



Volume 1 of 1 Project Manual

**Norwalk Roof and HVAC
Department of Motor Vehicles Branch Office Facility
Norwalk, CT
Project No.: BI-MM-53**

**Prepared By:
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06484**

Josh Geballe – Commissioner

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

Project Manual Date: March 9, 2020

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 UPDATED REQUIREMENTS:

10/10/19: UPDATED 01 11 00 SUMMARY OF WORK:

- **Section 1.11 F: Contract Documents will no longer be provided in paper format.** One (1) set of PDF (latest version) Contract Documents on Electronic Data Storage Devices will be provided to the Contractor, at no cost, on or about the time of execution of the Contract from the Architect. Additional sets of PDF (latest version) Contract Documents on Electronic Data Storage Devices from the Architect shall be available at the cost of their reproduction, to the Contractor.

10/10/19: UPDATED 00 21 13 INSTRUCTIONS TO BIDDERS:

- **Sections 1.10.3.2, 2.7.1, 2.7.5, Named Subcontractors and Classes of Work:** In accordance with Connecticut General Statutes 4b-93, if the Bidder intends to use **more than one** Subcontractor to perform a Class of Work, then it shall provide **ALL** of the Subcontractor Names and Proposed Dollar Values for **subcontracts in excess of \$100,000**. Failure to correctly state **ALL** of the **Named Subcontractor's prices within a particular Class of Work** on the Bid Proposal Form **shall** be cause for **rejection** of the Bid.
- **Section 2.7.8.1, 2.7.10.3, Named Subcontractor Prequalification:** For Subcontracts greater than \$500,000, the three (3) Apparent Lowest Bidders shall submit within ten (10) Calendar Days after receipt of the "Set-Aside Contractor Schedule 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 **shall** cause rejection of the bid.
- **Section 2.7.10.2, Bidder Performing Work as Named Subcontractor:** In the event that the Bidder names a Subcontractor to perform some, but not all, of the separate section of the specifications for a particular Class of Work, then it will be presumed, in addition, that the Bidder intends to perform the balance of the Class of Work. Post-bid, the Bidder cannot substitute a Subcontractor for one named in the Bid Proposal Form or bring in a Subcontractor for any designated subtrade work presumed to be performed by the General Contractor's own forces, except for "Good Cause" as determined by the awarding authority.

10/10/19: UPDATED 00 41 00 BID PROPOSAL FORM:

- **Section 2.7, Named Subcontractors and Classes of Work:** In accordance with Connecticut General Statutes 4b-93, if the Bidder intends to use **more than one** Subcontractor to perform a Class of Work, then it shall provide **ALL** of the Subcontractor Names and Proposed Dollar Values for **subcontracts in excess of \$100,000**. If applicable, Table 2.7 will include an extra page for listing additional named subcontractors.
- **Section 2.9, Insurance Coverages:** Descriptions have been edited to correlate with 00 72 13 General Conditions.

07/12/19: UPDATED SECTION 00 72 13 GENERAL CONDITIONS:

The following Articles of the 00 72 13 General Conditions have been revised and/or added:

- **Article 1 Definitions:** Section 1.71 and Section 1.72;
- **Article 3 Correlation of Contract Documents:** Section 3.6;
- **Article 28 Partial Payments:** Section 28.2;
- **Article 33: Owner’s Right to Stop Work or Terminate Contract:** Section 33.2 and Section 33.3;
- **Article 35 Contractor’s Insurance:** Section 35.1 and Section 35.6;
- **Article 36 Foreign Materials:** Section 36.3;
- **Article 40 Disclosure of Records:** Section 40.1; and
- **Article 41 Audit and Inspection of Plants, Places of Business, and Records:** Section 41.1.

02/01/19: NEW REPORTING & CONTRACTING REQUIREMENTS FOR SUBCONTRACTOR PAYMENTS:

NEW REPORTING REQUIREMENTS FOR CONTRACTOR AND SUBCONTRACTOR PAYMENTS:

- For compliance with the Connecticut General Statutes Sections 4b-95 and 49-41a, 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.

