contractor shall install all valves. Equal Percentage control characteristic shall be provided for all water coil control valves. Linear valve characteristic is acceptable for 3-way valves 2½ inch and above.
1. Characterized Control Valves shall be used for hydronic heating or cooling applications and small to medium AHU water coil applications to 100GPM. Actuators are non-spring return for terminal unit coil control unless otherwise noted. If the coil is exposed to the Outside Air stream then see plans for Spring Return requirement.
 - a. Leakage is Zero percent, Close-off is 200psi, Maximum differential is 30psi. Rangeability is 500:1.
 - b. Valves 1/2 inch through 2 inches shall be nickel-plated forged brass body, NPT screw type connections.
 - c. Valves 1/2 inch through 1-1/4 inches shall be rated for ANSI Class 600 working pressure. Valves 1-1/2 inch and 2 inches shall be rated for ANSI Class 400 working pressure.
 - d. The operating temperature range shall be 0° to 250° F.
 - e. Stainless steel ball & stem shall be furnished on all modulating valves.
 - f. Seats shall be fiberglass reinforced Teflon.
 - g. Two-way and three-way valves shall have an equal percentage control port. Full stem rotation is required for maximum flow to insure stable BTU control of the coil.
 - h. Three-way valve shall be applicable for both mixing and diverting.
 - i. The characterizing disc is made of TEFZEL and shall be keyed and held secure by a retaining ring.
 - j. The valves shall have a blow out proof stem design.
 - k. The stem packing shall consist of 2 lubricated O-rings designed for on-off or modulating service and require no maintenance.
 - l. The valves shall have an ISO type, 4-bolt flange, for mounting actuator in any orientation parallel or perpendicular to the pipe.
 - m. A non-metallic thermal isolation adapter shall separate valve flange from actuator.
 - n. One fastening screw shall secure the direct coupling of the thermal isolation adapter between the actuator and the valve. This will prevent all lateral or rotational forces from affecting the stem and it's packing O-rings.
 2. Globe valves ½" to 2" shall be used for steam control or water flow applications.
 - a. Valves shall be bronze body, NPT screw type, and shall be rated for ANSI Class 250 working pressure.
 - b. Valves 1/2 inch (DN15) through 2 inches (DN50) with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (.1%).
 - c. The operating temperature range shall be 20° to 280° F.

- d. Spring loaded TFE packing shall protect against leakage at the stem.
 - e. Two-way valves shall have an equal percentage control port.
 - f. Three-way valves shall have a linear control and bypass port.
 - g. Mixing and diverting valves must be installed specific to the valve design.
3. Globe Valve 2 ½ to 6”
 - a. Valves 2-1/2 inch (DN65) through 6 inches (DN50) shall be iron body, 125 lb. flanged with Class III (.1%) close-off leakage at 50 psi differential.
 - b. Valves with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (.1%).
 - c. Flow type for two-way valves shall be equal percentage. Flow type for three-way valves shall be linear.
 - d. Mixing and diverting valves must be installed specific to the valve design.
- G. Butterfly valves
1. Butterfly Valves shall be sized for modulating service at 60-70 degree stem rotation. Isolation valves shall be line-size. Design velocity shall be less than 12 feet per second when used with standard EPDM seats.
 - a. Body is Cast Iron.
 - b. Disc is Aluminum Bronze standard.
 - c. Seat is EPDM Standard.
 - d. Body Pressure is 200 psi, -30F to 275F.
 - e. Flange is ANSI 125/250.
 - f. Media Temperature Range is -22F to 240F.
 - g. Maximum Differential Pressure is 200 psi for 2” to 6” size.
- H. Butterfly Valve Industrial Actuators
1. Actuators shall be approved under Canadian Standards Association or other Nationally Recognized Testing Laboratory to UL standards. CSA Class 4813 02 or equal. Enclosure shall be NEMA 4 (weatherproof) enclosure and will have an industrial quality coating.
 - a. Actuator shall have a motor rated for continuous duty. The motor shall be fractional horsepower; permanent split capacitor type designed to operate on a 120 VAC, 1 pH, 60 Hz supply. Two adjustable cam actuated end travel limit switches shall be provided to control direction of travel. A self-resetting thermal switch shall be imbedded in the motor for overload protection.
 - b. Reduction gearing shall be designed to withstand the actual motor stall torque. Gears shall be hardened alloy steel, permanently lubricated. A self-locking gear assembly or a brake shall be supplied.
 - c. Actuator shall have a 6 ft wiring harness provided for ease in field wiring (above 1500 in-lbs). Two adjustable SPDT cam-actuated auxiliary switches, rated at 250 VAC shall be provided for indication of open and closed position. Actuator shall have heater and thermostat to minimize condensation within the actuator housing.
 - d. Actuator shall be equipped with a hand wheel for manual override to permit operation of the valve in the event of electrical power failure or system malfunction. Hand wheel must be permanently attached to the

actuator and when in manual operation electrical power to the actuator will be permanently interrupted. The hand wheel will not rotate while the actuator is electrically driven.

- e. The actuator shall be Analog, floating, or two position as called out in the control sequence of operation. All Analog valves shall be positive positioning, and respond to a 2-10 VDC, 4-20 mA, or adjustable signal as required. Analog actuators shall have a digital control card allowing any voltage input for control and any DC voltage feedback signal for position indication.
- I. Performance Verification Test
1. Control loops shall cause productive actuation with each movement of the actuator and actuators shall modulate at a rate which is stable and responsive. Actuator movement shall not occur before the effects of previous movement have affected the sensor.
 2. Actuator shall have capability of signaling a trouble alarm when the actuator Stop-Go Ratio exceeds 30%.
- J. Actuator Mounting for Damper and Valve arrangements shall comply to the following:
1. Damper Actuators: Shall not be installed in the air stream
 2. A weather shield shall be used if actuators are located outside. For Damper Actuators use clear plastic enclosure.
 3. Damper or valve actuator ambient temperature shall not exceed 122 degrees F through any combination of medium temperature or surrounding air. Appropriate air gaps, thermal isolation washers or spacers, standoff legs, or insulation shall be provided as necessary
 4. Actuator cords or conduit shall incorporate a drip leg if condensation is possible. Water shall not be allowed to contact actuator or internal parts. Location of conduits in temperatures dropping below dew point shall be avoided to prevent water from condensing in conduit and running into actuator.
 5. Damper mounting arrangements shall comply to the following:
 - a. The ventilation subcontractor shall furnish and install damper channel supports and sheet metal collars.
 - b. No jack shafting of damper sections shall be allowed.
 - c. Multi-section dampers shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per section.
 6. Size damper sections based on actuator manufacturers specific recommendations for face velocity, differential pressure and damper type. In general:
 - a. Damper section shall not exceed 24 ft-sq. with face velocity £ 1500 FPM.
 - b. Damper section shall not exceed 18 ft-sq. with face velocity £ 2500 FPM.
 - c. Damper section shall not exceed 13 ft-sq. with face velocity £ 3000 FPM.
 7. Multiple section dampers of two or more shall be arranged to allow actuators to be direct shaft mounted on the outside of the duct.
 8. Multiple section dampers of three or more sections wide shall be arranged with a 3-sided vertical channel (8" wide by 6" deep) within the duct or fan housing and between adjacent damper sections. Vertical channel shall be anchored at the top

and bottom to the fan housing or building structure for support. The sides of each damper frame shall be connected to the channels. Holes in the channel shall allow damper drive blade shafts to pass through channel for direct shaft mounting of actuators. Open side of channel shall be faced down stream of the airflow, except for exhaust air dampers.

9. Multiple section dampers to be mounted flush within a wall or housing opening shall receive either vertical channel supports as described above or sheet metal standoff collars. Sheet metal collars (12" minimum) shall bring each damper section out of the wall to allow direct shaft mounting of the actuator on the side of the collar.

K. Valve Sizing for Water Coil

1. On/Off Control Valves shall be line size.
2. Modulating Control Valve Body Size may be reduced at most two pipe sizes from the line size or not less than ½ the pipe size. The BAS contractor shall size all water coil control valves for the application as follows:
 - a. Booster-heat valves shall be sized not to exceed 4-9psi differential pressure. Size valve for 50% Valve Authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
 - b. Primary valves shall be sized not to exceed 5-15psi differential pressure. Size valve for 50% Valve Authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
 - c. Butterfly valves shall be sized for modulating service at 60-70 degree rotation. Design velocity shall be 12 feet per second or less when used with standard EPDM seats.
3. Valve Mounting arrangements shall comply to the following:
 - a. Unions shall be provided on all ports of two-way and three-way valves.
 - b. Install three-way equal percentage Characterized Control valves in a mixing configuration with the "A" port piped to the coil.
 - c. Install 2½ inch and above, Three-Way globe valves, as manufactured for mixing or diverting service to the coil.

2.7 ENCLOSURES

- A. All controllers, power supplies and relays shall be mounted in enclosures.
- B. Enclosures may be NEMA 1 when located in a clean, dry, indoor environment. Indoor enclosures shall be NEMA 12 when installed in other than a clean environment.
- C. Enclosures shall have hinged, locking doors.
- D. Provide laminated plastic nameplates for all enclosures in any mechanical room or electrical room. Include location and unit served on nameplate. Laminated plastic shall be 1/8" thick sized appropriately to make label easy to read.

2.8 AIRFLOW MEASUREMENT DEVICES

- A. Approved manufacturers
 - 1. Ebtron
 - 2. Air Monitor Corporation
 - 3. Paragon Controls

- B. Duct Mounted Configurations
 - 1. Installation applications shall conform to manufacturer’s recommended minimum and maximum velocity requirements
 - 2. Installation locations shall comply with manufacturer’s recommended straight lengths of duct upstream and downstream of station.
 - a. Provide open parallel cell air straightener–equalizer honeycomb upstream of station, where required, to meet manufacturer’s straight length recommendations. Honeycomb and probes to be mounted in 14 ga. (minimum) galvanized steel, welded casing in 8" depth with 90° connecting flanges in a configuration and size equal to that of the duct it is mounted into
 - 3. Thermal type (anemometer) airflow measuring system
 - a. Each probe array shall consist of one or more multi-point measuring probes and a single microprocessor based transmitter. The transmitter shall be supplied by the same manufacturer as the measuring station or probe array.
 - b. Each multi-point probe shall be assembled using heavy wall anodized aluminum tubing, aluminum mounting plates, aerodynamically optimized molded sensing apertures to ensure accurate measurement in angular airflow conditions, and neoprene mounting gasket.
 - c. The probe array shall be connected to the transmitter using a single cable, of up to 100' in length, included with the transmitter.
 - d. Each stand-alone sensing point shall use an ambient temperature thermistor and an externally heated thermistor to determine the point velocity and temperature. Automatic equal area averaging of the individual point measurements shall be performed in the transmitter.
 - e. Each airflow sensor shall have an operating range of 5,000 FPM, with a NIST traceable accuracy of ±2% of reading for velocity measurement and 0.1°F for temperature measurement.
 - f. The number of sensors for each rectangular probe array shall be:

Station Area	Sensor Density
1 to < 15 Sq. Ft.	1.50 Sq. Ft. Per Sensor
15 to < 30 Sq. Ft.	1.67 Sq. Ft. Per Sensor
30 to < 60 Sq. Ft.	2.10 Sq. Ft. Per Sensor
60 to 100 Sq. Ft.	3.13 Sq. Ft. Per Sensor

- g. Individual sensors shall be fully field serviceable without need for field calibration, not requiring that the probe be returned to the Factory for repair and/or calibration.

- h. Each transmitter shall be capable of averaging as many as thirty-two (32) sensors,
 - i. The transmitter will have a high visibility backlit LCD for display of either the averaged or individual sensor airflow and temperature measurements, in user selectable units of measure. The transmitter shall be factory configured to output duct air volume for plug and play operation.
 - j. All transmitter configuration, scaling, and diagnostic functions shall be performed by means of a password protected, cover mounted membrane keypad.
 - k. The transmitter outputs shall be dual analog (4-20mA, 0-5VDC or 0-10VDC) for airflow and temperature or optional LonWorks® communication interface.
 - l. The operating temperature range of the transmitter shall be from -20° to 140°F. The transmitter shall be located where it will be sheltered from water or weather.
 - m. Input power to each transmitter shall be 24VAC/24VDC.
 - n. When installed per the manufacturer's minimum installation requirements, the transmitter with accompanying station or probe array shall measure with an accuracy of $\pm 2-3\%$ of actual flow.
4. Pitot type (differential pressure) airflow measuring system
- a. Each airflow traverse probe shall contain multiple total and static pressure sensors located along the exterior surface of the cylindrical probe and internally connected to their respective averaging manifolds. The flow sensors shall not protrude beyond the surface of the probe(s), and shall be the offset (Fechheimer) type for static pressure and the chamfered impact type for total pressure measurement. The airflow sensing probe's measurement accuracy shall not be affected by directional flow having pitch and/or yaw angles up to 30°. Each airflow traverse probe shall be of extruded aluminum construction and furnished with mounting plate(s), gasket, and signal fittings suitable for HVAC duct installation.
 - b. Total and static pressure sensors shall be located at the centers of equal areas (for rectangular ducts) or at equal concentric area centers (for circular ducts) along the probe length.
 - c. Probes shall be AMCA certified and be capable of measuring the airflow rates within an accuracy of $\pm 2\%$ without the use of correction factors. The maximum allowable unrecovered pressure drop caused by the probes shall not exceed .025" w.c. at 2000 FPM, or .085" w.c. at 4000 FPM.
 - d. The Transmitter shall have an accuracy of $\pm 0.5\%$ of Natural Span and user selectable square root function. The Transmitter shall be housed in a NEMA 1 aluminum with universal 1/8" FPT signal connection ports. The transmitter shall be supplied by the same manufacturer as the measuring station or probe array.

- C. Fan Inlet Configurations
1. Provide only pitot type air flow measuring systems for fan inlet configurations.
 2. The Airflow Measuring Station shall contain multiple total and static pressure sensors placed at concentric area centers along the exterior surface of the cylindrical probes and internally connected to their respective averaging manifolds. Sensors shall not protrude beyond the surface of the probe, nor be adversely affected by particle contamination normally present in building system airflows.
 3. The Airflow Measuring Station shall have symmetrical averaging signal takeoffs, and shall be of aluminum construction with hard anodized finish with galvanized steel mounting hardware.
 4. The Airflow Measuring Station shall not significantly impact fan performance or contribute to fan generated noise levels. The probes shall be capable of producing steady, non-pulsating signals of standard total and static pressure, without need for flow corrections or factors, with an accuracy of 3% of actual flow over a fan operating range of 6 to 1 capacity turndown.
 5. The Transmitter shall have an accuracy of $\pm 0.5\%$ of Natural Span and user selectable square root function. The Transmitter shall be housed in a NEMA 1 aluminum enclosure with universal 1/8" FPT signal connection ports. The transmitter shall be supplied by the same manufacturer as the measuring station or probe array.
- D. Rooftop Unit Configurations with Direct inlet of Outside Air
1. This specification subsection refers to all outside airflow monitors for air handling units where outdoor air ductwork is not present (such as rooftop air handling units). For ducted outdoor airflow applications, refer either to this subsection or subsection B (Duct Mounted Configurations) above.
 2. The outside air flow station shall use a technology that measures pressure drop via an outside air reference and an inlet airflow sensor across a fixed resistance element to provide 5 % accuracy for outside air under all circumstances. The Outside Reference Sensor shall be centrally positioned in, and mounted to the surface of the inlet. The Reference shall be located upstream of any inlet louver, mist eliminator, bird screen, rain hood, etc. The Inlet Airflow Sensor shall be located downstream of any inlet louver, mist eliminator, bird screen, rainhood, etc., and upstream of the outside air intake control damper(s). Outside airflow sensors that use technologies other than pressure drop (thermal or pitot tube) shall provide the means to protect the flow station from moisture and provide a means to clean to unit from dirt and debris on a continuous basis.
 3. The outside air flow measuring station shall be constructed to prevent measurement instability caused by the variable presence of moisture (rain and humidity), and accuracy degradation caused by dirt build-up around flow station ports and thermal surfaces.
 4. The outside airflow measuring station shall obtain accurate and repeatable measurement in the absence of any upstream/downstream straight duct run.
 5. The outside air flow measuring station shall account for outside air temperature variances of 150° F installed in locations ranging from sea level to 5,000 feet elevation. The station shall make necessary temperature and altitude compensating adjustments.

6. The Outside Airflow Measurement System shall contain an integral multi-line liquid crystal display for use during the configuration and calibration processes, and to display two measured processes (volume, velocity, temperature) during normal operation. All configuration, output scaling, calibration, and controller tuning will be performed digitally in the on-board microprocessor via input pushbuttons
7. The Outside Airflow Measurement System shall measure inlet airflow with an accuracy of $\pm 5\%$ of reading over a range of 150-600 FPM, 250-1,000 FPM, 150-2,000 FPM, and 500-2,000 FPM and not have its reading affected by the presence of directional or gusting wind. Measured airflow shall be density corrected for ambient temperature variances, and atmospheric pressure due to site altitude.
8. The outside air flow measuring station shall be constructed to prevent measurement instability caused by the variable presence of moisture (rain and humidity), and accuracy degradation caused by dirt build-up around flow station ports and thermal surfaces.
9. The Outside Airflow Measurement System shall interface with existing building automation systems (BAS), accepting inputs for fan system start, economizer mode operation, and an external controller setpoint, and provide flow deviation alarm outputs.
10. The sensors shall be constructed of materials that resist corrosion due to the presence of salt or chemicals in the air; all non-painted surfaces shall be constructed of stainless steel. The electronics enclosure shall be NEMA 1.
 - a. If the electronics enclosure is to be mounted outdoors, provide in a thermostatically controlled NEMA 4 enclosure with heater.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence.
- B. Notify the owners' representative in writing of conditions detrimental to the proper and timely completion of the work.
- C. Do not begin work until all unsatisfactory conditions are resolved.

3.2 INSTALLATION (GENERAL)

- A. Install in accordance with manufacturer's instructions.
- B. Provide all miscellaneous devices, hardware, software, interconnections installation and programming required to ensure a complete operating system in accordance with the sequences of operation and point schedules.

3.3 LOCATION AND INSTALLATION OF COMPONENTS

- A. Locate and install components for easy accessibility; in general, mount 48 inches above floor with minimum 3'-0" clear access space in front of units where not subject to excessive vibration. Obtain approval on locations from owner's representative prior to installation.
- B. Install software in control units and in operator workstation. Implement features of programs to specified requirements and appropriate to sequence of operations.
- C. Install with 120 volt alternating current, 15 amp dedicated circuit to each programmable control unit or local UPS provided by ATC.
- D. All instruments, switches, transmitters, etc., shall be suitably wired and mounted to protect them from vibration, moisture and high or low temperatures.
- E. Identify all equipment and panels. Provide permanently mounted tags for all panels.
- F. Provide stainless steel or brass thermowells suitable for respective application and for installation under other sections—sized to suit pipe diameter without restricting flow.

3.4 INTERLOCKING AND CONTROL WIRING

- A. Provide all interlock and control wiring. All wiring shall be installed neatly and professionally, in accordance with Specification Division 26 and all national, state and local electrical codes.
- B. Provide wiring as required by functions as specified and as recommended by equipment manufacturers, to serve specified control functions. Provide shielded low capacitance wire for all communications trunks.
- C. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the owner's representative prior to rough-in.
- D. Provide auxiliary pilot duty relays on motor starters as required for control function.
- E. Provide power for all control components from nearest electrical control panel or as indicated on the electrical drawings—coordinate with electrical contractor.
- F. All control wiring in the mechanical, electrical, telephone and boiler rooms to be installed in raceways. All other wiring to be installed neatly and inconspicuously per local code requirements. If local code allows, control wiring above accessible ceiling spaces may be run with plenum rated cable (without conduit).

3.5 DDC OBJECT TYPE SUMMARY

- A. Provide all database generation.
- B. Displays
 - 1. System displays shall show all analog and binary object types within the system. They shall be logically laid out for easy use by the owner. Provide outside air temperature indication on all system displays associated with economizer cycles.
- C. Run Time Totalization
 - 1. At a minimum, run time totalization shall be incorporated for each monitored supply fan, return fan, exhaust fan, hot water and chilled water pumps. Warning limits for each point shall be entered for alarm and or maintenance purposes.
- D. Trendlog
 - 1. All binary and analog object types (including zones) shall have the capability to be automatically trended.
- E. Alarm
 - 1. All analog inputs (High/Low Limits) and selected binary input alarm points shall be prioritized and routed (locally or remotely) with alarm message per owner's requirements.
- F. Database Save
 - 1. Provide back-up database for all stand-alone Programmable controllers on disk.

3.6 FIELD SERVICES

- A. Prepare and start logic control system under provisions of this section.
- B. Start-up and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.
- C. Provide the capability for off-site monitoring at control contractor's local or main office. At a minimum, off-site facility shall be capable of system diagnostics and software download. Owner shall provide phone line for this service for 1 year or as specified.
- D. Provide Owner's Representative with spare parts list. Identify equipment critical to maintaining the integrity of the operating system.

3.7 AS BUILT DOCUMENTATION REQUIRED

- A. Refer to 23 04 00 - GENERAL CONDITIONS FOR MECHANICAL TRADES

3.8 TRAINING

- A. Provide application engineer to instruct owner in operation of systems and equipment.
- B. Provide system operator's training to include (but not limited to) such items as the following: modification of data displays, alarm and status descriptors, requesting data, execution of commands and request of logs. Provide this training to a minimum of 3 persons.
- C. Provide on-site training above as required, up to 16 hours as part of this contract.

3.9 DEMONSTRATION

- A. Provide systems demonstration under provisions of Section 23 04 00.
- B. Demonstrate complete operating system to owner's representative.
- C. Provide certificate stating that control system has been tested and adjusted for proper operation.

END OF SECTION

SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes sequence of operation for:
 - 1. Heating hot water system.
 - 2. Ventilation air handling units.
 - 3. Air terminal units.
 - 4. Radiant ceiling panels.
 - 5. Variable refrigerant flow systems.

- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 09 00 - Direct-Digital Control System for HVAC: For equipment, devices, system components, and software to implement sequences of operation.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

- B. Shop Drawings: Indicate mechanical system controlled and control system components.
 - 1. Label with settings, adjustable range of control and limits. Submit written description of control sequence.
 - 2. Submit flow diagrams for each control system, graphically depicting control logic.
 - 3. Submit draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
 - 4. Coordinate submittals with information requested in Section 23 09 00.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

- B. Project Record Documents: Record actual locations of components and set points of controls, including changes to sequences made after submission of shop drawings.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL

- A. The HVAC system shall be able to be “overridden” into the occupied or unoccupied mode for a period of two hours (adj.) from a button within the Building Management System (BMS). This “override” shall be available at all levels of the system, i.e. a single space shall be able to be overridden from the BMS graphic of the associated terminal unit or variable refrigerant volume air handler, a button on the variable refrigerant volume system BMS graphic or dedicated outside air system BMS screen shall “override” all spaces associated with that system and a button on the BMS front screen shall “override” the entire system.
- B. Each space temperature sensor shall be capable of placing the associated systems into the occupied mode for a period of two hours (adj.).
- C. The BMS shall monitor the building’s electrical and natural gas consumption and shall display this information on a “Building Energy Consumption” graphic.
- D. A unique schedule shall be provided for each piece of equipment controlled by the BMS. Applying a single schedule to multiple pieces of equipment is not permissible.
- E. Space temperature sensors shall have a digital temperature display and shall allow the occupant +/- 2 °F of adjustment.
- F. All setpoints shall be adjustable.
- G. The BMS shall connect to the lighting occupancy sensors within the corridors (refer to EL plans for quantities and locations) and shall disable the occupancy sensors during the occupied period.

3.2 HEATING HOT WATER SYSTEM

- A. Display:
 - 1. System graphic.
 - 2. Secondary hot water pumps command and status.
 - 3. Hot-water temperature - supply and return.
 - 4. Heating hot water supply temperature setpoint.
 - 5. Hot water control point adjustment.
 - 6. Boiler enable and status.
 - 7. Boiler output.
 - 8. System differential pressure.
 - 9. System differential pressure setpoint.
 - 10. Boiler primary pump command and status.
 - 11. System differential bypass valve commanded position.
 - 12. Outdoor air temperature.
 - 13. Hot water system glycol percentage and alarm

3.3 VENTILATION AIR HANDLING UNITS

- A. This sequence shall apply to DOA-1
- B. Building Management System Interface: The BMS will send the controller Occupied, Unoccupied, Optimal Start, Night Heat and Timed Override commands. The BMS will also send a discharge air temperature setpoint and supply and relief duct static pressure setpoints. If communication is lost with the BMS, the controller will operate in the Occupied mode using its default setpoints.
- C. Operating Modes:
1. Occupied Mode: During occupied periods, the supply and exhaust fans will run continuously, the outside air and exhaust air dampers will open and the recirculation damper will close to provide 100% outside air.
 - a. Cooling mode: When conditions permit (outside air enthalpy above relief air enthalpy), the energy wheel bypass dampers shall close and the energy recovery wheel shall be commanded on. When the outside air dewpoint is below 57 °F, the discharge temperature shall be 75 °F. When the outside air dewpoint is below 57 °F, the discharge air temperature shall be 55 °F. Should any space be unable to maintain a temperature of 70 °F with a discharge air temperature of 55 °F with the associated VRF unit off and the associated VAV at minimum position, the discharge air temperature shall be reset upward to maintain space temperature utilizing the hot gas reheat coil.
 - b. Heating Mode: The energy recovery wheel and hot water control valve will sequence. When conditions permit (outside air enthalpy below relief air enthalpy), the Energy Recovery Wheel shall be the first stage of heating. The bypass dampers shall open to the heat recovery wheel position and the energy recovery wheel shall be commanded on. If the energy recovery wheel status does not match the commanded value after a delay (30 sec. adj.) the wheel shall be commanded off, the bypass dampers shall be commanded open to the bypass position, and an alarm shall be generated at the OWS. The hot water control valve will modulate to maintain the discharge air temperature heating setpoint (55°F adj). Should the discharge air temperature exceed 55 °F, the hot water valve shall close and the energy recovery wheel shall continue to operate. If the discharge air temperature sensor fails during normal operation associated valve will remain open and an alarm will be annunciated.
 - c. Energy Recovery Wheel Frost Control: A differential pressure sensor on the exhaust stream of the energy recovery wheel shall sense a frost condition. When the differential pressure rises above setpoint (.5" adj.) the outdoor air Energy Recovery Wheel Bypass Damper shall open to the bypass position prevent airflow across the wheel. When the differential pressure returns to normal, the outdoor air energy recovery wheel bypass damper shall close, restoring outdoor air flow across the wheel.
 2. Unoccupied (Night Setback) Mode: During unoccupied periods, the supply and exhaust fans will remain off (note that the perimeter radiation shall be the primary source of unoccupied mode heating and the VRV units shall be the

- secondary source of unoccupied mode heating) and the outside air and exhaust air dampers will remain closed.
3. Warm-up Mode: During Optimal Start periods, the supply fan shall run continuously and the exhaust fan shall be off. The outside air damper and exhaust air damper shall remain closed and the recirculation damper shall be open.
 - a. Warm-up Mode: when the space temperature is 1.5°F (adj) or more below the Occupied heating setpoint, a daytime warm-up sequence will be activated. The hot water valve will modulate to maintain the DAT heating setpoint (115°F adj). Mode will terminate when the average space temperature reaches the Occupied heating setpoint or when the Occupied Sequence begins.
- D. VAV Supply Fan: The fan will be off in the Unoccupied mode. When the controller is in the Occupied mode, the supply fan will operate continuously and its speed will be modulated to maintain the duct static pressure setpoint. If the supply fan fails to prove status for 30 seconds (adj), the fan will be commanded off, the outside air damper and all valves will close, the associated exhaust fan will be commended off and an alarm will be annunciated. A manual reset is required to restart the fan. A hardwired, high static pressure cut-off switch is electrically interlocked with the variable speed drive. If the high static pressure cut-off switch is tripped the fan will stop, the outside air damper and all valves will close and an alarm will be annunciated. A manual reset of the high static pressure cut-off switch will be required to restart the fan. The duct static pressure setpoint is sent by the BMS and is reset by the DISCHARGE DUCT STATIC PRESSURE SETPOINT OPTIMIZATION Sequence.
1. When any ventilation VAV is more than 75% (adj.) open, the supply fan discharge duct static pressure setpoint shall be reset upward by 0.1 in W.C. (adj.), at a frequency of 15 minutes (adj.), until no VAV is more than 75% open or the static pressure setpoint has reset upward to the system maximum duct static pressure setpoint or the AHU variable-frequency drive is at the maximum speed setting.
 2. When all ventilation VAVs are less than 65% (adj.) open, the supply fan discharge duct static pressure setpoint shall be reset downward by 0.1 in W.C.(adj.), at a frequency of 15 minutes (adj.), until at least one VAV is more than 65% open or the static pressure setpoint has reset downward to the system minimum duct static pressure setpoint or the AHU variable-frequency drive is at the minimum speed setting.
 3. The control bands, setpoint increment values, setpoint decrement values and adjustment frequencies shall be adjusted to maintain maximum static pressure optimization with stable system control and maximum comfort control.
 4. The BMS shall have the capability to allow the operator to exclude “problem” zones that should not be considered when determining the optimized setpoint.
 5. The BMS shall also read the status of the supply air static pressure sensor and display the active duct static pressure reading on the status screen.
 6. The BMS shall have the ability to identify, and display to the user, the ventilation VAV that serves the Critical Zone (that is, the zone with the most wide-open ventilation VAV). This information shall update dynamically as the location of the Critical Zone changes based on building load, and duct static pressure setpoint optimization control.

7. During the commissioning process, the controls contractor shall demonstrate the performance of fan pressure optimization.
- E. VAV Exhaust Fan: The fan will be off in the Unoccupied mode. When the controller is in the Occupied mode, the exhaust fan will operate continuously and its speed will be modulated to maintain the duct static pressure setpoint. If the exhaust fan fails to prove status for 30 seconds (adj), the fan will be commanded off, the outside air damper and all valves will close, the associated supply fan will be commended off and an alarm will be annunciated. A manual reset is required to restart the fan. A hardwired, high static pressure cut-off switch is electrically interlocked with the variable speed drive. If the high static pressure cut-off switch is tripped the fan will stop, the outside air damper and all valves will close and an alarm will be annunciated. A manual reset of the high static pressure cut-off switch will be required to restart the fan. The duct static pressure setpoint is sent by the BMS and is reset by the DISCHARGE DUCT STATIC PRESSURE SETPOINT OPTIMIZATION Sequence.
1. When any exhaust VAV is more than 75% (adj.) open, the exhaust fan discharge duct static pressure setpoint shall be reset downward by 0.1 in W.C. (adj.), at a frequency of 15 minutes (adj.), until no VAV is more than 75% open or the static pressure setpoint has reset downward to the system minimum duct static pressure setpoint or the AHU variable-frequency drive is at the maximum speed setting.
 2. When all exhaust VAVs are less than 65% (adj.) open, the exhaust fan discharge duct static pressure setpoint shall be reset upward by 0.1 in W.C.(adj.), at a frequency of 15 minutes (adj.), until at least one VAV is more than 65% open or the static pressure setpoint has reset upward to the system maximum duct static pressure setpoint or the AHU variable-frequency drive is at the minimum speed setting.
 3. The control bands, setpoint increment values, setpoint decrement values and adjustment frequencies shall be adjusted to maintain maximum static pressure optimization with stable system control and maximum comfort control.
 4. The BMS shall have the capability to allow the operator to exclude “problem” zones that should not be considered when determining the optimized setpoint.
 5. The BMS shall also read the status of the supply air static pressure sensor and display the active duct static pressure reading on the status screen.
 6. The BMS shall have the ability to identify, and display to the user, the exhaust VAV that serves the Critical Zone (that is, the zone with the most wide-open exhaust VAV). This information shall update dynamically as the location of the Critical Zone changes based on building load, and duct static pressure setpoint optimization control.
 7. During the commissioning process, the controls contractor shall demonstrate the performance of fan pressure optimization.
- F. Low Temperature Protection: Should the discharge air temperature be 10 °F (adj.) below setpoint for 15 minutes (adj.), the BMS shall generate an alarm. Should the discharge air temperature be 10 °F (adj.) below setpoint for an additional 15 minutes (adj.), the outside air damper will close, all valves will open to 100% and an alarm will be annunciated. Once the discharge air temperature returns to setpoint, the unit shall return to normal operation. Should this occur three time within a 24 hour period, the unit shall not return to normal operation and the BMS shall require operator acknowledgement to return the unit to normal operation.

- G. Filter Status: Differential pressure switches will monitor the differential pressure across the filters when the fans are running. If the switch closes during normal operation a dirty filter alarm will be annunciated. Filters will be located as shown on drawings.
- H. Smoke Detector: Stop fans and close outside dampers when smoke is detected; signal alarm.
- I. The BMS shall monitor the status of all compressors.
- J. The BMS shall display the following information on a single graphic for each air handling unit:
 - 1. System graphic.
 - 2. Outdoor, exhaust, and recirculation air damper commanded position.
 - 3. Energy Recovery Wheel outdoor and exhaust air bypass damper commanded position.
 - 4. Energy Recovery Wheel command and status.
 - 5. Supply fan command, status, and output.
 - 6. Exhaust fan command, status, and output.
 - 7. Filter status.
 - 8. Compressor status.
 - 9. Heating control valve commanded position.
 - 10. Discharge air temperature.
 - 11. Discharge air temperature setpoint.
 - 12. Supply air static pressure.
 - 13. Supply air static pressure setpoint.
 - 14. Relief air static pressure.
 - 15. Relief air static pressure setpoint.
 - 16. Return air enthalpy.
 - 17. Outdoor air enthalpy.
 - 18. Outdoor air dewpoint.
 - 19. Energy recovery wheel pressure differential.
 - 20. Low temperature protection alarm.
 - 21. High return temperature alarm.
 - 22. Smoke detector alarm (common supply and return).

3.4 AIR TERMINAL UNITS

- A. Supply air terminal units serving spaces with CO₂ sensors shall modulate to maintain the space CO₂ setpoint (800 ppm adj.).
- B. Supply air terminal units serving spaces without CO₂ sensors shall modulate to maintain the air flow shown on the plans. During morning warm-up, these air terminal units shall modulate to maintain 75 cfm.
- C. Relief/exhaust air terminal units serving spaces with CO₂ sensors shall modulate to maintain the supply air/relief air offset indicated on the plans
- D. Relief/exhaust air terminal units serving spaces without CO₂ sensors shall modulate to maintain the air flow shown on the plans. During morning warm-up, these air terminal units shall be closed.

- E. When the space served by the air terminal unit is in cooling mode, the hot water valve shall be closed. When the space served by the air terminal unit is in heating mode, the hot water valve shall be modulated to maintain a discharge air temperature of 70 °F (adj.) (coincident with activation of the perimeter radiation). If space temperature is not met within 15 minutes (adj.), the discharge air temperature shall be reset upward to a maximum of 120 °F (adj.) to maintain space temperature.
- F. Display
 - 1. Air flow rate.
 - 2. Discharge air temperature.
 - 3. Discharge air temperature setpoint.
 - 4. Hot water valve commanded position.
 - 5. Space CO₂ level.
 - 6. Space CO₂ setpoint

3.5 PERIMETER RADIATION

- A. Where applicable, the perimeter radiation shall be the first stage of heating. Upon a call for heating, the BMS shall cycle the perimeter radiation control valve to maintain space temperature (coincident with reset of the VAV discharge temperature to 70 °F).

3.6 VARIABLE REFRIGERANT FLOW SYSTEMS

- A. The Building Management System shall monitor and control the VRF System Controls via BACnet Communication interface. The ATC contractor shall also be responsible for installation and communication wiring of all VRF control components including remote controllers, system controller(s), indoor units, and outdoor units. The VRF units shall control to the return air temperature. The BMS shall control the individual VRF Zone units as follows.
 - 1. The BMS shall command all functions of the VRF units and by sending on/off commands, not allow the VRF remote controller to control the unit. During occupied periods, the BMS shall command the VRF indoor unit to “Cool” or “Heat” mode as required by the space temperature and the space temperature setpoint. During unoccupied periods the supply fan shall be cycled to maintain unoccupied heating (as second stage heat only) or cooling setpoints. The supply fan shall be commanded on to high speed as default. The BMS shall control the VRF heating and cooling functions as follows.
 - a. Heating Mode – The radiant ceiling panels shall operate as the first stage of heating in both occupied and unoccupied modes. If the radiant ceiling panels have been commanded on, the associated air terminal unit is discharging the maximum temperature and the space temperature remains below setpoint, the BMS shall command the associated VRF to “Heat” mode.
 - b. Cooling Mode – If the space temperature is above setpoint, the BMS shall command the associated VRF to cooling during occupied periods, and start the fan and command the unit to cooling during unoccupied periods. The BMS shall not allow the VRV to enter into cooling mode if any associated radiant ceiling panel zone is actively in heating.
 - 2. The BMS shall monitor the VRF auxiliary condensate drain pan moisture sensor and shall shut down the unit and generate an alarm upon sensing excessive level within the auxiliary drain pan.

- B. The BMS shall display the following information on a single graphic for each zone:
1. Space temperature
 2. Space temperature setpoint
 3. VRV indoor unit status (On/Off/Alarm)
 4. VRV indoor unit mode (Heating/Cooling)
 5. VRV condensing unit status (On/Off/Alarm)
 6. Perimeter radiation status (On/Off)
 7. Condensate alarm.

END OF SECTION

SECTION 232113 - HYDRONIC PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Heating water piping, above ground.
 - 2. Coil condensate drain piping
 - 3. Unions and flanges.

- B. Related Sections:
 - 1. Section 07 84 00 - Firestopping: Product requirements for firestopping for placement by this section.
 - 2. Division 01 – General Conditions
 - 3. Section 23 05 16 - Expansion Fittings and Loops for HVAC Piping: Product and execution requirements for expansion compensation devices use in heating and cooling piping systems.
 - 4. Section 23 05 23 - General-Duty Valves for HVAC Piping: Product requirements for valves for placement by this section.
 - 5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports, sleeves, for placement by this section.
 - 6. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product requirements for Vibration Isolation for placement by this section.
 - 7. Section 23 05 53 - Identification for HVAC Piping and Equipment: Product requirements for pipe identification for placement by this section.
 - 8. Section 23 07 00 - HVAC Insulation: Product requirements for Piping Insulation for placement by this section.
 - 9. Section 23 21 16 - Hydronic Piping Specialties: Product and execution requirements for piping specialties used in heating and cooling piping systems.
 - 10. Section 23 25 00 - HVAC Water Treatment: Product and execution requirements for cleaning and chemical treatment of heating and cooling piping systems.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B16.3 - Malleable Iron Threaded Fittings.
 - 2. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - 3. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 4. ASME B31.9 - Building Services Piping.

- B. ASTM International:
 - 1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

3. ASTM A536 - Standard Specification for Ductile Iron Castings.
 4. ASTM B32 - Standard Specification for Solder Metal.
 5. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
 6. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
 7. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
- C. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
 2. AWS D1.1 - Structural Welding Code - Steel.
- D. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
 2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
 3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
- B. Provide flanges, union, and couplings at locations requiring servicing. Use unions, flanges, and Grooved coupling couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- C. Provide pipe hangers and supports in accordance with ASME B31.9, ASTM F708, MSS SP 58, MSS SP 69, and MSS SP 89.
- D. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
- E. Flexible Connectors or Grooved coupling Flexible Couplings: Use at or near motor driven equipment where piping configuration does not absorb vibration. Three (3) flexible couplings may be used in lieu of each flexible connector for vibration attenuation. Couplings shall be placed in close proximity to the vibrating source in accordance with published guidelines.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate schematic layout of piping system, including equipment, critical dimensions, and sizes.
1. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and be specifically identified with the applicable Grooved coupling style or series number.

- C. Product Data:
 - 1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
- D. Test Reports: Indicate results of piping system pressure test.
- E. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures and isolation.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- G. Welders' Certificate: Include welders' certification of compliance with ASME Section IX and AWS D1.1.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of valves, equipment and accessories.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- B. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.
- C. To assure uniformity and compatibility of piping components in grooved piping systems, all grooved products utilized shall be supplied by a single manufacturer. Grooving tools shall be supplied by the same manufacturer as the grooved components.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Fabricator or Installer: Company specializing in performing Work of this section with minimum three years experience.
- C. Design hangers and supports under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Connecticut.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.11 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

1.12 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 HEATING WATER PIPING, ABOVE GROUND

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
 - 1. Fittings: ASME B16.3, malleable iron or ASTM A234/A234M, forged steel welding type.
 - 2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.
- B. Steel Pipe: ASTM A53/A53M, Schedule 40, black, cut grooved ends.
 - 1. Fittings: ASTM A536 ductile iron, or ASTM A53 forged steel or fabricated from carbon steel pipe, grooved ends designed to accept Grooved coupling standard or AGS "W" series couplings.
 - 2. Joints: Grooved mechanical couplings meeting ASTM F1476.
 - a. Housing Clamps: ASTM A536 ductile iron, enamel coated, compatible with steel piping sizes, rigid or flexible type.
 - 1) Rigid Type: 2 inch through 12 inch: "Installation ready" rigid coupling with angle pattern bolt pads designed for direct 'stab' installation onto grooved end pipe without prior disassembly of the coupling, no torque requirement and Grade "EHP" EPDM gasket.
 - 2) Flexible Type: 2 inch through 24 inch: Use in locations where vibration attenuation and stress relief are required. Flexible couplings may be used in lieu of flexible connectors for vibration isolation at equipment connections. Three (3) couplings, for

each connector, shall be placed in close proximity to the source of vibration.

- b. Grade "E" EPDM Gasket: Elastomer composition for operating temperature range from -30 degrees F to 230 degrees F.
 - c. Accessories: Steel bolts, nuts, and washers.
- C. Copper Tubing: ASTM B88, Type L, drawn.
1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
 2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.
- D. Copper Tubing: ASTM B88, Type L, drawn, rolled grooved ends.
1. Fittings: ASME B16.18 cast copper alloy, or ASME B16.22 wrought copper and bronze, or ASTM B584 bronze sand castings, with copper tube dimensioned grooved ends. Flaring of tube and fitting ends to IPS dimensions is not permitted.
 2. Joints: Grooved mechanical couplings meeting ASTM F1476. "Installation ready" stab-on design for direct installation onto roll grooved copper tube without prior field disassembly.
 - a. Housing Clamps: Installation-ready ASTM A536 ductile iron, cast with offsetting, angle-pattern bolt pads, copper-color enamel coated, compatible with copper tubing sizes, to engage and lock with no torque requirement.
 - b. Gasket: Elastomer Grade "EHP" EPDM composition for operating temperature range from -30 degrees F to 250 degrees F.
 - c. Accessories: Steel bolts, nuts, and washers.

2.2 COIL CONDENSATE DRAIN PIPING

- A. Copper Tubing: ASTM B88, Type M, drawn.
1. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
 2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.3 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
1. Ferrous Piping: Class 150, malleable iron, threaded.
 2. Copper Piping: Class 150, bronze unions with soldered.
 3. Dielectric Connections:
 - a. Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
 - b. Waterway fitting with zinc electroplated steel or ductile iron body, male thread, grooved, or plain end, water impervious isolation barrier.
- B. Flanges for Pipe 2-1/2 inches and Larger:
1. Ferrous Piping:
 - a. Class 150, forged steel, slip-on flanges.

- b. Grooved joint flange adapter, flat face, for direct connection to ANSI Class 125 and 150 flanges. For direct connection to ANSI Class 300 flanges
2. Copper Piping:
 - a. Class 150, slip-on bronze flanges.
 - b. Grooved joint flange adapter, flat face, for direct connection to ANSI Class 125 and 150 flanges.
3. Gaskets: 1/16 inch thick preformed neoprene gaskets.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

3.2 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 flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 23 25 00.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Section 23 05 29.

3.4 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

- A. Install heating water piping in accordance with ASME B31.9.
- B. Route piping parallel to building structure and maintain gradient.
- C. Install piping to conserve building space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipe passing through partitions, walls and floors. Refer to Section 23 05 29.
- F. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Section 23 05 29.
- G. Install pipe identification in accordance with Section 23 05 53.

- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16.
- I. Provide access where valves and fittings are not exposed.
- J. Slope hydronic piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe aligned.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- L. Install valves with stems upright or horizontal, not inverted.
- M. Insulate piping; refer to Section 23 07 00.
- N. Grooved joint piping systems shall be installed in accordance with the manufacturer's guidelines and recommendations. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be supplied by the grooved coupling manufacturer. Grooved end shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove for proper gasket sealing. A factory trained field representative shall provide on-site training to contractor's field personnel in the installation of grooved piping products. Factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.
 - 1. Install the AGS piping system in accordance with the latest installation instructions. Use grooving tools with AGS roll sets to groove the pipe. Follow guidelines for tool selection and operation. Coupling installation shall be complete when visual metal-to-metal contact is reached. AGS products shall not be installed with standard grooved end pipe or components. Installing AGS products in combination with standard grooved end products could result in joint separation and/or leakage.

3.5 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test heating water piping system in accordance with ASME B31.9.

END OF SECTION

SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pressure gages.
 - 2. Pressure gage taps.
 - 3. Thermometers.
 - 4. Thermometer supports.
 - 5. Test plugs.
 - 6. Air vents.
 - 7. Strainers.
 - 8. Flow controls.

- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 21 13 - Hydronic Piping: Execution requirements for piping connections to products specified by this section.

1.2 REFERENCES

- A. American Society of Mechanical Engineers:
 - 1. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.

- B. ASTM International:
 - 1. ASTM E1 - Standard Specification for ASTM Thermometers.
 - 2. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

- B. Product Data: Submit for manufactured products and assemblies used in this Project.
 - 1. Manufacturer's data and list indicating use, operating range, total range, accuracy, and location for manufactured components.
 - 2. Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
 - 3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each piping specialty.

- C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures, application, selection, and hookup configuration. Include pipe and accessory elevations.

- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of actual locations of components and instrumentation, and flow controls.
- C. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

1.5 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.

1.6 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept piping specialties on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Protect systems from entry of foreign materials by temporary covers, caps and closures, completing sections of the work, and isolating parts of completed system until installation.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not install instruments when areas are under construction, except rough in, taps, supports and test plugs.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements before fabrication.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 PRESSURE GAGES

- A. Manufacturers:
 - 1. Trerice
 - 2. Ernst
 - 3. Davis
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Gage: ASME B40.1, with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
 - 1. Case: Fiberglass reinforced polypropylene.
 - 2. Bourdon Tube: Brass.
 - 3. Dial Size: 4 inch diameter.
 - 4. Mid-Scale Accuracy: One percent.
 - 5. Scale: Psi.

2.2 PRESSURE GAGE TAPS

- A. Manufacturers:
 - 1. Trerice
 - 2. Ernst
 - 3. Davis
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Needle Valve: Brass, 1/4 inch NPT for minimum 300 psi.
- C. Ball Valve: Brass, 1/4 inch NPT]for 250 psi.
- D. Pulsation Damper: Pressure snubber, brass with 1/4 inch NPT connections.
- E. Siphon: Brass, 1/4 inch NPT angle or straight pattern.

2.3 STEM TYPE THERMOMETERS

- A. Manufacturers:
 - 1. Trerice
 - 2. Ernst
 - 3. Davis
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Thermometer: ASTM E1, adjustable angle, red appearing organic liquid, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear glass.
 - 3. Stem: Brass, 3/4 inch NPT, 3-1/2 inch long.
 - 4. Accuracy: ASTM E77, 2 percent.
 - 5. Calibration: Degrees F.

2.4 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions, and with cap and chain.
- B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.5 TEST PLUGS

- A. Manufacturers:
 - 1. Omega
 - 2. Imac
 - 3. Peterson
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. 1/4 inch NPT or 1/2 inch NPT brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with:
 - 1. Neoprene core for temperatures up to 200 degrees F.
 - 2. Nordel core for temperatures up to 350 degrees F.
 - 3. Viton core for temperatures up to 400 degrees F.
- C. Test Kit:
 - 1. Carrying case, internally padded and fitted containing:
 - a. Two 2-1/2 inch diameter pressure gages.
 - b. Two gage adapters with 1/8 inch probes.
 - c. Two 1-1/2 inch dial thermometers.

2.6 AIR VENTS

- A. Manufacturers:
 - 1. B+G
 - 2. Amtrol
 - 3. Taco
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

- C. Float Type:
 - 1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
- D. Washer Type:
 - 1. Brass with hydrosopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

2.7 STRAINERS

- A. Manufacturers:
 - 1. Sarco
 - 2. Armstrong
 - 3. Yarway
 - 4. Victaulic
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Size 2 inch and Smaller:
 - 1. Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:
 - 1. Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.
 - 2. Grooved ductile iron body for 300 psi working pressure, Y-pattern with .062 inch minimum stainless steel perforated screen

2.8 FLOW CONTROLS – MANUAL AND AUTOMATIC TYPE

- A. GENERAL
 - 1. Construction: Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet with combination blow-down and back-flush drain.
 - 2. Calibration: Control within 10 percent of design flow over entire operating pressure with a maximum operating temperature of at least 232 deg F.
- B. Automatic Control Valves shall include:
 - 1. Control Mechanism: Either piston and spring or diaphragm and orifice plates are acceptable types. For piston and spring types: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring. For diaphragm and orifice plate types: elastomeric polymer diaphragm with polyphenylsulfone orifice seat.
 - 2. Accessories: In-line strainer on inlet and ball valve on outlet.
 - 3. Manufacturer shall be able to provide certified independent laboratory tests verifying accuracy of performance. (Consult the factory for details).
 - 4. All flow control valve cartridges shall be warranted by the manufacturer for five years from date of sale.

5. The body design shall allow inspection or removal of 20 mesh stainless steel strainer without disturbing piping connections.
6. Ball Valve shall be made of brass. Maximum pressure rating of 400 PSI. Ball Valve shall include a union end which will accept various end pieces.
7. The body design shall allow inspection or repair of handle operated stem without disturbing piping connections. The repairable stem shall include two Teflon seals and one EPDM O-ring for protection against chemicals and modulating temperature.
8. A pressure/temperature test valve, manual air vent and drain valve shall be included.
9. Dual pressure or pressure/temperature test valves for verifying accuracy of flow performance shall be provided for all valve sizes.
10. Valve shall have a body tag to indicate model number and a hanging tag showing Cv and flow/delta P reading required for specific flow rate. Manufacturers of automatic valves:
 - a. Nexus
 - b. Griswold
 - c. Flow Design
 - d. Hays Fluid Controls
 - e. Victaulic
11. Substitutions: Section 01 25 00 – Substitution Procedures.

PART 3 EXECUTION

3.1 INSTALLATION - THERMOMETERS AND GAGES

- A. Install gage taps in piping
- B. Install pressure gages with pulsation dampers. Provide needle valve or ball valve to isolate each gage. Extend nipples to allow clearance from insulation.
- C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Allow clearance from insulation.
- D. Install thermometer sockets adjacent to controls systems thermostat, transmitter, or sensor sockets.
- E. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- F. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- G. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.2 INSTALLATION - HYDRONIC PIPING SPECIALTIES

- A. Locate test plugs adjacent to thermometers and thermometer sockets, adjacent to pressure gages and pressure gage taps and as indicated on Drawings.
- B. Install manual air vents at system high points.
- C. Provide drain and hose connection with valve on strainer blow down connection.

3.3 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting installed construction.
- B. Do not install hydronic pressure gauges until after systems are pressure tested.

END OF SECTION

SECTION 232300 - REFRIGERANT PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Refrigerant piping.
- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports, sleeves, and firestopping for placement by this section.
 - 3. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product requirements for Vibration Isolation for placement by this section.
 - 4. Section 23 05 53 - Identification for HVAC Piping and Equipment: Product requirements for pipe identification for placement by this section.
 - 5. Section 23 07 00 - HVAC Insulation: Product requirements for Piping Insulation for placement by this section.

1.2 REFERENCES

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- B. American Society of Mechanical Engineers:
 - 1. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASME B31.5 - Refrigeration Piping.
- C. ASTM International:
 - 1. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
 - 2. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
- D. American Welding Society:
 - 1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
 - 2. AWS D1.1 - Structural Welding Code - Steel.
- E. Manufacturers Standardization Society of the Valve and Fittings Industry:
 - 1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
 - 2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
 - 3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.3 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 or equipment.
- C. Provide pipe hangers and supports in accordance with ASME B31.5, ASTM F708, MSS SP 58, MSS SP 69, and MSS SP 89.
- D. Flexible Connectors: Use at or near compressors where piping configuration does not absorb vibration.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate layout of refrigeration piping system, including equipment, critical dimensions, and sizes.
- C. Product Data:
 - 1. Piping: Submit data on pipe materials, fittings, and accessories.
- D. Test Reports: Indicate results of refrigerant leak test.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of equipment and refrigerant accessories.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ASME B31.5 code for installation of refrigerant piping systems.
- B. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Fabricator or Installer: Company specializing in performing Work of this section with minimum three years experience.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Dehydrate and charge refrigeration components including piping and receivers, seal prior to shipment. Maintain seal until connected into system.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.11 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

1.12 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 REFRIGERANT PIPING

- A. Copper Tubing: ASTM B280, drawn.
 - 1. Fittings: ASME B16.22 wrought copper.

2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install pipe hangers and supports in accordance with Section 23 05 29.

3.4 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

- A. Route piping parallel to building structure and maintain gradient.
- B. Install piping to conserve building space, and not interfere with use of space.
- C. Group piping whenever practical at common elevations.
- D. Sleeve pipe passing through partitions, walls and floors. Refer to Section 23 05 29.
- E. Install pipe identification in accordance with Section 23 05 53.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Arrange refrigerant piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- H. Flood refrigerant piping system with nitrogen when brazing.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- J. Insulate piping; refer to Section 23 07 00.
- K. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.

- L. Fully charge completed system with refrigerant after testing.
- M. Follow ASHRAE 15 procedures for charging and purging of systems and for disposal of refrigerant.
- N. Install refrigerant piping in accordance with ASME B31.5.

3.5 FIELD QUALITY CONTROL

- A. Section 01 77 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test refrigeration system with dry nitrogen to 200 psig. Perform final tests at 27 inches vacuum and 200 psig using electronic leak detector.
- D. Repair leaks.
- E. Retest until no leaks are detected.

END OF SECTION

SECTION 232500 - HVAC WATER TREATMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. System cleaner.

- B. Related Sections:

1.2 Division 01 – General Conditions

1.3 SUBMITTALS

- A. Product Data: Submit chemical treatment materials and chemicals.

1.4 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.

1.5 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

PART 2 PRODUCTS

2.1 SYSTEM CLEANER

- A. Manufacturers:
 - 1. Biomin
 - 2. Culligan
 - 3. Aptech
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products.

PART 3 EXECUTION

3.1 PREPARATION

- A. Operate, fill, start and vent systems existing hot water heating system prior to cleaning. Use water meter to record capacity in each system. Place terminal control valves in open position during cleaning.

3.2 CLEANING

- A. Work to be done at completion of project as per owners time of choice.
- B. Concentration:
 - 1. As recommended by manufacturer.
- C. Hot Water Heating Systems:
 - 1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.
 - 2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.
 - 3. Circulate for 6 hours at design temperatures, then drain.
 - 4. Refill with clean water and repeat until system cleaner is removed.
- D. Use neutralizer agents on recommendation of system cleaner supplier and acceptance of Architect/Engineer.
- E. Remove, clean, and replace strainer screens.
- F. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

END OF SECTION

SECTION 233100 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Duct Materials.
 - 2. Insulated flexible ducts.
 - 3. Single wall spiral round ducts.
 - 4. Transverse duct connection system.
 - 5. Ductwork fabrication.
 - 6. Duct cleaning.
 - 7. Ductwork leakage testing.

- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for hangers, supports and sleeves for placement by this section.
 - 3. Section 23 33 00 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A90/A90M - Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
 - 3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

- B. National Fire Protection Association:
 - 1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

- C. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - HVAC Air Duct Leakage Test Manual.
 - 2. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

- D. Underwriters Laboratories Inc.:
 - 1. UL 181 - Factory-Made Air Ducts and Connectors.

1.3 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.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Submit duct fabrication drawings, drawn to scale not smaller than 1/4 inch equals 1 foot, on drawing sheets same size as Contract Documents, indicating:
 - 1. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other work.
 - 2. Duct layout, indicating pressure classifications and sizes in plan view. For exhaust duct systems, indicate classification of materials handled as defined in this section.
 - 3. Fittings.
 - 4. Reinforcing details and spacing.
 - 5. Seam and joint construction details.
 - 6. Penetrations through fire rated and other walls.
 - 7. Terminal unit, coil, and humidifier installations.
 - 8. Hangers and supports, including methods for building attachment, vibration isolation, and duct attachment.
- C. Product Data: Submit data for duct materials, duct liner and duct connectors.
- D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and flexible.
- B. Construct ductwork to NFPA 90A standards.

1.7 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.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not install duct sealant when temperatures are less than those recommended by sealant manufacturers.
- C. Maintain temperatures during and after installation of duct sealant.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 DUCT MATERIALS

- A. Manufacturers:
 - 1. United McGill
 - 2. Semco
 - 3. ACME
 - 4. Nufab
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures..
- B. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G60 zinc coating of in conformance with ASTM A90/A90M.
- C. Fasteners: Rivets, bolts, or sheet metal screws.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 INSULATED FLEXIBLE DUCTS

- A. Manufacturers:
 1. Thermaflex Model M-KF
 2. Technaflex
 3. Tuttle + Bailey
 4. Substitutions: Section 01 25 00 – Substitution Procedures..

- B. Product Description: Two ply vinyl film supported by helical wound spring steel wire; fiberglass insulation; aluminized vapor barrier film.
 1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
 2. Maximum Velocity: 4000 fpm.
 3. Temperature Range: -10 degrees F to 160 degrees F.
 4. Thermal Resistance: 4.2 square feet-hour-degree F per BTU.

2.3 SINGLE WALL SPIRAL ROUND DUCTS

- A. Manufacturers:
 1. McGill AirFlow Corporation
 2. Semco Incorporated
 3. Tangent Air Corp
 4. Spiral Mfg. Co., Inc.
 5. Substitutions: Section 01 25 00 – Substitution Procedures..

- B. Product Description: UL 181, Class 1, round spiral lockseam duct constructed of galvanized steel.

- C. Construct duct with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	26
15 inches to 26 inches	24
28 inches to 36 inches	22
38 inches to 50 inches	20
52 inches to 84 inches	18

- D. Construct fittings with the following minimum gages:

Diameter	Gauge
3 inches to 14 inches	24
15 inches to 26 inches	22
28 inches to 36 inches	20
38 inches to 50 inches	20
52 inches to 60 inches	18

62 inches to 84 inches

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2.4 TRANSVERSE DUCT CONNECTION SYSTEM

- A. Manufacturers:
1. United McGill
 2. Semco
 3. ACME
 4. Nufab
 5. Substitutions: Section 01 25 00 – Substitution Procedures..
- B. Product Description: SMACNA "E" rated, SMACNA "F" rated or SMACNA "J" rated rigidity class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips.

2.5 DUCTWORK FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated on Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible (Round Duct Construction Standards), and as indicated on Drawings. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. TDC connections on all ductwork where any dimension exceeds 12 inches. Slip and drive connection acceptable on duct sizes less than 12" x 12".
- D. 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.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. 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.
- G. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.
- H. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems.
1. Sealants, Mastics: Conform to UL 181A. Provide products bearing appropriate UL 181A markings.
 2. Do not provide sealing products not bearing UL approval markings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

- A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Use crimp joints with or without bead or beaded sleeve couplings for joining round duct sizes 8 inch and smaller.
- D. Install duct hangers and supports in accordance with Section 23 05 29.
- E. Use double nuts and lock washers on threaded rod supports.
- F. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- G. Exhaust Outlet Locations:
 - 1. Minimum Distance from Property Lines: 3 feet.
 - 2. Minimum Distance from Building Openings: 3 feet.
 - 3. Minimum Distance from Outside Air Intakes: 10 feet.

3.3 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.
- B. Connect diffusers with 5 feet maximum length of flexible duct held in place with strap or clamp.
- C. Connect air outlets and inlets to supply ducts with five foot maximum length of flexible duct. Do not use flexible duct to change direction.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. 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.

3.5 DUCTWORK LEAKAGE TESTING

- A. The following ductwork systems shall be pressure/leakage tested:
1. All ductwork to be concealed in a sheetrock, concrete block or other permanent chase shall be pressure tested before ductwork is concealed.
 2. 2012 IECC REQUIREMENTS
 - a. All ductwork systems listed below that are constructed and installed for 3" w.c. or more (positive or negative).
 3. For ductwork leakage testing: "Ductwork main" shall be defined as all ductwork serving more than one grille or diffuser.
 4. All ductwork outside of the building insulation envelope shall be pressure tested.
- B. Testing shall conform to the following:
1. Test static pressure must be the lower of 125% of the external static pressure of the air moving equipment or the construction static pressure class of the ductwork.
 2. Test in accordance with SMACNA HVAC Air Duct Leakage Test Manual. Maximum Allowable Leakage shall be in accordance with Duct Pressure Class rating listed below and Leakage Class listed here-in.
 3. For Ductwork Pressure Class 3" w.c: Leakage Class shall be 8.
 4. For Ductwork Pressure Class 2" w.c or less: Leakage Class shall be 16.
 5. Testing shall occur after ductwork has been cleaned, but before duct insulation is applied or ductwork is concealed.
- C. Duct Leakage Test Report shall include:
1. Date of test.
 2. Name of company and person conducting the test.
 3. Name of company and person witnessing the test.
 4. Description of ductwork tested. Provide drawings to indicate section of ductwork being tested. Labeling on the drawings shall correspond to labeling in the report.
 5. Surface area (square feet) of section of ductwork being tested.
 6. Duct design operating pressure (inches w.c.)
 7. P = Duct design test static pressure (inches w.c.)
 8. Duct capacity, air flow
 9. CL = Specified Leakage Class.
 10. F = Leakage factor (CFM / 100 sf of duct area)
 11. Maximum allowable leakage (CFM)
 12. Test apparatus
 - a. Blower
 - b. Orifice tube size
 - c. Orifice size
 - d. Calibrated
 13. Test orifice differential pressure (inches w.c.)

3.6 SCHEDULES

A. Ductwork Material Schedule:

AIR SYSTEM	MATERIAL
Supply	Steel
Return and Relief	Steel
General Exhaust	Steel

B. Ductwork Pressure Class Schedule:

AIR SYSTEM	PRESSURE CLASS
Constant Volume Supply	1 inch wg regardless of velocity.
Variable Air Volume Supply (downstream of VAV boxes)	1 inch wg regardless of velocity.
Variable Air Volume Supply (upstream of VAV boxes)	2 inch wg
Return	1 inch wg regardless of velocity.
Relief	1 inch wg regardless of velocity.
General Exhaust	1 inch wg regardless of velocity.

END OF SECTION

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Duct access doors.
 - 2. Dynamic fire dampers.
 - 3. Volume control dampers.
 - 4. Flexible duct connections.
- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 31 00 - HVAC Ducts and Casings: Requirements for duct construction and pressure classifications.
 - 3. Division 26: Execution requirements for connection of electrical Combination Smoke and Fire Dampers specified by this section.

1.2 REFERENCES

- A. Air Movement and Control Association International, Inc.:
 - 1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
- B. National Fire Protection Association:
 - 1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 2. NFPA 92A - Recommended Practice for Smoke-Control Systems.
- C. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
- D. Underwriters Laboratories Inc.:
 - 1. UL 555 - Standard for Safety for Fire Dampers.
 - 2. UL 555S - Standard for Safety for Smoke Dampers.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers and duct access doors.
- C. Product Data: Submit data for shop fabricated assemblies and hardware used.
- D. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.
 - 1. Fire dampers including locations and ratings.
 - 2. Smoke dampers including locations and ratings.

3. Flexible duct connections.
 4. Volume control dampers.
 5. Duct access doors.
- E. Product Data: For fire dampers, smoke dampers and combination fire and smoke dampers submit the following:
1. Include UL ratings, dynamic ratings, leakage, pressure drop and maximum pressure data.
 2. Indicate materials, construction, dimensions, and installation details.
 3. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.
- F. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.
- 1.4 CLOSEOUT SUBMITTALS
- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
 - B. Project Record Documents: Record actual locations of access doors and test holes.
 - C. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.
- 1.5 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.
- 1.6 QUALIFICATIONS
- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- 1.7 PRE-INSTALLATION MEETINGS
- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
 - B. Convene minimum one week prior to commencing work of this section.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
 - B. Protect dampers from damage to operating linkages and blades.
 - C. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

- D. Storage: Store materials in a dry area indoor, protected from damage.
- E. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.
- B. Verify appropriate clearances, access doors for resetting dampers.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

1.12 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two of each size and type of fusible link.

PART 2 PRODUCTS

2.1 DUCT ACCESS DOORS

- A. Manufacturers:
 - 1. Ruskin
 - 2. Air Balance
 - 3. Greenheck
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures..
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.
- C. Fabrication: Rigid and close fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, furnish minimum 1 inch thick insulation with sheet metal cover.
 - 1. Less than 12 inches square, secure with sash locks.
 - 2. Up to 18 inches Square: Furnish two hinges and two sash locks.
 - 3. Up to 24 x 48 inches: Three hinges and two compression latches [with outside and inside handles].

4. Larger Sizes: Furnish additional hinge.
5. Access panels with sheet metal screw fasteners are not acceptable.

2.2 DYNAMIC FIRE DAMPERS

- A. Manufacturers:
 1. Ruskin
 2. Air Balance
 3. Greenheck
 4. Substitutions: Section 01 25 00 – Substitution Procedures..
- B. Fabricate in accordance with NFPA 90A and UL 555.
- C. Fire Resistance: As required by barrier rating.
- D. Dynamic Closure Rating: Dampers classified for dynamic closure to 2000 fpm and 4 inches wg static pressure.
- E. Construction:
 1. Integral Sleeve Frame: Minimum 20 gage roll formed galvanized steel. Length: 14 inches.
 2. Blades:
 - a. Style: Curtain type.
 - b. Action: Spring or gravity closure upon fusible link release.
 - c. Material: Minimum 24 gage roll formed, galvanized steel.
 3. Closure Springs: Type 301 stainless steel, constant force type, if required.
- F. Fusible Link Release Temperature: 165 degrees F.
- G. Mounting: Vertical or horizontal as indicated on Drawings.
- H. Duct Transition Connection, Damper Style:
 1. B style - rectangular connection, blades out of air stream, high free area.
 2. CR style - round connection, sealed.
- I. Finish: Mill galvanized.

2.3 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 1. Ruskin
 2. Air Balance
 3. Greenheck
 4. Substitutions: Section 01 25 00 – Substitution Procedures..
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.

- C. Splitter Dampers:
 - 1. Material: Same gage as duct to 24 inches size in both dimensions, and two gages heavier for sizes over 24 inches.
 - 2. Blade: Fabricate of double thickness sheet metal to streamline shape, secured with continuous hinge or rod.
 - 3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw.
 - 4. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized frame channel with suitable hardware.
- E. End Bearings: Except in round ductwork 12 inches and smaller, furnish end bearings. On multiple blade dampers, furnish oil-impregnated nylon or sintered bronze bearings. Furnish closed end bearings on ducts having pressure classification over 2 inches wg.
- F. Quadrants:
 - 1. Furnish locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches furnish regulator at both ends.

2.4 FLEXIBLE DUCT CONNECTIONS

- A. Manufacturers:
 - 1. United McGill
 - 2. Semco
 - 3. Tuthill + Bailey
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures..
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.
- C. Connector: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd.
 - 2. Net Fabric Width: Approximately 3 inches wide.
 - 3. Metal: 3 inch wide, 24 gage galvanized steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify rated walls are ready for fire damper installation.

- C. Verify ducts and equipment installation are ready for accessories.
- D. 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. Install back-draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated on Drawings.
- C. Access Doors: Install access doors at the following locations and as indicated on Drawings:
 - 1. Spaced every 50 feet of straight duct.
 - 2. Upstream of each elbow.
 - 3. Before and after each duct mounted coil.
 - 4. Before and after each duct mounted fan.
 - 5. Before and after each automatic control damper.
 - 6. Before and after each fire damper, smoke damper and combination fire and smoke damper.
 - 7. Downstream of each VAV box.
- D. Access Door Sizes: Install minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated on Drawings. Review locations prior to fabrication.
 - 1. Mark access doors for fire and smoke dampers on outside surface, with minimum 1/2 inch high letters reading: FIRE/SMOKE DAMPER, SMOKE DAMPER, OR FIRE DAMPER.
- E. Install temporary duct test holes where indicated on Drawings and 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.
- F. Install fire dampers, combination fire and smoke dampers and smoke dampers at locations as indicated on Drawings. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
 - 1. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92A.
 - 2. Install dampers square and free from racking with blades running horizontally.
 - 3. Do not compress or stretch damper frame into duct or opening.
 - 4. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jack shaft.
 - 5. Install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Install bracing as needed.

3.3 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate re-setting of fire dampers to Owner's representative.

END OF SECTION

SECTION 233600 - AIR TERMINAL UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Variable volume terminal units.
- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 09 00 - Direct-Digital Control System for HVAC: Controls remote from unit.
 - 3. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation applying to units in this section.
 - 4. Division 26: Execution requirements for electrical connections to air terminal units specified by this section.

1.2 REFERENCES

- A. American Refrigeration Institute:
 - 1. ARI 880 - Air Terminals.
 - 2. ARI 885 -Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.
- B. National Fire Protection Association:
 - 1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
- C. Underwriters Laboratories Inc.:
 - 1. UL 181 - Factory-Made Air Ducts and Connectors.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings indicating airflow, static pressure, heating coil capacity and NC designation. Include electrical characteristics and connection requirements. Include schedules listing discharge and radiated sound power level for each of second through sixth octave bands at inlet static pressures of 1 inch to 4 inches wg.
- C. Manufacturer's Installation Instructions: Submit support and hanging details, and service clearances required.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of units and controls components.
- C. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists. Include directions for resetting constant volume regulators.

1.5 QUALITY ASSURANCE

- A. Test and rate air terminal units performance for air pressure drop, flow performance, and acoustical performance in accordance with ARI 880 and ARI 885. Attach ARI seal to each terminal unit.

1.6 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.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with 23 09 00 - Direct-Digital Control System for HVAC.

1.10 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty from date of Owner's acceptance for air terminal units.

PART 2 PRODUCTS

2.1 SINGLE DUCT VARIABLE VOLUME AIR TERMINAL UNITS

- A. Manufacturers:
1. Krueger
 2. Price
 3. Titus
 4. The Trane Co.
 5. Johnson/York
 6. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Variable air volume terminal units for connection to central air systems, with electronic controls.
- C. Identification: Furnish each air terminal unit with identification label and airflow indicator. Include unit nominal airflow, maximum factory-set airflow and minimum factory-set airflow and coil type.
- D. Basic Assembly:
1. Casings: Minimum 22 gage galvanized steel.
 2. Lining: Minimum 1/2 inch thick neoprene or vinyl coated glass fiber insulation, 1.5 lb./cu ft density, meeting NFPA 90A requirements and UL 181 erosion requirements.
 3. Plenum Air Inlets: S slip and drive connections for duct attachment.
 4. Plenum Air Outlets: S slip-and-drive connections.
- E. Basic Unit:
1. Configuration: Air volume damper assembly inside unit casing. Locate control components inside protective metal shroud.
 2. Volume Damper: Construct of galvanized steel with peripheral gasket and self-lubricating bearings; maximum damper leakage: 2 percent of design air flow at 3 inches rated inlet static pressure.
 3. Mount damper operator to position damper as indicated on Drawings.
- F. Hot Water Heating Coil:
1. Construction: 1/2 inch copper tube mechanically expanded into aluminum plate fins, leak tested under water to 200 psig pressure, factory installed.
 2. Capacity: As indicated on drawings.
- G. Automatic Damper Operator:
1. Electric Actuator: 24 volt with high limit.
- H. Thermostat: Electronic type with appropriate mounting hardware. Refer to Section 23 09 00.
- I. Sequence of Operation: Refer to Section 23 09 93.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify ductwork is ready for air terminal installation.

3.2 INSTALLATION

- A. Connect to ductwork in accordance with Section 23 31 00.
- B. Install ceiling access doors or locate units above easily removable ceiling components.
- C. Support units individually from structure. Do not support from adjacent ductwork.
- D. Install transition piece to match flexible duct size to inlet or outlet of variable air volume terminal.

3.3 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Reset volume with damper operator attached to assembly allowing flow range modulation from 100 percent of design flow to 30 percent full flow. Set units with heating coils for minimum 30 percent full flow.

END OF SECTION

SECTION 233700 - AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Diffusers.
 - 2. Registers
 - 3. Grilles.
- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 33 00 - Air Duct Accessories: Volume dampers for inlets and outlets.

1.2 REFERENCES

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 70 - Method of Testing for Rating the Performance of Air Outlets and Inlets.
- B. Sheet Metal and Air Conditioning Contractors:
 - 1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit sizes, finish, and type of mounting. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- C. Test Reports: Rating of air outlet and inlet performance.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of air outlets and inlets.

1.5 QUALITY ASSURANCE

- A. Test and rate diffuser, register, and grille performance in accordance with ASHRAE 70.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.7 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty from date of Owner's acceptance for air outlets and inlets.

1.9 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish 5% percent extra air outlets and inlets.

PART 2 PRODUCTS

2.1 RECTANGULAR CEILING DIFFUSERS

- A. Manufacturers:
 - 1. E. H Price Company
 - 2. Krueger
 - 3. Titus
 - 4. Tuttle and Bailey
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Type: Square and rectangular, multi-louvered diffuser to discharge air in four-way pattern.
- C. Frame: Inverted T-bar type.
- D. Fabrication: Steel with baked enamel off-white finish.

2.2 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A. Manufacturers:
 - 1. E. H Price Company
 - 2. Krueger
 - 3. Titus
 - 4. Tuttle and Bailey
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, horizontal face.
- C. Frame: 1-1/4 inch margin with concealed mounting.
- D. Fabrication: Steel with 20 gage minimum frames and 22 gage minimum blades, steel and aluminum with 20 gage minimum frame, or aluminum extrusions, with factory off-white enamel finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify inlet and outlet locations.
- C. Verify ceiling systems are ready for installation.

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. Refer to Section 23 33 00.

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 238103 – PACKAGED ROOFTOP AIR CONDITIONING UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Packaged rooftop air conditioning unit.
 - 2. Roof curb.
- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Vibration isolators.
 - 3. Section 23 09 00 - Direct-Digital Control System for HVAC: Controls remote from unit.
 - 4. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation applying to units in this section.
 - 5. Section 23 21 13 - Hydronic Piping: Water and drain piping connections.
 - 6. Division 26: Electrical connection to units.

1.2 REFERENCES

- A. Air-Conditioning and Refrigeration Institute:
 - 1. ARI 210/240 - Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
 - 2. ARI 270 - Sound Rating of Outdoor Unitary Equipment.
- B. Air Movement and Control Association International, Inc.:
 - 1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.
- C. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- D. ASTM International:
 - 1. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
- E. National Fire Protection Association:
 - 1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

1.3 DEFINITIONS

- A. Energy Efficiency Ratio (EER) - Ratio of net cooling capacity in Btuh to total rate of electric input in watts under designated operating conditions.
- B. Seasonal Energy Efficiency Ratio (SEER) - Total cooling output of an air conditioner during its normal annual usage period for cooling (in Btu) divided by total electric energy input during the same period (in Wh).

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data indicating:
 - 1. Cooling and heating capacities.
 - 2. Dimensions.
 - 3. Weights.
 - 4. Rough-in connections and connection requirements.
 - 5. Duct connections.
 - 6. Electrical requirements with electrical characteristics and connection requirements.
 - 7. Controls.
 - 8. Accessories.
- C. Test Reports: Submit results of factory test at time of unit shipment.
- D. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- F. Manufacturer's Field Reports: Submit start-up report.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of controls installed remotely from units.
- C. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data.

1.6 QUALITY ASSURANCE

- A. Cooling Capacity: Rate in accordance with ARI 210/240.
- B. Sound Rating: Measure in accordance with ARI 270.
- C. Insulation and adhesives: Meet requirements of NFPA 90A.
- D. Performance Requirements: Conform to minimum SEER prescribed by ASHRAE 90.1 when tested in accordance with ARI 210/240.
- E. Outside Air Damper Leakage: Test in accordance with AMCA 500.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept units on site. Inspect for damage.
- C. Protect units from damage by storing off roof until roof mounting curbs are in place.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate installation of roof curbs with roof structure, roof deck and roof membrane installation.

1.11 FIELD MEASUREMENTS

- A. Verify field clearances, access doors and air intake and exhaust requirements shown on design drawings.

1.12 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.
- C. Furnish five year manufacturers warranty for compressors and the energy recover cassette.

1.13 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish one set of filters belts for each unit.

PART 2 PRODUCTS

2.1 ROOFTOP AIR CONDITIONING UNITS

- A. Manufacturers:
1. Aeon Incorporated
 2. Carrier Corp.
 3. The Trane Company
 4. Johnson/York International
 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Self-contained, packaged, factory assembled and wired, consisting of roof curb, cabinet, supply fan, refrigerant cooling coil, compressor, refrigeration circuit, condenser, hot water heating coil, air filters, mixed air casing, controls, and accessories.
- C. Configuration: As indicated on Drawings.
- D. Roof Mounting Curb: 14 inch high, galvanized steel, channel frame with gaskets, nailer strips. Full perimeter type for mounting under entire unit. To be anchored and properly secured on all four sides.
- E. Cabinet:
1. Designed for outdoor installation with weatherproof construction.
 2. Panels: Constructed of galvanized steel double wall construction with thermal break and baked enamel finish meeting salt spray test in accordance with ASTM B117 on the exterior of the panel. Furnish access doors or removable access panels.
 3. Insulation: Insulation shall have a minimum thermal resistance R-value of 13. Foam insulation shall have a minimum density of 2 pounds/cubic foot.
- F. Supply Fan: Backward curved plenum type, resiliently mounted with direct drive and factory mounted variable frequency drive. Motor permanently lubricated with built-in thermal overload protection.
- G. Exhaust Fan: Backward curved plenum type, resiliently mounted with direct drive and factory mounted variable frequency drive. Motor permanently lubricated with built-in thermal overload protection.
- H. Evaporator Coil: Constructed of copper tubes expanded onto aluminum fins. Galvanized drain pan with piping connection. Factory leak tested under water.
- I. Compressor: Scroll type, resiliently mounted with positive lubrication, and internal motor overload protection. Furnish internal vibration isolators and short cycle protection.
- J. Refrigeration circuit: Furnish thermal expansion valve, filter-drier, suction, discharge, and liquid line service valves with gauge ports and high and low pressure safety controls. Dehydrate and factory charge with oil and refrigerant. Refrigerant shall be R410A.

- K. Condenser:
1. Coil: Multi-pass aluminum microchannel tubes with subcooling rows. Factory leak tested under water.
 2. Condenser Fan: Direct drive propeller fans statically and dynamically balanced. Wired to operate with compressor. Motor permanently lubricated with built-in thermal overload protection. Furnish high efficiency fan motors.
- L. Hot Water Heating Coil:
1. Factory mounted.
 2. Coil: Constructed of copper tubes expanded into aluminum fins. Factory leak tested under water.
- M. Air Filters: Unit shall include 4 inch thick, pleated panel filters with an ASHRAE efficiency of 85% and a MERV rating of 13, upstream of the cooling coil. Unit shall also include 2 inch thick, pleated panel pre filters with an ASHRAE efficiency of 30% and MERV rating of 8, upstream of the 4 inch standard filters.
- N. Energy Recovery
1. Unit shall contain a factory mounted and tested energy recovery wheel. The energy recovery wheel shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seals and bearings. Frame shall slide out for service and removal from the cabinet.
 2. The energy recovery component shall incorporate a rotary wheel in an insulated cassette frame complete with seals, drive motor and drive belt.
 3. Wheel shall be wound continuously with one flat and one structured layer in an ideal parallel plate geometry providing laminar flow and minimum pressure drop-to-efficiency ratios. The layers shall be effectively captured in stainless steel wheel frames or aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix.
 4. Wheel shall be provided with removable energy transfer matrix. Wheel frame construction shall be a welded hub, spoke and rim assembly of stainless, plated and/or coated steel and shall be self-supporting without matrix segments in place. Segments shall be removable without the use of tools to facilitate maintenance and cleaning. Wheel bearings shall be selected to provide an L-10 life in excess of 400,000 hours. Rim shall be continuous rolled stainless steel and the wheel shall be connected to the shaft by means of taper locks.
 5. All diameter and perimeter seals shall be provided as part of the cassette assembly and shall be factory set. Drive belts of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.
 6. The energy recovery cassette shall be an Underwriters Laboratories Recognized Component for electrical and fire safety. The wheel drive motor shall be an Underwriters Laboratory Recognized Component and shall be mounted in the cassette frame and supplied with a service connector or junction box. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers and AHRI Standard 1060, Rating Air-to-Air Energy Recovery Ventilation Equipment. Cassettes shall be listed in the AHRI Certified Products.

7. Energy recovery wheel cassette shall carry a 5 year non-prorated warranty, from the date of original equipment shipment from the factory.
8. Unit shall include 2 inch thick, pleated panel outside air filters with an ASHRAE efficiency of 30% and MERV rating of 8, upstream of the wheels.
9. Hinged service access doors shall allow access to the wheel.
10. Total energy recovery wheels shall be coated with silica gel desiccant permanently bonded by a process without the use of binders or adhesives, which may degrade desiccant performance. The substrate shall be lightweight polymer and shall not degrade nor require additional coatings for application in marine or coastal environments. Coated segments shall be washable with detergent or alkaline coil cleaner and water. Desiccant shall not dissolve nor deliquesce in the presence of water or high humidity.

O. Mixed Air Casing:

1. Outside Air Damper Leakage: Maximum 3.0 cfm per square foot at 1.0 inches wg pressure differential.

P. Controls:

1. Furnish low limit thermostat in supply air to close outside air damper and stop supply fan.
2. Furnish terminal strip on unit for connection of operating controls to remote panel.

Q. Accessories:

1. Convenience Outlet: Factory installed, 115 volt, 15 amp, GFCI type, internally mounted.

R. Capacity:

1. Refer to schedules on Construction Drawings.

2.2 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Refer to schedules on Construction Drawings.

B. Provide disconnect switch for each rooftop unit next to unit for isolating the equipment for maintenance.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify roof curbs are installed and dimensions are as shown on shop drawings.

3.2 INSTALLATION

- A. Roof Curb:
 - 1. Assemble roof curb.
 - 2. Install roof curb level.
 - 3. Install units on roof curb providing watertight enclosure to protect ductwork and utility services.
 - 4. Install gasket material between unit base and roof curb.
- B. Connect units to supply and return ductwork with flexible connections. Refer to Section 23 33 00.
- C. Install condensate piping with trap and route from drain pan to splash block on roof. Refer to Section 23 21 13.
- D. Install components furnished loose for field mounting.
- E. Install electrical devices furnished loose for field mounting.
- F. Install control wiring between unit and field installed accessories.
- G. Remove from roof and dispose off-site panels removed from units during installation of economizer and dampers.

3.3 INSTALLATION - HOT WATER HEATING COIL

- A. Make connections to coils with unions or flanges.
- B. Connect water supply to leaving airside of coil (counter flow arrangement).
- C. Locate water supply at bottom of supply header and return water connection at top.
- D. Install water coils to allow draining and install drain connection at low points.
- E. Install the following piping accessories on hot water piping connections. Refer to Section 23 21 13.
 - 1. On supply:
 - a. Thermometer well and thermometer.
 - b. Well for control system temperature sensor.
 - c. Shutoff valve.
 - d. Strainer.
 - e. Control valve.
 - f. Pressure gage.
 - 2. On return:
 - a. Thermometer well and thermometer.
 - b. Well for control system temperature sensor.
 - c. Pressure gage.
 - d. Shutoff valve.
 - e. Flow control valve.

- F. Install valves and piping specialties in accordance with details as indicated on Drawings.
- G. Install manual air vents at high points complete with shutoff valve. Refer to Section 23 21 13.
- H. Install hot water piping accessories below roof.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Requirements for manufacturer's field services.
- B. Furnish initial start-up and shutdown during first year of operation, including routine servicing and checkout.

3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Vacuum clean coils and inside of unit cabinet.
- C. Install new throwaway filters in units at Substantial Completion.

3.6 DEMONSTRATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate unit operation and maintenance.
- C. Furnish services of manufacturer's technical representative for one 8 hour day to instruct Owner's personnel in operation and maintenance of units. Schedule training with Owner, provide at least 7 days notice to Architect/Engineer of training date.
- D. Approval of DCS building official is required.

END OF SECTION

SECTION 238127 – VARIABLE REFRIGERANT VOLUME MINI-SPLIT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes Inverter-based R-410A Mini-Split A. C. & Heat Pump Systems (Indoor Direct Expansion Fan Coil Units and Outdoor Air-cooled Condensing Units) with engineered piping/wiring for Variable Refrigerant Volume/Flow.
 - 1. System design includes All Heat-only or All Cool-only Operation.
 - 2. System design includes simultaneous Heat & Cool Operation (Heat Recovery).
- B. Consideration of Alternate Manufacturers: For non-listed, but established manufacturers of Variable Refrigerant Volume/Flow Mini-split systems, provide the following documentation a minimum of ten (10) working days prior to the published bid date, in order to be properly evaluated by the engineering design team:
 - 1. Name of proposed manufacturer and company information/profile.
 - 2. Name of proposed support organization (representative, distributor, etc.)
 - 3. Product & Performance data (capacities, efficiencies, physical dimensions, acoustic ratings, etc.) of equipment proposed in the Variable Refrigerant Volume/Flow System:
 - a. Indoor Fan Coils.
 - b. Outdoor Condensing Units.
 - c. Controls.
 - d. Accessories.
 - e. Pipe Sizing Layout.
 - f. Electrical Wiring Sizing/Layout.
 - 4. Location of nearest full-technical-service organization with full training on the proposed Variable Refrigerant Volume/Flow Mini-split System.
 - 5. Disclosure of all known design, specification, installation and operational differences of proposed system from basis-of-design system.

1.3 SUBMITTALS

- A. Product Data: For each mini-split system, include documentation for rated capacities, operating characteristics, acoustic performance, furnished specialties, and accessories. Include equipment dimensions, weights and structural loads, required clearances, method of field assembly, components, and location and size of each field connection.

- B. Piping Diagrams: Manufacturer to layout and size Refrigerant piping between each component of system. Provide sizing diagrams for review prior to installation by factory-trained refrigerant piping technicians.
- C. Wiring Diagrams: Manufacturer to layout and size power, signal & control wiring between each component of system. Provide sizing diagrams for review prior to installation by factory-trained refrigerant piping technicians/electrical contractor.
- D. Startup Personnel Certification: Provide evidence of factory training of each Refrigeration Technician scheduled to be utilized in installation/startup/commissioning of variable refrigerant volume mini-split systems.
- D. Operation and Maintenance Data: For Mini-split system to include in emergency, operation, and maintenance manuals.
- E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of mini-split systems and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. Performance Ratings: Certify published performance of Mini-split A. C. & Heat Pump units according to ARI Standard 210/240 covering Unitary Heat Pumps.
- C. Electrical Components, Devices, and Accessories: ETL Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Fabricate and install refrigeration system according to ASHRAE 15, "Safety Code for Mechanical Refrigeration."

1.5 COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."
- B. Coordinate location of piping and electrical rough-ins.

1.6 DEFINITIONS

- A. EAE – Engineer Approved Equal.