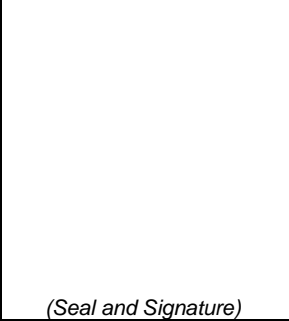

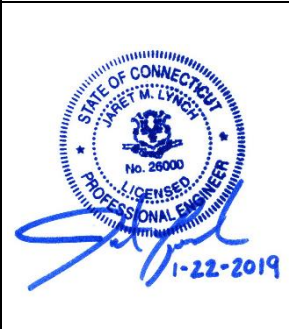
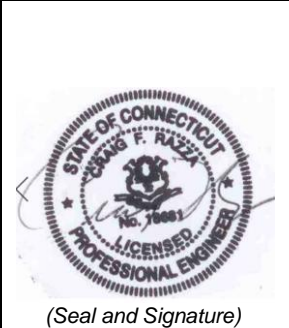
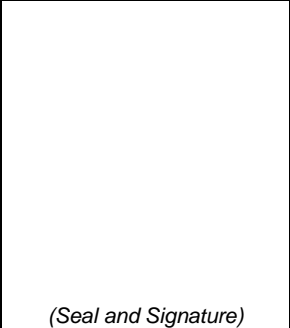
THE FOLLOWING DOCUMENTS HAVE BEEN REVISED TO REFLECT THE NEW REQUIREMENTS:

- Section 00 11 16 Invitation to Bid;
- Section 00 21 13 Instructions to Bidders;
- Section 00 41 10 Bid Package Submittal Requirements; and
- Section 01 11 00 Summary of Work.

END

Project Title:	Norwalk Roof and HVAC Department of Mortar Vehicles Branch Office Facility
Project Location:	540 Main Avenue, Norwalk, CT
Project Number:	BI-MM-53
Architect/Engineer:	Wiss, Janney, Elstner Associates, Inc.; 2 Trap Falls Road, Suite 502; Shelton, CT

SEALS, SIGNATURES, AND DATES OF DESIGN PROFESSIONALS OF RECORD

 <p>(Seal and Signature)</p>	<p>Architect Professional Certification: I hereby certify that these documents were prepared or approved by me and that I am a duly registered Architect.</p> <p>_____ (Print Consultant Name)</p> <p>_____ License No.</p> <p>_____ Expiration Date</p>	 <p>(Seal and Signature)</p>	<p>Civil Engineer Professional Certification: I hereby certify that these documents were prepared or approved by me and that I am a duly registered Professional Engineer.</p> <p>_____ (Print Consultant Name)</p> <p>_____ License No.</p> <p>_____ Expiration Date</p>
 <p>(Seal and Signature)</p>	<p>Structural Engineer Professional Certification: I hereby certify that these documents were prepared or approved by me and that I am a duly registered Professional Engineer.</p> <p>JARET LYNCH _____ (Print Consultant Name)</p> <p>26000 _____ License No.</p> <p>1/31/2020 _____ Expiration Date</p>	 <p>(Seal and Signature)</p>	<p>Electrical Engineer Professional Certification: I hereby certify that these documents were prepared or approved by me and that I am a duly registered Professional Engineer.</p> <p>CRAIG RAZZA _____ (Print Consultant Name)</p> <p>18681 _____ License No.</p> <p>1/31/2020 _____ Expiration Date</p>
 <p>(Seal and Signature)</p>	<p>Mechanical Engineer Professional Certification: I hereby certify that these documents were prepared or approved by me and that I am a duly registered Professional Engineer.</p> <p>CRAIG RAZZA _____ (Print Consultant Name)</p> <p>18681 _____ License No.</p> <p>1/31/2020 _____ Expiration Date</p>	 <p>(Seal and Signature)</p>	<p>Fire-Protection Engineer Professional Certification: I hereby certify that these documents were prepared or approved by me and that I am a duly registered Professional Engineer.</p> <p>_____ (Print Consultant Name)</p> <p>_____ License No.</p> <p>_____ Expiration Date</p>

**End of Section
00 01 07 Seals Page**

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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	6	<input type="checkbox"/>
00 01 15	List of Drawing Sheets	1	<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	3	<input type="checkbox"/>
00 30 10	General Statement for Existing Conditions Information		<input type="checkbox"/>
00 30 20	General Statement for Environmental Assessment Information		<input 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 type="checkbox"/>
00 30 50	General Statement for Elevator Agreement		<input type="checkbox"/>
00 30 60	General Statement for FM Global Checklist for Roofing Systems		<input type="checkbox"/>
00 30 70	General Statement for "Statement of Special Inspections"		<input type="checkbox"/>
00 30 80	General Statement for Other Information		<input 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	NEW: Bid Proposal Form (<i>Bidder uploads to BizNet</i>)	13	<input type="checkbox"/>
00 41 10	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	33	<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	24	<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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(continued)