1.7 WARRANTY

- A. Unit warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of mini-split equipment that fails in materials or workmanship. Submit a written warranty signed by the mini-split system manufacturer and installer agreeing to furnish labor and parts for failures within a warranty period of eighteen (18) months from the date of substantial completion/documentated Start-up.
- B. Compressor warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace compressor(s) that fail in materials or workmanship. Submit a written warranty signed by the mini-split system manufacturer and installer agreeing to furnish parts-only for compressor failures within a warranty period of five (5) years from the date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - 1. Daikin AC – “VRV”.
 - 2. Mitsubishi – “City Multi”
 - 3. Trane – “Advantage VRF”
 - 4. Johnson/York- “Gen II”
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Indoor Fan Coil Unit Description: Factory-assembled and tested, in configurations as scheduled, consisting of unit casing, fans, filters, coils and controls.
 - 1. Refrigerant: R-410A.
 - 2. Thermostat/Controller: Infrared Remote.
- C. Evaporator: Direct-expansion copper tube/aluminum fin evaporator coil with fan, configured in integral cabinet complete with electronic controls. Provide mounting plate/hardware, integral polypropylene air filter and piping/wiring connections (refrigerant, condensate drain and electrical). Provide Unit(s) in following configuration(s):
 - 1. Wall Surface-mounted.
 - 2. Ceiling Surface-mounted.
 - 3. Concealed Low-Profile Ducted – Horizontal.
 - 4. Concealed Medium-Static-Pressure Ducted – Horizontal.
 - 5. Exposed Floor Console.
 - 6. Concealed Vertical.
 - 7. Ceiling Recessed-cassette.
- D. Outdoor Condensing Unit Description: Factory assembled and tested, air-cooled; consisting of casing, multiple compressors, condenser coils, condenser fans and motors (DC), and unit controls. Provide direct-expansion air-cooled condensing unit in polyester powder-coated galvanized steel casing, suitable for outdoor use. Provide copper tube/aluminum fin condenser

coil, one Variable-speed & one Constant speed rotary/scroll-hermetic compressor w/ internal overload protection, plastic-resin spiral condenser fan and integral electronic operating controls, including refrigeration thermal expansion valve. Include the following:

1. Condenser coil grille to protect coil from physical damage.
2. Engineered Refrigeration Fittings designed for Variable Refrigerant Volume/Flow, as shown on design layouts:
 - a. Branch/Splitter Joints.
 - b. Liquid/Suction Header Fittings.
3. Heat Recovery Controls in Condensing Unit. Include the following:
 - a. Drainless Refrigeration Branch Selector Components for heating/cooling flow management.
4. Refrigerant Equalization Design for Multiple Condensing Unit Configurations.

E. Features: Provide Mini-Split Systems with the following features:

1. Auto Random Restart - automatic, randomly restarts the unit at the last setting in the event of a power failure.
2. Fan Cycle Selection - runs the fan at low speed during thermostat cycle cut-off and includes additional options to stop the fan or combine both modes at specific intervals.
3. Auto Fan Speed Control - automatically selects the fan speed based on indoor room conditions to achieve optimum cooling and heating performance and cost efficiency.
4. Auto Mode and Sleep Mode Control - setting changes automatically between Cool and Heat mode depending on the room temperature and set temperature required for maintaining comfortable conditions.
5. Automatic Air Swing (Up and Down) - enables air to be evenly distributed to every corner of the room.

F. Accessories:

1. Low Ambient Control/Baffle Kit: Field-installed kit to control condenser fan speed/allow to operate down to 0 deg F.
2. Fan Coil Condensate Pump – integral condensate lifter set into drain pan.
3. Wall-mounted Wired Controller.
4. Serial Communications Interface for Building Automation System:
 - a. BACNet.

2.2 SOURCE QUALITY CONTROL

- A. Testing Requirements: Factory test sound-power-level ratings according to ARI 270.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.
- B. Install roof-mounting units on equipment supports specified in Division 7.

- C. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Connect refrigerant piping to air-cooled condensing units; maintain required access to unit. Install furnished field-mounted accessories. Refrigerant piping and specialties are specified in Division 23 Section "Refrigerant Piping."
- D. Connect Power and Controls wiring according to manufacturer's documented instructions and Division 26 specification means and methods.

3.3 STARTUP SERVICE

- A. Perform Startup of Inverter-based R-410A Variable Refrigerant Volume/Flow mini-split systems using only manufacturer-trained refrigeration technicians.
- B. Complete installation and startup checks according to manufacturer's written instructions.
- C. Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain Variable Refrigerant Volume/Flow mini-split systems.
- B. Provide minimum of full day training, 8 hours spread over two days

END OF SECTION

SECTION 238200 - CONVECTION HEATING AND COOLING UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Finned tube radiation enclosure.
- B. Related Sections:
 - 1. Division 01 – General Conditions
 - 2. Section 23 21 13 - Hydronic Piping: Execution requirements for connection of hot water piping to units specified by this section.
 - 3. Section 23 21 16 - Hydronic Piping Specialties: Product requirements for hydronic piping specialties for placement by this section.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations. Indicate schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers.
- C. Manufacturer's Installation Instructions: Submit assembly, support details, and connection requirements.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access to valves.
- C. Operation and Maintenance Data: Submit manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.4 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.

1.5 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept units on site in factory packing. Inspect for damage. Store under roof.
- C. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors. Protect coils from entry of dirt and debris with pipe caps or plugs.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Manufacturer's standard, no less than eighteen months from date of Owner's acceptance.

PART 2 PRODUCTS

2.1 FINNED TUBE RADIATION (FTR-1)

- A. Manufacturers:
 - 1. Rittling
 - 2. Vulcan
 - 3. Slant Fin
 - 4. Sterling
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Heating Elements: Seamless copper tubing, mechanically expanded into evenly spaced aluminum fins, suitable for soldered fittings.
- C. Element Hangers: Quiet operating, ball bearing cradle type providing unrestricted longitudinal movement, on enclosure brackets.
- D. Enclosures: 0.0478 inch thick steel up to 8 inches in height, 0.598 inch steel over 8 inches in height, with easily jointed components for wall to wall installation. Support rigidly, on wall or floor mounted brackets at least 3 feet on center maximum.
- E. Finish: Factory applied baked enamel of color as selected.

- F. Damper: Where heating media is not thermostatically controlled, furnish knob-operated internal damper at enclosure air outlet.
- G. Access Doors: For otherwise inaccessible valves, furnish factory-made permanently hinged access doors, 6 x 7 inch minimum size, integral with cabinet.

2.2 FINNED TUBE RADIATION ENCLOSURE (REPLACEMENTS AT CLASSROOMS)

- A. Manufacturers:
 - 1. Rittling
 - 2. Vulcan
 - 3. Slant Fin
 - 4. Sterling
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Enclosures: 0.0478 inch thick steel up to 24 inches in height, 0.598 inch steel over 24 inches in height, with easily jointed components for wall to wall installation. Support rigidly, on wall or floor mounted brackets at least 3 feet on center maximum.
- C. Finish: Factory applied baked enamel of manufacturer's standard color.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

3.2 INSTALLATION

- A. On water coils, install shut-off valve on supply piping and lockshield balancing valve on return piping. Locate water supply at bottom of supply header and return water connection at top. Install manual air vents at high points complete with stop valve. Install water coils to be drainable and install drain connection at low points. Refer to Section 23 21 13.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.

3.3 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

END OF SECTION

SECTION 260519 - ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes building wire and wiring connectors and connections.
- B. Related Sections:
 - 1. Section 26 05 53 - Identification for Electrical Systems: Product requirements for wire identification.
 - 2. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
 - 2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.3 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
 - 2. Stranded conductors for control circuits.
 - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 4. Conductor not smaller than 16 AWG for control circuits.
 - 5. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet feet.
- B. Wiring Methods: Provide the following wiring methods:
 - 1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway, or metal clad cable.
 - 2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in rigid galvanized steel conduit.
 - 3. Above Accessible Ceilings: Use only building wire, Type THHN/THWN insulation, in EMT raceway or metal clad cable.
 - 4. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN insulation, in rigid galvanized steel conduit.
 - 5. Exterior Locations: Use only building wire, Type XHHW insulation, in rigid galvanized steel conduit.
 - 6. Underground Locations: Use only building wire, Type XHHW insulation in rigid galvanized steel conduit raceway or concrete encased PVC conduit.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit for building wire and each cable assembly type.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- D. Test Reports: Indicate procedures and values obtained.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of components and circuits.

1.6 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
- B. Perform Work in accordance with the current issue of the State of Connecticut Building and Fire Safety Code.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

1.10 WARRANTY

- A. All products provided and installed under this section shall be warrantied for a minimum period of 18 months.

PART 2 PRODUCTS

2.1 BUILDING WIRE

- A. Manufacturers:
 - 1. Southwire/Essex Group Inc.
 - 2. General Cable Co.
 - 3. Cerrowire.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Single conductor insulated solid wire.
- C. Conductor: Copper.
- A. Insulation: NFPA 70; Type THWN insulation for feeders and branch circuits, rated 75 degrees C.

2.2 WIRING CONNECTORS

- A. Split Bolt Connectors:
 - 1. IlSCO.
 - 2. OZ Gedney.
 - 3. Erico.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Solderless Pressure Connectors:
 - 1. IlSCO.
 - 2. OZ Gedney.
 - 3. Erico.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- C. Spring Wire Connectors:
 - 1. IlSCO.
 - 2. OZ Gedney.
 - 3. Erico.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- D. Compression Connectors:
 - 1. IlSCO.
 - 2. OZ Gedney.
 - 3. Erico.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify interior of building has been protected from weather.
- C. Verify mechanical work likely to damage wire and cable has been completed.
- D. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 EXISTING WORK

- A. Remove exposed abandoned wire and cable, including abandoned wire and cable above accessible ceiling finishes. Patch surfaces where removed cables pass through building finishes.
- B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.
- C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.
- D. Extend existing circuits using materials and methods as specified.
- E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.4 INSTALLATION

- A. Route wire and cable to meet Project conditions.
- B. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- C. Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.
- D. Special Techniques--Building Wire in Raceway:
 - 1. Pull conductors into raceway at same time.
 - 2. Install building wire 4 AWG and larger with pulling equipment.

- E. Special Techniques - Cable:
 - 1. Protect exposed cable from damage.
 - 2. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.
 - 3. Use suitable cable fittings and connectors.
- F. Special Techniques - Wiring Connections:
 - 1. Clean conductor surfaces before installing lugs and connectors.
 - 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 - 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
 - 4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
 - 5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
 - 6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- G. Install solid conductor for feeders and branch circuits 10 AWG and smaller.
- H. Install stranded conductors for branch circuits 10 AWG and smaller. However, when stranded conductors are used in lieu of solid, then install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

3.5 WIRE COLOR

- A. General:
 - 1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. Ground Conductors:
 - 1. For 6 AWG and smaller: Green.
 - 2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.6 FIELD QUALITY CONTROL

- A. Section : Field inspecting, testing, adjusting, and balancing.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Conduit supports.
 - 2. Formed steel channel.
 - 3. Spring steel clips.
 - 4. Sleeves.
 - 5. Mechanical sleeve seals.
 - 6. Firestopping relating to electrical work.
 - 7. Firestopping accessories.
 - 8. Equipment bases and supports.

- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete: Product requirements for concrete for placement by this section.
 - 2. Section 27 05 29 - Hangers and Supports for Communications Systems.
 - 3. Section 28 05 29 - Hangers and Supports for Electronic Safety and Security.
 - 4. Refer to Division 01 for General Conditions required for this section

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
 - 4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

- B. FM Global:
 - 1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

- C. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.

- D. Underwriters Laboratories Inc.:
 - 1. UL 263 - Fire Tests of Building Construction and Materials.
 - 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
 - 3. UL 1479 - Fire Tests of Through-Penetration Firestops.
 - 4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
 - 5. UL - Fire Resistance Directory.

1.3 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 SYSTEM DESCRIPTION

- A. Firestopping Materials: ASTM E119, ASTM E814 to achieve fire ratings of adjacent construction in accordance with UL Design Numbers noted on the Architectural Drawings.
- B. Surface Burning: ASTM E84 with maximum flame spread / smoke developed rating of 25/450.
- C. Firestop interruptions to fire rated assemblies, materials, and components.

1.5 PERFORMANCE REQUIREMENTS

- A. Firestopping: Conform to applicable code and UL requirements for fire resistance ratings and surface burning characteristics.
- B. Firestopping: Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
 - 2. Firestopping: Submit data on product characteristics, performance and limitation criteria.
- D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- E. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.
- F. Manufacturer's Installation Instructions:
 - 1. Hangers and Supports: Submit special procedures and assembly of components.
 - 2. Firestopping: Submit preparation and installation instructions.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

- H. Engineering Judgements: For conditions not covered by UL listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.7 QUALITY ASSURANCE

- A. Through Penetration Firestopping of Fire Rated Assemblies: ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 2-hour while maintaining STC50 requirements.
 - 2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
 - a. Floor Penetrations Within Wall Cavities: T-Rating is not required.
- B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
 - 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
 - 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
- D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.
- E. Surface Burning Characteristics: 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- F. Perform Work in accordance with the latest adopted version of the State of Connecticut Building and Fire Safety Codes.

1.8 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, approved by manufacturer.

1.9 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

1.12 WARRANTY

- A. All products provided and installed under this section shall be warrantied for a minimum period of 18 months

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

- A. Manufacturers:
 - 1. Allied Tube & Conduit Corp.
 - 2. Electroline Manufacturing Company.
 - 3. O-Z Gedney Co.
 - 4. Thomas and Betts
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.

- F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. B-Line Systems.
3. Midland Ross Corporation, Electrical Products Division.
4. Unistrut Corp.
5. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Product Description: Galvanized 12 gage) thick steel. With holes 1-1/2 inches on center.

2.3 SPRING STEEL CLIPS

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. B-Line Systems
3. Midland Ross Corporation, Electrical Products Division.
4. Unistrut Corp.
5. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Product Description: Mounting hole and screw closure.

2.4 SLEEVES

- A. Sleeves for conduit, raceway, cable tray, busway, or cable through Non-fire Rated Floors: 18 gage thick galvanized steel.

- B. Sleeves for conduit, raceway, cable tray, busway, or cable through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

- C. Sleeves for conduit, raceway, cable tray, busway, or cable through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

- D. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.5 MECHANICAL SLEEVE SEALS

A. Manufacturers:

1. Thunderline Link-Seal, Inc.
2. NMP Corporation.
3. PSI Link-Seal.
4. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.6 FIRESTOPPING

- A. Manufacturers:
1. Dow Corning Corp.
 2. Hilti Corp.
 3. 3M fire Protection Products.
 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
1. Silicone Firestopping Elastomeric Firestopping: Multiple component silicone elastomeric compound and compatible silicone sealant.
 2. Foam Firestopping Compounds: Multiple component foam compound.
 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 4. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
 7. Firestop Pillows: Formed mineral fiber pillows.
- C. Color: Black .

2.7 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. General:
1. Furnish UL listed products .
 2. Select products with rating not less than rating of wall or floor being penetrated.
- C. Non-Rated Surfaces:
1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
 2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify openings are ready to receive sleeves.
- C. Verify openings are ready to receive firestopping.

3.2 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.
- C. Obtain permission from Owner before using powder-actuated anchors.
- D. Do not drill or cut structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Provide expansion anchors .
 - 2. Steel Structural Elements: Provide beam clamps spring steel clips .
 - 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts .
 - 5. Solid Masonry Walls: Provide expansion anchors .
 - 6. Sheet Metal: Provide sheet metal screws.
 - 7. Wood Elements: Provide wood screws.
- B. Inserts:
 - 1. Install inserts for placement in concrete forms.
 - 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut grouted flush with slab.
- C. Install conduit and raceway support and spacing in accordance with NEC.
- D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- E. Install multiple conduit runs on common hangers.

- F. Supports:
1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
 4. Support vertical conduit at every floor.

3.4 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit 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 .
- D. Fire Rated Surface:
1. Seal opening at wall, and 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.
 2. Where cable tray, conduit, penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.
- E. Non-Rated Surfaces:
1. Seal opening through non-fire rated wall, partition floor, ceiling, and 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.
 - c. Install type of firestopping material recommended by manufacturer.
 2. Install where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
 3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.
 4. Interior partitions: Seal pipe penetrations at computer rooms, telecommunication rooms data rooms . Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

- A. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond supported equipment . Refer to Section 03 30 00.
- B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct supports of formed steel channel . Brace and fasten with flanges bolted to structure.

3.6 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- G. Install stainless steel escutcheons at finished surfaces.

3.7 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.8 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements:Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.9 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes.
- B. Related Sections:
 - 1. Section 26 05 03 - Equipment Wiring Connections.
 - 2. Section 26 05 29 - Hangers and Supports for Electrical Systems.
 - 3. Section 26 05 53 - Identification for Electrical Systems.
 - 4. Section 26 27 26 - Wiring Devices.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
 - 3. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).
- B. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - 6. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 7. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.3 SYSTEM DESCRIPTION

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.
- B. Wet and Damp Locations: Provide rigid galvanized steel, intermediate metal conduit or electrical metallic tubing with compression fittings. Provide cast metal outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.
- C. Concealed Dry Locations: Provide electrical metallic tubing . Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

- D. Exposed Dry Locations: Provide electrical metallic tubing . Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.4 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit for the following:
 - 1. Flexible metal conduit.
 - 2. Liquidtight flexible metal conduit.
 - 3. Raceway fittings.
 - 4. Conduit bodies.
 - 5. Surface raceway.
 - 6. Wireway.
 - 7. Pull and junction boxes.
 - 8. Handholes.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents:
 - 1. Record actual routing of conduits larger than 2 inch.
 - 2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.

- C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

1.9 WARRANTY

- A. All products provided and installed under this section shall be warrantied for a minimum period of 18 months.

PART 2 PRODUCTS

2.1 METAL CONDUIT

- A. Manufacturers:
 - 1. Allied Tube and Conduit.
 - 2. Western Tube and Conduit.
 - 3. Wheatland Tube Company.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Rigid Aluminum Conduit: ANSI C80.5.
- D. Intermediate Metal Conduit (IMC): Rigid steel.
- E. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit. all steel fittings.

2.2 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Allied Tube and Conduit
 - 2. Western Tube and Conduit.
 - 3. Wheatland Tube Company.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Interlocked steel construction.
- C. Fittings: NEMA FB 1.

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Carlon Electrical Products.
 - 2. Anamet Electrical.
 - 3. Allied Tube and Conduit.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Interlocked steel construction with PVC jacket.
- C. Fittings: NEMA FB 1.

2.4 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube and Conduit.
 - 2. Western Tube and Conduit.
 - 3. Wheatland Tube Company.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type.

2.5 WIREWAY

- A. Manufacturers:
 - 1. Carlon Electrical Products.
 - 2. Thomas & Betts Corp.
 - 3. Hoffman.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Oiltight and dust-tight type wireway.
- C. Knockouts: Manufacturer's standard.
- D. Size: 8 x 8 inch, 12 x 12 inch; length as indicated on Drawings.
- E. Cover: Hinged with full gaskets.
- F. Connector: Flanged.
- G. Fittings: Lay-in type with removable top, bottom, and side; captive screws.
- H. Finish: Rust inhibiting primer coating with gray enamel finish.

2.6 OUTLET BOXES

- A. Manufacturers:
 - 1. Erico Products.
 - 2. Raco.
 - 3. Thomas & Betts Corp.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- C. Cast Boxes: NEMA FB 1, Type FS, cast ferrous alloy. Furnish gasketed cover by box manufacturer. Furnish with threaded hubs.

- D. Wall Plates for Finished Areas: Brushed Stainless Steel.
- E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.7 PULL AND JUNCTION BOXES

- A. Manufacturers:
 - 1. Carlon Electrical Products.
 - 2. Hubbell Wiring Devices.
 - 3. Thomas & Betts Corp.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- C. Hinged Enclosures: As specified in Section 26 27 16.
- D. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron or cast aluminum.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- E. Fiberglass Concrete composite Handholes: Die-molded, concrete composite hand holes:
 - 1. Cable Entrance: Pre-cut 6 inch x 6 inch cable entrance at center bottom of each side.
 - 2. Cover: Glass-fiber concrete composite, weatherproof cover with nonskid finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

- A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.
- B. Remove concealed abandoned raceway to its source.
- C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.
- D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

- E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.
- F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

- A. Ground and bond raceway and boxes in accordance with Section 26 05 26.
- B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.
- C. Identify raceway and boxes in accordance with Section 26 05 53.
- D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29 .
- E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach raceway to ceiling support wires or other piping systems.
- G. Construct wireway supports from steel channel specified in Section 26 05 29.
- H. Route exposed raceway parallel and perpendicular to walls.
- I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- J. Route conduit in and under slab from point-to-point.
- K. Maximum Size Conduit in Slab Above Grade: 1 inch. Do not cross conduits in slab .
- L. Maintain clearance between raceway and piping for maintenance purposes.
- M. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- N. Cut conduit square using saw or pipe cutter; de-burr cut ends.

- O. Bring conduit to shoulder of fittings; fasten securely.
- P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- Q. Install conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- R. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate factory elbows for bends in metal conduit larger than 2 inch size.
- S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- T. Install fittings to accommodate expansion and deflection where raceway crosses seismic , control and expansion joints.
- U. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- V. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- W. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
- X. Close ends and unused openings in wireway.

3.5 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.
- B. Adjust box location up to 2 feet prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.
- N. Install gang box where more than one device is mounted together. Do not use sectional box.
- O. Install gang box with plaster ring for single device outlets.

3.6 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with Section 07 84 00 .
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.
- C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.7 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused openings in boxes.

3.8 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nameplates.
 - 2. Labels.
 - 3. Wire markers.
 - 4. Conduit markers.
 - 5. Lockout Devices.

- B. Related Sections:
 - 1. Section 26 24 16 - Panelboards
 - 2. Section 27 13 00 – Telecommunication and Data Wiring Systems.
 - 3. Section 28 13 00 – Security and Access Control.
 - 4. Refer to Division 01 for General Conditions required for this section.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures:

- B. Product Data:
 - 1. Submit manufacturer's catalog literature for each product required.
 - 2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

- C. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

- B. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept identification products on site in original containers. Inspect for damage.
- C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Install labels nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

1.7 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for extra materials.
- B. Furnish two containers of spray-on adhesive.

1.8 WARRANTY

- A. All products provided and installed under this section shall be warrantied for a minimum period of 18 months

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 - 1. Brady
 - 2. Seton
 - 3. Panduit
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Laminated three-layer plastic with engraved black letters on white contrasting background color.

- C. Letter Size:
 - 1. 1/8 inch high letters for identifying individual equipment and loads.
 - 2. 1/4 inch high letters for identifying grouped equipment and loads.
- D. Minimum nameplate thickness: 1/8 inch.

2.2 LABELS

- A. Manufacturers:
 - 1. Brady
 - 2. Seton
 - 3. Panduit
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.3 WIRE MARKERS

- A. Manufacturers:
 - 1. Brady
 - 2. Seton
 - 3. Panduit
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Description: Cloth tape, split sleeve type wire markers.
- C. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.
 - 2. Control Circuits: Control wire number as indicated on schematic and interconnection diagrams. shop drawings.

2.4 CONDUIT AND RACEWAY MARKERS

- A. Manufacturers:
 - 1. Brady
 - 2. Seton
 - 3. Panduit
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Description: Nameplate fastened with adhesive Labels fastened with adhesive .
- C. Color:
 - 1. 208 Volt System: Black lettering on white background.
- D. Legend:
 - 1. 208 Volt System: 208 VOLTS.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 EXISTING WORK

- A. Install identification on existing equipment to remain in accordance with this section.
- B. Install identification on unmarked existing equipment.
- C. Replace lost nameplates, labels.
- D. Re-stencil existing equipment.

3.3 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
 - 1. Install nameplate parallel to equipment lines.
 - 2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
 - 3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
 - 4. Secure nameplate to equipment front using [screws] [, rivets] [, or] [adhesive].
 - 5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
 - 6. Install nameplates for the following:
 - a. Panelboards.
 - b. Transformers.
 - c. Service Disconnects.
- C. Label Installation:
 - 1. Install label parallel to equipment lines.
 - 2. Install label for identification of individual control device stations.
 - 3. Install labels for permanent adhesion and seal with clear lacquer.
- D. Wire Marker Installation:
 - 1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
 - 2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
 - 3. Install labels at data outlets identifying patch panel and port designation.
- E. Conduit and Raceway Marker Installation:
 - 1. Install conduit raceway marker for each conduit raceway longer than 10 feet.
 - 2. Conduit Raceway Marker Spacing: 20 feet on center.

3. Raceway Painting: Identify conduit using field painting in accordance with Section 09 90 00.
 - a. Paint continuous length.
 - b. Color:
 - 1) Fire Alarm System: Red

- F. Stencil Installation:
 1. Apply stencil painting in accordance with Section 09 90 00.

END OF SECTION

SECTION 262416 - PANELBOARDS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes distribution and branch circuit panelboards.
- B. Related Sections:
 - 1. Section 26 05 53 - Identification for Electrical Systems.
 - 2. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
- B. National Electrical Manufacturers Association:
 - 1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
 - 2. NEMA FU 1 - Low Voltage Cartridge Fuses.
 - 3. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
 - 4. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.
 - 5. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 6. NEMA PB 1 - Panelboards.
 - 7. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.
- C. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- D. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
- E. Underwriters Laboratories Inc.:
 - 1. UL 67 - Safety for Panelboards.
 - 2. UL 1283 - Electromagnetic Interference Filters.
 - 3. UL 1449 - Transient Voltage Surge Suppressors.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- C. Product Data: Submit catalog data showing specified features of standard products.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.
- C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.6 MAINTENANCE MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance products.
- B. Furnish two of each panelboard key. Panelboards shall be keyed alike.

PART 2 PRODUCTS

2.1 DISTRIBUTION PANELBOARDS

- A. Manufacturers:
 - 1. General Electric.
 - 2. Square D.
 - 3. Siemens.
 - 4. Eaton/Cutler Hammer
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: NEMA PB 1, circuit breaker type panelboard. .
- C. Service Conditions:
 - 1. Temperature: 40 degrees C.
 - 2. Altitude: 500 feet above sea level.

- D. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.
- E. Minimum integrated short circuit rating: 65,000 amperes rms symmetrical for 208 volt distribution panelboards; 65,000 for 480 volt distribution panelboards larger than 100 amps, or as indicated on Drawings.
- F. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Furnish circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
- G. Molded Case Circuit Breakers with Current Limiters: NEMA AB 1, circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.
- H. Current Limiting Molded Case Circuit Breakers (**Retrofit into existing switchboard**): NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size NEMA FU 1, Class RK-5 fuse.
- I. Circuit Breaker Accessories: Handle locks, ground fault protection, LI, LSI and LSIG solid state trip units, lugs, all hardware and component kits to ensure a complete and fully functional installation.
- J. Enclosure: NEMA PB 1, Type 1 cabinet box.
- K. Cabinet Front: Surface door-in-door type, fastened with screws, hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

2.2 BRANCH CIRCUIT PANELBOARDS

- A. Manufacturers:
 - 1. General Electric.
 - 2. Square D.
 - 3. Siemens.
 - 4. Eaton/Cutler Hammer
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- C. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard; furnish an isolated/insulated ground bus as indicated on Drawings for use with IG panels.
- D. Minimum Integrated Short Circuit Rating: 10,000 for 208 branch circuit panelboards less than 100 amperes, 22,000 for branch circuit panelboards larger than 100 amperes, 14,000 for 480 volt panelboards 100 amperes or less, or as indicated on Drawings.

- E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.
- F. Current Limiting Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size NEMA FU 1, Class RK-5 fuse.
- G. Enclosure: NEMA PB 1, Type 1 Type 3R .
- H. Cabinet Box: 6 inches deep, 20 inches wide for 208 volt and less panelboards, 20 inches inches wide for 480 volt panelboards.
- I. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike. Finish in manufacturer's standard gray enamel.

2.3 PANELBOARD SURGE SUPPRESSION

- A. Integral Surge Suppressor:
 - 1. Component recognized in accordance with UL 1449 and UL 1283.
 - 2. Independently tested with category C3 high exposure waveform (20 kV-1.2/50us, 10kA-8/20 us) per IEEE C62.41.
 - 3. Furnish copper bus bars for surge current path.
 - 4. Construct using surge current modules (MOV based). Each module fused with user replaceable 200,000 AIR rated fuses. Status of each module monitored on front cover of panelboard enclosure and on module.
 - 5. Furnish with audible alarm activated when one of surge current modules has failed. Furnish alarm on/off to silence alarm and alarm push-to-test switch to test alarm. Locate switches and alarm on front cover of panelboard enclosure.
 - 6. Meet or exceed the following criteria:
 - a. Maximum single impulse current rating not less than 80 Ka for branch circuit panelboards and SPD2 protection; 120 kA for distribution panelboards requiring SPD1 protection.
 - b. Pulse Lift Test: Capable of protecting against and surviving 5000 IEEE C62.41 Category C transients without failure or degradation.
 - c. Clamping voltage not exceeding the following:

Voltage	L-N	N-G	L-G
208Y/120	500 V	500 V	500 V
480Y/277	1000 V	1000 V	1000 V

- 7. Furnish response time no greater than five nanoseconds for individual protection modes.

8. Designed to withstand maximum continuous operating voltage (MCOV) of not less than 115 percent of nominal RMS voltage.
9. Furnish visible indication of proper suppresser connection and operation. Lights indicate operable phase and module.
10. Furnish minimum EFI/RFI filtering of 34 dB at 100 kHz with insertion loss ratio of 50: 1 using Mil Std. 220A methodology.

B. Panelboard:

1. UL 67 listed and TVSS device UL 1449 Component Recognized. TVSS device meets UL 1449. Furnish panelboard markings with clamp voltage at TVSS terminals and clamp voltage at panelboard line terminals.
2. Top or bottom feed as indicated on Drawings. Furnish circuit directory inside door.
3. Construct box of galvanized steel. Box size as indicated on Drawings.
4. Main bus constructed of copper and rated for load current.
5. Furnish interior with branch circuit breakers. Furnish one 60 amp circuit breaker, with appropriate number of poles, as dedicated disconnect for TVSS.
6. Furnish standard rated, neutral assembly with copper neutral bus.
7. Furnish with insulated ground bus and safety ground bus.
8. Furnish wiring gutters in accordance with NEC.
9. Field connections to panelboard: main lug or main breaker type.
10. Construct with surface mounted trim and NEMA Type 1 enclosure.
11. Furnish with branch breaker positions and nominal current rating as indicated on Drawings.

2.4 WARRANTY

- A. All products provided and installed under this section shall be warrantied for a minimum period of 18 months

PART 3 EXECUTION

3.1 EXISTING WORK

- A. Remove existing circuits from existing panels that are no longer required for the renovated space. It is the intent to phase out existing electrical panels. Any new circuits shall be connected to new panels.
- B. Maintain access to existing panelboard remaining active and requiring access. Modify installation or provide access panel.
- C. Clean and repair existing panelboards to remain.

3.2 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1.
- B. Install panelboards plumb.
- C. Install recessed panelboards flush with wall finishes.

- D. Height: 6 feet to top of panelboard ; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- E. Install filler plates for unused spaces in panelboards.
- F. Provide typed circuit directory for each branch circuit panelboard . Revise directory to reflect circuiting changes to balance phase loads.
- G. Install engraved plastic nameplates in accordance with Section 26 05 53.
- H. Install spare conduits out of each recessed panelboard to accessible location above ceiling . Minimum spare conduits: 5 empty 1 inch. Identify each as SPARE.
- I. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels in accordance with NFPA 70.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.
- D. Perform switch inspections and tests listed in NETA ATS, Section 7.5.
- E. Perform controller inspections and tests listed in NETA ATS, Section 7.16.1.

3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 10 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 262726 - WIRING DEVICES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes wall switches; wall dimmers; receptacles; multioutlet assembly; and device plates and decorative box covers.
- B. Related Sections:
 - 1. Section 26 05 33 - Raceway and Boxes for Electrical Systems: Outlet boxes for wiring devices.
 - 2. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Samples: Submit two samples of each wiring device and wall plate illustrating materials, construction, color, and finish.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.5 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two of each style, size, and finish wall plate.

1.6 WARRANTY

- A. All products provided and installed under this section shall be warrantied for a minimum period of 18 months

PART 2 PRODUCTS

2.1 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Wiring Products.
 - 2. Leviton.
 - 3. Bryant.
 - 4. Pass and Seymour.
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: NEMA WD 1, Heavy-Duty , AC only general-use snap switch.
- C. Body and Handle: Ivory plastic with toggle handle.
- D. Indicator Light: Lighted handle type switch ; red color handle .
- E. Locator Light: Lighted handle type switch; red color handle.
- F. Ratings:
 - 1. Voltage: 120 volts, AC.
 - 2. Current: 20 amperes.
- G. Ratings: Match branch circuit and load characteristics.

2.2 RECEPTACLES

- A. Manufacturers:
 - 1. Hubbell Wiring Products.
 - 2. Leviton.
 - 3. Bryant.
 - 4. Pass and Seymour.
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: NEMA WD 1, Heavy-duty general use receptacle.
- C. Device Body: Ivory plastic.
- D. Configuration: NEMA WD 6, type or as indicated on Drawings.
- E. Convenience Receptacle: Type 5-20R.
- F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.
- G. Special Receptacle: Type 6-30R.

2.3 WALL PLATES

- A. Manufacturers:
 - 1. Hubbell Wiring Products.
 - 2. Leviton.
 - 3. Bryant.
 - 4. Pass and Seymour.
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Decorative Cover Plate: 302 stainless steel .
- C. Jumbo Cover Plate: 302 Stainless steel
- D. Weatherproof Cover Plate: Gasketed cast metal plate with hinged and gasketed device cover.

2.4 MULTIOUTLET ASSEMBLY

- A. Manufacturers:
 - 1. Wiremold Products.
 - 2. Hubbell.
 - 3. Leviton.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Multi-outlet Assembly: Sheet metal channel with fitted cover, suitable for use as multi-outlet assembly.
- C. Size: LeGrand Wiremold #G4000 steel two compartment white finish with internal divider.
- D. Receptacles: Furnish covers and accessories to accept convenience receptacles specified in this Section.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify outlet boxes are installed at proper height.
- C. Verify wall openings are neatly cut and completely covered by wall plates.
- D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Clean debris from outlet boxes.

3.3 EXISTING WORK

- A. Disconnect and remove abandoned wiring devices.
- B. Modify installation to maintain access to existing wiring devices to remain active.
- C. Clean and repair existing wiring devices to remain or to be reinstalled.

3.4 INSTALLATION

- A. Install devices plumb and level.
- B. Install switches with OFF position down.
- C. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- D. Do not share neutral conductor on load side of dimmers.
- E. Install receptacles with grounding pole on top .
- F. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.
- G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- H. Connect wiring devices by wrapping solid conductor around screw terminal. Install stranded conductor for branch circuits 10 AWG and smaller. When stranded conductors are used in lieu of solid, use crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under device screws.
- I. Use jumbo size plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights as specified and as indicated on drawings.
- B. Install wall switch 48 inches above finished floor.
- C. Install convenience receptacle 18 inches above finished floor.
- D. Install convenience receptacle 6 inches above counter or desktop .
- E. Install dimmer 48 inches above finished floor.

- F. Coordinate installation of wiring devices with underfloor raceway service fittings provided under Section 26 05 39.
- G. Coordinate installation of wiring devices with floor box service fittings provided under Section 26 05 34.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust devices and wall plates to be flush and level.

3.8 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 265100 - INTERIOR LIGHTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes interior luminaires, lamps, ballasts, and accessories.
- B. Related Sections:
 - 1. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
 - 2. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.
 - 2. ANSI C82.4 - American National Standard for Ballasts-for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type).

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.
- C. Product Data: Submit dimensions, ratings, and performance data.
- D. Samples: Submit two color chips 3 x 3 inch in size illustrating luminaire finish color where indicated in luminaire schedule.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.5 MOCK-UP

- A. Section 01 40 00 - Quality Requirements: Mock-up requirements.
- B. Provide luminaires in ceiling assembly mock-up specified in Section .
- C. Locate where indicated on Drawings.
- D. Incorporate accepted mockup as part of Work.
- E. Remove mockup when directed by Architect/Engineer. .

1.6 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.7 WARRANTY

- A. All products provided and installed under this section shall be warrantied for a minimum period of 18 months

PART 2 PRODUCTS

2.1 INTERIOR LUMINAIRES

- A. Manufacturers:
 - 1. Metalux / Cooper Industries.
 - 2. Acuity Lighting.
 - 3. Hubbell
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

2.1 INTERIOR LUMINAIRES

- A. Manufacturers:
 - 1. Refer to Lighting Fixture Schedule for named manufacturers.
 - 2. Alternates: Equal fixture approval shall be as judged by engineer and/or architect. Fixtures shall be equal in aesthetics, quality, construction and optical performance. Provide fixture samples and photometric calculations as requested by engineer and/or architect.
 - 3. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

2.2 LED FIXTURES AND DRIVERS

- A. Refer to lighting fixture schedule for manufacturers and descriptions.

PART 3 EXECUTION

3.1 EXISTING WORK

- A. Disconnect and remove abandoned luminaires, lamps, and accessories.
- B. Extend existing interior luminaire installations using materials and methods compatible with existing installations, or as specified.
- C. Clean and repair existing interior luminaires to remain or to be reinstalled.

3.2 INSTALLATION

- A. Install suspended luminaires using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.
- B. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- C. Locate recessed ceiling luminaires as indicated on Drawings as indicated on reflected ceiling plan.
- D. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- E. Exposed Grid Ceilings: Support surface-mounted luminaires on grid ceiling directly from building structure .
- F. Install recessed luminaires to permit removal from below.
- G. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- H. Install clips to secure recessed grid-supported luminaires in place.
- I. Install wall-mounted luminaires at height as scheduled.
- J. Install accessories furnished with each luminaire.
- K. Connect luminaires to branch circuit outlets provided under Section 26 05 33 using flexible conduit.
- L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- M. Confirm that dimming controls, daylight harvesting and occupancy sensor controls conform to the recommended sequence of operation.
- N. Ground and bond interior luminaires in accordance with NEC Article 250.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Aim and adjust luminaires as indicated on Drawings.

3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

3.6 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Relamp luminaires at Substantial Completion.

3.7 SCHEDULES

- A. Refer to Drawings.

END OF SECTION

SECTION 270529 - HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Conduit supports.
 - 2. Spring steel clips.
 - 3. Sleeves & Seals

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 1. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
 - 2. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- C. FM Global:
 - 1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.
- D. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
- E. Underwriters Laboratories Inc.:
 - 1. UL 263 - Fire Tests of Building Construction and Materials.
 - 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
 - 3. UL 1479 - Fire Tests of Through-Penetration Firestops.
 - 4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
 - 5. UL - Fire Resistance Directory.
- F. Refer to Division 01 for General Conditions required for this section.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

- D. Design Data: Indicate load carrying capacity of hangers and supports.
- E. Manufacturer's Installation Instructions:
 - 1. Hangers and Supports: Submit special procedures and assembly of components.
 - 2. Firestopping: Submit preparation and installation instructions.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- G. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.4 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, approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

- A. Manufacturers:
 - 1. Allied Tube & Conduit Corp.
 - 2. Electroline Manufacturing Company.
 - 3. O-Z Gedney Co.
 - 4. Thomas and Betts
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

- D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.
- F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 SPRING STEEL CLIPS

- A. Manufacturers:
 - 1. Allied Tube & Conduit Corp.
 - 2. B-Line Systems
 - 3. Midland Ross Corporation, Electrical Products Division.
 - 4. Unistrut Corp.
 - 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Mounting hole and screw closure.

2.3 SLEEVES

- A. Sleeves for conduit, cable tray, raceway or cable through Non-fire Rated Floors: 18 gage thick galvanized steel.
- B. Sleeves for conduit, cable tray, raceway or cable through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.
- C. Sleeves for conduit, cable tray, raceway, or cable through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

2.4 MECHANICAL SLEEVE SEALS

- A. Manufacturers:
 - 1. Thunderline Link-Seal, Inc.
 - 2. NMP Corporation.
 - 3. PSI Link-Seal.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

3.2 PREPARATION

- A. Obtain permission from Architect/Engineer before drilling or cutting structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Provide, expansion anchors, and preset inserts.
 - 2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset fasteners.
 - 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
 - 5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
 - 6. Sheet Metal: Provide sheet metal screws.
 - 7. Wood Elements: Provide wood screws.
- B. Inserts:
 - 1. Install inserts for placement in concrete forms.
 - 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- C. Install conduit and raceway support and spacing in accordance with NEC.
- D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- E. Install multiple conduit runs on common hangers.
- F. Supports:
 - 1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
 - 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
 - 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
 - 4. Support vertical conduit at every floor.

3.4 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Seal with adjustable interlocking rubber links.
- B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

- E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

3.5 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.6 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.7 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 270533 - CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 GENERAL PROVISIONS

- A. Refer to Division 01 for General Conditions required for this section.

1.2 SUMMARY

- A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.
- B. Related Sections:
 - 1. Section 07 8413 - Firestopping: Product requirements for firestopping for placement by this section
 - 2. Section 26 0503 - Equipment Wiring Connections.
 - 3. Section 26 0533 - Raceway and Boxes for Electrical Systems.
 - 4. Section 26 0534 - Floor Boxes for Electrical Systems.
 - 5. Section 26 2726 - Wiring Devices.
 - 6. Section 27 0526 - Grounding and Bonding for Communications Systems.
 - 7. Section 27 0529 - Hangers and Supports for Communications Systems.
- C. American National Standards Institute:
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
 - 2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
- D. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.
 - 5. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 6. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.
- E. Allowances: Refer to Division 01 Section "Allowances" for lump-sum allowance for additional conduit and backboxes.
- F. Unit Prices: Administrative and procedural requirement for unit prices for conduit and backboxes are specified in Division 1 Section "Unit Prices".

1.3 SYSTEM DESCRIPTION

- A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

1.4 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit for the following:
 - 1. Metallic conduit
 - 2. Liquidtight flexible metal conduit.
- C. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents:
 - 1. Record actual routing of conduits larger than 2 inch.
 - 2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 - Product Requirements: Product storage and handling requirements.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.8 COORDINATION

- A. Section 01 3000 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.
- C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 METAL CONDUIT

- A. Manufacturers:
 - 1. Allied Tube and Conduit.
 - 2. Western Tube and Conduit.
 - 3. Wheatland Tube Company.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Rigid Aluminum Conduit: ANSI C80.5.
- D. Intermediate Metal Conduit (IMC): Rigid steel.
- E. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.2 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Carlon Electrical Products.
 - 2. Anamet Electrical.
 - 3. Allied Tube and Conduit.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Interlocked steel aluminum construction with PVC jacket.
- C. Fittings: NEMA FB 1.

2.3 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube and Conduit.
 - 2. Western Tube and Conduit.
 - 3. Wheatland Tube Company.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel

2.4 OUTLET BOXES

- A. Manufacturers:
 - 1. Erico Products.
 - 2. Raco.
 - 3. Thomas & Betts Corp.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.

- B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- C. Nonmetallic Outlet Boxes: NEMA OS 2.
- D. Cast Boxes: NEMA FB 1, Type FD, aluminum. Furnish gasketed cover by box manufacturer.
- E. Wall Plates for Finished Areas: As specified in Section 26 27 26.
- F. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.5 PULL AND JUNCTION BOXES

- A. Manufacturers:
 - 1. Carlon Electrical Products.
 - 2. Hubbell Wiring Devices.
 - 3. Thomas & Betts Corp.
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- C. Hinged Enclosures: As specified in Section 26 27 16.
- D. Surface Mounted Cast Metal Box: NEMA 250; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron Cast aluminum.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 INSTALLATION

- A. Ground and bond raceway and boxes in accordance with Section 26 05 26.
- B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

- C. Identify raceway and boxes in accordance with Section 26 05 53.
- D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.3 INSTALLATION - RACEWAY

- A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- B. Arrange raceway supports to prevent misalignment during wiring installation.
- C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.
- E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- F. Do not attach raceway to ceiling support wires or other piping systems.
- G. Construct wireway supports from steel channel specified in Section 26 05 29.
- H. Route exposed raceway parallel and perpendicular to walls.
- I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.
- J. Route conduit in and under slab from point-to-point.
- K. Maximum Size Conduit in Slab Above Grade: 3/4 inch. Do not cross conduits in slab larger than 1/2 inch.
- L. Maintain clearance between raceway and piping for maintenance purposes.
- M. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- N. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- O. Bring conduit to shoulder of fittings; fasten securely.
- P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- Q. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

- R. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate factory elbows for bends in metal conduit larger than 2 inch size.
- S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- T. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- U. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- V. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.
- W. Close ends and unused openings in wireway.