DIVISION 01 GENERAL REQUIREMENTS

Section No.	Title	Page Count	Not Used
01 11 00	Summary of Work	6	<input type="checkbox"/>
01 20 00	Contract Considerations		<input checked="" type="checkbox"/>
01 23 13	Supplemental Bids		<input checked="" type="checkbox"/>
01 25 00	Substitution Procedures	4	<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	3	<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	2	<input type="checkbox"/>
01 35 26	Government Safety Requirements	12	<input type="checkbox"/>
01 42 20	Reference Standards & Definitions	3	<input type="checkbox"/>
01 45 00	Quality Control	4	<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	8	<input type="checkbox"/>
01 57 30	Indoor Environmental Control	2	<input 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	3	<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	6	<input type="checkbox"/>
01 78 30	Warranties & Bonds	3	<input type="checkbox"/>
01 80 13	Sustainable Design Requirements		<input checked="" type="checkbox"/>
01 91 00	Commissioning	6	<input type="checkbox"/>

**VOLUME Insert of Insert
(continued)**

TECHNICAL SPECIFICATIONS

DIVISION 02	EXISTING CONDITIONS	Not Used <input checked="" type="checkbox"/>
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DIVISION 03	CONCRETE	Not Used <input checked="" type="checkbox"/>
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DIVISION 04	MASONRY	Not Used <input checked="" type="checkbox"/>
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DIVISION 05	METALS	Not Used <input type="checkbox"/>
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Section No.	Title	Page Count
05 40 00	Miscellaneous Steel	6

DIVISION 06	WOOD, PLASTICS AND COMPOSITES	Not Used <input type="checkbox"/>
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06 10 00	Rough Carpentry	5
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DIVISION 07	THERMAL AND MOISTURE PROTECTION	Not Used <input type="checkbox"/>
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Section No.	Title	Page Count
07 01 50	Preparation for Re-Roofing	4
07 53 23	EPDM Membrane Roofing	18
07 62 00	Sheet Metal and Flashing	5
07 72 00	Roof Accessories	5
07 92 00	Joint Sealants	7

DIVISION 08	OPENINGS	Not Used <input type="checkbox"/>
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DIVISION 09	FINISHES	Not Used <input type="checkbox"/>
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Section No.	Title	Page Count
09 29 00	Gypsum Board	3
09 51 23	Acoustical Tile Ceilings	2
09 91 00	Interior Painting	4
09 97 13	Steel Coating	6

DIVISION 10	SPECIALTIES	Not Used <input checked="" type="checkbox"/>
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DIVISION 11	EQUIPMENT	Not Used <input checked="" type="checkbox"/>
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DIVISION 12	FURNISHINGS	Not Used <input checked="" type="checkbox"/>
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**VOLUME Insert of Insert
(continued)**

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 15	RESERVED	
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DIVISION 16	RESERVED	
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DIVISION 17	RESERVED	
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DIVISION 18	RESERVED	
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DIVISION 19	RESERVED	
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DIVISION 20	RESERVED	
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DIVISION 21	FIRE SUPPRESSION	Not Used <input checked="" type="checkbox"/>
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DIVISION 22	PLUMBING	Not Used <input type="checkbox"/>
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Section No.	Title	Page Count
22 11 25	Facility Natural-Gas Piping	9
22 14 23	Storm Drainage Piping Specialties	1

DIVISION 23	HEATING, VENTILATING AND AIR CONDITIONING	Not Used <input type="checkbox"/>
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Section No.	Title	Page Count
23 00 00	General Provisions	18
23 05 29	Hangers and Supports for HVAC Piping and Equipment	10
23 05 48	Vibration and Seismic Controls for HVAC Piping and Equipment	10
23 05 53	Identification for HVAC Piping and Equipment	4
23 05 93	Testing, Adjusting and Balancing for HVAC	11
23 07 00	HVAC Insulation	16
23 09 93	Sequence of Operations for HVAC, Plumbing and Electrical Controls	5
23 21 13	Hydronic Piping	3
23 31 13	Metal Ducts	12
23 33 00	Air Duct Accessories	11
23 34 23	HVAC Power Ventilators	4
23 36 00	Air Terminal Units	4
23 74 13	Packaged, Outdoor, Central-Station Air- Handling Units	10
23 81 26	Split-System Air-Conditioners	7