3.4 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings. specified in section for outlet device.
- B. Adjust box location prior to rough-in to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Install stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Install adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires or other piping systems.
- M. Support boxes independently of conduit.

- N. Install gang box where more than one device is mounted together. Do not use sectional box.
- O. Install gang box with plaster ring for single device outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements.
- B. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.6 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused openings in boxes.

3.7 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 271300 - TELECOMMUNICATIONS AND DATA WIRING SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Horizontal data cabling network infrastructure.
- B. Category 6 and 6A patch panels.
- C. Category 6 and 6A jacks, faceplates and fittings.
- D. Category 6 and 6A patch cords.

1.2 RELATED SECTIONS

- A. Carefully examine all of the Contract Documents for requirements that affect the work of this section. Other specification sections that directly relate to the work of this section include, but are not limited to the following:
 - 1. Section 27 0529 – Hangers and Supports for Communication Systems
 - 2. Section 27 0533 – Conduits and Backboxes for Communication Systems
 - 3. Refer to Division 01 for General Conditions required for this section.

1.3 REFERENCES

- A. All wire and components supplied and installed shall meet the requirements of the following and all sub-referenced documents:
 - 1. The National Electrical Code, Article 800.
 - 2. Underwriters Laboratories (UL).
 - 3. EIA/TIA 568-B.
 - 4. EIA/TIA 569.
 - 5. BICSI TDMM

1.4 SYSTEM DESCRIPTION

- A. Telecommunications outlets shall be wired with unshielded, twisted pair 23 AWG wire (UTP) with suitable insulation and sheath material to meet or exceed ANSI/TIA-568-C.0 and ANSI/TIA-568-C.1 or equivalent. The wire shall be type communications riser cable (CMR) or communications plenum cable (CMP) (UL) with rating dependent or NEC Section 800-15.
- B. The sum total cable length between each Work Area Outlet (WA) to Telecommunication Room (TR) shall not exceed 295 ft.
- C. Each Work Area Outlet shall be supplied by no less than two (2) separate communication cables.
- D. UTP cables shall be terminated on an eight conductor eight position (commonly referred to as "RJ45") jack. The wiring scheme shall T568B unless existing terminations in an existing building utilize the T568A scheme in which case T568A may be used.

- E. Termination Hardware (Blocks and Patch Panels) Positioning and Layout must be reviewed and approved by CSCU Telecommunications Department prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.
- F. Cables shall, at a minimum, adhere to the Category 6 specifications (higher categories when approved).
- G. Horizontal pathway: Conform to TIA/EIA 569 using conduit, sleeves, J-Hooks, and other methods indicated on drawings.
- H. Horizontal wiring: Complete from rack in MDF or IDF to each outlet using unshielded horizontal cables as indicated on drawings.
- I. Fireproofing of penetrations, grout, sleeve seals and openings for pathways.
- J. Testing, certification, and warranty for all cabling.
- K. Record drawings and documentation.
- L. Operation and Maintenance Instruction Manuals.
- M. Training for work and equipment of this section.

1.5 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Submittal procedures.
- B. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material used.
- C. Authorizations: The vendor must submit, with this bid, proof of any manufacturer's authorizations that may be required to sell, install and configure proposed cable and hardware.
- D. Warranty Information: The vendor is required to submit, with this bid, specifications describing the standard warranty for all proposed cable and hardware. Minimum warranty accepted shall be 18 months, with 25 year extended performance warranty.
- E. Field Quality Control Reports.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations and sizes of pathways and outlets.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum THREE YEARS documented experience.

- B. UL Compliance: The communication system supplied shall be listed by Underwriters' Laboratories under the UL Standard 1459 for Telephone Appliances and Equipment. A copy of the UL listing card for the proposed system shall be included with the contractor's submittal.
- C. FCC Approval: The system shall be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems that are not FCC approved or that utilize intermediary devices for connection, shall not be considered. Provide FCC registration number of the system being proposed as part of the submittal process.
- D. Installer: Company specializing in installing products specified in this section with minimum three years documented experience, and with service facilities within 50 miles of project.
 - 1. Evidence of ability: Furnish training certifications. Certified training shall be industry recognized at least equal to:
 - a. Building Industry Consulting Service international, Inc (BICSI).
 - b. Ortronics Certified installer.
 - c. Hubbell Certified installer.
 - d. Leviton Certified Installer.
 - e. Siemon Cabling System Certified Installer.
- E. Provide a full time, on-site Project manager to supervise the project.
- F. Testing Agency: Company member of International Electrical Testing Association and specializing in testing products specified in this section with minimum three years documented experience.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 – Administrative Requirements: pre-installation meeting.
- B. Convene minimum THREE WEEKS prior to commencing work of this section.

1.9 EXTRA MATERIALS

- A. Section 01 70 00 – Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish ten single gang 4-port face plates.
- C. Furnish ten communications outlet jacks of each type.
- D. Furnish 2-48 port patch panels.
- E. Furnish 2-horizontal wire managers.
- F. Furnish five of each length and type of patch cords.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from all possible damage. Sequence deliveries to avoid delays, but minimize on-site storage.

1.11 COORDINATION

- A. Coordinate the installation of cable and equipment with other construction activities and the work of other sections.
- B. Pre-installation Conference: Conduct conference at project site to comply with requirements in Section 01 1100.
- C. Coordinate with utility company, relocation of overhead of underground lines interfering with construction.
- D. Contact utility company regarding charges related to service installation. Include utility charges in this contract.
- E. Utility charges for service installation paid by Owner and are not part of this contract.

1.12 MOCKUP

- A. Provide a complete Classroom mock-up (one typical classroom) for coordination and review by owner and engineer prior to installing systems throughout the building. Refer to section 01 4000 Quality Requirements and Section 26 0400 – General Conditions for Electrical Trades.

1.13 WARRANTY

- A. Provide a warranty for 18 months against defects in material and workmanship on all components, equipment, jacks, cabling, etc. as specified herein. Warranty shall start at time of substantial completion or beneficial use, whichever comes sooner. Any failure due to defective material, equipment, installation, or workmanship that may develop over the course of the warranty period shall be corrected at no expense to the Owner, including all materials, labor, travel and expenses.
- B. Data Cabling Warranty: provide a manufacturer's data cabling twenty-five (25) year mission critical warranty for voice and data structured cabling system.
 - 1. The Contractor shall provide documented proof that he/she is authorized and certified and in good standing with the manufactures to provide this warranty.
 - 2. The contractor shall provide a written 25-year warranty from the manufacturer at substantial completion of the project.
 - 3. The warranty shall include connecting hardware products and installed cable as part of the data cabling system warranty.
 - 4. The data cabling system shall include:
 - a. Work area outlets.
 - b. Horizontal cable.
 - c. Backbone cable.

- d. The connecting hardware in the horizontal cross-connect.
 - e. The equipment patch cord at the work area outlet.
 - f. The patch cord at the horizontal cross-connect.
5. The manufacturer's warranty shall guarantee that the data cabling system shall be free from defects in materials and workmanship for the duration of the warranty.

PART 2 PRODUCTS

2.1 HORIZONTAL CABLE

- A. Manufacturers:
1. General Cable
 2. Belden
 3. Mohawk
 4. Allied Wire & Cable
 5. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description:
1. Unshielded, twisted pair 23AWG wire (UTP) with suitable insulation and sheath material to meet or exceed EIA /TIA 568C.0 or equivalent. The wire shall be type communications riser cable (CMR). Cables shall adhere to the EIA/TIA Category 6e specifications.
 2. Shielded, twisted pair 23AWG wire (UTP) with suitable insulation and sheath material to meet or exceed EIA /TIA 568C.0 or equivalent. The wire shall be type communications riser cable (CMR). Cables shall adhere to the EIA/TIA Category 6A specifications
- C. Provide 9" of slack on outlet boxes behind each faceplate.
- D. Pulling tension: The cable pulling tension shall not exceed 25 ft/lbs as indicated in TIA/EIA-568-A.
- E. Supports: Horizontal cabling shall be supported via cable trays where indicated in drawings. Cabling between cable tray and work station conduit shall be supported via J-Hooks or straps anchored to structural elements. J-Hooks and cabling straps shall be manufactured by:
1. Cooper B-Line
 2. Caddy
 3. Chatsworth

2.2 COPPER PATCH PANELS AND TERMINATIONS

- A. Manufacturers:
1. Hubbell
 2. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: TIA/EIA 568 19 inch, Cat. 6 rated, rack-mounted panels with 110-type terminations. All patch panels shall be angled; Hubbell #HP6-48AU.

- C. Panels shall be 48 port, 2U, UL Cat. 6 type with integral printed circuit board, color coding, 110-type IDC terminations, and 8-position jacks.
- D. Each port shall include a color coded identification label.
- E. Category 6 and 6A cables shall be suitable for installation free-air, in building risers, in conduit and/or in cable tray and carry CMP or CMR rating dependent on NEC Section 800-15.
- F. The maximum permitted horizontal distance is 295 feet with 33 additional feet allowed as the total cumulative length for patch cables, jumpers cords, etc. (total maximum length not to exceed 328 feet).
- G. Category-6 cable shall be 'enhanced', often referred to as Category-6e. Minimum compliant cable is not acceptable. Headroom above TIA Standards for NEXT and PSNEXT shall be at least 3dB. All Cat-6 cables shall be constructed with an internal pair separator.
- H. Category-6A shielded cable shall have an overall shield over all pairs, and constructed to support Power over Ethernet of up to 100 Watts.
- I. All cable must be constructed of pure copper. Aluminum clad copper cable is not acceptable.
- J. Provide horizontal wire management above and below each patch panel. Provide rear cable management bar with strain-relief brackets behind each patch panel.
- K. Patch Cords: Supply patch cords which meet the following specification and are of the same TIA/EIA category rating and manufacturer as the workstation cabling:
 - 1. 4- unshielded twisted pairs for Cat 6; 4 shielded pairs for Cat 6A
 - 2. 24 AWG stranded conductors
 - 3. Thermoplastic Dielectric
 - 4. EIA/TIA 568B Category 6e
 - 5. EIA/TIA 568B Category 6A
 - 6. Quantity: (48) per each Patch Panel provided for the project, plus 10% spare capacity
 - 7. Length: Coordinate length with owner.

2.3 BACKBOARDS

- A. Material: Class "A" fire retardant plywood.
- B. Size: 3/4" thick. Width and Height as indicated on drawings.
- C. Paint with two(2) coats of grey paint.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Rated Stairs: Penetrations into stairs are NOT permitted except for items serving that stair.
- B. Wiring Method:
1. Install all required telecommunications conduits, sleeves, and back boxes. Conduits, sleeves and boxes shall be installed in accordance with Section 270533.
 2. Install cables in raceways, conduits and interstitial spaces above suspended ceilings.
 3. Conceal wiring except in unfinished spaces.
 4. Wire shall not be subjected to pulling tensions greater the maximum specified by the manufacturer
 5. Wire bend radius shall not be less than the manufacturer's minimum of one (1) inch.
 6. Support cables that are not in raceway or conduit at intervals no greater than 60 inches with supports designed for high-speed twisted pair wire ("J" hooks)
- C. Riser Cables:
1. Install multimode and single mode fiber optic cable through the ceilings and riser conduit as indicated on the attached cable plates. The fiber shall be run in innerduct for its entire length. Cables shall be terminated as follows:
 2. Multi/Single Mode Fiber: Mount SC type terminators in a 19" rack mounted enclosure at both ends.
- D. Horizontal Cables:
1. Mount new station jacks on the specified plate, flush or surface mounted, as construction requires.
 2. STATION IDENTIFICATION: Label connectors at station faceplates using the following system:
 - a. Data Jacks: "D-", followed by the room number, followed by "-#" (where # is the number in sequence.)
 - b. VOIP Jacks: "V-", followed by the room number, followed by "-#" (where # is the number in sequence.)
 - c. Wireless Access Points: "W-", followed by the room number, followed by "-#" (where # is the number in sequence.)
 - d. Security cameras: "S-", followed by the room number, followed by "-#" (where # is the number in sequence.)
 - e. Devices located outside shall use "OUT" in place of room number.
 - f. Example: If there are (4) data jacks and (2) VOIP jacks in room 133, they shall be labeled as:
 - 1) D-133-1
 - 2) D-133-2
 - 3) D-133-3
 - 4) D-133-4
 - 5) V-133-1
 - 6) V-133-2

3. Mark the plate with standard nomenclature as required by the configuration. Mark the outlet plainly and neatly with its station identification, as indicated in above paragraph. The station identification shall also be marked inside the outlet plate on the backing plate of the outlet, and shall match the ID used at the patch panel port. Make the outlet marking using the Panduit system or equal, except for the inside marking which may be by indelible marker. Place exposed marking on outlet plates under a transparent window for protection. Label cable with permanent marker compliant with EIA/TIA 606, six (6) inches back from the termination at both ends.
4. At the station end, terminate 4-pair UTP cables on 8-pin modular jacks according to TIA/EIA 568B terminating specifications.
5. At the telecom room, terminate all 4-pair UTP cables (voice & data) onto panel mounted 8-pin modular connectors that meet the TIA/EIA Category 6 specification. Provide sufficient patch jacks (ports) at each telecom closet to terminate the cables from all of the stations served by that closet. Mark the voice and data patch terminating jacks with its associated station identification in ascending sequential order. Mark patch panel using the Panduit system or equal. Match the patch panels into the supplied equipment racks.
6. Analog Line (Emergency Line) Connection:
 - a. Coordinate with Telephone provider. Telephone provider shall terminate phone service at DEMARC. Contractor shall extend, punch down and make final connections to the specific locations listed below for complete service.
 - b. Provide 110 type blocks as indicated in above PART 2. Terminate all cables within these blocks.
 - c. The Contractor is responsible for establishing an analog metallic connection to each "ANALOG" line, locations shown on drawings.
7. Provide coaxial cabling from work stations back to cable company demarcation equipment.

3.2 TESTING, HORIZONTAL CABLING

- A. Horizontal cabling testing shall be conducted from the jack at the outlet in the Work Area to the Patch Panel on which the cables are terminated.
- B. Baseline accuracy of the test equipment must exceed TIA Level III, as indicated by independent laboratory testing. Test adapter cable must be approved by the manufacturer of the test equipment.
- C. All horizontal cables must be tested with a Level 3 Fluke DTX Networks Cable Tester.
- D. Testing of the Permanent Link shall be performed. However, contractor shall warrant performance based on channel performance and provide patch cords that meet channel performance criteria. All cabling not tested strictly in accordance with these procedures shall be retested at no cost to the Owner.
- E. Horizontal station cables shall be free of shorts within the pairs, and be verified for continuity, pair validity, and polarity, and Wire Map (Conductor Position on the Modular Jack). Any defective, split or miss-positioned pairs must be identified and corrected.

- F. Testing of the Cabling Systems rated at TIA Category 6 and above shall be performed to confirm proper functioning and performance.
 - G. Testing of the Transmission Performance of station cables (Category 6 shall include):
 - 1. Length
 - 2. Attenuation
 - 3. Pair to Pair NEXT
 - 4. ACR
 - 5. PSNEXT Loss
 - 6. Return Loss
 - 7. Pair to Pair ELFEXT Loss (Equal Level Far End Cross-Talk)
 - 8. PSEFEXT Loss
 - 9. Propagation Delay
 - 10. Delay Skew
 - 11. Return Loss
 - H. The maximum length of horizontal cable shall not exceed 90 meters, which allows 10 meters for equipment and patch cables.
 - I. Cables shall be tested to the maximum frequency defined by the EIA/TIA 568B standards covering that performance category. Test records shall verify a “PASS” on each cable and display the specified parameters – comparing test values with standards based “templates” integral to the unit.
 - J. Any “Pass*” or “Warning” test results shall be considered a “FAIL” for the channel or permanent link under test. In order to achieve an overall “Pass Condition”, the test result for each individual test parameter shall be “PASS”.
 - K. All data shall indicate the worst-case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept frequency manner from 1MHz to the highest relevant frequency, using a swept frequency interval consistent with TIA and ISO requirements. Information shall be provided for all pairs or pair combinations. And in both directions when required by the appropriate standards.
- 3.3 TESTING, FIBER OPTIC CABLING
- A. Tests after Installation
 - 1. Upon completion of a cable installation and termination, the Fiber Optic cabling shall be tested to include Optical Attenuation (“Insertion Loss” Method).

B. Optical Attenuation Testing

1. Optical Attenuation shall be measured on all terminated optical fibers, in both directions of transmission, using the “Insertion Loss” method. Measurement shall be inclusive of the optical connectors and couplings installed at the system endpoints. Access jumpers shall be used at both transmit and receive ends to ensure an accurate measurement of connector losses.
2. Field test instruments for fiber cabling shall meet the requirements of ANSI/TIA/EIA-526-14A. The light source shall meet the launch requirements of ANSI/EIA/TIA-455-50-B.3, Method A. This launch condition shall be achieved either within the field test equipment or by use of an external mandrel wrap (as described in clause 11 of ANSI/TIA/EIA-568-B.1) with Category 1 light source.
3. Field test instruments for single mode fiber cabling shall meet the requirements of ANSI/EIA/TIA-526-7.
4. The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.
5. The fiber optic launch cables and adapters must be of high quality and the cables shall not show excessive wear resulting from repetitive coiling and storing of the tester interface adapters.
6. The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests detailed in the following section.
 - a. Performance Test Parameters
 - 1) The link attenuation shall be calculated by the following formulas specified in ANSI/TIA/EIA standard 568-B.1
 - 2) $\text{Link Attenuation} = \text{Cable_Attn} + \text{Connector_Attn} + \text{Splice_Attn}$
 - 3) $\text{Cable Attn (dB)} = \text{Attenuation Coefficient (dB/km)} * \text{Length (Km)}$
 - 4) The values for Attenuation_Coefficient are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation_Coefficient (dB/Km)
Single-mode outside plant	1310	0.5
	1550	0.5
Single-mode inside plant	1310	1.0
	1550	1.0

- 5) $\text{Connector_Attn (dB)} = \text{number_of_connector_pairs} * \text{connector_loss (dB)}$
- 6) Maximum allowable mated connector_loss = 0.70 DB
- 7) $\text{Splice_Attn (dB)} = \text{number of splices (S)} * \text{splice_loss (dB)}$
- 8) Maximum allowable splice_loss = 0.2dB
- 9) Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters , or optical amplifiers.
- 10) Test equipment shall measure the link lenth and automatically calculates the link loss based on the above formulas is preferred.

- 11) The above link test limits attenuation are based on the use of the One Reference Jumper Method specified by ANSI/TIA/EIA-526-14A, Method B and ANSI/TIA/EIA-526-7, Method A.1. The user shall follow the procedures established by these standards or application notes to accurately conduct performance testing.
- 12) The backbone link shall be tested in two directions at both operating wavelengths to account for attenuation deltas associated with wavelength.
- 13) Backbone links shall be tested in accordance with ANSI/EIA/TIA-526-14A.
- 14) Because backbone length and the potential number of splices vary depending upon site conditions, the link attenuation equation shall be used to determine limit (acceptance) values.
- 15) Single mode backbone links shall be tested at 1310 nm and 1550 nm in accordance with ANSI/TIA/EIA-526-7. All single mode links shall be certified with test tools using laser light sources.

3.4 DOCUMENTATION

- A. At the completion of the project and prior to system acceptance provide the following documentation:
 1. As-built floor plans that show the final location and identification of the telecom outlets. Submit the floor plans in printed form and as AutoCAD 2000 files (Original AutoCAD files will be made available).
 2. Test results for each strand of fiber optic cable installed. This should be supplied in a page per strand printed format and in machine-readable (computer file) format. If the machine-readable file requires special software for reading, a single-user version of that software shall be provided as well.
 3. Test results for each pair of copper riser cabling installed and the installed cable length.
 4. Test results for each UTP station cable installed. This should be supplied in a page per cable printed format and in machine-readable (computer file) format. If the machine-readable file requires special software for reading, a single-user version of that software will be provided as well.
 5. Test results for each coaxial riser and horizontal cable installed. Documentation indicating successful testing and length for each cable shall be bound and provided by the vendor.
 6. Cross connection documentation for the voice station cable (cut sheets) which detail the station number, telecom room, and riser pair number for each installed cross connection.

END OF SECTION

SECTION 281300 – SECURITY AND ACCESS CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes security access devices and control panel, and signal and control wiring.
- B. Related Sections:
 - 1. Section 08 71 00 - Door Hardware.
 - 2. Section 26 05 19 – Building Wire and Cable.
 - 3. Section 27 05 29 – Hangers and Supports for Communications.
 - 4. Section 27 05 33 – Conduits and Backboxes for Communications.
 - 5. Refer to Division 01 for General Conditions required for this section.

1.2 REFERENCES

- A. National Fire Protection Association:
 - 1. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.3 REFERENCE TO OWNER'S GENERAL CONDITIONS

- A. The Project General Conditions shall be considered part of this Specification. Unless this Section contains statements, which are more definitive or more restrictive than those contained in the General Conditions, this Specification shall not be interpreted as waiving or overruling any requirements expressed in the General Conditions.

1.4 DEFINITIONS

- A. The following shall serve as general identifiers as specified herein.
- B. Owner — The Owner is Western Connecticut State University.
- C. Consultant — The Consultant.
- D. Contractor — The Contractor is the firm submitting a proposal to furnish and install the Work as defined within this Specification.
- E. Subcontractor — The Subcontractor is the firm approved by the Owner and hired by the Contractor to furnish and install a specific task or part of the Contractor's obligations to the Work as defined with in this Specification.
- F. Specification — Contract Documents for Work Contained in the Security Management System Specifications.
- G. Project — The Project is the Security Management System installation.

- H. Work — The term "Work" means all construction and services specified within this document. The Work includes all related labor, materials, equipment, and services provided, or to be provided, by the Security Contractor to fulfill the proposal's obligations.
- I. Drawings — The term "Drawings" means all security System Drawings and associated sketches, details, riser diagrams, etc.
- J. As used in the Drawings and Specifications for the Work, certain non-technical words and phrases shall be understood to have specific meanings as follows, regardless of indications to the contrary in the General Conditions or other documents governing the Work.
1. "Furnish" — Purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the security Systems Work. Purchasing shall include payment of all sales taxes and other surcharges as may be required to assure that purchased items are free of all liens, claims, or encumbrances.
 2. "Install" — Unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project, all as part of the Work.
 3. "Integrate" — To Provide Circuitry and coordinated alignment of two otherwise independent Subsystems.
 4. "New" — Manufactured within the past year and never before used.
 5. "Provide" — Furnish and Install.
- K. Regardless of their usage in codes or other industry standards, certain words or phrases as used in the Drawings or Specifications for the Work, shall be understood to have the specific meanings as ascribed to them in the following list:
1. "Circuit" — Any specific run of circuitry.
 2. "Circuitry" — Any Work which consists of wires, cables, raceways, and/or specialty wiring method assemblies complete with associated junction boxes, pull boxes, outlet boxes, joints, couplings, splices, and connections except where limited to a lesser meaning by specific description.
 3. "Concealed" (as applied to circuitry) — Covered completely by building materials, except for penetrations (by boxes and fittings) to a level flush with the surface as necessitated by functional or specified accessibility requirements.
 4. "Exposed" (as applied to circuitry) — Not covered in any way by building materials.
 5. "Normal Work Conditions" — Locations within building confines that are not damp, wet, or hazardous and that are not used for air handling.
 6. "Patch Panel" — A System of terminal blocks, patch cords, and backboards that facilitate administration of cross-connecting cables.
 7. "Raceway" — Any pipe, duct, extended enclosure, or conduit (as specified for a particular System) which is used to contain wires and which is of such nature as to require that the wires be installed by a "pulling in" procedure.
 8. "Riser" — Shall refer to the portion of the installation that transmits between building floors (or between security System rooms), also referred to as "Backbone Cabling".

9. "Security Closet" — The enclosed area or room specifically designated for the routing, termination, and/or cross connecting of security System cable (i.e. riser cable) to other security System cable and/or equipment.
 10. "SMS" — Security Management System, includes all components contained herein that work in conjunction to create and completely integrated and fully functioning system as described within the Drawings and Specifications.
 11. "Security System Wiring" — See "Circuitry".
 12. "Security System Work" — See "Work".
 13. "Standard" (as applied to wiring devices) — Not of a separately designated individual type.
 14. "Subject to Mechanical Damage" — Exposed within seven (7) feet of the floor in mechanical rooms, manufacturing spaces, vehicular spaces, or other spaces where heavy items are moved around or rigged as a common practice or as required for replacement purposes.
 15. "Subsystem" — Any ancillary system approved by Owner to be Integrated with the SMS.
 16. "System" — See "SMS".
 17. "Wiring" — See "Circuitry".
 18. "Workstation" — The location where security System monitoring equipment is provided.
- L. Where the word "conduit" is used without specific reference to type, it shall be understood to mean "raceway".
- M. Reference to "U.L. (Materials Construction) Standards" shall mean the "Standards for Safety" published by Underwriters Laboratories, Inc.
- N. Reference to "NEMA Standards" shall mean the "Approved Standards" published by the National Electrical Manufacturers Association.
- O. Reference to "ANSI Standards" shall mean the standards published by the American National Standards Institute.
- P. Reference to "IEEE Standards" shall mean the standards published by the Institute of Electrical and Electronics Engineers.
- Q. Reference to "BICIS Standards" shall mean the guidelines and methods published by the Building Industries Consulting Service International.

1.5 SCOPE OF WORK

- A. The Work shall include installation and commissioning of the following:
1. Integrated Security Management System (SMS) consisting of:
 - a. Access Control and Alarm Monitoring System (ACAMS).
 - b. Data Gathering Panels (DGPs).
 - c. Intercom Communications (IC) System.
 2. Interfaces
 - a. SMS.
 - b. Fire Alarm System.
 - c. Handicapped Door Operators

3. Equipment Racks and Consoles (ERC).
 4. Wire and cable to install all equipment as specified herein.
 5. Miscellaneous conduit and back boxes (not shown on the Drawings as provided, but required for a complete installation).
- B. The Work detailed within the Contract Documents has been specified to meet certain requirements for performance, appearance, and costs. Some information, such as exact locations of field equipment, exact wire routing, and exact conduit requirements have been intentionally omitted. It shall be the responsibility of the Contractor to implement the guidelines and requirements contained in the Specification and translate them into a complete design package containing all elements necessary for a complete, operational, and functionally integrated Security System.
1. Coordinate with related trades to schedule the Work and ensure a complete installation in accordance with the schedule outlined by the Owner.
- C. Provide all work as detailed in the Specification as a turnkey installation including all material, labor, warranties, taxes, freight, and permits. Only items and requirements specifically stated to be provided by others shall not be a requirement for this Section of the Work.
- D. Coordinated Work
1. Coordinate with related trades to schedule the Work and ensure a complete installation in accordance with the schedule outlined by the Owner.
 2. Within the Specification, certain mounting heights and general device locations are specified. Carefully examine related architectural and engineering drawings to coordinate final equipment/device locations, facility designations, floor accessibility, floor type, ceiling heights, ceiling accessibility, and ceiling types. Verify the exact mounting locations and mounting heights of all equipment with the Owner prior to installation. Notify the Owner in the event that a particular location appears to be unsuitable.

1.6 PROJECT MANAGEMENT

- A. The Contractor shall provide a Project Manager to oversee and coordinate all activities on the Project.
- B. Project Manager's Duties and Responsibilities:
1. The Contractor shall provide to the Owner, as a part of the prefabrication submittal, the name of the Project Manager that will provide all duties and responsibilities as specified herein, during the term of the project.
 2. The Project Manager shall maintain the ability of making all managerial decisions on behalf of the Contractor on a day-to-day basis, and shall retain the authority of accepting notices of deduction, inspection reports, payment schedules and any other project related correspondence on behalf of the owner.
 3. The Project Manager shall schedule and attend project management meetings, during which time all System related issues are discussed, scheduled, confirmed, and/or resolved.

4. The Project Manager shall be available during normal business hours (8:00 AM to 5:00 PM) within two (2) hours by telephone during the term of the project.
 - a. After normal business hours, the Project Manager shall be available within four (4) hours by telephone during the term of the project.
 - b. In the event that the Project Manager is not available within the allotted time frame, the Contractor may designate another employee to temporarily act as the Project Manager in all correspondence with the Owner.
 - c. The Contractor shall ensure that any individual temporarily assuming the duties of the Project Manager is at equal or higher level in the Contractor's managerial chain of command.
 - d. Upon notification by the Owner, of any project related installation issue, or issue that may contradict the Specifications as stated herein, the Project Manager shall respond to such issue, verbally and/or in writing within an eight (8) hour period.
 - e. Responses to such issues as stated above shall include a clear understanding of the issue, along with a tentative plan of action, reflecting milestones and/or deadlines to resolve the issue.
 - f. Where appropriate, based on the overall importance of the project issue, the Project Manager shall follow-up their initial response with a written response to the issue within 24 hours of identification of the issue.
5. Prior to the initiation of the Work, the Project Manager shall submit a schedule reflecting key milestones of the Work, including but not limited to the following:
 - a. Bid award.
 - b. Kick-off meeting.
 - c. Prefabrication submittal.
 - d. Ordering, deliver, and installation of head-end System equipment.
 - e. Field equipment delivery.
 - f. Project management schedule.
 - g. Payment schedule.
 - h. Installation completion date.
 - i. System training.
 - j. Delivery of As-Built documentation.
 - k. Delivery of Operations & Maintenance Manuals.
 - l. Final System Test.
 - m. Acceptance of System.
6. The Project Manager shall update the schedule on a weekly basis to reflect the status of each key milestone as the Work progresses.
7. As the System installation progresses, the Project Manager shall be capable of discussing any/or all of the above mentioned items at the request of the Owner, and shall address each item, as it relates to the current status of the Work.

1.7 OTHER CONDITIONS

- A. The Owner may at any time choose to replace, modify, or otherwise delete any item from the scope of Work defined herein without undo cost or charge for said change in scope by the Contractor. For this reason the Contractor shall submit unit pricing as defined in the Instructions to Bidders which shall include the Net Add and Net Deduct pricing for each component defined herein. This "Net" pricing shall include all labor, materials, and equipment associated with each component. In addition individual unit prices for

"equipment only" shall be provided that will enable the Owner to replace a component with a similar device to be installed by the Contractor.

1.8 SPECIAL CONFIDENTIALITY REQUIREMENT

- A. The Work is critical to the security of the Owner's facility. All Drawings, Specifications and other material and information about the Work are confidential information and must remain secure and confidential at all times. Confidential information must not be deliberately or inadvertently disclosed to anyone other than the Contractor's personnel and subcontractors who require disclosure to perform their portion of the Work.
- B. The Contractor shall keep track of all confidential information at all times and shall ensure that all copies are accounted for at all times. The Contractor shall not permit any persons to have access to the confidential information of the Work unless and until the Contractor has assured itself of the trustworthiness of such persons.
- C. All paperwork associated with the installation, programming, and user guides of the equipment being Installed shall be retained by the Contractor and submitted to the Owner upon completion of the Work.

1.9 REFERENCES

- A. The Security System shall be installed in accordance with the latest applicable revisions pertaining to all applicable national, state, and local codes and standards including, but not limited to the following:
 - 1. National Fire Protection Association, (NFPA 70).
 - 2. National Fire Protection Association Life Safety Code, (NFPA 101).
 - 3. National Electrical Code (NEC).
 - 4. Building Officials & Code Administrators International, Inc. (BOCA) National Building Code.
 - 5. Americans with Disabilities Act (ADA).
 - 6. Underwriters Laboratories (UL) Applicable Standards for Safety.
 - 7. Underwriters Laboratories (UL) Applicable Standards for Proprietary Security Systems.
 - 8. Uniform Building Code, (UBC).
 - 9. Local Governing Authorities Having Jurisdiction.

1.10 PRE-FABRICATION SUBMITTALS

- A. General Description and Requirements.
 - 1. Submit pre-fabrication submittals in accordance with the Owner's construction schedule.
 - 2. Pre-fabrication submittals shall consist of product data, shop drawings, samples, and a detailed completion schedule. Partial submittals will not be accepted without prior written approval from the Architect.
 - 3. Pre-fabrication submittals shall be furnished in electronic formats as defined by the General Conditions under Part 1 of the Project Specifications.
 - 4. No portion of the Work shall commence nor shall any equipment be procured until the Owner has approved the pre-fabrication submittals in writing.

5. A letter of transmittal identifying the name of the Project, Contractor's name, date submitted for review, shall accompany pre-fabrication submittals and a list of items transmitted.
- B. Product data required as part of the pre-fabrication submittal shall include the following:
1. Equipment schedules listing all System components, manufacturer, model number and the quantity of each.
 2. General functional descriptions for each System.
 3. Manufacturer's data specification sheets for all System components, including any warranty information (sheets containing more than one device or component model number shall be clearly marked to delineate items included in the Work).
 4. A complete list of cable and wiring types, sizes, manufacturer, and model number.
 5. A complete list of finishes and sample graphics, including custom art work and custom graphics (if applicable).
 6. List of parts inventory to provide manufacturer recommended service and maintenance of the Work.
- C. Shop Drawings shall include the following:
1. Floor plan drawings indicating device locations with device legends.
 2. System riser diagram with all devices, wire runs, and wire designations.
 3. Schematic block diagrams for each System showing all equipment, interconnects, data flow, etc.
 4. Wiring diagrams for each subsystem defining the interconnection of all inputs and outputs for all equipment.
 5. Wiring diagram of electric locking mechanical.
 6. Fabrication shop drawings for all custom equipment (if applicable).
 7. Plans and elevations of the security console(s) and equipment racks quantifying all equipment to be mounted therein.
 8. Elevations of security closet layouts showing panel locations, power supply locations, conduit, wire ways, wire molds, and all other equipment.
 9. The Contractor shall submit samples of any equipment components upon request of the Owner.
 10. Samples submitted shall be the latest version of equipment.
 11. It is the responsibility of the Contractor to confirm all dimensions, quantities, and the coordination of materials and products supplied by the Contractor with other trades. Approval of shop drawings containing errors does not relieve the Contractor from making corrections at their expense.

1.11 QUALITY ASSURANCE

- A. Contractor Qualifications.
1. Work specified herein shall be the responsibility of a single Security Contractor. Bid submission shall document a minimum of five (5) years experience in the fabrication, assembly, and installation of Systems of similar complexity as specified herein. The documentation shall include the names, locations, and points of contact for at least three (3) installations of the type and complexity specified herein.
 2. The Contractor shall have local in-house engineering and project management capabilities consistent with the requirements of the Work.

3. By submitting a bid, the Contractor thereby certifies that it is qualified in all areas pertaining to, directly or indirectly, the Work. In the event the Contractor becomes unable to complete the Work in accordance with the Contract Documents, or the satisfaction of the Owner, it shall be the responsibility of the Contractor to retain the services of applicable manufacturers' representatives to expeditiously complete the Work in accordance with the Owner's construction schedule with no additional cost to the Owner.
4. The Contractor shall maintain, or establish and maintain, a fully staffed office including a service center capable of providing maintenance and service to the Project. The Contractor shall staff the service center with factory trained technicians and adequately equip the office to provide emergency service within four (4) hours after being called, 24 hours per day.
5. The Contractor shall provide factory-certified technicians to install, commission, and maintain the Work. All installing personnel shall be licensed as required by local and/or state jurisdictions.
6. The Contractor shall ensure compliance with, and have a thorough understanding of, all local codes and contract conditions pertaining to this Project.
7. The Contractor shall maintain an inventory of spare parts and other items critical to System operation and as necessary to meet the emergency service requirements of this Project within the local service center.

B. Product Standards

1. All equipment and materials for contained herein shall be the products of recognized manufacturers and shall be new.
2. New equipment and materials shall:
 - a. Be Underwriters Laboratories, Inc. (U.L.) listed and approved where specifically called for; or where normally subject to such U.L. labeling and/or listing services.
 - b. Be clearly labeled identifying make, model, and manufacturer.
 - c. Be without blemish or defect.
 - d. Be products that meet with the acceptance of the agency inspecting the security Systems work.
3. It is the intent of these specifications that wherever a manufacturer of a product is specified, and the terms "other approved" or "approved equal" are used, the substituted item must conform in all respects to the specified item. Consideration will not be given to claims that the substituted item meets the performance requirements with lesser construction. Performance as delineated in schedules and in the specifications shall be interpreted as minimum performance.
4. Substituted equipment or optional equipment, where permitted and approved, must conform to space requirements. Any substituted equipment that cannot meet space requirements, whether approved or not, shall be replaced at the Contractor's expense. Any modifications of related Systems as a result of substitutions shall be made at the Contractor's expense.
5. The approval of shop drawings, or other information submitted in accordance with the requirements herein before specified, does not ensure that the Security Consultant, Architect, or the Owner attests to the dimensional accuracy, dimensional suitability of the material, or mechanical performance of equipment. Approval of shop drawings does not invalidate the Drawings and Specifications.

6. Substitutions of SMS equipment shown on the schedules or designated by model number in the specifications will not be considered if the item is not a regular catalogued item carried by the manufacturer.
7. Manufacturers Recommendations: Where installation procedures of any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations may be cause for rejection of the material.
8. The Contractor shall provide a complete fit-out of the security closets for review by the Consultant and Owner prior to continuing with the installation of the other security closets. The closet fit-out shall include all cabinets, conduit, blocks, patch panels, frames, labels, etc.
9. The Contractor shall provide a complete fit-out of all command center equipment for review by the Security Consultant and Owner. The fit-out shall include all devices, console layouts, furniture, labeling, cable support, etc.
10. Within the Specifications, certain manufacturers have been listed. These manufacturers are listed for example purposes (unless followed by "No Exceptions"). The Contractor may substitute manufacturers and models that may be more cost effective or readily available than that specified. However, all substitutions shall meet or exceed the specified functional and technical requirements. Acceptance of such substitutions is at the discretion of the Owner.
11. All exterior devices shall be sealed and protected against all weather conditions consistent with the region including heat, cold, moisture, dust, etc.

1.12 WARRANTY AND MAINTENANCE

- A. Security Contractor shall provide an 18 month warranty for all Work. The warranty shall cover all Work, Systems, and subsystems against defects in materials and workmanship. The Work as specified herein, including all materials and labor, but excepting any existing devices and equipment which are incorporated in the completed Work, shall be warranted to be free from defects in design, workmanship, and materials. Further, the Contractor shall warrant that the completed Systems, including all components (except those, which are existing or provided by others), are of sufficient size and capacity to fulfill the requirements of the Specifications.
- B. The warranty shall be valid for a period of 18 months following the date of System acceptance by the Owner. System acceptance shall commence when all parts, components, sub-Systems, and Systems have been tested, shown to be working in accordance with the Specification, and approved by the Owner.
- C. Nothing contained in the Contract Documents shall be construed to establish a shorter period of limitation with respect to any other obligation, which the Contractor might have under the Contract Documents or any manufacturer's warranty. The establishment of the time period of one and one half (1 ½) year after the date of final acceptance of the Work or such longer period of time as may be prescribed by law or by the terms of any warranty required by the Contract Documents, relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which its obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's

liability with respect to its obligations other than specifically to correct the Work or equipment.

D. Warranty Service:

1. In the event that defects in the materials and/or workmanship are identified during the warranty period, the Contractor shall provide all labor and materials as may be required for prompt correction of the defect.
2. During the warranty period, the Contractor shall, upon receipt of a request for service from the Owner, deploy service personnel to the Owner's premises within four hours to initiate corrective action.
3. All warranty service and repair work shall be performed by personnel, who have been trained, certified and is experienced in the operation and maintenance of the installed System(s).
4. Unless otherwise requested by the Owner, warranty service shall be performed during normal business hours (8:00 AM to 4:00 PM), Monday through Friday, exclusive of Holidays. In the event that the Owner requests warranty service to be performed during other than normal business hours, the Contractor shall be compensated for such service at 150% of his normal hourly service rates as listed in the bid proposal for this project.
5. Warranty service shall include the replacement of all parts and/or components as required to restore normal System operation. In the event that the System parts or components must be removed for repair, it shall be the responsibility of the Contractor to furnish and install temporary parts and/or components as required to restore normal System operation until the repaired parts or components can be repaired and re-installed.
6. It shall be the responsibility of the Contractor to maintain an inventory of spare parts or to arrange for manufacturer parts support as required ensuring correction of all critical component failures or malfunctions within 48 hours of the Owner's request for service. Critical parts shall be defined as those, which govern or affect the normal operation of more than one field device.
7. The Contractor's warranty obligation shall include correction of any software/firmware defects, which may be identified during the warranty period. Any failure of the software/firmware to perform as specified by the software/firmware manufacturer at the time of final acceptance shall be defined as a software/firmware error.
8. In the event that the Contractor determines and successfully demonstrates to the Owner that service or repairs are required as a result of misuse, abuse, or abnormal wear and tear, the Contractor shall be compensated for such service or repairs at the Contractor's hourly rates as listed in the bid proposal for the Project. Similarly, such compensation to the Contractor shall apply in the event that repairs are required for devices and equipment not provided by the Contractor but incorporated in the completed Systems.
9. Immediately following the completion of a warranty repair or service call, the Contractor's service personnel shall submit a written report to the Owner which details the service work performed, the cause of the trouble, and any outstanding work which is required to restore complete and normal operation.

- E. The Owner reserves the right to expand or add to the System during the warranty period using firm(s) other than the Contractor for such expansion without affecting the

Contractor's responsibilities, provided that the expansion is done by a firm which is an authorized dealer or agent for the equipment or System being expanded.

- F. The Contractor shall perform preventative maintenance during the warranty period as part of the warranty service. The Contractor shall submit a list of items to be included in the preventative maintenance program and the service to be performed. Preventative maintenance shall include, but not be limited to, the following:
1. Annual Preventative Maintenance:
 - a. Test and adjust System sensors.
 2. Semi-Annual Preventive Maintenance
 - a. Inspect, test, clean, and adjust UPS. Replace batteries as necessary.
 - b. Inspect and clean all DGPs.
 - c. Inspect, test, and clean power supplies. Replace batteries as necessary.
 - d. Inspect, clean and vacuum all consoles and equipment racks.
 - e. Test and adjust all CCTV System pan, tilt, zoom, and preset functions. Inspect, clean, and adjust CCTV System matrix switcher and multiplexers.
 3. Quarterly Preventive Maintenance
 - a. Inspect and clean the SMS file server, printers, and System workstations. Perform hardware, firmware, software, and disk drive maintenance as required to ensure optimum performance.
 - b. Run SMS diagnostics and perform file maintenance to insure optimal performance.
 - c. Inspect, clean, and adjust digital video recorders.
 - d. Clean all camera housings.
 - e. Visually observe all camera and monitor displays and adjust as needed for optimal performance.
- G. Include a manufacturer's software maintenance agreement as part of the Warranty. This agreement shall include all software updates, revisions, telephone service assistance, and training for any changes in operation.
- H. Provide written notice to the Owner documenting any Work performed during the warranty period, including any preventative maintenance Work performed.
- I. Provide loaner equipment that is fully compatible with the SMS for any equipment not field repairable.
- J. Loaner equipment for components that must be shipped to/from the manufacturer or distributor shall be on site and operational within 48 hours of the component failure. Furnish lists of equipment that will require shipment from the manufacturer or distributor and lead times associated with that equipment.
- K. Repair or Replacement Service
 1. Repair or replacement service during the warranty period shall be performed in accordance with the following schedule:
 - a. Schedule A: 7 days, 24 hours per day with a four (4) hour response time.
 - b. Schedule B: 8:00 AM — 4:00 PM on business days, excluding holidays, with a four (4) hour response time.

2. Schedule A shall apply for major System components including, but not limited to, the file servers, System workstations, DGPs, intercom exchange and master stations, CCTV equipment, and the uninterruptible power System.
 3. Schedule B shall apply for all other components and devices.
 4. As part of the proposal submission, the Contractor shall include a labor rate schedule for any warranty service required during hours not covered under schedule B.
- L. Failure to Perform Service
1. Schedule A Components: The Contractor shall provide 14 days of additional total System warranty (at no additional cost to the Owner) for every two (2) consecutive days of System or device failure.
 2. Schedule B Components: The Contractor shall provide seven (7) days of additional total System warranty (at no additional cost to the Owner) for every two (2) consecutive days of System or device failure.
 3. If the Contractor is unable to restore System operation during the warranty period within two (2) business days of a System failure, the Owner reserves the right to require the Contractor to provide on-site manufacturer's service technicians at no cost to the Owner.
- M. If the Contractor is unable to restore System operation during the warranty period within two (2) business days of a System failure, the Owner reserves the right to require the Contractor to provide on-site manufacturer's service technicians at no cost to the Owner.
- N. Provide on-line software maintenance and support during the warranty period including all software and hardware (including telephone modems as required). Modem access to the System shall be password protected and controlled by the Owner.

1.13 EXTENDED MAINTENANCE

- A. Provide as part of the bid submission a quote for annual costs for the second through fifth years for an extended maintenance agreement to provide repair service including all parts and labor and a preventative maintenance program on the System. Provide a list of all items, schedules, and services included in the preventative maintenance program with the bid. Pricing shall be formatted to provide the Owner with the yearly breakdown of costs.
- B. The extended maintenance agreement shall include a periodic preventative maintenance program. Submit a list of items to be included in the periodic preventative maintenance program. This program shall be at least as comprehensive as the program provided under the warranty service.

PART 2 PRODUCTS

2.1 ACCESS CONTROL AND ALARM MONITORING SYSTEM

- A. System Overview
 1. The system must be the Owner's existing system, no exceptions. The contractor must verify the current version of software and firmware being utilized by the university and provide the most current version of each. Currently the university

- is utilizing a Software House C-Cure 800 System, v8.2, Model 40, no exceptions. Data Gather Panels (DGPs) shall be Software House iStar Pro with 64MB of memory including all necessary input/output modules, no exceptions.
2. The System shall incorporate supervised input and relay output modules necessary to accommodate all System components.
 3. All DGP connections to the existing system shall be coordinated with the Owner.
 4. All associated system components must emanate from the same iStar Panel. All door contacts, card readers, door latch relays, audible devices, and any other input/output associated with a door or device shall all be on the same iStar panel.
 5. Types of areas/items include but are not limited to:
 - a. Exterior doors: exterior doors : All doors shall have electric strikes and door contacts for automatic lock and unlock capability.
 - b. classroom doors
 - c. network closets
 - d. AED cabinets
 - e. Delayed egress doors
 - f. Handicapped door with automatic door operators
 - g. Alarm contact for roof hatches and other exterior doors
 - h. Lab doors
 - i. Offices
 - j. Storage
 - k. Automatic openers (see later section)
 - l. Parking gates
 - m. 24 hour computer labs
 6. Event Linking
 - a. Event linking shall tie an activity on one controller to the triggering of an action on the same or different controller. The Server Controller shall support three types of event linking:
 - 1) Local Event Linking: When the source device and the target device are linked through an activity on the same iStar, local event linking shall occur.
 - 2) Cluster Event Linking: When the source device and the target device being linked are on different controllers in the same cluster, cluster event linking shall occur. The transmission of the action request from one controller to another shall occur (routed through the master controller) with no System Server intervention.
 - 3) Global Event Linking: When the source device and the target device being linked are on different clusters, global event linking shall occur. This cross-cluster linking will require that the action request be routed through the System Server. The event link definitions shall be created on the System Server and shall be downloaded to the appropriate iStars. The System Server shall also insure that the event link definitions are valid and that there are no recursive links.
 - b. Action Scheduling: The system software shall provide an action scheduling service that will execute actions on devices residing on the same or other controllers at a predefined time, frequency and time interval. The action definitions shall be the same System Server-defined actions utilized by event linking. The actions and the action schedule

shall be defined by the System Server software and shall be downloaded to the appropriate controllers.

- c. Offline/Online Reporting: The system shall provide a mechanism to report activities to the System Server for display, reporting and archiving. If a System Server is not currently connected to the cluster of controllers, the activity reports will be buffered until the System Server reconnects to the cluster. Should the user-configured, activity buffer limit be exceeded before the System Server reconnects, the first in first out rule shall apply.

B. Data Gathering Panels

1. All iStar Pro panels must be upgraded to the latest version of firmware that the Owner is using to ensure uniformity. iStar panels will communicate via the LAN utilizing the onboard Ethernet communication port. Each iStar panel will receive an IP address, and be programmed as the Master. All Panels shall be battery backed up. Panels shall be mounted in a secured area with a climate controlled environment. STAR0016W-64ANPS, no exceptions.
2. All panels shall include an AS0100CAB, APC power supply cable.
3. A DGP program sheet that must be completed prior to installation of the system so that the panel inputs and outputs are clearly/properly labeled.
4. All inputs on the System shall be normally closed.
5. All Inputs on the System shall be supervised, no exceptions.
6. All DGPs shall be mounted in secure locations, typically in the telecommunications and network closets.

C. Power Supplies

1. Power supplies shall be mounted in the same location as the DGPs.
2. The DGP Power Supply shall be dedicated to the DGP and shall not provide power for locks or any other low voltage device.
3. Each iSTAR™ Pro shall accept a regulated input voltage of 11.5VDC to 13.8VDC and generate appropriate voltage levels for on-board use as required. The maximum power required shall be calculated based on the number of readers and other auxiliary devices connected to the iStar not to exceed 5A at 12VDC. All power outputs to external devices shall be current limited by the iStar.
4. Power is to be hardwired to the DGPs. The security system shall be on a dedicated circuit, and tied in to the emergency generator system.
5. DGPs and peripheral devices shall be supplied with battery back-up for a minimum of twelve (12) hours.
 - a. Please be cognizant of all penetrations into the power supplies, as the bottom of the enclosures must be kept clear in order to accommodate the batteries.
6. Power fail and low battery inputs shall be normally open, and wired from the apS and Altronix battery backup power supply outputs to report A/C power fail and low battery conditions.
7. Power supplies shall include:
 - a. Altronix AL1024ULACM (24VDC at 10 AMP UL Listed), no exceptions.
 - b. Please be cognizant of all penetrations into the power supplies, as the bottom of the enclosures must be kept clear in order to accommodate the batteries.

- c. Software House apS AS00063-01, no exceptions.
8. Batteries shall be genesis by ENERSYS NP series, 12VDC/&AH for use with power supply/chargers, no exceptions.
9. Batteries shall be tested upon installation to verify that the voltage and current capacity conform to allowable limits. A battery schedule shall be submitted upon completion of the work to the Owner detailing the voltage and current of each battery used in the installation.
10. Installation Date shall be indicated and labeled on each battery.
11. Each Power Supply shall be housed in a locking steel enclosure designed for surface mounting. The housing shall include a tamper switch to sense the removal or opening of the enclosure cover.
12. All power supplies, DGPs, and power distribution cabinets shall be keyed alike.

D. Card Reader

1. General
 - a. Card Readers shall be mounted on the strike side of the door. Mounting location shall be 48” from the floor to the top of the reader and 12” from the frame of the door.
 - b. All Card Readers shall be grounded and bonded to the head end with a 14awg copper conductor green insulation via a female disconnect, no exceptions.
 - 1) Acceptable Manufactures:
 - a) Panduit DNF14-110-C, no exceptions.
2. Acceptable Manufacturers: Sensormatic RM Series, Indala RM2-PI and RM2L-PI, no exceptions.
 - a. Card Readers installed on the exterior of the building shall include a card reader heater kit: 130-915, no exceptions.
 - b. All gaskets which are included with each reader shall be installed behind the card reader’s mount plate.
 - c. Flat head counter sunk screws shall be used to mount the reader mount plate, no exceptions.
 - d. Security screws provided with the card reader shall be used, no exceptions.
3. Non Main Entry Exterior Door card reader manufacturer: Indala Flexpass Black Arch Wallswitch Proximity reader FP4527A
4. System Operation:
 - a. Ingress (Functions: Exterior; Storeroom)
 - 1) Authorized users shall present card and pin, and C*cure system shall release electric trim and allow users to ingress.
 - b. Forced Door
 - 1) If door is opened with key override then the access control system shall activate a “forced door event” which will be received at University police dispatch.
 - a) Local Audible Device Shall Sound.
 - c. Held Door
 - 1) If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
 - a) Local Audible Device Shall Sound

- d. Egress (Functions: Exterior; Storeroom)
 - 1) Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*care access control system. The access control system will not go into an alarm and allow a valid egress.
- e. Forced Door
 - 1) If door is opened with key override then the access control system shall activate a “forced door event” which will be received at University police dispatch.
 - a) Local Audible Device Shall Sound.
- 5. Held Door
 - 1) If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
 - a) Local Audible Device Shall Sound.
- b. Ingress/Disarming (Function: Classroom/Intrusion Zones) [All areas with a Break Glass shall be programmed this way, but it is not limited to those areas]
 - 1) Authorized users shall present card and pin, and C*care system shall release electric trim and allow users to ingress.
 - 2) System shall be programmed as an Intrusion Zone and shall include an active “ARM” input which will toggle the doors into the room to remain unlocked.
 - 3) Break Glass: shall have two outputs
 - a) Breaking the glass shall activate the device which will physically drop power [Locking the doors] locally via appropriate RIB relay (i.e. with enough relays to drop every lock into the area).
 - b) Breaking the glass shall activate the device which will be tied to an input on the corresponding iStar panel and trigger an event that notifies the University Police that an “Emergency has been reported in that area.”
 - c) Please note that each entry into the area will need to have electrified hardware and a separate wiring schema will need to be developed specific to the environment in which it will be securing.
 - 4) Forced Door
 - a) If door is opened with key override, or without presenting Card and PIN then the access control system shall activate a “forced door event” which will be received at University police dispatch.
 - i. Local Audible Device Shall Sound.
 - 5) Held Door
 - a) If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
 - ii. Local Audible Device Shall Sound

- c. Egress/Arming (Function: Classroom/Intrusion Zones) [All areas with a Break Glass shall be programmed this way, but it is not limited to those areas]
- 1) Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*ure access control system. The access control system will not go into an alarm and allow a valid egress.
 - 2) System shall be programmed as an Intrusion Zone and shall include an active “ARM” input which will toggle the doors locked and unlocked.
 - 3) Authorized users shall close all doors into the area and present card and pin, and C*ure system shall lock electric trim and secure area.
6. All Exterior Door that are not considered “Main Entrances” (i.e. have been specified to include an RM series Reader with Keypad) shall have a Card Reader which is Prox only, and shall serve as an indicator that the door is unlocked (Solid Green), Locked (Solid Red), or for authorized users only to gain entry into the building (i.e. Police Department).
- a. Operation:
- 1) Ingress/Egress Unlocked:
 - a) When the building is Unlocked the card reader will remain solid green and users may enter and exit without triggering an alarmed event.
 - 2) Ingress (when Locked) (Exterior Prox Only)
 - a) Authorized users shall present card, and C*ure system shall release electric trim and allow users to ingress.
 - (1) Forced Door
 - (a) If door is opened with key override then the access control system shall activate a “forced door event” which will be received at University police dispatch.
 - Local Audible Device Shall Sound.
 - (b) Held Door
 - (2) If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.
 1. Local Audible Device Shall Sound
 - 3) Egress (When Locked) (Exterior Prox Only)
 - a) Users shall depress crash bar on exit device or turn handle on electrified trim which will send a request-to-exit via internal switch to the C*ure access control system. The access control system will not go into an alarm and allow a valid egress.
 - (1) Forced Door
 - (a) If door is opened with key override then the access control system shall activate a

“forced door event” which will be received at University police dispatch.

- Local Audible Device Shall Sound.

(2) Held Door

- (a) If door has valid opening and remains opened for longer than 30 seconds then the access control system shall activate a “Held door event” which will be received at University police dispatch.

- Local Audible Device Shall Sound.

E. Local Audible Device

1. All card reader locations shall have a local audible device that should activate upon forced and held event activations.
2. The Local Audible Device shall be installed on the wall above the door 90” to the top of the box, and/or at least 4” below finished ceiling height.
3. Tone 3 shall be utilized, no exceptions.
4. Local Audible Device shall be 80 - 88 dB @ 12 - 24 VDC.
5. Local Audible Device
 - a. WBOX Technologies 0E-1GANGCHIM, no exceptions.
6. Audible Device 3-Tone Chime WBOX Technologies: 0E-1GANGCHIM
 - a. All card reader locations with a Door Contact shall have a local audible device that should activate upon forced and held event activations.
 - b. The Local Audible Device shall be installed on the wall above the door 90” to the top of the box, and/or at least 4” below finished ceiling height.
 - c. Local Audible Device shall be 80 - 88 dB @ 12 - 24 VDC.
 - d. Trigger 3 shall be used as the tone for alarms on the C*cure system.

F. Request-To-Exit Device

1. The Request-To-Exit shall be installed in the exit device, or electromechanical lockset, no exceptions.
2. Refer to drawings for device type and location.
 - a. Corbin Russwin M92, no exceptions.

G. Key Switch Door Alarm Unit

1. Provide a Key Switch Door Alarm Units as indicated on the drawings.
2. Door alarm units shall be able to accept the university’s existing keyway.
3. Key Switch Door alarm units shall be Model ES4200K4, or ES4300A-K3-T1 as manufactured by Designed Security, Inc., no exceptions.

H. Door Position Switches

1. Provide normally closed (N/C) magnetic door position switches to monitor the open/closed status of doors as specified herein and as indicated on the Drawings.
2. Metal doors with a “U” trac shall use squeeze fit rare earth magnets.
 - a. Acceptable Manufacturer: GE 1840, no exceptions.
3. Concealed Door Position Switch
 - a. All Door Position Switches shall be 1” in diameter, no exceptions.
 - b. All Door Position Switches shall be installed on top of frame 4” on center from the strike side of the frame, no exceptions.
 - c. Acceptable Manufacturers: GE Interlogix 1076 Series.

4. Flush Bolt Monitors
 - a. Provide normally closed (N/C) Flush Bolt monitoring switches to monitor the latch of an inactive double door.
 - 1) Von Duprin 4670-T1 MON STRIKE US26D, No exceptions.
5. Overhead Door/Gate Position Switch
 - a. Provide armored cable from the switch location to the associated junction box in order to conceal and protect the wire, no exceptions.
 - b. Acceptable Manufacturers: GE Interlogix 2500 Series, or approved equal.
6. Tamper Switch
 - a. Provide normally closed tamper switches to monitor the secure status of all DGPs, power supplies, and power distribution units.
 - b. Include the number of tamper switches in the total alarm input figures.
 - c. Minimum Specifications:
 - 1) Type: Plunger.
 - 2) Configuration: N/C.
 - 3) Mounting: Within cabinet with no outside access to fasteners.
 - d. Acceptable Manufacturers: GE Interlogix 3010, or approved equal.
7. Duress Alarms
 - a. Provide desk-mounted personnel duress alarms with normally closed alarm output contacts as indicated on the Drawings.
 - b. Activation of these alarms shall initiate an alarm event on the ACAMS. Local alarms will be silent with no visual indication of activation.
 - c. Upon activation, the duress alarm will remain active until which time it is reset by key. No other form of deactivation shall be provided.
 - d. Locate desk mounted duress buttons below counter tops or in the knee space of desks in an accessible location. Verify the exact location with the Owner.
 - e. Stainless steel flex cable shall be properly supported with a galvanized steel tube clamp model 2UTD8 or approved equal. Nylon or PVC type tube supports, zip ties, or zip tie supports shall not be permitted.
 - f. All duress devices shall have a single gang back box located within 5 feet from permanent location.
 - g. All back boxes shall be covered with a stainless steel cover plate model: Mulberry 97151, or approved equal.
 - h. All cover plates shall be integrated with the stainless steel flex cable with a 1/2" strain relief cord connector model: Arlington LPCG50, or approved equal.
 - i. Minimum Specifications:
 - 1) Activation: Pull button.
 - 2) Alarm output: DPDT contacts.
 - 3) Reset method: Key.
 - 4) Mounting: Surface-mount as indicated on Drawings.
 - j. Acceptable Manufacturers: Ademco model 269R, no exceptions.
 - k. Cable shall be protected by GE Interlogix 1980 Stainless Steel Flex Cable, or approved equal.
8. Emergency Break Glass Station (Interior Classroom Function Locking Mechanism)
 - a. Emergency Break Glass Stations shall be installed within each classroom, or intrusion zoned gathering spaces.

- b. Provide break glass locking mechanism on interior, strike side of classroom door to allow for locking of the strike in an emergency situation. This includes junction boxes for aesthetic mounting of the devices, and must adhere to ADA guidelines for height.
 - c. Activation of these devices will allow for the physical locking of the electrified hardware as well as initiate an alarm event on the ACAMS. Local alarms will be silent with no visual indication of activation. Event based or logical programming in order to lock the doors via the data gathering panels or door controllers shall not be permitted.
 - 1) Each entry from hallway and adjoining rooms which have access into the hallway shall have electrified hardware that will lock upon activating the associated break glass device. In the event that there is an adjoining door each of the adjoining room's break glass shall lock that adjoining door.
 - 2) Output 1 shall physically break power to the fail secure locking devices, as logical programming will not suffice. In the event there are more than one doors into the room there needs to be electrified locks installed on them and the break glass shall lock those too. When there are more than one door being locked by the break glass then auxiliary relays need to be used. In this configuration Output 1 should break power to a RIB relays that will then lock the corresponding doors.
 - 3) Output 2 shall send an alarm to the monitoring station via a supervised input.
 - a) Physical locking shall be provided by utilizing an auxiliary RIB relay that will drop power to the fail secure locksets into the area, as well as, supply power to failsafe locksets into the area.
 - b) Break Glass shall be mounted on the strike side of the door 48" from the floor to the top of the unit, and within 12" from the door frame.
 - c) Break Glass shall be blue in color, no exceptions.
 - d) Break Glass and have white silk screened custom wording on the device itself as follows:
 - 4) Above Glass: "DOOR LOCK," no exceptions.
 - 5) Below Glass: "BREAK GLASS IN EMERGENCY," no exceptions.
 - a) Acceptable Manufacturer:
 - 6) Security Door Controls break glass model 491, no exceptions.
9. Electrical Power Transfer
- a. Provide an Electrical Power Transfer where applicable, for integration of power and Request-To-Exit monitoring to and from the exit device hardware. A power transfer is to be utilized in lieu of an electrified hinge for delayed egress, electromechanical lockset, and electrified panic device applications.
 - 1) Acceptable Manufacturers:
 - 2) Von Duprin EPT-10 finish SP28, no exceptions.
 - b. An electrified hinge shall be provided where appropriate, for integration of power to the Electromechanical Lockset from the door frame. A electrified hinge shall be provided in lieu of a power transfer on all

electromechanical locksets. An electrified hinge shall not be used in delayed egress and electrified panic device applications. Electrified Hinge shall provide power and request-to-exit signals to and from electromechanical lockset. The use of Quick Connect shall be required.

- 1) Acceptable Manufacturers:
 - a) McKinney t4A3788CC8 ELC HINGE 4.5x4.5 QC 26D with Stanley Prep per application, no exceptions.
10. Electromechanical locksets
 - a. All Electromechanical locksets shall be fail-secure, no exceptions.
 - b. All electromechanical locksets shall be 24VDC, no exceptions.
 - c. High Amperage Inrush Hardware required Power Supplies shall be Corbin Russwin 782, no exceptions.
 - d. All Electromechanical locksets shall fit the removable core keying system of the Owner.
 - e. All Electromechanical locksets shall be installed so that the dead latch mechanism of the latch engages upon the door securing, no exceptions.
 - f. All Electromechanical lockset trim shall be of Newport design, no exceptions.
 - g. Acceptable Manufacturers:
 - 1) Corbin Russwin ML20900 M92 ECL Series, no exceptions.
 - a) Shall have a built in request to exit monitor.
 - 2) Corbin Russwin CL33905 NZD M92 626, no exceptions.
 - 3) Corbin Russwin CL3357 NZD M92 626, no exceptions.
 - 4) Corbin Russwin ED5200 (N9905) M94 M92 M99 630, no exceptions.
 - 5) Corbin Russwin ED5200 (N9905) M92 M99 MELR 630, no exceptions.
 - a) This device shall be supplied with an earth ground, no exceptions.
11. Delayed Egress Locking Devices
 - a. All Delayed Egress Locking Devices shall be fail-secure, no exceptions.
 - b. All Delayed Egress Locking Devices shall be 24VDC, no exceptions.
 - c. All Delayed Egress Locking Devices shall fit the removable core keying system of the Owner.
 - d. All Delayed Egress Locking Devices shall be installed so that the dead latch mechanism of the latch engages upon the door securing, no exceptions.
 - e. All Delayed Egress Locking Devices trim shall be of Newport design, no exceptions.
 - f. Acceptable Manufacturers
 - 1) Corbin Russwin ED5200AD (N9905) M51 M88 M92 M99 630, no exceptions.
12. Handicapped door with automatic door operator interface
 - a. All access controlled handicapped doors with automatic door operators shall be integrated into the SMS.
 - b. All handicapped doors with automatic door operators shall have an interface board separate from the SMS.
 - c. All handicapped door automatic door operator interface board shall be supplied with a dedicated fused power source with battery back-up and tied into the emergency generator system.

- d. In an application where there are two automatic door operators controlling the same egress/ingress both operators shall work in conjunction with each other. The doors shall work in succession with the specific environmental conditions, and shall be coordinated with the Owner.
- e. All interior ADA activation buttons shall be activated with a Card Reader controlled by the SMS.
- f. The ingress handicapped door operator activation button shall not be active when the doors are locked, and shall only become active upon authorized access through the SMS. The SMS shall have a dedicated output for this purpose.
- g. All egress door operator activation buttons shall send a request-to-exit signal to the SMS.
- h. All egress door operators shall be integrated with the SMS relay that controls the locking mechanism so that the relay “unlocks” the door upon activation.
- i. Acceptable Manufacturers:
 - 1) MS Sedco TDM Universal Time Delay Module, or Equivalent.

2.2 VIDEO INTERCOM COMMUNICATIONS SYSTEM

A. General

1. The Contractor shall provide a video intercom system to facilitate entry through the service entry/loading dock area as indicated on the Drawings and specified herein.
2. The IC System shall provide the following:
 - a. Two-way signaling and voice communication between master stations and substations as indicated on the Drawings.
 - b. Telephone quality communication at substations and master stations for both handset and speakerphone conversation.
 - c. Master stations shall provide means to remotely release door lock.

B. IC Master Stations

1. General
 - a. Provide master stations as indicated on the Drawings. Master stations shall be Aiphone Model LEF-5 with MYH-CU video monitor, or approved equal.

C. IC Exterior Substation

1. General
 - a. Provide an exterior substation as indicated on the Drawings.
 - b. The substation shall consist of a call button, speaker in integrated CCTV camera in a wall mount, vandal resistant enclosure.
2. Acceptable Manufacturers:
 - a. As Per the Intercom Communications System manufacturer’s recommendations.

2.3 WIRE AND CABLE

A. General Requirements:

1. Install cabling provided by WCSU, terminate wire and cable as required to install the Security System as indicated on the Drawings and specified herein.
2. All wire and cable shall be Underwriter's Laboratories (UL) listed, and shall meet all national, state, and local code requirements for its application.
3. All wire and cable shall meet individual system or subsystem manufacturer Specifications.
4. All wire and cable shall be plenum type cable and shall conform to the minimum requirements of Insulated Cable Engineers Association (ICEA) Standards.
5. Wire and cable shall comply with the applicable requirements of the National Electrical Code (NEC), latest edition, in regards to cable construction and usage.
6. The conductors of wires shall be stranded copper, and have conductivity in accordance with the standardization rules of the Institute of Electrical and Electronics Engineers, Inc. (IEEE). The conductor and each strand shall be round and free of kinks and defects.
7. All cable carrying data or voice transmissions shall be shielded. All other cable shall be shielded where necessary for interference-free signals.
8. Insulation shall be rated for a minimum of 300V.
9. Color-coding shall be accomplished by using solidly colored insulation.
10. Grounding conductors shall be insulated, and be colored solid green as required by the National Electric Code (NEC).

B. Wire Types and Sizes:

1. Signal Cable (Non-Power): Wire size shall be a minimum of 20 AWG, twisted, shielded, stranded, insulated, and jacketed.
2. Signal Cable (Low Voltage Power): Wire size shall be a minimum of 18 AWG, stranded, insulated, and jacketed.
 - a. Wire size shall be a minimum of 18 AWG, twisted, stranded, insulated and jacketed and shall be used for cable runs less than 500 feet.
 - b. Wire size shall be a minimum of 16 AWG, twisted, stranded, insulated and jacketed and shall be used for cable runs in excess of 500 feet, but less than 750 feet.
 - c. Wire size shall be a minimum of 14 AWG, twisted, stranded, insulated and jacketed and shall be used for cable runs in excess of 750 feet, but less than 1,250 feet.
 - d. Each access control point shall include at the minimum the following cables and conductors ran from the DGP Security Closet and labeled as such:
 - 1) Card Reader cable shall be royal blue, no exceptions.
 - a) This cable shall consist of three pairs of 18AWG conductors, each of which shall be individually shielded and consist of a drain (3) drains in total, no exceptions.
 - b) The colors of the pairs of conductors shall be Red/Black (Power), White/Black (Data), and Green/Black (Spare), no exceptions.

- 2) Door Latch Relay 1 cable shall be gray, no exceptions.
 - a) This cable shall consist of (4) 18AWG conductors, no exceptions.
 - b) The colors of these conductors shall be Red/Black (Power), White/Green (Spare), no exceptions.
 - 3) Door Latch Relay 2 cable shall be white, no exceptions.
 - a) This cable shall consist of (4) 18AWG conductors, no exceptions.
 - b) The colors of these conductors shall be Red/Black (Power), White/Green (Spare), no exceptions.
 - 4) Request-To-Exit cable shall be green, no exceptions.
 - a) This cable shall be 20AWG shielded and consist of 4 conductors, no exceptions.
 - b) The colors of these conductors shall be Red/Black (Power), White/Green (Spare), no exceptions.
 - 5) Audible Device cable shall be yellow, no exceptions.
 - a) This cable shall be 20AWG shielded and consist of 4 conductors, no exceptions.
 - b) The colors of these conductors shall be Red/Black (Power), White/Green (Spare), no exceptions.
 - 6) Emergency Door Lock cable shall be orange, no exceptions.
 - a) This cable shall be 20AWG shielded and consist of two pairs.
 - b) The colors of the pairs of wires shall be Red/Black (Spare) and Green/White (Alarm Signal), no exception.
 - 7) Grounding Conductor 14AWG.
3. Coaxial Cable:
- a. RG-59U with a minimum center conductor of 20 AWG solid, bare copper and overall bare copper braided shield shall be used for cable runs less than 500 feet.
 - b. Plenum rated.

2.4 INTERFACES

A. SMS/Fire Alarm System

1. General - Interface with the fire alarm System to provide the following:
 - a. Auxiliary monitoring of the normally closed general fire alarm contacts from the SMS file server/workstations.
 - b. Auxiliary monitoring of the normally closed System trouble alarm contacts from the SMS file server/workstations.
 - c. Auxiliary monitoring of the manual unlock key-switch position from the SMS file server/workstations.
 - d. Automatic release of fail-safe locking devices during a building fire alarm condition and/or upon activation of the manual unlock key-switch.
2. Functional
 - a. Auxiliary Monitoring of the Fire Alarm System
 - 1) The SMS shall provide auxiliary monitoring of the alarm and trouble states of the building fire alarm System.
 - 2) Activation of a fire alarm or trouble condition shall cause an alarm indication on the SMS Workstation.

- b. Interface Terminal Cabinet
 - 1) To provide for Security System/Fire Alarm System interface, the Contractor shall provide one terminal cabinet in the Fire Command Center. The terminal cabinet shall contain all terminals required to interface the Fire Alarm System to the SMS.
 - 2) The interface terminal cabinet shall be a lockable continuous hinge cover NEMA Type 4 enclosure. The cover of the enclosure shall be labeled to identify its function.
 - 3) The Contractor shall provide dual screw barrier-type terminal strips for each interface point within the interface terminal cabinet. Label all terminals to identify their function.
 - 4) The Contractor shall provide all conduit, and wiring required for the installation of the terminal cabinet, traveling cables and interfacing to the Fire Alarm System.
 - 5) Provide all wiring from the interface terminal cabinet to the SMS.

- B. Delayed Egress Doors
 - 1. Functional
 - a. Delayed Egress shall be integrated to operate with University's C*Cure access control system.
 - 1) A door position switch shall be installed to monitor the state of the door. The University's C*cure system shall receive an alarm from the delayed egress door when the door is opened.
 - 2) The University's C*cure system shall receive an alarm from the delayed egress device when the Alarm Cycle is activated.
 - 3) The University's C*cure system shall receive an alarm from the door if the door is opened once the Alarm Cycle is complete and the device has released.
 - 4) The University's C*cure system shall have the ability to remotely reset an alarm from the delayed egress device.

- C. SMS/Automatic Doors
 - 1. Functional
 - a. Handicapped door with automatic door operator interface
 - 1) All access controlled handicapped doors with automatic door operators shall be integrated into the SMS.
 - 2) All handicapped doors with automatic door operators shall have an interface board separate from the SMS.
 - 3) All handicapped door automatic door operator interface board shall be supplied with a dedicated fused power source with battery back-up and tied into the emergency generator system.
 - 4) In an application where there are two automatic door operators controlling the same egress/ingress both operators shall work in conjunction with each other. The doors shall work in succession with the specific environmental conditions, and shall be coordinated with the Owner.
 - 5) The ingress handicapped door operator activation button shall not be active when the doors are locked, and shall only become

- active upon authorized access through the SMS. The SMS shall have a dedicated output for this purpose.
- 6) All egress door operator activation buttons shall send a request-to-exit signal to the SMS.
 - 7) Egress shall require a card reader that personnel with proper credentials from the SMS may present their credential to the reader which will activate the interior ADA operator activation button. Otherwise, the interior ADA operator activation button will be deactivated.
 - 8) All egress door operators shall be integrated with the SMS relay that controls the locking mechanism so that the relay “unlocks” the door upon activation.
 - 9) Acceptable Manufacturers:
 - a) Camden door controls CX-SA-1 door sequencer, or approved equal.
- b. SMS Monitoring The Open/Closed Status of Automatic Doors:
- 1) The SMS shall provide for monitoring of the open/closed status of automatic doors as indicated on the Drawings.
 - 2) Monitoring of the open/closed status of automatic doors shall be facilitated through door position switches provided by the Contractor.
- c. Remote control of Card Reader Controlled Automatic Doors:
- 1) Provide for remote control of card reader controlled automatic doors.
 - 2) Provide door release pushbuttons at door control panels as specified herein and as indicated on the Drawings.
- d. Interface Terminal Cabinet:
- 1) To provide for Security System/automatic door operator interface, the automatic door contractor shall provide one interface terminal cabinet for each automatic door. The interface terminal cabinet shall contain all interface terminals required for each automatic door operation described herein.
 - 2) The interface terminal cabinet shall be a lockable continuous hinge cover NEMA Type 4 enclosure. The cover of the enclosure shall be labeled to identify its function.
 - 3) The automatic door contractor shall provide dual screw barrier-type terminal strips for each interface point within the interface terminal cabinet. Two separate terminals shall be provided for each interface point to prevent ground loops. Label all terminals to identify their function.
 - 4) The Contractor shall provide any control logic and relays required to interface the door operator to the dry contact closures (rated for 2 Amps at 24VDC) provided by the SMS.
 - 5) The Contractor shall provide all conduit, power, and wiring required for the installation of the terminal cabinet and interfacing to the automatic sliding door.
 - 6) The Contractor shall provide all wiring from the interface terminal cabinet to the SMS.
 - 7) Interface terminal cabinets shall be located as indicated on the Drawings.

PART 3 EXECUTION

3.1 LANGUAGE USAGE

- A. English language shall be used throughout the security system, signage, labels, voice messages, instructions, manuals, software, and graphic displays.

3.2 INSTALLATION

A. Site Inspections

- 1. Continuously verify that the site conditions are in agreement with the Contract Documents and the design package. Submit a report to the Owner documenting changes to the site or conditions that affect the performance of the System to be installed. For those changes or conditions, which affect System installation or performance, provide (with the report) specification sheets, or written functional requirements to support the findings, and a cost estimate to correct the deficiency. No deficiency shall be corrected without written permission from the Owner.
- 2. Specific mounting locations, exact wire and cable runs, and conduit routing have not been specified or delineated on the Drawings. Coordinate all aspects of the Work with the Owner.

B. Coordination

- 1. Coordinate with the Owner to ensure that adequate conduit is provided and that equipment back-boxes are adequate for System installation.
- 2. Coordinate with the Owner to ensure that adequate power has been provided and properly located for the security System equipment.
- 3. Coordinate with the Owner to ensure that doors and doorframes are properly prepared for electric locking hardware and door position switches.
- 4. Coordinate locations of all devices with the Owner prior to installation.
- 5. Coordinate and verify the location of each piece of rack-mounted equipment with the Owner.
- 6. Coordinate custom SMS report requirements with the Owner. Submit report formats to the Owner for review and acceptance.
- 7. Coordinate all initial database partitioning and setup with the Owner prior to initial programming and cardholder data entry.
- 8. Coordinate final camera locations, desired views, and camera housing and mount requirements with the Owner prior to installation.
- 9. Coordinate camera housing and mount finishes with the (Owner prior to installation.
- 10. Coordinate finishes and colors of all equipment with the Owner. Submit all finish and graphics for all equipment in public areas to the Owner for approval prior to installation.

C. General

- 1. Verify acceptance of each type of specified request-to-exit hardware for each application with local life safety code officials.
- 2. Verify fail-safe and fail-secure lock requirements with the Owner.

3. Contractor or equipment manufacturer logos or names shall not be visible on equipment in public areas.
 4. Provide tamper proof fasteners for all equipment in public areas. Fastener finish shall match equipment finish.
- D. Equipment: Provide equipment as indicated on the Drawings and specified herein. Additional specific installation requirements are as follows:
1. Security Equipment Room and DGP Locations
 - a. All equipment shall be on a dedicated circuit and tied to emergency generator.
 - b. Configure security equipment as indicated in the Drawings.
 - c. Wire all power supply power fail alarm contacts in each equipment room as a single alarm input to the SMS.
 - d. Wire each power supply low battery alarm contact as individual alarm inputs to the SMS.
 2. DGPs
 - a. Configure the System such that devices can be connected to spare input points, output points and card reader inputs on the DGP without requiring reconfiguration of the SMS.
 3. Card Readers
 - a. Wire card reader LEDs to indicate valid and invalid card reads, and door locked and unlocked conditions. All card reader LED indicators shall operate identically.
 4. Electric Locking Mechanisms
 - a. Interface with all electric locking mechanisms.
 - b. Wire electric locking mechanisms as indicated by the manufacturer.
 - c. Wire fail-safe electric locking mechanisms in accordance with local codes.
 - d. Wire fail-secure electric locking mechanisms and power supplies such that a fire alarm condition or building power failure shall not affect operation of the lock.
 5. Delayed Egress Locking Devices
 - a. Interface with all delayed egress locking devices.
 - b. Wire delayed egress locking devices as indicated by the manufacturer.
 - c. Wire delayed egress locking devices for fail-safe operation in accordance with local codes.
 - d. Interface with a normally closed supervised alarm contacts that shall open upon activation of the unlock timer and report to the System Workstation.
 - e. Interface with sounder bypass control contacts. Wire SMS control output contacts to bypass sounder by System Workstation.
 - f. Interface with lock control contacts activated by System Workstation and/or time schedule. Wire SMS control output contacts to lock/unlock devices by time schedule and/or System Workstation.
 6. Fire Alarm Interface
 - a. Connect (hard wire) fail-safe electric and time delay locking mechanical to the building fire alarm System for fail-safe release upon any fire alarm.
 - b. Interface with a single low voltage/low current normally closed dry contact from the fire alarm System provided by the fire alarm contractor

- in the Fire Command Center (FCC). The contact shall open on any fire alarm condition.
- c. Provide all additional UL listed fail-safe relays and power supplies necessary to interface to this contact and unlock all fail-safe doors.
 - d. Connect fail-safe relays and power supplies to standard building power. Connection of fail-safe devices to emergency or UPS power shall not be acceptable.
 - e. Reference the Drawings for fire alarm interface requirements.

3.3 WIRING TECHNIQUES

- A. Furnish and install all SMS wire and cable with the exception of traveling cable for elevator control and monitoring.
- B. Provide code compliant fire proofing techniques for all penetrations of fire rated partitions and slabs, where the penetrations are made by or used for installation of the SMS.
- C. Coordinate the routing of wire and cable requiring isolation from power, radio frequency (RF), electromagnetic interference (EMI), telephone, etc. with the Owner.
- D. Run all wire and cable continuous from device location to the final point of termination. No mid-run cable splices shall be allowed.
- E. Where splicing and/or patching of coaxial cable are deemed necessary, it shall be accomplished through equalization and/or distribution amplifiers. Provide power for the amplifiers as required. The exact location of all equalization/distribution amplifiers (as applicable) shall be indicated on the Record Drawings.
- F. Furnish and install all coaxial cable such that ample slack is supplied at the device terminating end of the cable to compensate for any final field modifications in camera location. The extra cable (approximately three meters) shall be bundled and wrapped.
- G. At no time shall any coaxial cable be subjected to a bend less than a 150 mm radius.
- H. Wire and cable within DGPs, power distribution cabinets and other security enclosures shall be neatly installed, completely terminated, pulled tight with slack removed and routed in such a way as to allow direct, unimpeded access to the equipment within the enclosure. All wire and cable shall be bundled and tied. Ties shall be similar to T&B TyRap cable ties.
- I. Provide heat-shrink to insulate all wire splices and connections. The use of electrical tape for splices and connections shall not be acceptable.
- J. Visually inspect all wire and cable for faulty insulation prior to installation.
- K. Provide grommets and strain relief material where necessary to avoid abrasion of wire and excess tension on Wire and Cable.

- L. Make connections with solder-less devices, mechanically and electrically secured in accordance with the manufacturers' recommendations. Wire nuts shall not be an acceptable means of connecting wire and cable.
- M. Neatly bundle and wrap all horizontally run (above accessible ceilings and not within conduit) wire and cable at three-meter intervals. Provide supports as required. All supports shall be UL listed for the application.
- N. All System wiring within vertical riser shafts (as required) shall be bundled, wrapped and tied to the structure at three-meter intervals in order to isolate it from other wire and cable within the shaft. Additionally, all wire and cable within the shaft shall be supported at least every two floors using Greenlee Slack Grips (Split Mesh Lace Closing) or approved equal. Provide all personnel and equipment necessary to install and support the cable. All equipment shall be UL listed for the application.

3.4 GROUNDING

- A. Provide grounding connections to the existing grounding bar located within the equipment room where the existing head end equipment is located (Room 232).
- B. #6 Conductor green stranded copper conductor to be tied to telecommunications grounding bus with approved lug.
- C. All sleeve penetrations within head end equipment room shall have bonding bushings and shall be incorporated with the grounding conductor for the DGP.
- D. #14 grounding conductor shall be terminated on the grounding bar of the DGP.
- E. All shielded wiring drains shall be bonded and terminated to ground within the DGP with approved ground lug.

3.5 CONDUIT, BOXES, AND RACEWAYS

- A. Install all conduit necessary for a complete installation, but not provided for in the Security Conduit Drawings, in finished areas concealed in chases, furrings, concrete slabs and/or above suspended ceilings. No exposed conduit shall be installed within public areas.
- B. Conduit shall be carefully installed, properly and adequately supported as required to comply with the requirements outlined herein and as required by the NEC to provide a neat, Workmanlike installation. Horizontal conduit runs shall be supported by clamps, pipe straps, special brackets, or heavy iron tie, tied to the black iron structural members supporting the ceiling. Fastening of conduit to masonry walls, floor or partitions require malleable pipe clips with screws and suitable expansion sleeves.
- C. All conduit shall be cut accurately to measurements established at the building and shall be installed without springing or forcing.
- D. All required inserts shall be drilled-in and all openings required through concrete or masonry shall be saw cut or core drilled with tools specifically designed for this purpose.

- E. Swab out and remove all burrs from conduit before any wires are pulled.
- F. Layout and install conduit runs as to avoid proximity to hot pipes. In no case shall a conduit be run within 75 mm of such pipes, except where crossings are unavoidable and then the conduit shall be kept at least 25 mm from the covering of the pipe crossed.
- G. Provide fire stops where conduits penetrate fire rated walls and/or floors.
- H. All conduit installation, whether run exposed or concealed, shall be approved prior to installation by the Owner.

3.6 POWER REQUIREMENTS

- A. 120VAC power dedicated to security and on generator backup shall be provided by the electrical contractor for the Security System as indicated on the Security Device and Conduit Drawings. Coordinate with the Owner to establish locations of security dedicated 120VAC circuits.
- B. Connect to the AC power (provided by electrical contractor) and provide UL listed power supplies and transformers to distribute low voltage power to the System components as required.
- C. Provide hinged cover terminal cabinets with tamper switches for all power supplies, transformers, and power distribution terminal strips. Provide all conduit and wiring from the AC power facilities to the terminal cabinets.
- D. Surge Protection
 - 1. Provide protection against spikes, surges, noise, and other line problems for all System equipment and components.
 - 2. Protect all exterior video, control, power, signal cables, and conductors against power surges. Video surge protectors shall not attenuate or reduce video and sync signals under normal conditions. Each surge protector shall be UL Listed.

3.7 LABELED DOORS AND FRAMES

- A. In no instance shall any UL labeled door or frame be drilled, cut, penetrated, or modified in any way.
- B. The Contractor shall be responsible for replacing any labeled door or frame that is modified without written approval from the Owner.

3.8 LABELING

- A. Label all controls as necessary to agree with their function.
- B. Mark all Wire and Cable in common at both ends using a permanent method such as self-laminating cable marking tape. The tags shall be attached to the wire and in an accessible location so that they can easily be read. Tags shall be installed when wire and cables are installed. Labeling shall agree with Record Documentation.

- C. Place wire identification numbers at each end of the conductor involved by using sleeve type, heat shrinkable markers. The markers shall be installed so as to be readable from left to right or top to bottom.
- D. Mark all connectors with common designations for mating connectors. The connector designations shall be indicated on the Record Drawings.
- E. Coil all spare conductors in the device back-box, panel wire way, or trough. These conductors shall be neatly bundled and tagged.

3.9 TRAINING

- A. Training on system installation shall not be required unless otherwise noted by Owner.

3.10 SYSTEM START-UP

- A. The Work shall be complete and ready to operate prior to final acceptance.
- B. Load the entire initial user database into all programmable Systems up to the day of beneficial use of the System. The Owner shall assist in establishing procedural guidelines and in defining terminology and conditions unique to the Owner's operation.

3.11 SUBSTANTIAL COMPLETION

- A. In order to qualify for the Owner's consideration of Substantial Completion, the Work must, at a minimum, meet the following requirements:
 - 1. All alarm points, access control points, CCTV cameras, and intercom substations must be installed, programmed and fully operational.
 - 2. All sub-System interfaces must be complete and operational.
- B. Substantial Completion shall NOT be construed as final acceptance of the Work.

3.12 SYSTEM ACCEPTANCE

- A. Final acceptance testing of the Work will be conducted by the Owner, Contractor, and/or Architect.
- B. Prior to any final acceptance testing, the Contractor shall submit two (2) sets of preliminary Record Drawings to the Owner. The preliminary Record Drawings are to be used by the Owner to conduct the System final test.
- C. The Contractor shall submit a report matrix indicating completion or delinquency for each item included in the Specification and all subsequent addenda and bulletins as part of the Work. Should work on any item be under way, but not yet fully complete, indicate the extent (or lack thereof) of completion to date, and the proposed date of completion.
- D. Conduct a complete test of the entire System and provide the Owner with a written report on the results of that test. During the course of this test, place the integrated System in service and calibrate and test all equipment.