DIVISION 24	RESERVED	
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DIVISION 25	INTEGRATED AUTOMATION	Not Used <input checked="" type="checkbox"/>
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DIVISION 26 **ELECTRICAL** Not Used

Section No.	Title	Page Count
26 01 00	General Electrical Requirements	7
26 05 00	Common Work Results for Electrical	3
26 05 19	Low-Voltage Electrical Power Conductors and Cables	3
26 05 26	Grounding and Bonding for Electrical Systems	2
26 05 29	Hangers and Supports for Electrical Systems	4
26 05 33	Raceway and Boxes for Electrical Systems	3
26 05 53	Identification for Electrical Systems	3
26 24 16	Panel Boards	5
26 27 26	Wiring Devices	4
26 28 16	Enclosed Switches and Circuit Breakers	4

DIVISION 27 **COMMUNICATIONS** Not Used

DIVISION 28 **ELECTRONIC SAFETY AND SECURITY** Not Used

Section No.	Title	Page Count
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DIVISION 29 **RESERVED**

DIVISION 30 **RESERVED**

DIVISION 31 **EARTHWORK** Not Used

DIVISION 32 **EXTERIOR IMPROVEMENTS** Not Used

Section No.	Title	Page Count
32 17 23	Painted Pavement Markings	4

DIVISION 33 **UTILITIES** Not Used

DIVISION 34 **TRANSPORTATION** Not Used

DIVISION 35 **WATERWAYS AND MARINE** Not Used

DIVISION 36 **RESERVED**

DIVISION 37 **RESERVED**

DIVISION 38 **RESERVED**

DIVISION 39 **RESERVED**

VOLUME Insert of Insert (continued)			
DIVISION 40	PROCESS INTEGRATION		Not Used <input checked="" type="checkbox"/>
DIVISION 41	MATERIAL PROCESSING		Not Used <input checked="" type="checkbox"/>
DIVISION 42	PROCESS HEATING, COOLING, AND DRYING		Not Used <input checked="" type="checkbox"/>
DIVISION 43	PROCESS GAS AND LIQUID HANDLING, PURIFICATION, AND STORAGE EQUIPMENT		Not Used <input checked="" type="checkbox"/>
DIVISION 44	POLLUTION CONTROL EQUIPMENT		Not Used <input checked="" type="checkbox"/>
DIVISION 45	INDUSTRY SPECIFIC MANUFACTURING EQUIPMENT		Not Used <input checked="" type="checkbox"/>
DIVISION 46	RESERVED		
DIVISION 47	RESERVED		
DIVISION 48	RESERVED		
DIVISION 49	RESERVED		
DIVISION 50	PROJECT-SPECIFIC AVAILABLE INFORMATION	Page Count	Not Used <input type="checkbox"/>
50 10 00	Existing Conditions Survey		<input checked="" type="checkbox"/>
50 20 00	Environmental Assessment Information		<input checked="" type="checkbox"/>
50 30 00	Hazardous Building Materials Inspection and Inventory	40	
50 40 00	Subsurface Geotechnical Report		<input checked="" type="checkbox"/>
50 50 00	Elevator Agreement		<input checked="" type="checkbox"/>
50 60 00	FM Global Checklist For Roofing Systems	5	
50 70 00	Statement of Special Inspections	7	
50 80 00	Additional Info:		<input checked="" type="checkbox"/>

00 01 10 Table of Contents



Advertisement No.:	20-07	Advertisement Date:	March 13, 2020
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<h2 style="margin: 0;">INVITATION TO BID</h2> <p style="margin: 0;">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>

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:	<input style="width: 100px; height: 20px;" type="text" value="April"/> <i>(Month)</i>	<input style="width: 50px; height: 20px;" type="text" value="22"/> <i>(Day)</i>	<input style="width: 50px; height: 20px;" type="text" value="2020"/> <i>(Year)</i>	Time:	<input style="width: 50px; height: 20px;" type="text" value="1:00"/> <i>(ET)</i>	PM
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This Invitation to Bid is for the following Project:

Project Title:	Norwalk Roof and HVAC Department of Motor Vehicles Branch Office Facility		
Project Location:	540 Main Avenue Norwalk, CT		
Project Number:	BI-MM-53 (Re-Bid)		
Project Description:	See Specifications Section 01 11 00 Summary of Work, Section 1.3		
Construction Costs:	Greater Than \$500,000		
Bidding Limited To:	Contractors Prequalified by DAS for General Building Construction (Group A)		
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%		
Date DAS/CS Began Planning Project:	8/11/2017		
Special Requirements:	N/A		
Cost Estimate Range:	\$ 831,343.	To \$	875,097.
Date Plans & Specs Ready:	March 18, 2020		
Plans & Specs Download:	Plans & Specs are available for electronic download on the DAS State Contracting Portal.		
Contract Time Allowed:	Calendar Days:	160	
Liquidated Damages:	\$ 1,359.00	Per Calendar Day Beyond Substantial Completion.	
	\$ 1,059.00	Per Calendar Day Beyond 90 days After Substantial Completion	



Advertisement No.:	20-07	Advertisement Date:	March 13, 2020
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Invitation to Bid (continued)

Pre-Bid Meeting Date:	March 23, 2020		
	<input checked="" type="checkbox"/>	Bidders are strongly encouraged to attend the Pre-Bid Meeting.	
	<input type="checkbox"/>	Bidders are required to attend a MANDATORY Pre-Bid Meeting.	
Pre-Bid Meeting Time:	11:00	<input checked="" type="checkbox"/> AM	<input type="checkbox"/> PM
Pre-Bid Meeting Location:	Department of Motor Vehicles Branch Office Facility, 540 Main Avenue, Norwalk, CT Meet in the Main Public Waiting Room		
Pre-Bid Meeting Contact:	DAS/CS Project Manager:	Lisa Humble	
	Phone No.:	860.713.5823	
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:	<p>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. See Section 00 73 44 Prevailing Wage Rates.</p> <p>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.</p> <p>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.</p>		
To access Executive Orders:	Go to www.ct.gov > Governor Ned Lamont > Executive Orders.		
UPDATED DOCUMENTS:	<p>Many Division 00 and Division 01 documents have been updated. Read all of the contents of the Project Manual <i>carefully!</i></p> <p>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!</p>		



Advertisement No.:	20-07	Advertisement Date:	March 13, 2020
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Invitation to Bid (continued)

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 0111 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 manual, "**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 Connecticut 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.

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:	Wiss, Janney, Elstner Associates, Inc.	Email:	planteri@wje.com
Construction Administrator:	Lisa Humble	Email:	Lisa.Humble@ct.gov
DAS/CS Project Manager:	Lisa Humble	Email:	Lisa.Humble@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

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 <u>ALL</u> of the Named Subcontractors within a particular Class of Work on the Bid Proposal Form for subcontracts in excess of \$100,000 ;
.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 <i>paper Bid Package</i> 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 not 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 ALL 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, <i>if the subcontracts are in excess of \$100,000</i> . 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 ALL of the Named Subcontractor's prices within a particular Class of Work 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 shall 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	In the event that the Bidder names a Subcontractor to perform some, but not all, of the separate section of the specifications for a particular Class of Work, then it will be presumed, in addition, that the Bidder intends to perform the balance of the Class of Work. Post-bid, the Bidder cannot substitute a Subcontractor for one named in the Bid Proposal Form or bring in a Subcontractor for any designated subtrade work presumed to be performed by the General Contractor's own forces, except for "Good Cause" as determined by the awarding authority.
.3	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. 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.
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 and their 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 Online**", 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

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.



» 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	
	The Department of Administrative Services. Review our Privacy Policy. All State disclaimers and permissions apply. Need to contact us? Send e-mail to das.webmaster@state.ct.us
Copyright ©2001, 2002, 2003, 2004 - Last Updated: Saturday, October 09, 2004	
	The software to view and print Adobe Acrobat documents (PDF Files) is available free from the Adobe website. To get a free copy of the software, click the "Get Acrobat" image.