- E. Fully complete a Security Systems Readiness Checklist prior to the test of the System. The checklist shall accompany the written certification to the Owner that the installed complete System has been calibrated, tested, and is fully functional as specified herein.
 - 1. Security System Readiness Checklist — The Contractor shall indicate completion of the listed items. All items are required to be complete before a final inspection of the System. If for some reason the Contractor is unable to fully comply with any of the listed conditions, a written statement describing the exception is to be submitted with the checklist for review.

END OF SECTION

SECTION 283100 - FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes modifications to the existing Simplex 4100 fire alarm control panels, manual fire alarm stations, automatic smoke and heat detectors, fire alarm signaling appliances, and auxiliary fire alarm equipment and power and signal wire and cable.
- B. Refer to Division 01 for General Conditions required for this section.
- C. Related Sections:
 - 1. Section 23 33 00 - Air Duct Accessories: Smoke dampers.

1.2 REFERENCES

- A. National Fire Protection Association:
 - 1. NFPA 72 - National Fire Alarm Code.
 - 2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

1.3 SYSTEM DESCRIPTION

- A. Fire Alarm System: NFPA 72, manual and automatic local fire alarm system components to added and modified to the existing Simplex 4010 system located within the building.
- B. Alarm Sequence of Operation: Actuation of initiating device causes the following system operations:
 - 1. Local fire alarm signaling devices sound and display with voice evac signal.
 - 2. Zone-coded signal transmits to remote station equipment.
 - 3. Location of alarm zone indicates on the networked fire alarm control panel and on remote control/ annunciator panel.
 - 4. Signal transmits to building mechanical controls, shutting down fans and operating dampers.
 - 5. Signal transmits by zone to release door hold-open devices.
 - 6. Signal releases magnetic door hold opens.
 - 7. Signal releases electric door locks.
- C. Drill Sequence of Operation: Manual drill function causes alarm mode sequence of operation.
- D. Trouble Sequence of Operation: System or circuit trouble causes the following system operations:
 - 1. Visual and audible trouble alarm indicates by zone at fire alarm control panel.
 - 2. Visual and audible trouble alarm indicates at remote annunciator panel.
- E. The existing fire alarm system on the Second and Third floors of the White Hall building at WCSU shall be converted from hard-wired zoned components to analog addressable intelligent devices and operating characteristics. Work under this division shall be

performed utilizing Johnson Controls – Simplex-Grinnell design and construction services to perform this work. The intent will be to utilize existing wiring in place and convert hard-wired zoned communication protocol to intelligent addressable with conversion of the necessary peripheral devices as required. Refer to the drawings for specific scope of work items related to upgrades required at the head end control panel and peripheral devices. This work shall be provided as turn-key with all requisite documentation and witness testing per NFPA provided as part of the renovation and upgrade.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate system wiring diagram showing each device and wiring connection; indicate annunciator layout, and design calculations. Shop drawings shall be provided to ensure that UL listed devices are utilized with the existing head end equipment; that proper equipment is used to enable system performance.
- C. Product Data: Submit catalog data showing electrical characteristics and connection requirements.
- D. Test Reports: Indicate procedures and results for specified field testing and inspection.
- E. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of fire alarm equipment.
- C. Operation and Maintenance Data: Submit manufacturer's standard operating and maintenance instructions.

1.6 QUALITY ASSURANCE

- A. Provide wiring materials located in plenums with peak optical density not greater than 0.5, average optical density not greater than 0.15, and flame spread not greater than 5 feet (1.5 m) when tested in accordance with NFPA 262.
- B. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities within 50 miles of project.
- B. Installer: Certified fire alarm installer with service facilities within 50 miles of Project.

- C. Design fire alarm under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Connecticut. Work under this Division shall be supervised by Simplex Grinnell. Contact Richard Baker at Johnson Controls Fire Protection, at 860-602-3896. This Division shall cover all costs related to procurement, installation, final termination, programming and testing for a turnkey system installation.

1.8 MAINTENANCE SERVICE

- A. Section 01 70 00 - Execution and Closeout Requirements: Maintenance service.
- B. Furnish service and maintenance of fire alarm equipment for one year from Date of Substantial Completion.

1.9 MAINTENANCE MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two manual station break-glass rods.
- C. Furnish two keys of each type.
- D. Provide (3) manual fire alarm pullstations, complete with all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.
- E. Provide (3) fire alarm audio/visual appliances, complete with all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.
- F. Provide (6) addressable monitoring and control modules, including all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.

1.10 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Provide (2) manual fire alarm pullstations, complete with all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.
- C. Provide (2) fire alarm audio/visual appliances, complete with all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.
- D. Provide (4) addressable ceiling type smoke or heat detectors, complete with all labor, material, and programming, to be located in the field as directed by the Local Authority Having Jurisdiction.

- E. Provide (4) addressable monitoring and control modules, including all labor, material, and programming, to be located in the field as directed by the Local Authority having Jurisdiction.

PART 2 PRODUCTS

2.1 CONTROL PANEL

- A. Manufacturers:
 - 1. Existing to Remain / Simplex 4010.
 - 2. No Substitutions.
- B. Product Description: Provide initiating and annunciating devices, wiring, and system programming to satisfy the project requirements and the local Fire Marshal.
- C. System Supervision: Component or power supply failure places system in trouble mode.
- D. Initiating Device Circuits: Supervised zone module with alarm and trouble indication; occurrence of single ground or open condition places circuit in trouble mode but does not disable circuit from initiating alarm.
- E. Indicating Appliance Circuits: Supervised signal module, sufficient for signal devices connected to system; occurrence of single ground or open condition places circuit in trouble mode but does not disable circuit from signaling alarm.
- F. Auxiliary Relays: Sufficient SPDT auxiliary relay contacts to provide accessory functions specified.

2.2 MANUAL FIRE ALARM STATIONS

- A. Manufacturers:
 - 1. Simplex.
- B. Mounting: Surface.
- C. Backbox: Manufacturer's standard.

2.3 SPOT HEAT DETECTOR

- A. Manufacturers:
 - 1. Simplex.
- B. Temperature Rating: 135 degrees F.
- C. Rate-of-Rise: To be used only when approved by the local fire marshal.

2.4 CEILING SMOKE DETECTOR

- A. Manufacturers:
 - 1. Simplex.

- B. Adjustable sensitivity.
- C. Plug-in analog addressable base.
- D. Auxiliary relay contact.
- E. Visual indication of detector actuation.
- F. Mounting: 4 inch outlet box.
- G. Furnish four-wire detector with separate power supply and signal circuits.

2.5 FLAME DETECTOR

- A. Manufacturers:
 - 1. Simplex
 - 2. Substitutions: Not Permitted.
- B. Product Description: NFPA 72, ultraviolet radiation type flame detector.

2.6 WIRE AND CABLE

- A. Manufacturers:
 - 1. Essex
 - 2. Belden
 - 3. Carol
 - 4. Substitutions: Section 01 25 00 – Substitution Procedures.
- B. Product Description: Non-power limited fire-protective signaling cable, copper conductor, 150 volt insulation rated 60 degrees C. and Power limited fire-protective signaling cable, copper conductor, 300 volts insulation rated 105 degrees C.
- C. All cabling shall be run in Rigid Galvanized Steel conduit.
- D. Fire alarm circuit conductors have insulation color or code as follows:
 - 1. Power Branch Circuit Conductors: Black, red, white.
 - 2. Initiating Device Circuit: Black, red.
 - 3. Detector Power Supply: Violet, brown.
 - 4. Signal Device Circuit: Blue (positive), white (negative).
 - 5. Door Release: Gray, gray.
 - 6. Municipal Trip Circuit: Orange, orange.
 - 7. Municipal Fire Alarm Loop: Black, white.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify products and systems receiving devices are ready for installation.

3.2 EXISTING WORK

- A. Remove exposed abandoned fire alarm wiring, including abandoned wiring above accessible ceiling finishes. Cut cable flush with walls and floors, and patch surfaces.
- B. Disconnect and remove abandoned fire alarm equipment.
- C. Maintain access to existing fire alarm equipment and other installations remaining active and requiring access. Modify installation or provide access panel.
- D. Extend existing fire alarm installations using materials and methods compatible with existing installations, or as specified.
- E. Clean and repair existing fire alarm equipment to remain or to be reinstalled.

3.3 INSTALLATION

- A. Install manual station with operating handle 4 feet 6 inches feet above floor.
- B. Install audible and visual signal devices 7 feet 6 inches feet above floor.
- C. Install 14 AWG minimum size conductors for fire alarm detection and signal circuit conductors in conduit.
- D. Mount end-of-line device in control panel.
- E. Mount outlet box for electric door holder to withstand 80 pounds pulling force.
- F. Connect conduit and wire to sprinkler flow switches, sprinkler valve tamper switches, fire detection components i.e. smoke detectors, duct mounted smoke detectors, heat detectors.
- G. Automatic Detector Installation: Conform to NFPA 72.
- H. Install engraved plastic nameplates in accordance with Section 28 05 53.
- I. Ground and bond fire alarm equipment and circuits in accordance with Section 26 05 26.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test in accordance with NFPA 72 and local fire department requirements.

3.5 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Manufacturer's field services.
- B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

3.6 DEMONSTRATION AND TRAINING

- A. Furnish 10 hours of instruction each for two persons, to be conducted at project site with manufacturer's representative.

END OF SECTION

Section 50 30 00 Hazardous Building Materials Inspection and Inventory



ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

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March 10, 2018

Mr. Anthony DeNapoli
State of Connecticut
Department of Administration Services
Division of Construction Services
450 Columbus Boulevard
Hartford, CT 06103

Re: Asbestos Inspection
White Hall
Western Connecticut State University
Danbury, Connecticut
Project 18-RD-HAZ-02
Building 07405
ATC Project 2257318017

Dear Mr. DeNapoli:

Please find enclosed the Asbestos Inspection Report for White Hall, Western Connecticut State University, Danbury, Connecticut.

Should you have any questions concerning this report, do not hesitate to contact me at 860 282-9924 ext. 1123.

Sincerely,

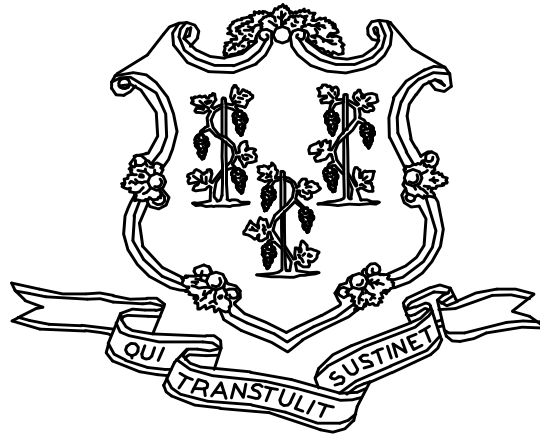
ATC Group Services LLC

Edward P. Fennell Jr., P.E.
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Encl: Asbestos Inspection Report – White Hall WCSU

Cc: Peter Simmons, DAS/DCS
Daniel Robertson, DAS/DCS
Luigi Marcone, WCSU

ASBESTOS INSPECTION REPORT

**WHITE HALL
WESTERN CONNECTICUT STATE UNIVERSITY
DANBURY, CONNECTICUT
BUILDING 07405
PROJECT 18-RD-HAZ-02**



**STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
DIVISION OF CONSTRUCTION SERVICES**

Prepared by:

**ATC GROUP SERVICES LLC
290 ROBERTS STREET - SUITE 301
EAST HARTFORD, CT 06108**

**ATC PROJECT NUMBER
2257318017**

APRIL 10, 2018

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1.0 INTRODUCTION

ATC Group Services LLC (ATC) of East Hartford, Connecticut was retained by the State of Connecticut Department of Construction Services (CTDCS) to conduct an asbestos survey of White Hall – Second and Third Floors, and the Roof at Western Connecticut State University (WCSU) in Danbury, Connecticut. The purpose of the investigation was to identify Asbestos-Containing Material (ACM) present prior to planned renovation activities. The scope of the asbestos inspection included: surveying, sampling, and testing of suspect interior and exterior building materials.

The asbestos inspection was conducted by Scott Johnson and Michael Byrd of ATC on March 16, 2018 and April 5, 2018. Mr. Johnson and Mr. Byrd are State of Connecticut Department of Public Health (CTDPH) licensed asbestos inspectors (CTDPH license numbers 000297 and 000998 respectively). The survey was performed as a walk-through visual inspection, combined with the collection and analysis of bulk samples. Destructive testing was not conducted during this inspection.

2.0 ASBESTOS-CONTAINING MATERIALS SURVEY

Building components which were considered suspect ACM, included Adhesive at Window (3rd Floor, Room 301), Gray Wall Caulk at Window, Brown and Mesh Tile Debris under Wall (3rd Floor, Room 301), Brown Glue Daubs for 1'x1' Ceiling Tiles, Built up roof membrane 4th layer – lower roof, Gray tar on flashing – lower roof, Gray tar on flashing – main roof, Flashing tar – main roof, Flashing 2nd layer – main roof, Built up roof membrane 3rd layer – main roof, Built up roof membrane w/ tar on decking – main roof, Brown/black/yellow built up roof membrane 2nd layer – upper roof, Black built up roof tar on decking – upper roof, Black flashing 2nd layer – upper roof, White Vibration Isolation Cloth (HVAC White Flex Connector), Black Door Glaze, and Yellow Joint Compound.

2.1 ASBESTOS BULK SAMPLE COLLECTION/ANALYSIS PROCEDURE

Building materials considered suspect ACM were inspected and assessed using the methods presented in the United States Environmental Protection Agency AHERA regulations (40 CFR Part 763) and NESHAP regulations (40 CFR Part 61).

ATC collected bulk samples of building materials utilizing a sampling strategy that correlated with 40 CFR 763.86 as follows:

- (a) *Surfacing materials.* An accredited inspector shall collect, in a statistically random manner that is representative of the homogeneous area, bulk samples from each homogeneous area of friable surfacing material that is not assumed to be ACM, and shall collect the samples as follows:
 - (1) At least three bulk samples shall be collected from each homogeneous area that is 1,000 ft² or less, except as provided in 40 CFR Part 763.87(c)(2).
 - (2) At least five bulk samples shall be collected from each homogeneous area that is greater than 1,000 ft² but less than or equal to 5,000 ft², except as provided in 40 CFR Part 763.87(c)(2).
 - (3) At least seven bulk samples shall be collected from each homogeneous area that is greater than 5,000 ft², except as provided in 40 CFR Part 763.87(c)(2).

- (b) *Thermal system insulation.*
- (1) Except as provided in paragraphs (b)(2) through (4) of this section and 40 CFR Part 763.87(c), an accredited inspector shall collect, in a randomly distributed manner, at least three bulk samples from each homogeneous area of thermal system insulation that is not assumed to be ACM.
 - (2) Collect at least one bulk sample from each homogeneous area of patched thermal system insulation that is not assumed to be ACM if the patched section is less than 6 linear or square feet.
 - (3) In a manner sufficient to determine whether the material is ACM or not ACM, collect bulk samples from each insulated mechanical system that is not assumed to be ACM where cement or plaster is used on fittings such as tees, elbows, or valves, except as provided under 40 CFR Part 763.87(c)(2).
 - (4) Bulk samples are not required to be collected from any homogeneous area where the accredited inspector has determined that the thermal system insulation is fiberglass, foam glass, rubber, or other non-ACM.
- (c) *Miscellaneous materials.* In a manner sufficient to determine whether material is ACM or not ACM, an accredited inspector shall collect bulk samples from each homogeneous area of friable or non-friable miscellaneous material that is not assumed to be ACM.

The bulk samples collected during the survey were analyzed by EMSL Analytical, Inc. located in Wallingford, Connecticut (NVLAP Lab Code 200700-0). The bulk samples were analyzed by Polarized Light Microscopy (PLM) with dispersion staining using the EPA method as defined in Perkins, R.L. and B.W. Harvey "Method for the Determination of Asbestos in Bulk Materials," July 1993, p.61 (EPA 600/R-93/116 Method). Utilizing PLM, the microscopist is able to identify and distinguish between asbestos group minerals and other fibrous materials such as cellulose, mineral wool, fiberglass, or synthetic fibers. The quantities of each of these substances is estimated based on the procedures defined in the above-cited reference and are reported as a percentage.

The EPA recognizes the following as asbestos: Chrysotile, Crocidolite, Amosite, Tremolite, Actinolite, and Anthophyllite. To be classified as ACM, the material must be determined to contain greater than one percent (1%) asbestos. In order to consider a material to be non-ACM, all samples of a homogeneous type of material that are collected must be analyzed and all results must indicate the material to contain less than 1% asbestos by weight.

3.0 ASBESTOS-CONTAINING MATERIALS

The results of PLM laboratory analysis indicated that the following materials are asbestos-containing material (ACM). ACM are those materials that contain greater than 1% asbestos, and are as follows:

- Brown Tile Debris Under Wall (3rd Floor, Room 301)
- Brown Glue Daubs For 1'x1' Ceiling Tile
- Adhesive At Window (3rd Floor, Room 301)
- Gray Wall Caulk At Window
- Built Up Roof Membrane 4th Layer – Lower Roof
- Gray Tar On Flashing – Lower Roof
- Gray Tar On Flashing – Main Roof
- Flashing Tar – Main Roof

- Flashing 2nd Layer – Main Roof
- Built Up Roof Membrane 3rd Layer – Main Roof
- Built Up Roof Membrane W/ Tar On Decking – Main Roof
- Brown/Black/Yellow Built Up Roof Membrane 2nd Layer – Upper Roof
- Black Built Up Roof Tar On Decking – Upper Roof
- Black Flashing 2nd Layer – Upper Roof
- White Vibration Isolation Cloth (HVAC White Flex Connector)

Previous inspections have found the following materials to be ACM:

- 9”x9” White with Brown and Gray Floor Tile and Associated Mastic
- 9”x9” Pale Yellow Floor Tile and Associated Mastic
- 9”x9” Brown and Red Floor Tile and Associated Mastic
- 9”x9” Light Grey with White and Grey Floor Tile and Associated Mastic
- 9”x9” Beige with White Streaks Floor Tile and Associated Mastic
- 9”x9” Cream Floor Tile and Associated Mastic
- 9”x9” Black and White Floor Tile and Associated Mastic
- 9”x9” Beige Floor Tile and Associated Black Mastic
- 1’x1’ Tan/White Ceiling Tile
- 1’x1’ Tan Ceiling Tiles
- 1’x1’ Brown Ceiling Tile
- 1’x1’ Grey Ceiling Tile
- 1’x1’ Brown Ceiling Tile Glue Daubs
- 1’x1’ Ceiling Tile Joint Compound
- Tan Joint Compound
- Tan Duct Sealant
- Grey Ceiling Seam Caulk
- White Vibration Isolation Cloth

The following materials in the building were determined to contain a trace (<1%) amount of asbestos:

- Black Door Glazing
- Yellow Joint Compound

The remaining materials which were sampled and tested were found to contain no detectable amounts of asbestos. Specifically, the following materials throughout the building were determined to be non-ACM:

- Brown Floor Sheeting with Mesh Underlay
- Dark Brown Carpet Adhesive
- Light Brown Carpet Adhesive
- Blue Carpet Adhesive
- Yellow Carpet Adhesive
- Yellow Floor Tile Mastic
- Brown Floor Tile Mastic
- 12”x12”Black Floor Tile
- Brown Camo Floor Tile

- 12"x12" Tan Floor Tile
- Cove Base Adhesive for 4 inch Blue Cove Base
- 4 inch Blue Cove Base
- Cove Base Adhesive for 6 inch Blue Cove Base
- 6 inch Blue Cove Base
- Cove Base Adhesive for 6 inch Brown Cove Base
- 6 inch Brown Cove Base
- Adhesive for 4 inch Green Cove Base
- 4inch Green Cove Base
- Adhesive for 4 inch Green Cove Base
- 6 inch Gray Cove Base
- Gypsum Wall Board
- White Joint Compound
- Gray Ceramic Wall Tile
- 1'x1' Fissured Wall Tile
- White Setting Compound for Ceramic Wall Tile
- Plaster Wall Base Coat
- Plaster Ceiling Base Coat
- 2'x4' Pin and Worm Suspended Ceiling Tiles
- 1'x1' Pin and Worm Suspended Ceiling Tile
- 1'x1' White Splined Ceiling Tile
- Brown Glue Daubs For 1'x1' Ceiling Tiles
- Roof Field Built Up Membrane – Lower Roof
- Built Up Roof Membrane 2nd Layer – Lower Roof
- Flashing Top Layer – Lower Roof
- Flashing 2nd Layer – Lower Roof
- Flashing Tar – Lower Roof
- Flashing 3rd Layer – Lower Roof
- Flashing Tar Bottom Layer – Lower Roof
- Light Weight Concrete Deck – Lower Roof
- Flashing Top Layer – Main Roof
- Flashing Tar – Main Roof
- Flashing Second Layer – Main Roof
- Flashing Coal Tar On Concrete – Main Roof
- Roof Field Built Up Membrane – Main Roof
- Built Up Roof Membrane Second Layer – Main Roof
- Roof Field Black Tar W/ Stones – Upper Roof
- Roof Field Built Up Membrane – Upper Roof
- Built Up Roof Membrane 4th Layer – Upper Roof
- Flashing Top Layer – Upper Roof
- Fiberboard Cant – Upper Roof
- Flashing Tar – Upper Roof
- Flashing 3rd Layer – Upper Roof
- Flashing Tar Bottom Layer – Upper Roof
- Gray Caulk On Metal Coping Seam – Upper Roof
- Mudded Pipe Fitting Insulation

- Tar Paper Over Fiberglass Pipe Insulation
- Adhesive For Tar Paper Over Fiberglass Pipe Insulation

Refer to Section 6.0, Bulk Sample Summary of Suspect Materials, for all suspect materials that were identified and sampled.

4.0 DISCUSSION AND RECOMMENDATIONS

EPA regulations require the removal of Regulated Asbestos-Containing Materials (RACM) prior to renovation or demolition activities. RACM is defined as (a) Friable ACM, (b) Category I non-friable ACM that has become friable, (c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation activities. The CTDPH defines "asbestos abatement" as removal, encapsulation, enclosure, renovation, repair, demolition, or other disturbance of ACM but does not include activities which are related to (A) the removal or repair of asbestos cement pipe and are performed by employees of a water company as defined in section 25-32a, or (B) the removal of non-friable ACM found exterior to a building or structure other than material defined as RACM in 40 CFR 61, the National Emission Standards for Hazardous Air Pollutants (NESHAP). Based upon these definitions, ACM identified in the building requires removal prior to renovation, demolition, or disturbance. The State of Connecticut Department of Energy and Environmental Protection (CTDEEP) regulations require the proper disposal of all ACM, regardless of categorization.

5.0 LIMITATIONS

As with all such assessments, the results of the sampling represent conditions found on the date of the survey and may not represent conditions found at other times. Additionally, this assessment was limited with respect to the specific parameters indicated above and should not be construed to be a comprehensive evaluation or a definitive representation of conditions within the facility. The information presented in this report is intended to be used as a guide to evaluate the need for further investigation or the need for modifications to the processes or procedures surveyed.

Building materials that were installed after previous recent abatements were not sampled at the request of WCSU. In addition, ATC was not able to access waterproofing membranes in ceramic floors, sample chalkboards/tack boards or other miscellaneous items where damage would be visible.

6.0 BULK SAMPLE SUMMARY OF SUSPECT MATERIALS

**TABLE 6-1
BULK SAMPLE SUMMARY OF SUSPECT MATERIALS
WESTERN CONNECTICUT STATE UNIVERSITY
WHITE HALL**

Sample Number	Sample Location	Material	% Asbestos	Asbestos Type
031618-1A	3 rd Floor Room 301	Gypsum Board	ND	
031618-1B	3 rd Floor Room 321	Gypsum Wallboard	ND	
031618-2A	3 rd Floor Room 301	White Joint Compound	ND	
031618-2B	3 rd Floor Room 321	White Joint Compound	ND	
031618-2C	3 rd Floor Room 325	White Joint Compound	ND	
031618-3A	3 rd Floor Room 325	Cove Base Adhesive For 4" Blue Cove Base	ND	
031618-4A	3 rd Floor Room 301	Cove Base Adhesive For 6" Blue Cove Base	ND	
031618-4B	3 rd Floor Room 329	Cove Base Adhesive For 6" Blue Cove Base	ND	
031618-5A	3 rd Floor Bath 328	Cove Base Adhesive For 6" Blue Cove Base	ND	
031618-6A	3 rd Floor Bath 328	6" Gray Cove Base	ND	
031618-7A	3 rd Floor, Room 321	Cove Base Adhesive For 4" Blue Cove Base	ND	
031618-8A	3 rd Floor Room 329	6" Blue Cove Base	ND	
031618-9A	3 rd Floor Room 301	4" Blue Cove Base	ND	
031618-9B	3 rd Floor Room 321	4" Blue Cove Base	ND	
031618-9C	3 rd Floor Room 325	4" Blue Cove Base	ND	
031618-10A	3rd Floor Room 301	Adhesive At Window	2	Chrysotile
031618-11A	3 rd Floor Woman's Restroom	6" Brown Cove Base	ND	

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WHITE HALL**

Sample Number	Sample Location	Material	% Asbestos	Asbestos Type
031618-12A	3rd Floor Woman's Restroom	Cove Base Adhesive For 6" Brown Cove Base	ND	
031618-13A	3rd Floor Room 301	Brown Glue Daubs For 1x1 Ceiling Tiles	2	Chrysotile
031618-13B	3rd Floor Room 329	Brown Glue Daubs For 1x1 Ceiling Tiles	2	Chrysotile
031618-14A	3rd Floor Room 321	Dark Brown Carpet Adhesive	ND	
031618-15A	3rd Floor Room 323	Light Brown Carpet Adhesive	ND	
031618-16A	3rd Floor Room 325	Blue Carpet Adhesive	ND	
031618-17A	3rd Floor Room 329	Yellow Carpet Adhesive	ND	
031618-18A	3rd Floor Restroom 328	Brown Floor Tile Mastic	ND	
031618-18B	3rd Floor Woman's Restroom	Brown Floor Tile Mastic	ND	
031618-19A	3rd Floor Bath 328	12"X12" Black Floor Tile	ND	
031618-20A	3rd Floor Woman's Restroom	Brown Camo Floor Tile	ND	
031618-21A	3rd Floor Room 301	12"X12" Tan Floor Tile	ND	
031618-22A	3rd Floor Restroom 328	Gray Ceramic Wall Tile	ND	
031618-23A	3rd Floor Room 301	Yellow Floor Tile Mastic	ND	
031618-23B	3rd Floor Room 301	Yellow Floor Tile Mastic	ND	
031618-24A	3rd Floor Restroom 328	White Setting Compound For Ceramic Wall Tile	ND	
031618-25A	3rd Floor Room 301	Brown Tile Debris Under Wall	10	Chrysotile

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Sample Number	Sample Location	Material	% Asbestos	Asbestos Type
031618-26A	3rd Floor Room 301	Black Door Glaze	<1	Chrysotile
031618-27A	3rd Floor Room 301	Plaster Wall Base Coat	ND	
031618-27B	3rd Floor Hall By 302	Plaster Wall Base Coat	ND	
031618-27C	3rd Floor Hall By 302	Plaster Wall Base Coat	ND	
031618-27D	3rd Floor East Hallway	Plaster Wall Base Coat	ND	
031618-27E	3rd Floor East Hallway	Plaster Wall Base Coat	ND	
031618-28A	3rd Floor, Hall By 302	Plaster Ceiling Base Coat	ND	
031618-28B	3rd Floor Hall By 324	Plaster Ceiling Base Coat	ND	
031618-28C	3rd Floor Bath 328	Plaster Ceiling Base Coat	ND	
031618-29A	3rd Floor Room 301	2'x4' Pin And Worm Suspended Ceiling Tile	ND	
031618-29B	3rd Floor Room 301	2'x4' Pin And Worm Suspended Ceiling Tile	ND	
031618-30A	3rd Floor Room 325	2'x2' Pin And Worm Suspended Ceiling Tile	ND	
031618-30B	3rd Floor Bath 328	2'x2' Pin And Worm Suspended Ceiling Tile	ND	
031618-30C	3rd Floor, Hall By 329	2'x2' Pin And Worm Suspended Ceiling Tile	ND	
031618-30D	3rd Floor Hall By 329	2'x2' Pin And Worm Suspended Ceiling Tile	ND	
031618-31A	3rd Floor Men's Restroom	Pipe Fitting Insulation	ND	
031618-31B	3rd Floor Men's Restroom	Pipe Fitting Insulation	ND	

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WHITE HALL**

Sample Number	Sample Location	Material	% Asbestos	Asbestos Type
031618-32A	3rd Floor East Hallway	1'x1' Pin And Worm Suspended Ceiling Tile	ND	
031618-33A	2nd Floor Room 226	Gray Wall Caulk At Window	6	Chrysotile
031618-17B	2nd Floor Room 221-A	Yellow Carpet Adhesive	ND	
031618-17C	2nd Floor Room 222	Yellow Carpet Adhesive	ND	
031618-27F	2nd Floor Room 208	Plaster Wall Base Coat	ND	
031618-28E	2nd Floor North Hallway	Plaster Ceiling Base Coat	ND	
031618-34A	2nd Floor Room 220-13	White Flex Connector	45	Chrysotile
031618-34B	2nd Floor Room 220-13	White Flex Connector	45	Chrysotile
031618-35C	2nd Floor Room 220-13	White Flex Connector	45	Chrysotile
031618-35D	2nd Floor Room 220-13	White Flex Connector	45	Chrysotile
031618-30E	2nd Floor Room 208	2'x2' Pin And Worm Suspended Ceiling Tile	ND	
031618-30F	2nd Floor Room 225	2'x2' Pin And Worm Suspended Ceiling Tile	ND	
031618-22B	2nd Floor Men's Restroom	Gray Ceramic Wall Tile	ND	
031618-19B	2nd Floor Men's Restroom	12"X12" Black Floor Tile	ND	
031618-24B	2nd Floor Men's Restroom	White Setting Compound For Ceramic Wall Tile	ND	
031618-18C	2nd Floor Men's Restroom	Brown Floor Tile Mastic	ND	
031618-18D	2nd Floor Woman's Restroom	Brown Floor Tile Mastic	ND	

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Sample Number	Sample Location	Material	% Asbestos	Asbestos Type
031618-2D	2nd Floor Room 208	White Joint Compound	ND	
031618-36A	2nd Floor Room 222	Yellow Joint Compound	< 1	Chrysotile
031618-36B	2nd Floor Room 223	Yellow Joint Compound	< 1	Chrysotile
031618-13C	2nd Floor Room 201	Brown Glue Daubs For 1'x1' Ceiling Tile	2	Chrysotile
031618-13D	2nd Floor Room 208	Brown Glue Daubs For 1'x1' Ceiling Tile	2	Chrysotile
031618-37A	2nd Floor Room 222	Brown Glue Daubs For 1'x1' Wall Tile	2	Chrysotile
031618-31C	2nd Floor East Hall By 214	Mudded Pipe Fitting Insulation	ND	
031618-31D	2nd Floor East Hall By 214	Mudded Pipe Fitting Insulation	ND	
031618-31E	2nd Floor East Hall By 214	Mudded Pipe Fitting Insulation	ND	
031618-38A	2nd Floor Room 222	4" Green Cove Base	ND	
031618-38B	2nd Floor Room 222	Adhesive For 4" Green Cove Base	ND	
031618-39A	2nd Floor Custodial Room	Tar Paper Over Fiberglass Pipe Insulation	ND	
031618-39B	2nd Floor Custodial Room	Tar Paper Over Fiberglass Pipe Insulation	ND	
031618-40A	2nd Floor Custodial Room	Adhesive For Tar Paper Over Fiberglass Insulation	ND	
031618-40B	2nd Floor Custodial Room	Adhesive For Tar Paper Over Fiberglass Insulation	ND	
031618-41A	2nd Floor Room 221-A	Brown Floor Sheeting With Mesh Underlay	ND	
031618-41B	2nd Floor Room 221-A	Brown Floor Sheeting With Mesh Underlay	ND	

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WHITE HALL**

Sample Number	Sample Location	Material	% Asbestos	Asbestos Type
031618-41C	2nd Floor Room 225	Brown Floor Sheeting With Mesh Underlay	ND	
031618-42A	2nd Floor Room 225	1'x1' White Splined Ceiling Tile	ND	
031618-42B	2nd Floor Room 226	1'x1' White Splined Ceiling Tile	ND	
031618-42C	2nd Floor Room 226	1'x1' White Splined Ceiling Tile	ND	
031618-43A	2nd Floor Room 226	1'x1' Fissured Wall Tile	ND	
031618-43B	2nd Floor Room 226	1'x1' Fissured Wall Tile	ND	
031618-1C	2nd Floor Room 208	Gypsum Wallboard	ND	
040518-1A	Upper Roof-Field	Roof Field Black Tar W/Stones	ND	
040518-1B	Upper Roof	Roof Field Black Tar W/Stones	ND	
040518-2A	Upper Roof	Roof Field Built Up Membrane	ND	
040518-2B	Lower Roof	Roof Field Built Up Membrane	ND	
040518-2C	Main Roof	Roof Field Built Up Membrane	ND	
040518-3A	Upper Roof	Built Up Roof Membrane 2nd Layer	10	Chrysotile
040518-3B	Lower Roof	Built Up Roof Membrane 2nd Layer	ND	
040518-3C	Main Roof	Built Up Roof Membrane 2nd Layer	ND	
040518-4A	Upper Roof	Built Up Roof Membrane 4th Layer	ND	
040518-4B	Lower Roof	Built Up Roof Membrane 4th Layer	6	Chrysotile

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WHITE HALL**

Sample Number	Sample Location	Material	% Asbestos	Asbestos Type
040518-4C	Main Roof	Built Up Roof Membrane 3rd Layer	10	Chrysotile
040518-5A	Upper Roof	Built Up Roof Tar On Decking	5	Chrysotile
040518-5B	Upper Roof	Built Up Roof Tar On Decking	8	Chrysotile
040518-5C	Main Roof	Built Up Roof Membrane W/Tar On Decking	10	Chrysotile
040518-6A	Upper Roof	Flashing Top Layer	ND	
040518-6B	Lower Roof	Flashing Top Layer	ND	
040518-7A	Upper Roof	Flashing 2nd Layer	8	Chrysotile
040518-7B	Lower Roof	Flashing 2nd Layer	ND	
040518-8A	Upper Roof	Fiberboard Cant	ND	
040518-8B	Upper Roof	Fiberboard Cant	ND	
040518-9A	Upper Roof	Flashing Tar	ND	
040518-9B	Lower Roof	Flashing Tar	ND	
040518-10A	Upper Roof	Flashing 3rd Layer	ND	
040518-10B	Lower Roof	Flashing 3rd Layer	ND	
040518-11A	Upper Roof	Flashing Coal Tar Bottom Layer	ND	
040518-11B	Lower Roof	Flashing Coal Tar Bottom Layer	ND	
040518-12A	Upper Roof	Gray Caulk On Metal Coping Seam	ND	

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WESTERN CONNECTICUT STATE UNIVERSITY
WHITE HALL**

Sample Number	Sample Location	Material	% Asbestos	Asbestos Type
040518-12B	Upper Roof	Gray Caulk On Metal Coping Seam	ND	
040518-13A	Lower Roof	Gray Tar On Flashing	10	Chrysotile
040518-13B	Main Roof	Gray Tar On Flashing	8	Chrysotile
040518-14A	Lower Roof	Light Weight Concrete Deck	ND	
040518-15A	Main Roof	Flashing Top Layer	ND	
040518-15B	Main Roof	Flashing Top Layer	ND	
040518-16A	Main Roof	Flashing Tar	5	Chrysotile
040518-16B	Main Roof	Flashing Tar	ND	
040518-17A	Main Roof	Flashing 2nd Layer	7	Chrysotile
040518-17B	Main Roof	Flashing 2nd Layer	ND	
040518-18A	Main Roof	Flashing Tar On Concrete	ND	

ND = None Detected

7.0 BULK SAMPLE RESULTS/CHAIN-OF-CUSTODY FORMS



EMSL Analytical, Inc.

29 North Plains Highway, Unit # 4 Wallingford, CT 06492

Tel/Fax: (203) 284-5948 / (203) 284-5978

<http://www.EMSL.com> / wallingfordlab@emsl.com

EMSL Order: 241801466

Customer ID: ATCE54

Customer PO: 18-10133-0001

Project ID:

Attention: Scott Johnson
ATC Group Services LLC
290 Roberts Street
East Hartford, CT 06108

Phone: (860) 282-9924

Fax: (860) 282-9826

Received Date: 03/19/2018 4:00 PM

Analysis Date: 03/22/2018

Collected Date: 03/16/2018

Project: 2257318017/WCSU-WHITE HALL, 181 WHITE STREET, DANBURY CT 06810

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos % Type
			% Fibrous	% Non-Fibrous	
031618-1A 241801466-0001	3rd floor, room 301 - gypsum wallboard	Gray/Tan Fibrous Homogeneous	15% Cellulose 2% Glass	83% Non-fibrous (Other)	None Detected
031618-1B 241801466-0002	3rd floor, room 321 - gypsum wallboard	Gray/Tan Fibrous Homogeneous	20% Cellulose 2% Glass	78% Non-fibrous (Other)	None Detected
031618-2A 241801466-0003	3rd floor, room 301 - white joint compound	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-2B 241801466-0004	3rd floor, room 321 - white joint compound	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-2C 241801466-0005	3rd floor, room 325 - white joint compound	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-3A 241801466-0006	3rd floor, room 325 - cove base adhesive for 4" blue cove base	Tan Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
031618-4A 241801466-0007	3rd floor, room 301 - cove base adhesive for 6" blue cove base	Tan Non-Fibrous Homogeneous	5% Cellulose 2% Synthetic	93% Non-fibrous (Other)	None Detected
031618-4B 241801466-0008	3rd floor, room 329 - cove base adhesive for 6" blue cove base	Tan Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
031618-5A 241801466-0009	3rd floor, bath 328 - cove base adhesive for 6" blue cove base	Tan Non-Fibrous Homogeneous	3% Cellulose	97% Non-fibrous (Other)	None Detected
031618-6A 241801466-0010	3rd floor, bath 328 - 6" gray cove base	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-7A 241801466-0011	3rd floor, room 321 - cove base adhesive for 4" blue cove base	Tan/White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-8A 241801466-0012	3rd floor, room 329 - 6" blue cove base	Blue Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-9A 241801466-0013	3rd floor, room 301 - 4" blue cove base	Blue Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-9B 241801466-0014	3rd floor, room 321 - 4" blue cove base	Blue Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-9C 241801466-0015	3rd floor, room 325 - 4" blue cove base	Blue Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-10A 241801466-0016	3rd floor, room 301 - adhesive at window	Tan Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile

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EMSL Order: 241801466
Customer ID: ATCE54
Customer PO: 18-10133-0001
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
031618-11A 241801466-0017	3rd floor woman's bath - 6" brown cove base	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-12A 241801466-0018	3rd floor woman's bath - cove base adhesive for 6" brown cove base	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-13A 241801466-0019	3rd floor, room 301 - brown glue daubs for 1x1 ceiling tiles	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
031618-13B 241801466-0020	3rd floor, room 329 - brown glue daubs for 1x1 ceiling tiles	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
031618-14A 241801466-0021	3rd floor, room 321 - dark brown carpet adhesive	Brown Non-Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
031618-15A 241801466-0022	3rd floor, room 323 - light brown carpet adhesive	Gray Non-Fibrous Homogeneous	15% Cellulose 5% Synthetic	80% Non-fibrous (Other)	None Detected
031618-16A 241801466-0023	3rd floor, room 325 - blue carpet adhesive	Green Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
031618-17A 241801466-0024	3rd floor, room 329 - yellow carpet adhesive	Yellow Non-Fibrous Homogeneous	3% Cellulose 5% Synthetic	92% Non-fibrous (Other)	None Detected
031618-18A 241801466-0025	3rd floor, bath 328 - brown floor tile mastic	Brown Non-Fibrous Heterogeneous	5% Cellulose	5% Quartz 90% Non-fibrous (Other)	None Detected
031618-18B 241801466-0026	3rd floor, woman's bath - brown floor tile mastic	Gray/Tan Non-Fibrous Heterogeneous		5% Quartz 95% Non-fibrous (Other)	None Detected
031618-19A 241801466-0027	3rd floor, bath 328 - 12"x12" black floor tile	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-20A 241801466-0028	3rd floor, woman's bath - brown camo floor tile	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-21A 241801466-0029	3rd floor, room 301 - 12"x12" tan floor tile	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-22A 241801466-0030	3rd floor, bath 328 - gray ceramic wall tile	White/Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-23A 241801466-0031	3rd floor, room 301 - yellow floor tile mastic	Yellow Non-Fibrous Homogeneous	5% Cellulose 5% Synthetic	90% Non-fibrous (Other)	None Detected
031618-23B 241801466-0032	3rd floor, room 301 - yellow floor tile mastic	Yellow Non-Fibrous Homogeneous	2% Cellulose 5% Synthetic	93% Non-fibrous (Other)	None Detected
031618-24A 241801466-0033	3rd floor, bath 328 - white setting compound for ceramic wall tile	White Non-Fibrous Homogeneous		5% Quartz 95% Non-fibrous (Other)	None Detected
031618-25A 241801466-0034	3rd floor, room 301 - brown and mesh tile debris under wall	Brown Fibrous Homogeneous	10% Cellulose	80% Non-fibrous (Other)	10% Chrysotile

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
031618-26A 241801466-0035	3rd floor, room 301 - black door glaze	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	<1% Chrysotile
031618-27A 241801466-0036	3rd floor, room 301 - plaster wall base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-27B 241801466-0037	3rd floor, hall by 302 - plaster wall base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-27C 241801466-0038	3rd floor, hall by 302 - plaster wall base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-27D 241801466-0039	3rd floor, east hallway - plaster wall base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-27E 241801466-0040	3rd floor, east hallway - plaster wall base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-28A 241801466-0041	3rd floor, hall by 302 - plaster ceiling base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-28B 241801466-0042	3rd floor, hall by 324 - plaster ceiling base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-28C 241801466-0043	3rd floor, bath 328 - plaster ceiling base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-28D 241801466-0044	3rd floor, east hallway - plaster ceiling base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-29A 241801466-0045	3rd floor, room 301 - 2'x4' pin and worm suspended ceiling tiles	Gray/White Fibrous Homogeneous	60% Cellulose 20% Min. Wool	10% Perlite 10% Non-fibrous (Other)	None Detected
031618-29B 241801466-0046	3rd floor, room 301 - 2'x4' pin and worm suspended ceiling tiles	Gray/White Fibrous Homogeneous	50% Cellulose 30% Min. Wool	10% Perlite 10% Non-fibrous (Other)	None Detected
031618-30A 241801466-0047	3rd floor, room 325 - 2'x2' pin and worm suspended ceiling tiles	Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
031618-30B 241801466-0048	3rd floor, bath 328 - 2'x2' pin and worm suspended ceiling tiles	Gray/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
031618-30C 241801466-0049	3rd floor, hall by 329 - 2'x2' pin and worm suspended ceiling tiles	Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
031618-30D 241801466-0050	3rd floor, hall by 329 - 2'x2' pin and worm suspended ceiling tiles	Gray/White Fibrous Homogeneous	35% Cellulose 40% Min. Wool	10% Perlite 15% Non-fibrous (Other)	None Detected
031618-31A 241801466-0051	3rd floor, men's bathroom - mudded pipe fitting insulation	Gray/Yellow Fibrous Homogeneous	10% Cellulose 25% Min. Wool	65% Non-fibrous (Other)	None Detected

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
031618-31B 241801466-0052	3rd floor, men's bathroom - mudded pipe fitting insulation	Gray Fibrous Homogeneous	25% Min. Wool	75% Non-fibrous (Other)	None Detected
031618-32A 241801466-0053	3rd floor, east hallway - 1'x1' pin and worm suspended ceiling tile	Gray/White Fibrous Homogeneous	35% Cellulose 35% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
031618-33A 241801466-0054	2nd floor, room 226 - gray wall caulk at window	Gray Non-Fibrous Homogeneous		94% Non-fibrous (Other)	6% Chrysotile
031618-17B 241801466-0055	2nd floor, room 221-A - yellow carpet adhesive	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-17C 241801466-0056	2nd floor, room 222 - yellow carpet adhesive	Yellow Non-Fibrous Homogeneous	3% Cellulose	97% Non-fibrous (Other)	None Detected
031618-27F 241801466-0057	2nd floor, room 208 - plaster wall base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-28E 241801466-0058	2nd floor, north hallway - plaster ceiling base coat	Gray Non-Fibrous Homogeneous		15% Quartz 85% Non-fibrous (Other)	None Detected
031618-34A 241801466-0059	2nd floor, room 220-13 - white flex connector	Tan/White Fibrous Homogeneous	50% Cellulose	5% Non-fibrous (Other)	45% Chrysotile
031618-34B 241801466-0060	2nd floor, room 220-13 - white flex connector	Tan/White Fibrous Homogeneous	50% Cellulose	5% Non-fibrous (Other)	45% Chrysotile
031618-35C 241801466-0061	2nd floor, room 220-13 - white flex connector	Tan/White Fibrous Homogeneous	50% Cellulose	5% Non-fibrous (Other)	45% Chrysotile
031618-35D 241801466-0062	2nd floor, room 220-13 - white flex connector	White Fibrous Homogeneous	50% Cellulose	5% Non-fibrous (Other)	45% Chrysotile
031618-30E 241801466-0063	2nd floor, room 208 - 2'x2' pin and worm suspended ceiling tiles	Gray/White Fibrous Homogeneous	35% Cellulose 40% Min. Wool	10% Perlite 15% Non-fibrous (Other)	None Detected
031618-30F 241801466-0064	2nd floor, room 225 - 2'x2' pin and worm suspended ceiling tiles	Gray/White Fibrous Homogeneous	35% Cellulose 40% Min. Wool	25% Non-fibrous (Other)	None Detected
031618-22B 241801466-0065	2nd floor, men's bath - gray ceramic wall tile	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-19B 241801466-0066	2nd floor, men's bath - 12"x12" black floor tile	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-24B 241801466-0067	2nd floor, men's bath - white setting compound for ceramic wall tile	Gray Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (Other)	None Detected
031618-18C 241801466-0068	2nd floor, men's bath - brown floor tile mastic	Brown/Tan Non-Fibrous Heterogeneous		5% Quartz 95% Non-fibrous (Other)	None Detected
031618-18D 241801466-0069	2nd floor, woman's bath - brown floor tile mastic	Brown Non-Fibrous Homogeneous		5% Quartz 95% Non-fibrous (Other)	None Detected

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EMSL Order: 241801466

Customer ID: ATCE54

Customer PO: 18-10133-0001

Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
031618-2D 241801466-0070	2nd floor, room 208 - white joint compound	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-36A 241801466-0071	2nd floor, room 222 - yellow joint compound	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	<1% Chrysotile
031618-36B 241801466-0072	2nd floor, room 223 - yellow joint compound	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	<1% Chrysotile
031618-13C 241801466-0073	2nd floor, room 201 - brown glue daubs for 1'x1' ceiling tiles	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
031618-13D 241801466-0074	2nd floor, room 208 - brown glue daubs for 1'x1' ceiling tiles	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
031618-37A 241801466-0075	2nd floor, room 222 - brown glue daubs for 1'x1' wall tiles	Brown Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
031618-31C 241801466-0076	2nd floor, east hall by 214 - mudded pipe fitting insulation	Gray Fibrous Homogeneous	25% Min. Wool	75% Non-fibrous (Other)	None Detected
031618-31D 241801466-0077	2nd floor, east hall by 214 - mudded pipe fitting insulation	Gray Fibrous Homogeneous	25% Min. Wool	75% Non-fibrous (Other)	None Detected
031618-31E 241801466-0078	2nd floor, east hall by 214 - mudded pipe fitting insulation	Gray Fibrous Homogeneous	25% Min. Wool	75% Non-fibrous (Other)	None Detected
031618-38A 241801466-0079	2nd floor, room 222 - 4" green cove base	Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
031618-38B 241801466-0080	2nd floor, room 222 - adhesive for 4" green cove base	Tan Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
031618-39A 241801466-0081	2nd floor, custodial room - tar paper over fiberglass pipe insulation	Black Fibrous Homogeneous	50% Cellulose	50% Non-fibrous (Other)	None Detected
031618-39B 241801466-0082	2nd floor, custodial room - tar paper over fiberglass pipe insulation	Brown/Tan/Black Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (Other)	None Detected
031618-40A 241801466-0083	2nd floor, custodial room - adhesive for tar paper over fiberglass TSI	Black Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
031618-40B 241801466-0084	2nd floor, custodial room - adhesive for tar paper over fiberglass TSI	Black Non-Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
031618-41A 241801466-0085	2nd floor, room 221-A - brown floor sheeting with mesh underlay	Gray Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (Other)	None Detected
031618-41B 241801466-0086	2nd floor, room 221-A - brown floor sheeting with mesh underlay	Gray Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (Other)	None Detected
031618-41C 241801466-0087	2nd floor, room 225 - brown floor sheeting with mesh underlay	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

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Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
031618-42A <i>241801466-0088</i>	2nd floor, room 225 - 1'x1' white splined ceiling tile	Gray Fibrous Homogeneous	85% Min. Wool	15% Non-fibrous (Other)	None Detected
031618-42B <i>241801466-0089</i>	2nd floor, room 226 - 1'x1' white splined ceiling tile	Gray Fibrous Homogeneous	85% Min. Wool	15% Non-fibrous (Other)	None Detected
031618-42C <i>241801466-0090</i>	2nd floor, room 226 - 1'x1' white splined ceiling tile	Gray Fibrous Homogeneous	2% Cellulose 85% Min. Wool	13% Non-fibrous (Other)	None Detected
031618-43A <i>241801466-0091</i>	2nd floor, room 226 - 1'x1' fissured wall tiles	Gray Fibrous Homogeneous	85% Min. Wool	15% Non-fibrous (Other)	None Detected
031618-43B <i>241801466-0092</i>	2nd floor, room 226 - 1'x1' fissured wall tiles	Gray Fibrous Homogeneous	85% Min. Wool	15% Non-fibrous (Other)	None Detected
031618-1C <i>241801466-0093</i>	2nd floor, room 208 - gypsum wallboard	Gray/Tan Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (Other)	None Detected

Analyst(s) _____

Lauren Brennan (4)

Lauren Buffone (49)

Quetcy Castro Romero (40)

Lauren Brennan, Asbestos Lab Manager
or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Wallingford, CT NVLAP Lab Code 200700-0,

Initial report from: 03/22/2018 13:39:08

241801466



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BULK SAMPLE LOG

Page 1 of 6

290 Roberts Street, Suite 301
East Hartford, CT 06108
(860) 282-9924 Fax: (860) 282-9826

ATC Inspector: Michael Byrd Client Name: CT-DCS
 Accreditation No.: 998 Project No./Task No.: 2257318017
 Survey Date: 03/16/18 Project Manager: Scott Johnson
 Signature: [Signature] Requested Completion Date: _____
 Lab Name: EMSL Requested turnaround time (circle): 3 HR 6 HR 24 HR 48 HR 3 DY 5 DY
 Building: WCSU - White Hall Address: 181 White street, Danbury CT 06810

Location	Material Description	Type		Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample_of (homogeneous material)	Field Number
		TSI	MISC					
3rd Floor, Room 301	Gypsum Wall Board		MISC		N	ND	1 3	031618-1A
Room 321							2 3	1B
Room 301							1 74	2A
Room 321	White Joint Compound		MISC		N	ND	2 74	2B
Room 325	White Joint Compound		MISC		N	ND	3 74	2C
Room 325	Cove base Adhesive for 4" blue cove base		MISC		N	ND	1 1	3A
Room 301							1 2	4A
Room 329	Cove base Adhesive for 6" blue cove base		MISC		N	ND	2 2	4B
Bath 328	Cove base Adhesive for 6" gray cove base		MISC		N	ND	1 1	5A
Bath 328	6" Gray Cove base		MISC		N	ND	1 1	6A
Room 321	Cove base Adhesive for 4" blue cove base		MISC		N	ND	1 1	7A
Room 329	6" blue Cove base		MISC		N	ND	1 1	8A
Room 301							1 3	9A
Room 321	4" blue cove base		MISC		N	ND	2 3	9B
Room 325	4" blue cove base		MISC		N	ND	3 3	9C
Room 301	Adhesive at window		MISC		N	ND	1 1	10A

Comments: Analyze by PLM

Notes:
 Damage Factors: Physical (sig dmg-dmg-no dmg) Water (extensive-moderate-slight-none)
 Disturbance Factors: Proximity (<1ft- 1-6ft- >6ft) Accessibility (within reach-barely reachable-not reachable)
 Ventilation (yes-no-if yes, type) Air shaft - elevator shaft - duct

Relinquished By/Date: [Signature] 03/19/18
 Relinquished By/Date: _____

Received By/Date: [Signature]
 Received By/Date: _____

Fraility (yes-no, hard-mod-soft surface) Barriers (perm airtight-enclosed-encapsulated) Texture (rough-pitted-prograde-smooth)



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BULK SAMPLE LOG

290 Roberts Street, Suite 301
East Hartford, CT 06108
(860) 282-9924 Fax: (860) 282-9826

241801466

ATC Inspector: Michael Byrd Client Name: CT-DCS

Accreditation No.: 998 Project No./Task No.: 2257318017

Survey Date: 03/16/18 Project Manager: Scott Johnson

Signature: [Signature] Requested Completion Date: _____

Lab Name: EMSL Requested turnaround time (circle): 3 HR 6 HR 24 HR 48 HR 8 DY 5 DY No. Samples Collected 93

Building: WCSU - White Hall Address: 181 white street, Danbury CT 06810

Location	Material Description	Type TSI S MISC	Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample_of_ (homogeneous material)	Field Number
3rd Floor women's Bath	6" Brown Cove base	MISC		N	ND	1	031618-11A
women's Bath	cove base adhesive for 6" Brown Cove base	MISC		N	ND	1	12A
Room 301	Brown Blue Dabs for Iceberg tiles	MISC		N	ND	2	13A
Room 329	Dark brown Carpet Adhesive	MISC		N	ND	1	14A
Room 321	light brown Carpet Adhesive	MISC		N	ND	1	15A
Room 323	Blue Carpet Adhesive	MISC		N	ND	1	16A
Room 325	Yellow Carpet Adhesive	MISC		N	ND	1	17A
Room 329	Brown Floor tile Mastic	MISC		N	ND	2	18A
Bath 328	12"x12" Black Floor tile	MISC		N	ND	1	18B
women's Bath	Brown Camo Floor tile	MISC		N	ND	1	19A
Bath 328	12"x12" Tan Floor tile	MISC		N	ND	1	20A
women's Bath	Gray Ceramic Wall tile	MISC		N	ND	1	21A
Room 301	Yellow Floor tile Mastic	MISC		N	ND	2	22A
Room 301							23A
							23B

Comments: Analyze by PLM

Notes

Damage Factors: Physical (sig dmg-dmg-no dmg) Water (extensive-moderate-slight-none) Friability (yes-no, hard-mod-soft surface)

Disturbance Factors: Proximity (<1ft-1-6ft->6ft) Accessibility (within reach-barely reachable-not reachable) Barriers (perm airtight-enclosed-encapsulated)

Ventilation (yes-no, if yes, type) Air conduits (air plenum - air shaft - elevator shaft, duct) Air movement (high-moderate-low) Texture (rough-pitted-moderate-smooth)

Relinquished By/Date: _____ Received By/Date: _____

Relinquished By/Date: _____ Received By/Date: _____



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BULK SAMPLE LOG

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ATC Inspector: Michael Byrd Client Name: CT-DCS

Accreditation No.: 998 Project No./Task No.: 2257318017

Survey Date: 03/16/18 Project Manager: Scott Johnson

Signature: [Signature] Requested Completion Date: 9

Lab Name: EMSL Requested turnaround time (circle) 3 HR 6 HR 24 HR 48 HR 3 DY 5 DY No. Samples Collected 93

Building: WCSU-White Hall Address: 181 white street, Danbury CT 06810

Location	Material Description	Type TSI MISC	Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample_of_ (homogeneous material)	Field Number
3rd Floor Bath 328	white setting compound for ceramic wall tile	MISC		N	ND	1	031618-24A
Room 301	Brown and Mesh Tile debris under wall	MISC		N	D	1	25A
Room 301	Black Door glaze	MISC		Y	ND	1	26A
Room 301	Plaster wall board base coat	S		Y	SD	1	27A
Hall by 302	Plaster wall board base coat	S		Y	SD	2	27B
Hall by 302	Plaster wall board base coat	S		Y	SD	3	27C
East Hallway	Plaster wall board base coat	S		Y	SD	4	27D
East Hallway	Plaster wall board base coat	S		Y	SD	5	27E
Hall by 302	Plaster Ceiling Board base coat	S		Y	SD	1	28A
Hall by 324	Plaster Ceiling Board base coat	S		Y	SD	2	28B
Bath 328	Plaster Ceiling Board base coat	S		Y	SD	3	28C
East Hallway	Plaster Ceiling Board base coat	S		Y	SD	4	28D
Room 301	2"x4" pin and worm suspended ceiling tiles	MISC		N	ND	1	29A
Room 301	2"x4" pin and worm suspended ceiling tiles	MISC		N	ND	2	29B
Room 325	2"x2" Pin and Worm Suspended Ceiling Tiles	MISC		N	ND	1	30A
Bath 328	2"x2" Pin and Worm Suspended Ceiling Tiles	MISC		N	ND	2	30B

Comments: Analyze by PLM

Notes

Damage Factors: Physical (sig dmg-dmg-no dmg) Water (extensive-moderate-slight-none) Deterioration (heavy-moderate-light-none) Friability (yes-no; hard-mod-soft surface)

Disturbance Factors: Proximity (<1ft-1-6ft->6ft) Accessibility (within reach-barely reachable-not reachable) Air conduits (air plenum - air shaft - elevator shaft - duct) Vibration (gym-music rm-auditorium-mechanical rm-elevator-other) Barriers (perm airtight-enclosed-encapsulated) Air movement (high-moderate-low) Air texture (rough-pitted-moderate-smooth)

Relinquished By/Date: [Signature] 03/19/18 Received By/Date: _____

Relinquished By/Date: _____ Received By/Date: _____

241801466



ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

BULK SAMPLE LOG

290 Roberts Street, Suite 301
East Hartford, CT 06108
(860) 282-9924 Fax: (860) 282-9826

ATC Inspector: Michael Byrd Client Name: CT-DCS

Accreditation No.: 998 Project No./Task No.: 2257318017

Survey Date: 03/16/18 Project Manager: Scott Johnson

Signature: [Signature] Requested Completion Date: _____

Lab Name: EMSL Requested turnaround time (circle): 3 HR 6 HR 24 HR 48 HR 3 DY 5 DY No. Samples Collected 93

Building: WCSU - white Hall Address: 181 white street, Danbury CT 06810

Location	Material Description	Type	Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample_of_homogeneous_material	Field Number
3rd Floor, Hall by 329		TSI					
Hall by 329	2x2' pin and worm suspended ceiling tile	MISC		ND	ND	3	031618-30C
Men's Bathroom						4	30D
Men's Bathroom	Muddled Pipe Fitting Insulation	TST		Y	ND	1	31A
East Hallway	1x1 pin and worm suspended ceiling tile	MISC		N	ND	2	31B
2nd Floor Room 226	gray wall caulk at window	MISC		N	ND	1	32A
Room 221-A						1	33A
Room 222	Yellow Carpet Adhesive	MISC		N	ND	2	17B
Room 208	Plaster wall board base coat	MISC		Y	SD	3	17C
North Hallway	Plaster Ceiling board base coat	MISC		Y	SD	6	27F
Room 220-13						5	28E
Room 220-13	White Flex Connector	MISC		N	ND	1	34A
Room 220-13						2	34B
Room 220-13	White Flex Connector	MISC		N	ND	3	35C
Room 208	2x2' pin and worm suspended ceiling tile	MISC		N	ND	4	35D
Room 225	2x2' pin and worm suspended ceiling tile	MISC		N	ND	5	30E
						6	30F

Comments: Analyze by PLM

Notes:

Damage Factors: Physical (sig dmg-dmg-no dmg) Water (extensive-moderate-slight-none)
 Proximity (<1ft-1-6ft->6ft) Accessibility (within reach-barely reachable-not reachable)
 Disturbance Factors: Ventilation (yes-no, if yes, type) Air conduits (air plenum - air shaft - elevator shaft - duct)

Relinquished By/Date: _____ Received By/Date: _____

Relinquished By/Date: _____ Received By/Date: _____

Reliability (yes-no; hard-mod-soft surface) _____
 Barriers (perm airtight-enclosed-encapsulated) _____
 Texture (rough-pitted-moderate-smooth) _____

241801466



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BULK SAMPLE LOG

Page 5 of 6

290 Roberts Street, Suite 301
East Hartford, CT 06108
(860) 282-9924 Fax: (860) 282-9826

ATC Inspector: Michael Byrd Client Name: CT-DCS
 Accreditation No.: 998 Project No./Task No.: 2757318017
 Survey Date: 03/16/18 Project Manager: Scott Johnson
 Signature: [Signature] Requested Completion Date: _____
 Lab Name: EMSL Requested turnaround time (circle): 3 HR 6 HR 24 HR 48 HR 3 DY 5 DY No. Samples Collected 93
 Building: WCSU - white Hall Address: 181 white street, Danbury CT 06810

Location	Material Description	Type TSI S MISC	Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample_of_ (homogeneous material)	Field Number
2nd Floor Men's Bath	Gray Ceramic wall tile	MISC		N	ND	2	031618-22B
Men's Bath	12"X12" Black Floor tile	MISC		N	ND	2	19B
Men's Bath	white setting compound for ceramic wall tile	MISC		N	ND	2	24B
Men's Bath	Brown Floor tile mortar	MISC		N	ND	3	18C
Woman's Bath	Brown Floor tile mortar	MISC		N	ND	4	18D
Room 208	White Joint Compound	MISC		N	ND	4	2D
Room 207	Yellow Joint Compound	MISC		N	ND	1	36A
Room 203						2	36B
Room 201						3	13C
Room 208	Brown glue dabs for 1x1' ceiling tiles	MISC		N	SD	4	13D
Room 202	Brown glue dabs for 1x1' wall tiles	MISC		N	ND	1	37A
East Hall by 214	Muddled Pipe fitting Insulation	TSI		Y	ND	3	31C
East Hall by 214						4	31D
East Hall by 214	Muddled Pipe fitting Insulation	TSI		Y	ND	5	31E
Room 202	4" Green core base	MISC		N	ND	1	38A
Room 202	Adhesive for 4" Green core base	MISC		N	ND	2	38B

Comments: Analyze by PLM

Notes:
 Damage Factors: Physical (sig dmg-dmg-no dmg) Water (extensive-moderate-slight-none)
 Disturbance Factors: Proximity (<1ft-1-6ft->6ft) Accessibility (within reach-barely reachable-not reachable)
 Ventilation (yes-no; if yes, type) Air conduits (air plenum - air shaft - elevator shaft + duct)

Relinquished By/Date: [Signature] 03/19/18
 Relinquished By/Date: _____

Received By/Date: _____
 Received By/Date: _____

Frailability (yes-no, hard-mod-soft surface)
 Barriers (perm airtight-enclosed-encapsulated)
 Texture (rough-pitted-moderate-smooth)

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BULK SAMPLE LOG

Page 6 of 6

290 Roberts Street, Suite 301
East Hartford, CT 06108
(860) 282-9924 Fax: (860) 282-9826

ATC Inspector: Michael Byrd Client Name: CT-DCS
 Accreditation No.: 998 Project No./Task No.: 2257318017
 Survey Date: 03/16/18 Project Manager: Scott Johnson
 Signature: [Signature] Requested Completion Date: _____
 Lab Name: EMSL Requested turnaround time (circle): 3 HR 6 HR 24 HR 48 HR 3 DY 5 DY No. Samples Collected 93
 Building: WCSU-White Hall Address: 181 white street, Danbury CT 06810

Location	Material Description	Type TSI MISC	Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample_of_ (homogeneous material)	Field Number
2nd Floor Custodial Room						1	031618-39A
Custodial Room	tar paper over fiberglass Pipe Insulation	MISC		N	SD	2	39B
Custodial Room	adhesive for tar paper over Fiberglass TSI	MISC		M	SD	1	40A
Custodial Room						2	40B
Room 221-A						1	41A
Room 221-A	Brown Floor sheeting with mesh underlay	MISC		N	ND	2	41B
Room 225	Brown Floor sheeting with mesh underlay	MISC		N	ND	3	41C
Room 225	1'x1' white spined ceiling tile	MISC		N	ND	1	42A
Room 226						2	42B
Room 226	1'x1' white spined ceiling tile	MISC		N	ND	3	42C
Room 226						1	43A
Room 226	1'x1' Assured wall tiles	MISC		N	ND	2	43B
Room 208	Gypsum wall board	MISC		N	ND	3	1C

Comments:

Notes
 Damage Factors: Physical (sig dmg-dmg-no dmg) Water (extensive-moderate-slight-none)
 Disturbance Factors: Proximity (<1ft- 1-6ft- >6ft) Accessibility (within reach-barely reachable-not reachable)
 Ventilation (yes-no, if yes, type) Air conduits (air plenum- air shaft- elevator shaft- duct)
 Friability (yes-no, hard-mod-soft surface)
 Barriers (perm airtight-enclosed-encapsulated)
 Texture (rough-pitted-moderate-smooth)

Relinquished By/Date: _____
 Relinquished By/Date: _____

Received By/Date: _____
 Received By/Date: _____



EMSL Analytical, Inc.

29 North Plains Highway, Unit # 4 Wallingford, CT 06492

Tel/Fax: (203) 284-5948 / (203) 284-5978

<http://www.EMSL.com> / wallingfordlab@emsl.com

EMSL Order: 241801730

Customer ID: ATCE54

Customer PO: 18-10133-0001

Project ID:

Attention: Ed Fennell
ATC Group Services LLC
290 Roberts Street
Suite 301
East Hartford, CT 06108

Phone: (860) 282-9924

Fax: (860) 282-9826

Received Date: 04/05/2018 2:25 PM

Analysis Date: 04/06/2018

Collected Date: 04/05/2018

Project: 2257318017/WHITE HALL-ROOF, DANBURY, CT

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
040518-1A <small>241801730-0001</small>	Upper roof-field - roof field black tar w/stones	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-1B <small>241801730-0002</small>	Upper roof - roof field black tar w/stones	Black Non-Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
040518-2A <small>241801730-0003</small>	Upper roof - roof field built up membrane	Black/Yellow Fibrous Heterogeneous	20% Cellulose 10% Glass	70% Non-fibrous (Other)	None Detected
040518-2B <small>241801730-0004</small>	Lower roof - roof field built up membrane	Black Fibrous Homogeneous	30% Glass	70% Non-fibrous (Other)	None Detected
040518-3A <small>241801730-0005</small>	Upper roof - built up roof membrane 2nd layer	Brown/Black/Yellow Fibrous Heterogeneous	15% Cellulose	75% Non-fibrous (Other)	10% Chrysotile
040518-3B <small>241801730-0006</small>	Lower roof - built up roof membrane 2nd layer <i>The sample group is not homogeneous.</i>	Black Non-Fibrous Homogeneous	15% Glass	85% Non-fibrous (Other)	None Detected
040518-4A <small>241801730-0007</small>	Upper roof - built up roof membrane 4th layer	Black Non-Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
040518-4B <small>241801730-0008</small>	Lower roof - built up roof membrane 4th layer <i>The sample group is not homogeneous.</i>	Brown/Black Non-Fibrous Heterogeneous	15% Glass	79% Non-fibrous (Other)	6% Chrysotile
040518-5A <small>241801730-0009</small>	Upper roof - built up roof tar on decking	Black Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
040518-5B <small>241801730-0010</small>	Upper roof - built up roof tar on decking	Black Non-Fibrous Heterogeneous		92% Non-fibrous (Other)	8% Chrysotile
040518-6A <small>241801730-0011</small>	Upper roof - flashing top layer	Black Fibrous Homogeneous	25% Synthetic	75% Non-fibrous (Other)	None Detected
040518-6B <small>241801730-0012</small>	Lower roof - flashing top layer	Black Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-7A <small>241801730-0013</small>	Upper roof - flashing 2nd layer	Black Fibrous Homogeneous	20% Glass	72% Non-fibrous (Other)	8% Chrysotile
040518-7B <small>241801730-0014</small>	Lower roof - flashing 2nd layer <i>The sample group is not homogeneous.</i>	Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
040518-8A <small>241801730-0015</small>	Upper roof - fiberboard cant	Brown Fibrous Homogeneous	98% Cellulose	2% Non-fibrous (Other)	None Detected

Initial report from: 04/06/2018 13:13:13



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29 North Plains Highway, Unit # 4 Wallingford, CT 06492

Tel/Fax: (203) 284-5948 / (203) 284-5978

<http://www.EMSL.com> / wallingfordlab@emsl.com

EMSL Order: 241801730
Customer ID: ATCE54
Customer PO: 18-10133-0001
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
040518-8B <small>241801730-0016</small>	Upper roof - fiberboard cant	Brown/Black Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
040518-9A <small>241801730-0017</small>	Upper roof - flashing tar	Black Non-Fibrous Homogeneous	5% Glass	95% Non-fibrous (Other)	None Detected
040518-9B <small>241801730-0018</small>	Lower roof - flashing tar	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-10A <small>241801730-0019</small>	Upper roof - flashing 3rd layer	Black Fibrous Homogeneous	5% Cellulose 25% Glass	70% Non-fibrous (Other)	None Detected
040518-10B <small>241801730-0020</small>	Lower roof - flashing 3rd layer	Black Non-Fibrous Homogeneous	5% Glass	95% Non-fibrous (Other)	None Detected
040518-11A <small>241801730-0021</small>	Upper roof - flashing coal tar bottom layer	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-11B <small>241801730-0022</small>	Lower roof - flashing coal tar bottom layer	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-12A <small>241801730-0023</small>	Upper roof - gray caulk on metal coping seam	Brown/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-12B <small>241801730-0024</small>	Upper roof - gray caulk on metal coping seam	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-13A <small>241801730-0025</small>	Lower roof - gray tar on flashing	Black Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
040518-13B <small>241801730-0026</small>	Main roof - gray tar on flashing	Black Non-Fibrous Homogeneous		92% Non-fibrous (Other)	8% Chrysotile
040518-14A <small>241801730-0027</small>	Lower roof - light weight concrete deck	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-15A <small>241801730-0028</small>	Main roof - flashing top layer	Black Fibrous Homogeneous	25% Synthetic	75% Non-fibrous (Other)	None Detected
040518-15B <small>241801730-0029</small>	Main roof - flashing top layer	Black Fibrous Homogeneous	10% Synthetic 10% Glass	80% Non-fibrous (Other)	None Detected
040518-16A <small>241801730-0030</small>	Main roof - flashing tar	Black Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
040518-16B <small>241801730-0031</small>	Main roof - flashing tar	Black Non-Fibrous Heterogeneous		100% Non-fibrous (Other)	None Detected
<i>The sample group is not homogeneous.</i>					
040518-17A <small>241801730-0032</small>	Main roof - flashing 2nd layer	Black Non-Fibrous Homogeneous		93% Non-fibrous (Other)	7% Chrysotile
040518-17B <small>241801730-0033</small>	Main roof - flashing 2nd layer	Black Fibrous Heterogeneous	15% Glass	85% Non-fibrous (Other)	None Detected
<i>The sample group is not homogeneous.</i>					

Initial report from: 04/06/2018 13:13:13



EMSL Analytical, Inc.

29 North Plains Highway, Unit # 4 Wallingford, CT 06492

Tel/Fax: (203) 284-5948 / (203) 284-5978

<http://www.EMSL.com> / wallingfordlab@emsl.com

EMSL Order: 241801730
Customer ID: ATCE54
Customer PO: 18-10133-0001
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
040518-18A <small>241801730-0034</small>	Main roof - flashing coal tar on concrete	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
040518-2C <small>241801730-0035</small>	Main roof - roof field built up membrane	Black Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
040518-3C <small>241801730-0036</small>	Main roof - built up roof membrane 2nd layer	Brown/Black Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
040518-4C <small>241801730-0037</small>	Main roof - built up roof membrane 3rd layer	Brown/Black Non-Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
040518-5C <small>241801730-0038</small>	Main roof - built up roof membrane w/tar on decking	Brown/Black Non-Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile

Analyst(s) _____

Lauren Buffone (22)

Quetcy Castro Romero (16)

Lauren Brennan, Asbestos Lab Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Analytical, Inc. Wallingford, CT NVLAP Lab Code 200700-0,

Initial report from: 04/06/2018 13:13:13



ENVIRONMENTAL • GEOTECHNICAL
BUILDING SCIENCES • MATERIALS TESTING

BULK SAMPLE LOG

241801730

290 Roberts Street, Suite 301
East Hartford, CT 06108
(860) 282-9924 Fax: (860) 282-9826

ATC Inspector: <u>Scott Johnson / DAN TORV</u>		Client Name: <u>CTDCS</u>		No. Samples Collected: <u>38</u>			
Accreditation No.: <u>00297/00996</u>		Project No./Task No.: <u>2252318017</u>					
Survey Date: <u>4/5/18</u>		Project Manager: <u>Ed Fennell</u>					
Signature: <u>[Signature]</u>		Requested Completion Date:					
Lab Name: <u>EMSL</u>		Requested turnaround time (circle): 3 HR 6 HR 24 HR 48 HR 3 DY 5 DY					
Building: <u>White Hall - Roof</u>		Address: <u>Jacobus, CT</u>					
Location	Material Description	Type TSI S MISC	Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample of - (homogeneous material)	Field Number
Upper Roof - Field	Roof Field Black Tar w/stones	M		N		1	012018-1A
Upper Roof						2	-1B
Upper Roof	Roof Field Built up Membrane	M		N		1	-2A
Lower Roof						2	-2B
Upper Roof	Built up Roof Membrane 2nd Layer	M		N		1	-3A
Lower Roof						2	-3B
Upper Roof	Built up Roof Membrane 4th Layer	M		N		1	-4A
Lower Roof						2	-4B
Upper Roof	Built up Roof Tar on Decking	M		N		1	-5A
Upper Roof						2	-5B
Upper Roof	Flashing Tip layer	M		N		1	-6A
Lower Roof						2	-6B
Upper Roof	Flashing 2nd Layer	M		N		1	-7A
Lower Roof						2	-7B
Upper Roof	Fiberboard Cant	M		Y		1	-8A
Upper Roof						2	-8B

Comments: (Analyze by PM)

Notes:
 Damage Factors: Physical (sig dmg-no dmg) Water (extensive-moderate-slight-none)
 Disturbance Factors: Proximity (<1ft-1-6ft->6ft) Accessibility (within reach-barely reachable-not reachable)
 Ventilation (yes-no; if yes, type) Air conduits (air plenum - air shaft - elevator shaft - duct)

Relinquished By/Date: [Signature] 4/5/18
 Relinquished By/Date: [Signature] 4/5/18

Received By/Date: [Signature] 4/5/18 14:05
 Received By/Date: Wall 2

Fraility (yes-no: hard-mod-soft surface) Barriers (perm airtight-enclosed-encapsulated) Texture (rough-pitted-moderate-smooth)



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BULK SAMPLE LOG

290 Roberts Street, Suite 301
East Hartford, CT 06108
(860) 282-9924 Fax: (860) 282-9826

241801730

ATC Inspector: <u>Scott Johnson / DAN TORO</u>	Client Name: <u>CTDLS</u>						No. Samples Collected: <u>38</u>
Accreditation No.: <u>002917/00996</u>	Project No./Task No.: <u>2257318017</u>						
Survey Date: <u>4/5/18</u>	Project Manager: <u>Ed Fenwick</u>						
Signature: <u>[Signature]</u>	Requested Completion Date:						
Lab Name: <u>EMSL</u>	Requested turnaround time (circle): <u>24 HR</u>	3 HR	6 HR	24 HR	48 HR	3 DY	5 DY
Building: <u>White Hall - Roof</u>	Address: <u>Deerbury, CT</u>						
Location	Material Description	Type TSI MISC	Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample of (homogeneous material)	Field Number
Upper Roof	Flashing Tar	M		N		2	2418-9A
Lower Roof	Flashing 3" layer	M		N		2	-9B
Upper Roof	Flashing Coal Tar - Bottom layer	M		N		2	-10A
Lower Roof	Gray Caulk on Metal Coping Seam	M		N		2	-10B
Upper Roof	Gray Tar on Flashing	M		N		2	-11A
Lower Roof	Light Weight Concrete Deck	M		N		2	-11B
Main Roof	Flashing Top layer	M		N		2	-12A
	Flashing Tar	M		N		2	-12B
		M		N		1	-13A
		M		N		2	-13B
		M		N		1	-14A
		M		N		2	15A
		M		N		2	15B
		M		N		2	16A
		M		N		2	16B

Comments: (Analyze by Plan)

Notes:
 Damage Factors: Physical (sig dmg-dmg-no dmg) Water (extensive-moderate-slight-none)
 Disturbance Factors: Proximity (<1ft-1-6ft->6ft) Accessibility (within reach-barely reachable-not reachable)
 Ventilation (yes-no; if yes, type) Air conduits (air plenum- air shaft- elevator shaft - duct)

Relinquished By/Date: [Signature] Received By/Date: _____
 Relinquished By/Date: 4/5/18 Received By/Date: _____

Fraility (yes-no, hard-mod-soft surface)
 Barriers (perm airtight-enclosed-encapsulated)
 Texture (rough-pitted-moderate-smooth)



BULK SAMPLE LOG

290 Roberts Street, Suite 301
 East Hartford, CT 06108
 (860) 282-9924 Fax: (860) 282-9826

241801730

ATC Inspector: Scott Johnson / Dan Toru		Client Name: CTDCS	
Accreditation No.: 000297 / 000996		Project No./Task No.: 2257318017	
Survey Date: 4/5/18		Project Manager: Ed Fennell	
Signature: [Signature]		Requested Completion Date:	
Lab Name: F. M. S. L.	Requested turnaround time (circle)	3 HR	6 HR
Building: White Hall - Roof	Requested turnaround time (circle)	48 HR	3 DY
Address: Danbury, CT		5 DY	No. Samples Collected: 38

Location	Material Description	Type TSI MISC	Estimated Quantity	Friable Y/N	Condition (SD D ND)	Sample_of_ (homogeneous material)	Field Number
Main Roof	Flashing 2nd layer	M		N		2	040115-17A
	Flashing cont Tar on concrete	M		N		1	17B
	Roof Field Builtup Membrane	M		N		3	-18A
	Built up Membrane 2nd layer	M		N		3	-2C
	Built up Root Membrane 3' layer	M		N		3	-3C
	Built up Root Membrane w/ Tar on Decking	M		N		3	-4C
				N		3	-5C

Comments: (Analysis by PLM)

Notes:
 Damage Factors: Physical (sig dmg-dmg-no dmg) Water (extensive-moderate-slight-none)
 Disturbance Factors: Proximity (<1ft-1.6ft->6ft) Accessibility (within reach-barely reachable-not reachable) Air conduits (air plenum - air shaft - elevator shaft - duct)
 Ventilation (yes-no; if yes, type) Air movement (high-moderate-low)
 Friability (yes-no; hard-mod-soft surface)
 Barriers (perm airtight-enclosed-encapsulated)
 Texture (rough-pitted-moderate-smooth)


Relinquished By/Date: [Signature] 4/15/18
 Received By/Date: _____

APPENDIX A
LICENSES AND CERTIFICATIONS

Dear SCOTT J JOHNSON,

Attached you will find your validated certificate for the coming year. Should you have any questions about your certificate renewal, please do not hesitate to write or call:

Department of Public Health (860) 509-7603
P.O. Box 340308 oplc.dph@ct.gov
M.S.#12MQA www.ct.gov/dph/license
Hartford, CT 06134-0308

Sincerely,

RAUL PINO, MD, MPH, COMMISSIONER
DEPARTMENT OF PUBLIC HEALTH

EMPLOYER'S COPY

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH


NAME: SCOTT J JOHNSON

CERTIFICATE NO.: 000297

CURRENT THROUGH: 09/30/18

PROFESSION: ASBESTOS CONSULTANT-INSPI/MGMT PLANNER

VALIDATION NO.: 03-615244

SIGNATURE:  COMMISSIONER

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH


PURSUANT TO THE PROVISIONS OF THE GENERAL STATUTES OF CONNECTICUT
THE INDIVIDUAL NAMED BELOW IS CERTIFIED
BY THIS DEPARTMENT AS A
ASBESTOS CONSULTANT-INSPI/MGMT PLANNER

CERTIFICATE NO.: 000297

CURRENT THROUGH: 09/30/18

VALIDATION NO.: 03-615244

SCOTT J JOHNSON

SIGNATURE:  COMMISSIONER

INSTRUCTIONS:

1. Detach and sign each of the cards on this form
2. Display the large card in a prominent place in your office or place of business.
3. The wallet card is for you to carry on your person. If you do not wish to carry the wallet card, place it in a secure place.
4. The employer's copy is for persons who must demonstrate current licensure/certification in order to retain employment or privileges. The employer's card is to be presented to the employer and kept by them as a part of your personnel file. Only one copy of this card can be supplied to you.

WALLET CARD

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH


NAME: SCOTT J JOHNSON

CERTIFICATE NO.: 000297

CURRENT THROUGH: 09/30/18

PROFESSION: ASBESTOS CONSULTANT-INSPI/MGMT PLANNER

VALIDATION NO.: 03-615244

SIGNATURE:  COMMISSIONER

CERTIFICATE OF ACHIEVEMENT

This certifies that

Scott Johnson

has successfully completed the
**Asbestos Site Inspector Refresher Training
Asbestos Accreditation Under TSCA Title II
40 CFR Part 763**

conducted by

ATC Group Services LLC
73 William Franks Drive
West Springfield, MA 01089
(413) 781-0070

Gregory Morsch

Principal Instructor: Gregory Morsch

October 12, 2017

Date of Course

October 12, 2018

Expiration Date

Gregory Morsch

Regional Training Manager: Gregory Morsch

SIAR - 5858

Certificate Number

October 12, 2017

Examination Date

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH

PURSUANT TO THE PROVISIONS OF THE GENERAL STATUTES OF CONNECTICUT

THE INDIVIDUAL NAMED BELOW IS CERTIFIED
BY THIS DEPARTMENT AS A
ASBESTOS CONSULTANT-INSPECTOR

MICHAEL W BYRD

CERTIFICATE NO.

000998

CURRENT THROUGH

01/31/19

VALIDATION NO.