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
SAMPLE	

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:

Project Title:	Norwalk Roof and HVAC Department of Motor Vehicles Branch Office Facility
Project Location:	540 Main Avenue Norwalk, CT
Project Number:	BI-MM-53
Construction Costs:	Greater Than \$500,000
Bidding Limited To :	Contractors Prequalified by DAS for General Building Construction (Group A)
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%
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:	Wiss, Janney, Elstner Associates, Inc., 2 Trap Falls Road – Suite 502, Shelton, CT 06484

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

160
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 \$

1,359.00

 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 \$

1,059.00

 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: NOT APPLICABLE		
ADD: \$	<input style="width: 90%;" type="text"/> <i>(Insert Numerical Figures)</i>	<input style="width: 90%;" type="text"/> <i>(Insert "Printed Words" Dollar Amount)</i>
Dollars		
Supplemental Bid No. 2: NOT APPLICABLE		
ADD: \$	<input style="width: 90%;" type="text"/> <i>(Insert Numerical Figures)</i>	<input style="width: 90%;" type="text"/> <i>(Insert "Printed Words" Dollar Amount)</i>
Dollars		
Supplemental Bid No. 3: NOT APPLICABLE		
ADD: \$	<input style="width: 90%;" type="text"/> <i>(Insert Numerical Figures)</i>	<input style="width: 90%;" type="text"/> <i>(Insert "Printed Words" Dollar Amount)</i>
Dollars		
Supplemental Bid No. 4: NOT APPLICABLE		
ADD: \$	<input style="width: 90%;" type="text"/> <i>(Insert Numerical Figures)</i>	<input style="width: 90%;" type="text"/> <i>(Insert "Printed Words" Dollar Amount)</i>
Dollars		

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 Prequalification Requirements for Projects Exceeding \$500,000:

2.6.1 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**".

2.6.2 Named Subcontractor(s) for Subcontracts exceeding \$500,000: The **Named Subcontractor(s)** **must** be "**prequalified**" by DAS in the **Class of Work** specified in **Table 2.7** of this **Bid Proposal Form** *at the time of bid submission*, pursuant to **C.G.S. §4b-91(j)** and **C.G.S. § 4a-100**, as amended, to the extent the Class of Work for the Named Subcontractor is a Prequalification Classification. This requirement also applies to the Bidder, if the Bidder is a Named Subcontractor. 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**.

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 type="checkbox"/>	Electrical Work: NOT APPLICABLE 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 For each **Class of Work** checked in **Table 2.7**, the Bidder shall insert the name of each **Subcontractor** with their **Proposed Dollar Value of Subcontract**; this is known as the **“Named Subcontractor”**. If the Bidder intends to use **more than one** Subcontractor to perform a Class of Work, then it shall provide **ALL** of the **Subcontractor Names** and Proposed Dollar Values of **each Subcontract in excess of \$100,000**.
 - .3 *If a Bidder* intends to use **one or more** **Subcontractors** 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 **ALL** of the Subcontractors or SBE/MBE Subcontractors 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 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.
 - .5 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)**.
 - .6 **In the event that the Bidder names a Subcontractor to perform some, but not all, of the separate section of the specifications for a particular Class of Work, then it will be presumed, in addition, that the Bidder intends to perform the balance of the Class of Work. Post-bid, the Bidder cannot substitute a Subcontractor for one named in the Bid Proposal Form or bring in a Subcontractor for any designated subtrade work presumed to be performed by the General Contractor’s own forces, except for “Good Cause” as determined by the awarding authority.**
 - .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.

**Table 2.7 (continued):
 ADDITIONAL Named Subcontractors and Classes of Work:**

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

ALL BIDDERS: CLICK DROPDOWN ARROW to select a Class of Work for Additional Named Subcontractors:	
Complete Subcontractor Name:	
Proposed Dollar Value of Subcontract: \$	

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 " <i>with</i> your Bid Proposal Form <i>prior</i> 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 " <i>with</i> your Bid Proposal Form <i>prior</i> 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. **NOTE: Check the correct box(es). Delete this note by pressing the spacebar.**

2.9.1 Commercial General Liability Insurance: The Bidder **shall** maintain Commercial General Liability Insurance. **NOTE:** All selected firms are required to provide an endorsement to the CGL insurance stating that the State of Connecticut, the Department of Administrative Services, and their respective officers, agents, and employees shall be named as an Additional Insured. Please be advised that a blanket endorsement **may not** be acceptable. Products/Completed Operations insurance shall be maintained for the duration of the Project and shall be maintained for a minimum of **three (3) years** after certification by the Owner that all Work has been completed and accepted by the Owner in accordance with the Contract Documents. CGL coverage may include **Special Hazards Insurance**, as described below.