03-662927


SIGNATURE


COMMISSIONER

CERTIFICATE OF ACHIEVEMENT

This certifies that

Michael Byrd

has successfully completed the
**24 Hour Asbestos Site Inspector Initial Training
Asbestos Accreditation Under TSCA Title II
40 CFR Part 763**

conducted by

*ATC Group Services LLC
73 William Franks Drive
West Springfield, MA 01089
(413) 781-0070*

Marcus Soutra

*Principal Instructor: Marcus Soutra
January 22-24, 2018*

Date of Course

January 24, 2019

Expiration Date

Gregory Morsch

*Regional Manager: Gregory Morsch
SL-1911*

Certificate Number

January 24, 2018

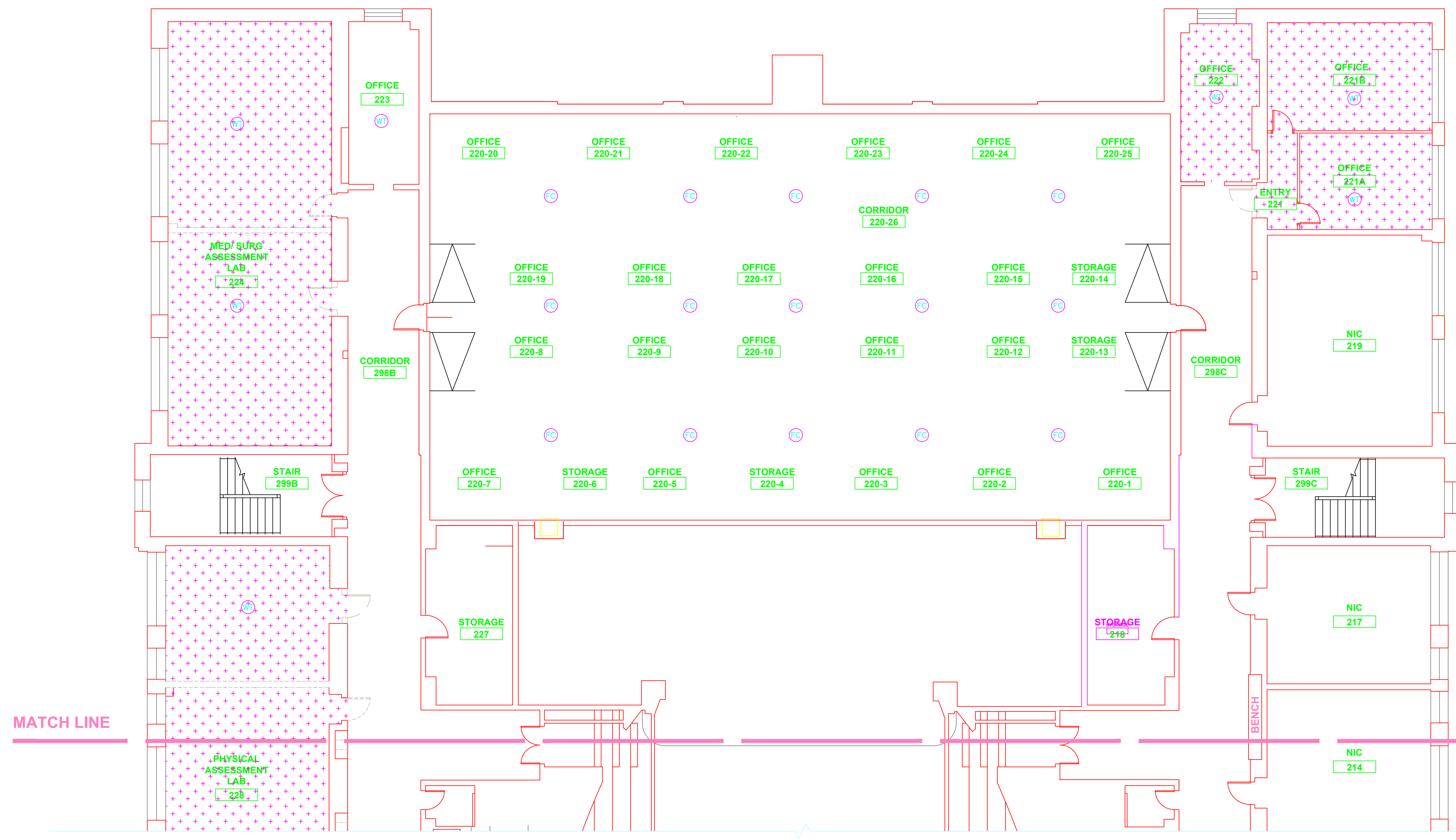
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APPENDIX B

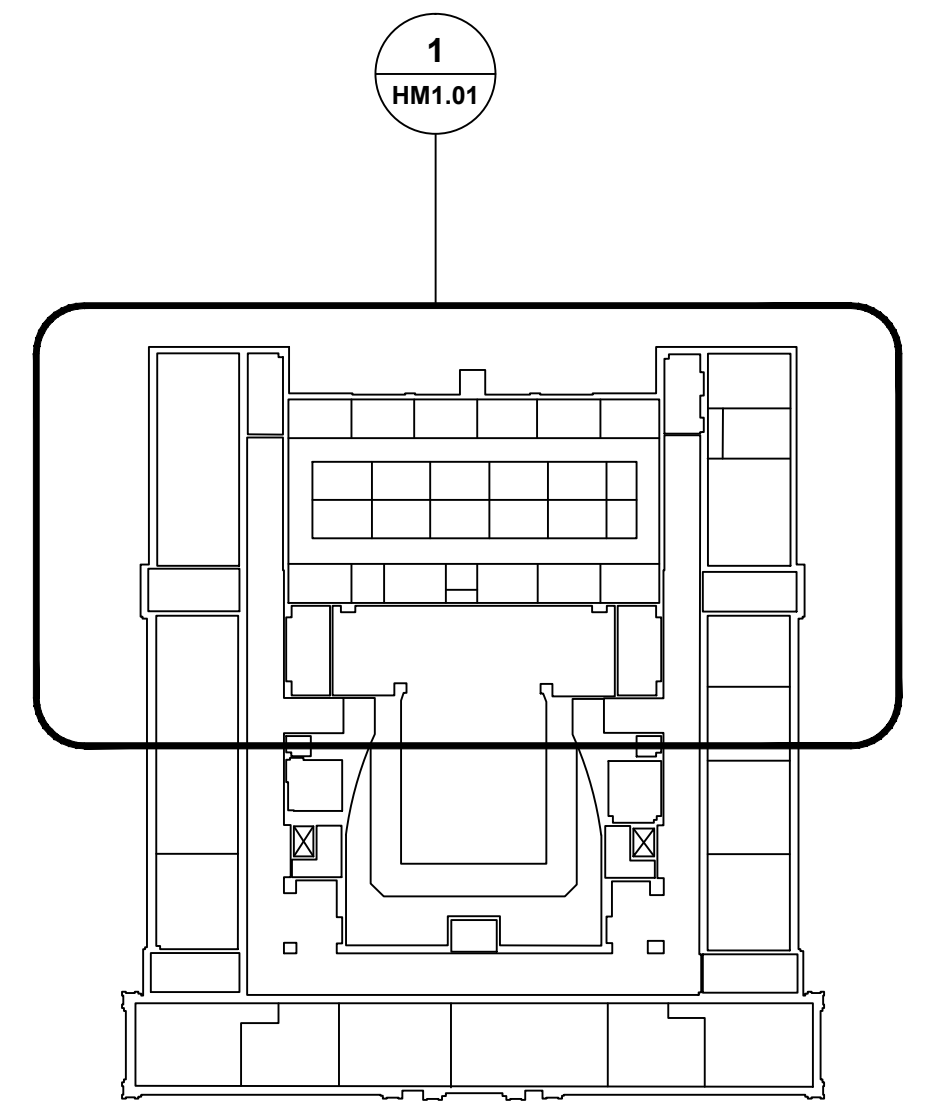
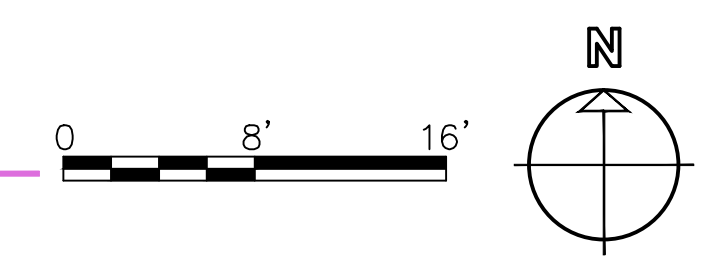
DRAWINGS

HAZMAT LEGEND

- ACM RESILIENT FLOORING AND MASTIC
- ACM CEILING TILE GLUE DAUBS
- ACM PIPE INSULATION
- ACM PIPE FITTING INSULATION
- ACM WALL TILE GLUE DAUBS
- ACM FLEX CONNECTOR



1 NORTH WING PARTIAL PLAN



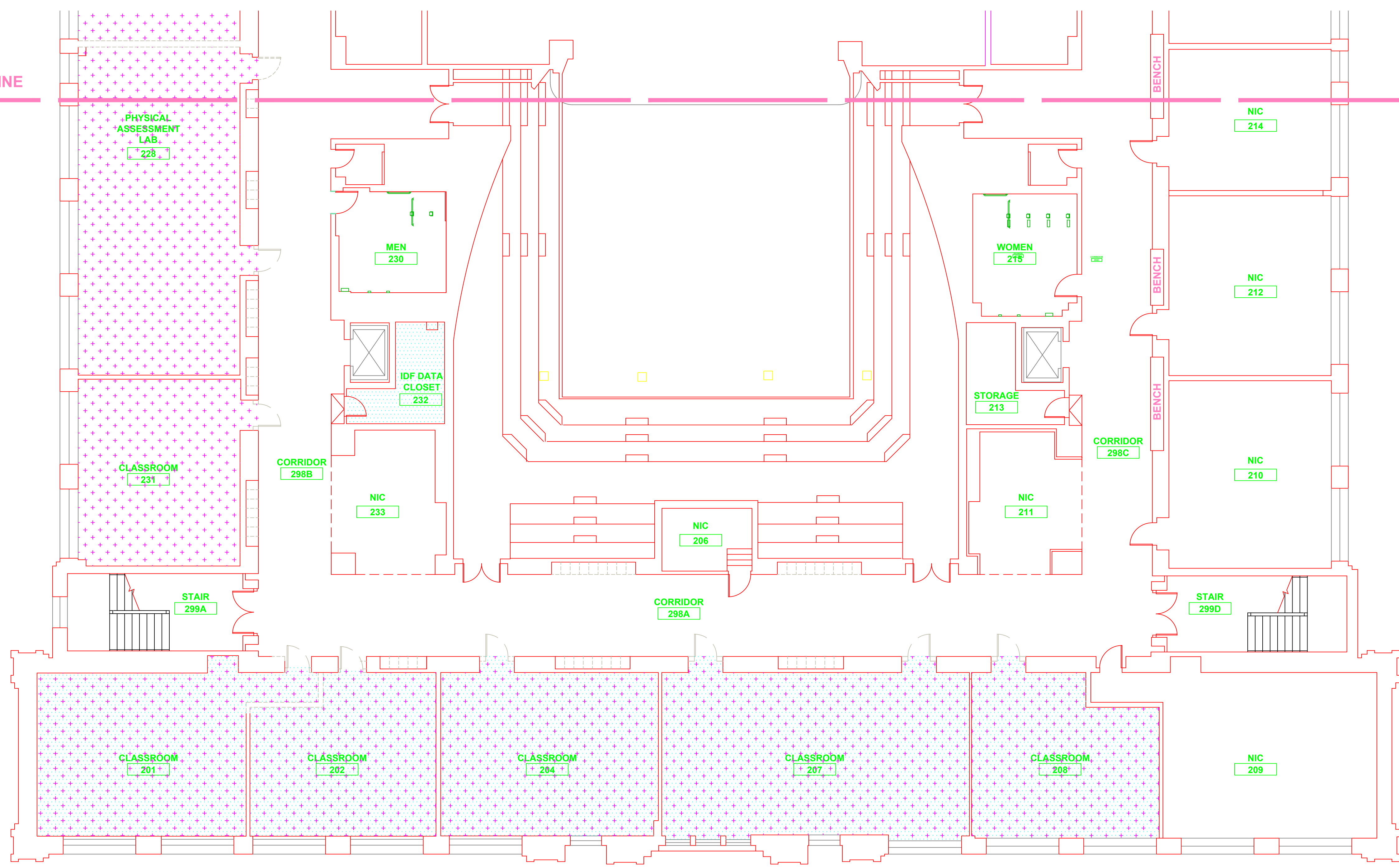
KEY PLAN

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REVISIONS			DIVISION OF CONSTRUCTION SERVICES		
mark	date	description	drawing prepared by	date	scale
			ATC GROUP SERVICES LLC	04/10/18	AS NOTED
			290 ROBERTS STREET EAST HARTFORD, CT		
			project	drawn by	approved by
			WESTERN CT STATE UNIVERSITY	EPF	EPF
			RENOVATIONS TO WHITE HALL		
			2ND & 3RD FLOORS	drawing no.	HM1.01
			DANBURY, CONNECTICUT		
			CAD no.	project no.	
				BI-RD-299	

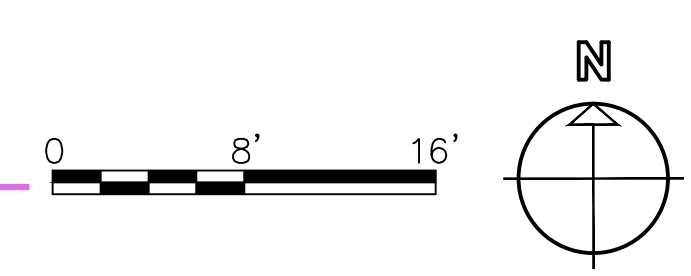
HAZMAT LEGEND

- ACM RESILIENT FLOORING AND MASTIC
- ACM CEILING TILE GLUE DAUBS
- ACM PIPE INSULATION
- ACM PIPE FITTING INSULATION
- ACM WALL TILE GLUE DAUBS
- ACM FLEX CONNECTOR

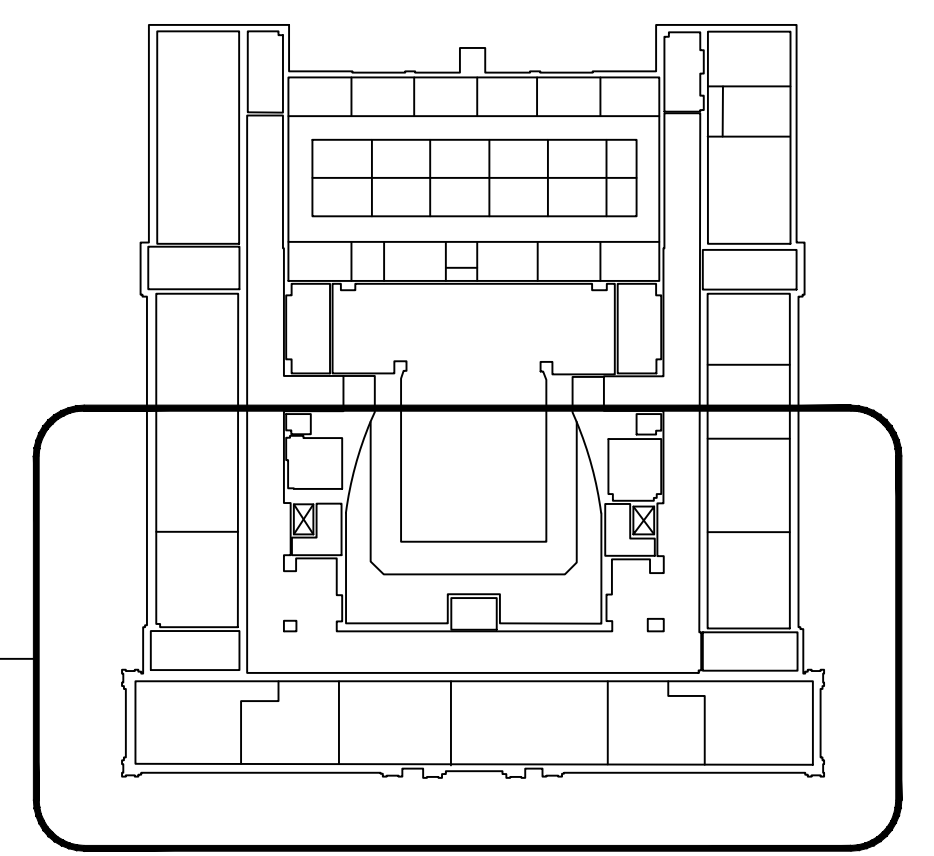
MATCH LINE



1 SOUTH WING PARTIAL PLAN



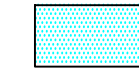





1 HM1.02

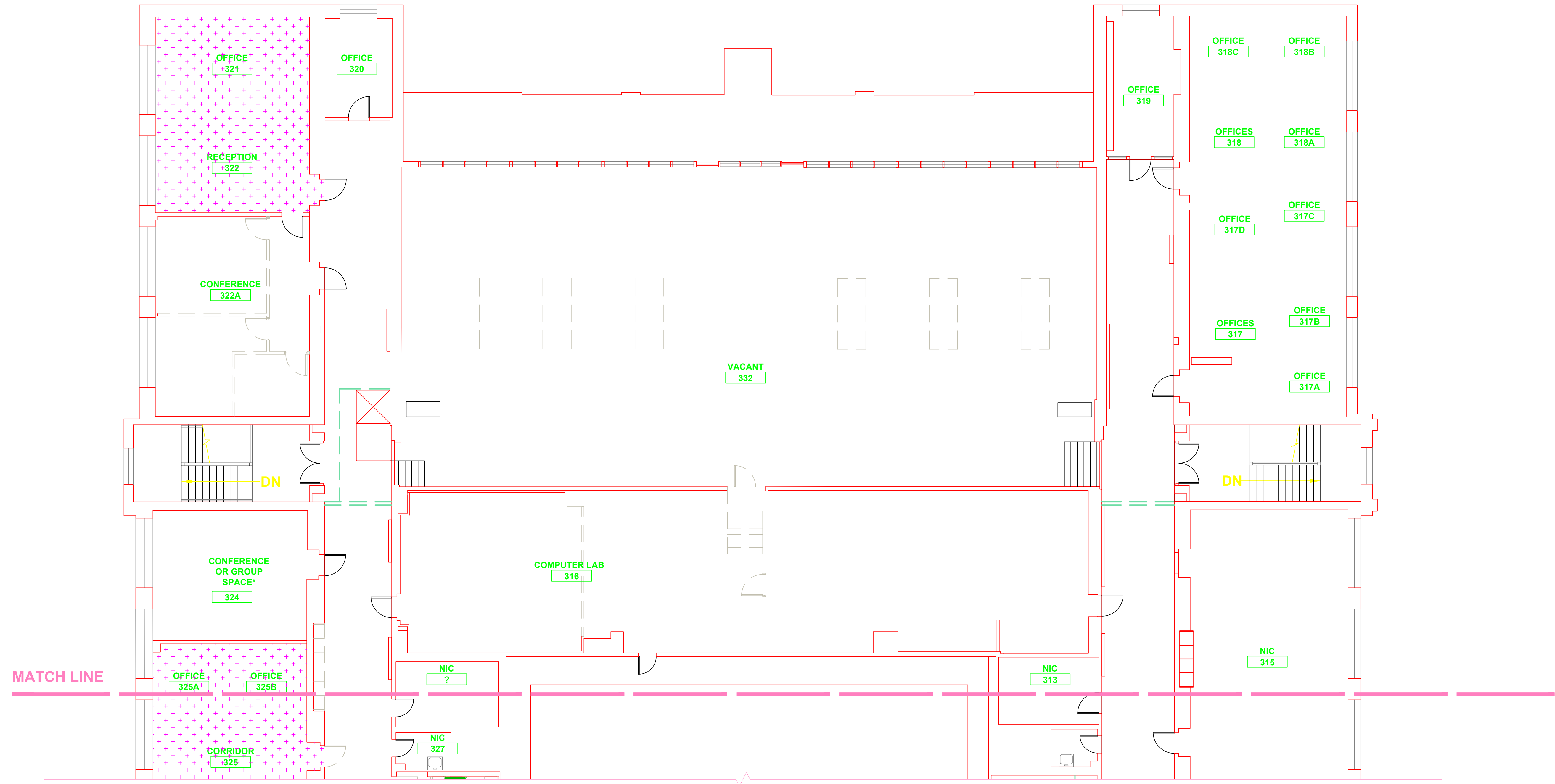


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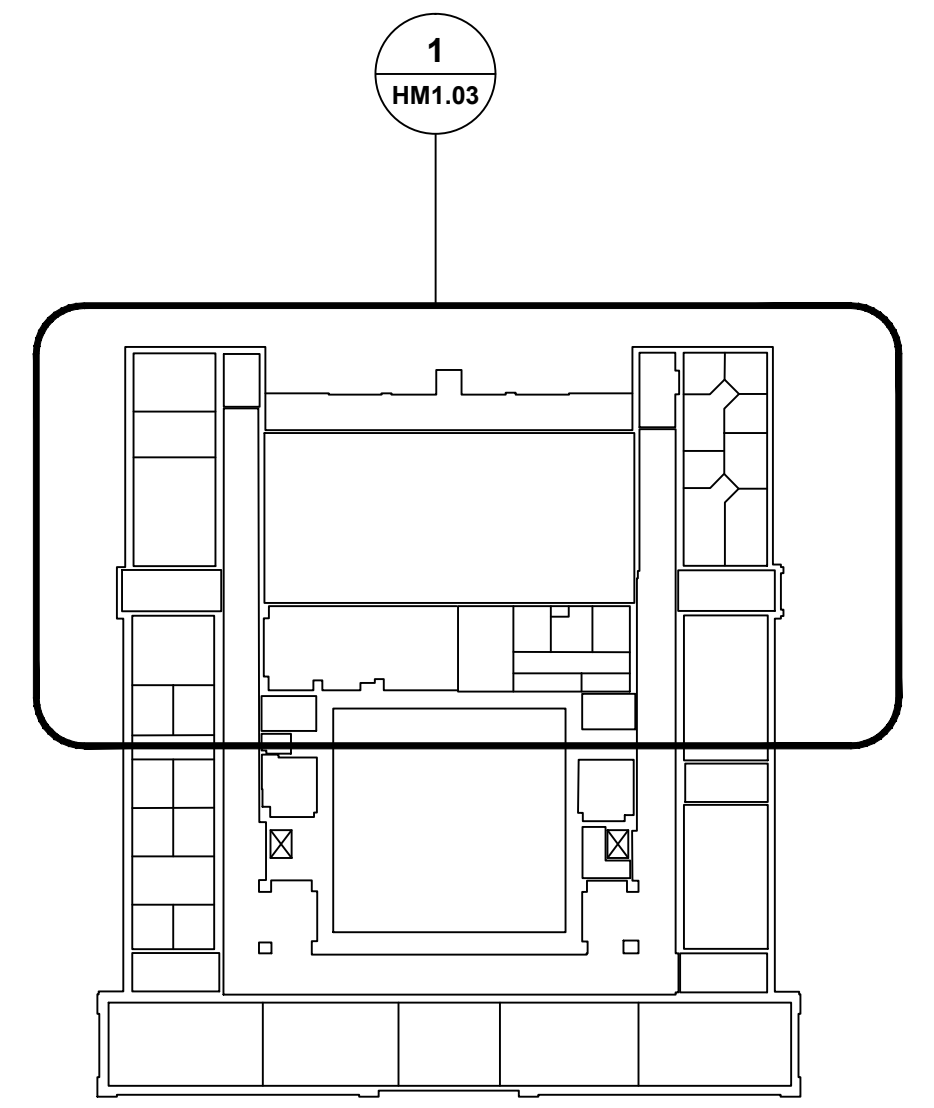
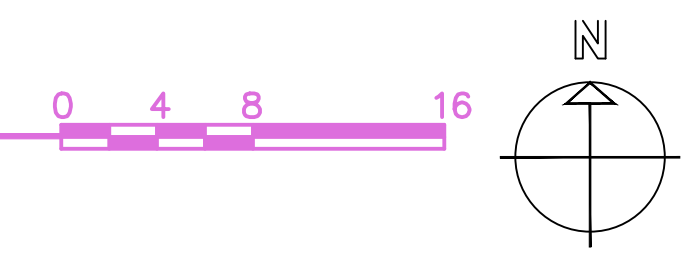
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REVISIONS			drawing prepared by ATC GROUP SERVICES LLC 290 ROBERTS STREET EAST HARTFORD, CT		
mark	date	description	date 04/10/18 scale AS NOTED		
			drawn by EPF		
			approved by EPF		
			drawing no. HM1.02		
			project WESTERN CT STATE UNIVERSITY RENOVATIONS TO WHITE HALL 2ND & 3RD FLOORS DANBURY, CONNECTICUT		
			CAD no. project no. BI-RD-299		

HAZMAT LEGEND

-  ACM RESILIENT FLOORING AND MASTIC
-  ACM CEILING TILE GLUE DAUBS
-  ACM PIPE INSULATION
-  ACM PIPE FITTING INSULATION
-  ACM WALL TILE GLUE DAUBS
-  ACM FLEX CONNECTOR



1 THIRD FLOOR - NORTH PARTIAL PLAN

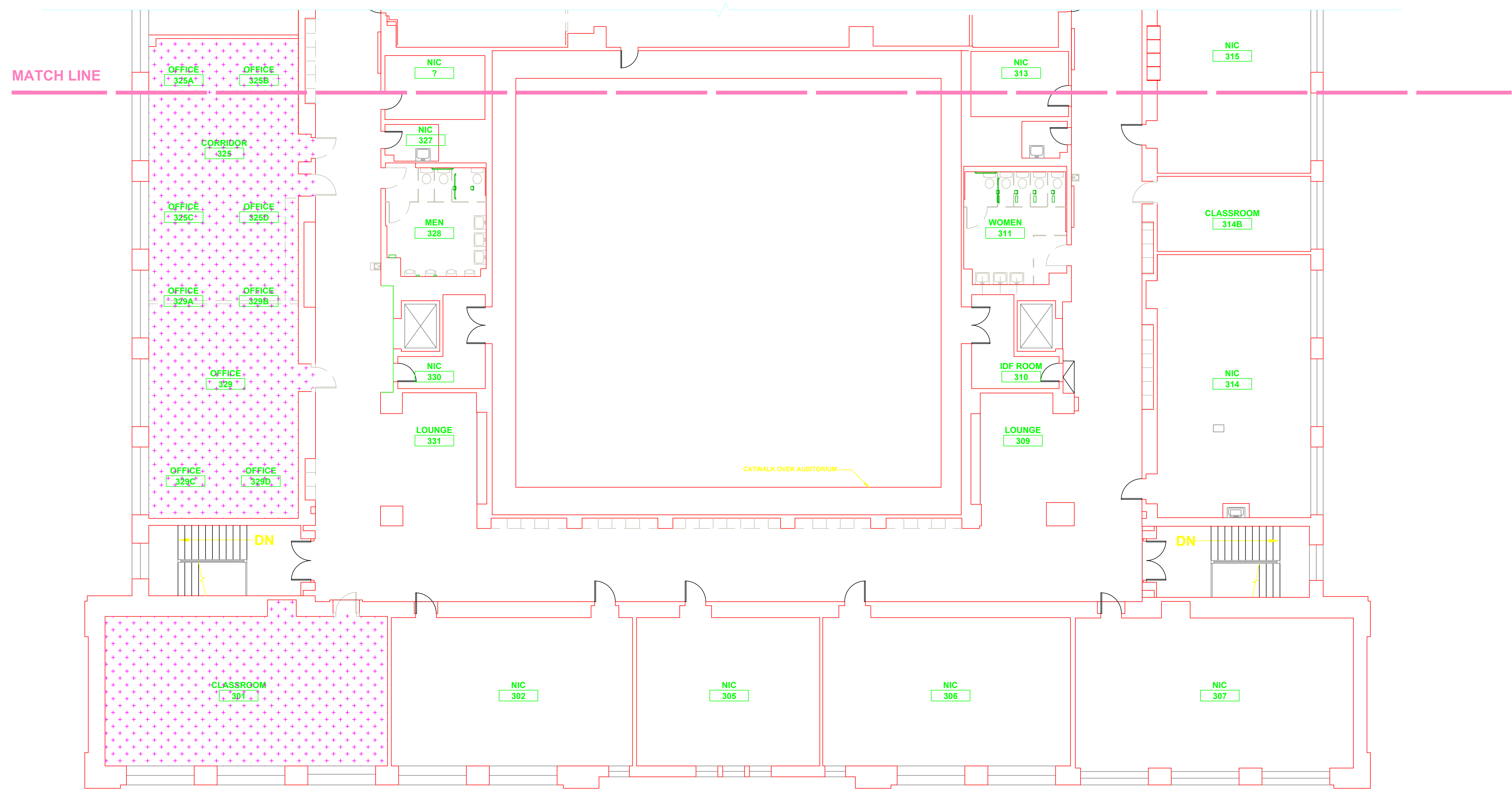


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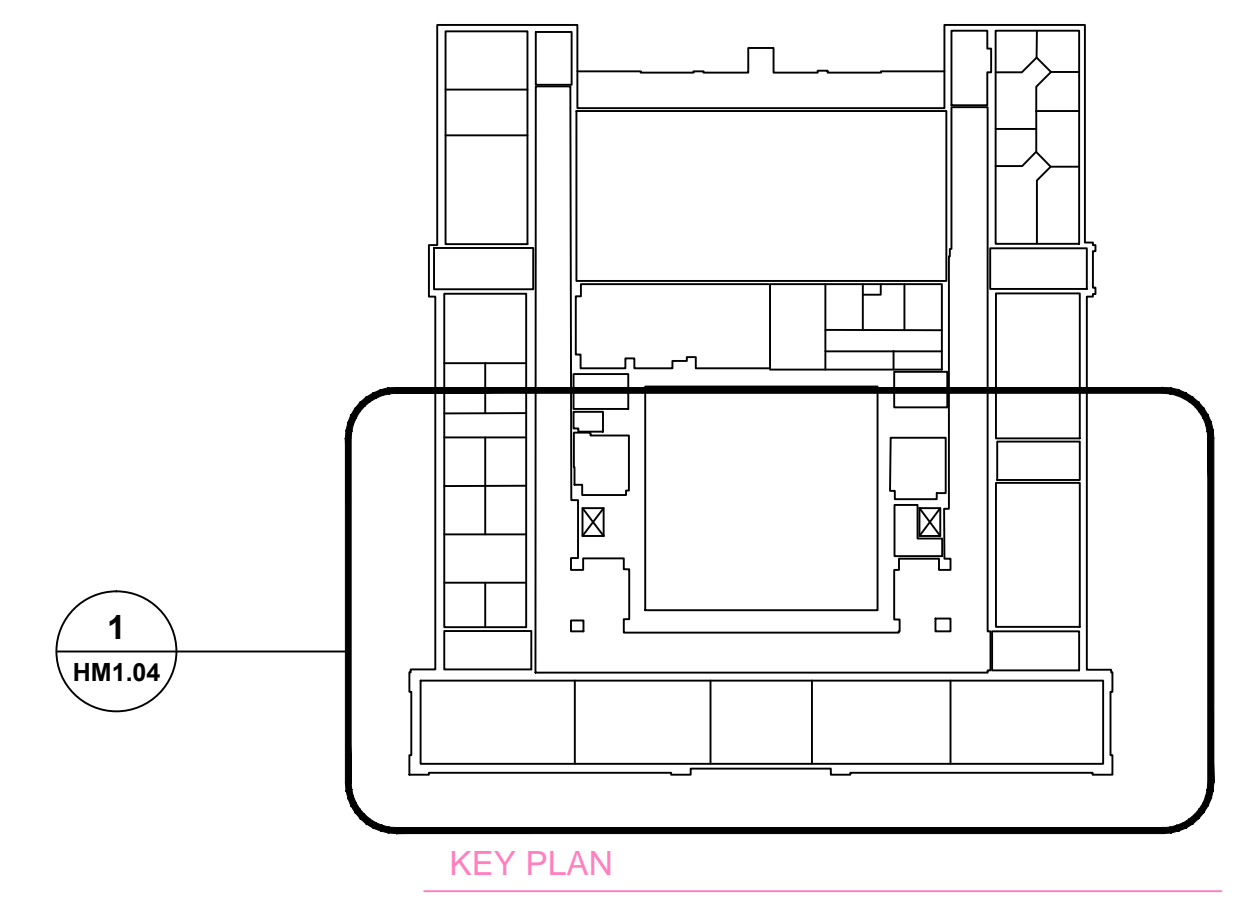
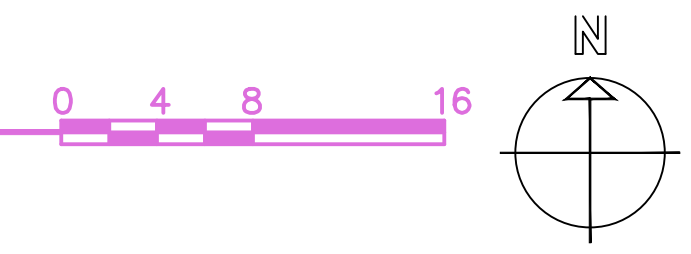
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mark	date	description	date 04/10/18		
			scale AS NOTED		
			project WESTERN CT STATE UNIVERSITY RENOVATIONS TO WHITE HALL 2ND & 3RD FLOORS DANBURY, CONNECTICUT		
			drawn by EPF		
			approved by EPF		
			drawing no. HM1.03		
			CAD no.	project no. BI-RD-299	

HAZMAT LEGEND

- ACM RESILIENT FLOORING AND MASTIC
- ACM CEILING TILE GLUE DAUBS
- ACM PIPE INSULATION
- ACM PIPE FITTING INSULATION
- ACM WALL TILE GLUE DAUBS
- ACM FLEX CONNECTOR



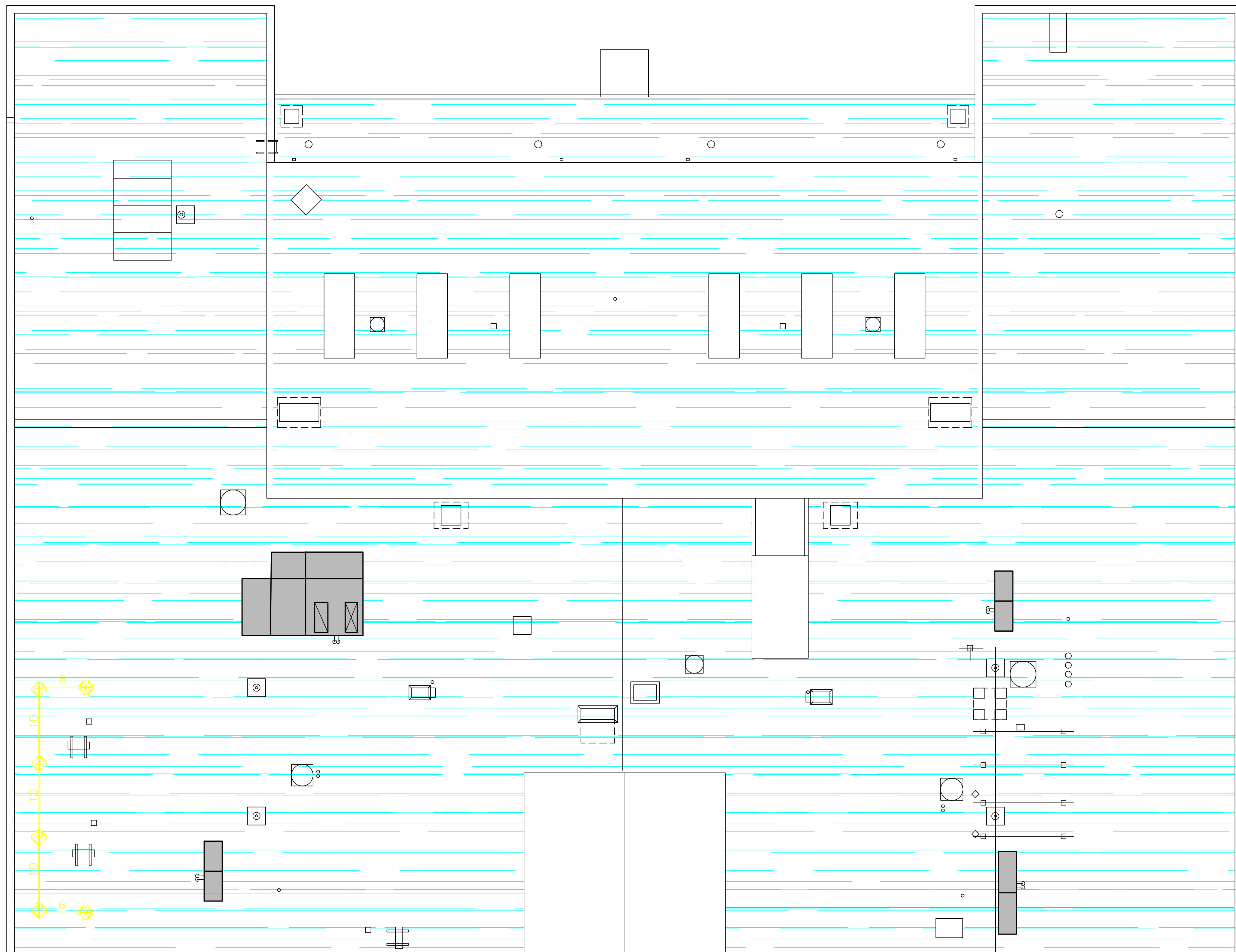
1 THIRD FLOOR - SOUTH PARTIAL PLAN



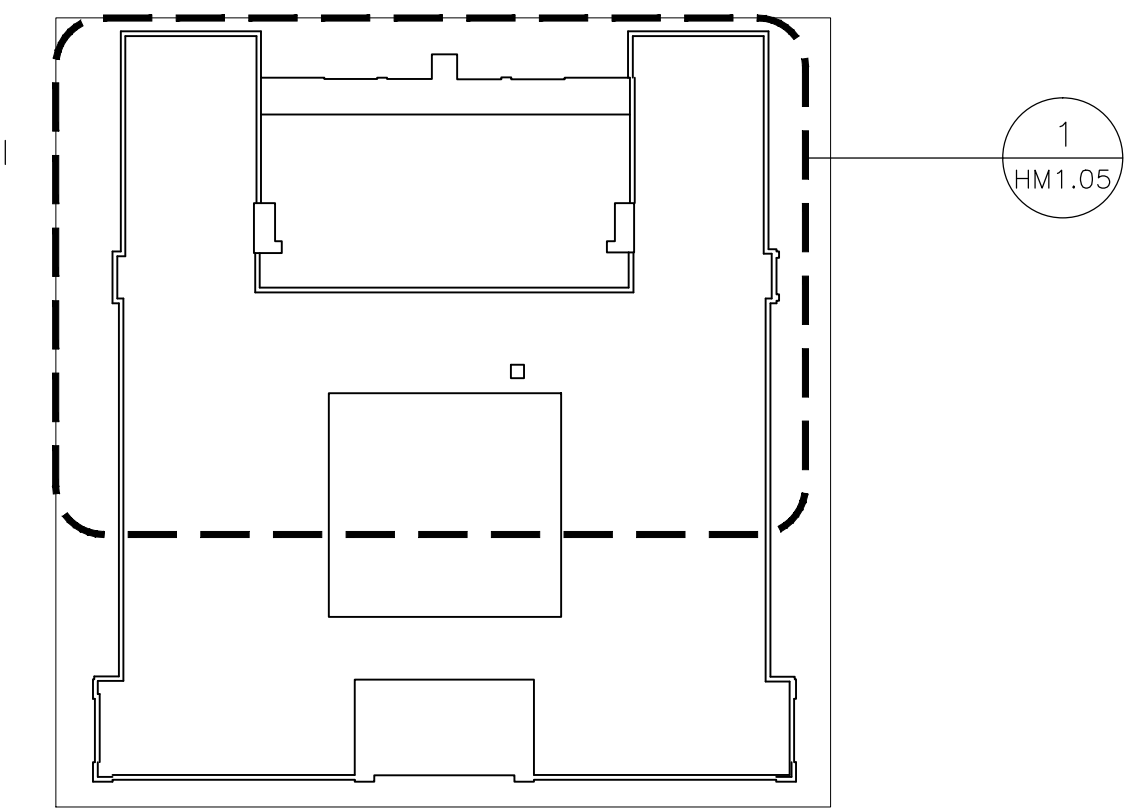
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REVISIONS					
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			project WESTERN CT STATE UNIVERSITY RENOVATIONS TO WHITE HALL 2ND & 3RD FLOORS DANBURY, CONNECTICUT	drawn by EPF	approved by EPF
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HAZMAT LEGEND

ACM ROOFING



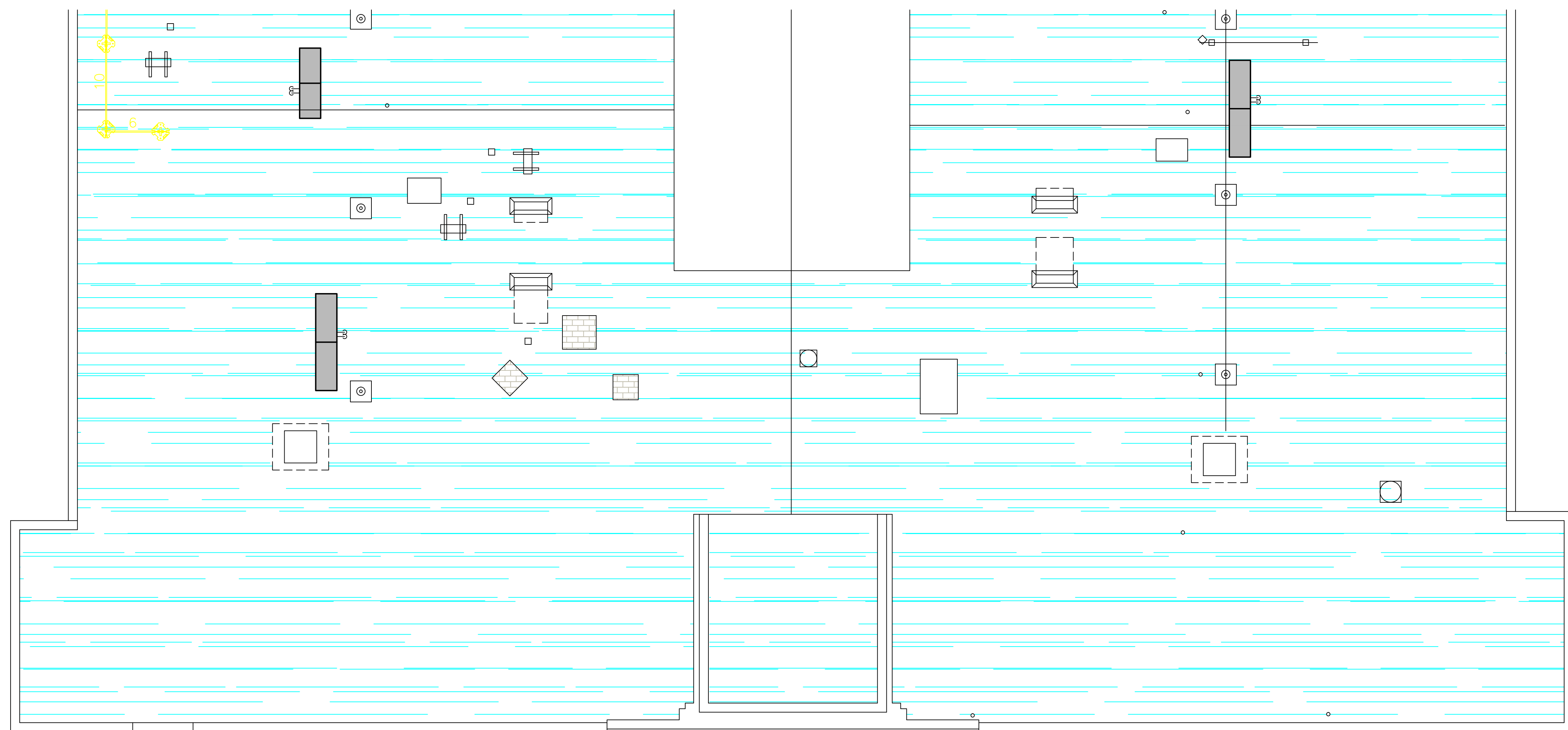
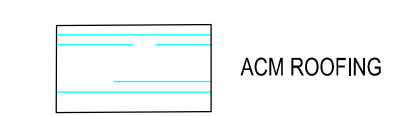
1 ROOF PLAN NORTH



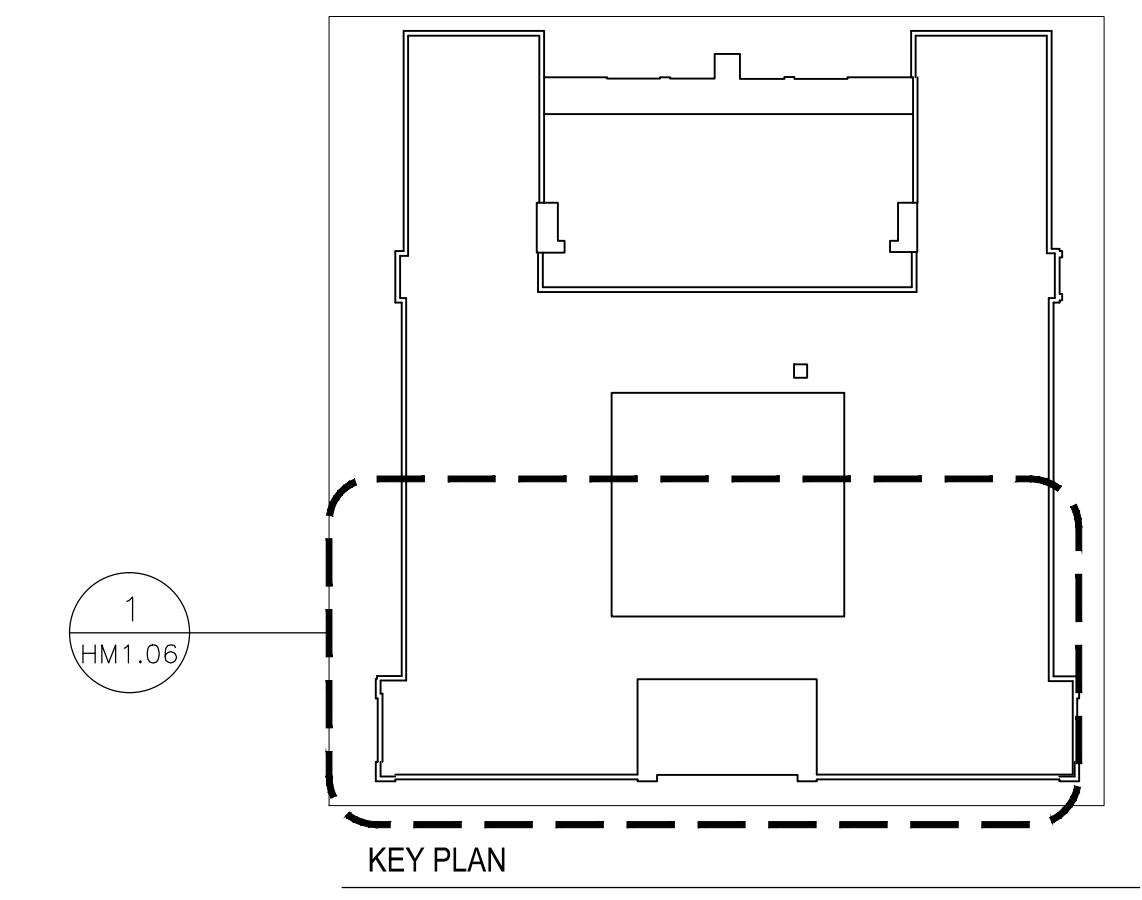
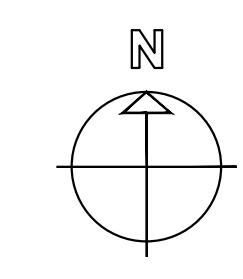
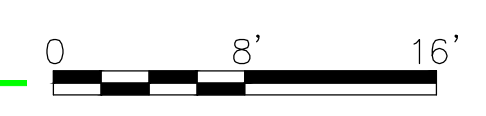
KEY PLAN

Drawing title ROOF - NORTH PARTIAL PLAN			STATE OF CONNECTICUT DEPARTMENT OF ADMINISTRATIVE SERVICES DIVISION OF CONSTRUCTION SERVICES	
REVISIONS			drawing prepared by ATC GROUP SERVICES LLC 290 ROBERTS STREET EAST HARTFORD, CT	date 04/10/18
mark	date	description	project WESTERN CT STATE UNIVERSITY RENOVATIONS TO WHITE HALL 2ND & 3RD FLOORS DANBURY, CONNECTICUT	scale AS NOTED
			approved by EPF	drawn by EPF
			drawing no. HM1.05	
			CAD no. BI-RD-299	

HAZMAT LEGEND



1 ROOF PLAN SOUTH



Drawing title ROOF - SOUTH PARTIAL PLAN			STATE OF CONNECTICUT DEPARTMENT OF ADMINISTRATIVE SERVICES DIVISION OF CONSTRUCTION SERVICES	
REVISIONS			drawing prepared by ATC GROUP SERVICES LLC 290 ROBERTS STREET EAST HARTFORD, CT	date 04/10/18
mark	date	description	project WESTERN CT STATE UNIVERSITY RENOVATIONS TO WHITE HALL 2ND & 3RD FLOORS DANBURY, CONNECTICUT	scale AS NOTED
			CAD no.	approved by
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