- 2.9.2 Special Hazards Insurance:**
- None is Required.
 - The Bidder **shall** maintain Special Hazards Insurance, including coverage for **explosion, collapse or underground damage (X-C-U)**.
 - The Bidder **shall** maintain Special Hazards Insurance, including coverage for **Asbestos Abatement and Lead Liability**.

2.9.3 Owner's and Contractor's Protective Liability Insurance: The Bidder **shall** maintain Owner's and Contractor's Protective Liability Insurance. This coverage shall be for and in the name of the State of Connecticut.

2.9.4 Automobile Liability Insurance: The Bidder **shall** maintain Automobile Liability Insurance for the operation of all motor vehicles including those owned, non-owned and hired or used in connection with the Contract. Should the Bidder not own any automobiles, the automobile & liability requirement shall be amended to allow the Bidder to maintain only hired and non-owned liability coverage.

2.9.5 Umbrella Liability Insurance: The Bidder **shall** maintain Umbrella Liability Insurance. The Bidder shall provide an endorsement to the Umbrella Liability Insurance stating that the State of Connecticut is an additional insured.

2.9.6 Workers Compensation/Employer Liability Insurance: The Bidder **shall** maintain Workers Compensation/Employer Liability Insurance.

- 2.9.7 Builder's Risk Insurance:**
- None is Required.
 - The Bidder **shall** 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. Prior to the Owner's issuance of a Notice to Proceed, the Contractor shall provide coverage for the entire Work in an amount equal to the total contract amount and any additional modifications. The Owner and its officers, agents and employees shall be listed as loss payee subject to the prior review of the Owner, and not as an additional insured for these coverages. The Builder's Risk Insurance policy shall state it is for the benefit of and payable to the State of Connecticut. The **Period of Coverage** shall be the number of Calendar Days from Construction Start Date to Substantial Completion as stated in the Bid Proposal Form of the Project Manual, plus ninety (90) Calendar Days to Acceptance of the Work.

- 2.9.8 Inland Marine/Transit Insurance (Transportation Insurance):**
- None is Required.
 - The Bidder **shall** maintain Inland Marine/Transit Insurance (Transportation Insurance) provided the coverage is not afforded by a Builder's Risk policy. The 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.

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:

3.5.1 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.

3.5.2 For Named Subcontractor(s) with Subcontracts exceeding \$500,000, the Bidder acknowledges that the **Named Subcontractor(s)** *must* be "prequalified" by DAS in the **Class of Work** specified in **Table 2.7** of this **Bid Proposal Form** *at the time of bid submission*, pursuant to **C.G.S. §4b-91(j)** and **C.G.S. § 4a-100**, as amended, to the extent the Class of Work for the Named Subcontractor is a Prequalification Classification. In addition, the Bidder agrees to submit within *ten (10) Calendar Days* after receipt of the "Set-Aside Contractor Schedule Request" the current DAS Prequalification Certificate(s) and Update (Bid) Statement(s) for each Named Subcontractor in Table 2.7 of this Bid Proposal Form.

3.0 Bid Proposal Acknowledgements (continued):**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.

3.8 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>
--	---

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 <i>prior</i> 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 <i>prior</i> 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 <i>prior</i> 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:	Form Location
	<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	When Applicable, submit the following documents as noted:	Form Location

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 _____

_____ (Principal's Signature)	by	_____ Surety
_____ (Print Name)		_____ Its attorney in fact Signature
_____ Company Name		_____ (Print Name)

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 **General Building Construction (Group A):**

YES NO

2.2 **General Building Construction (Group B):**

YES NO

2.3 **General Building Construction (Group C):**

YES NO

2.4 **General Trades (Interior Work Only):**

YES NO

2.5 **CPS Projects ONLY: Insert Class of Work**

YES NO

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

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: 25px;" type="text"/>	<input style="width: 40px; height: 25px;" type="text"/>
		<i>Years</i>	<i>Months</i>
7.2	<input style="width: 95%; height: 40px;" type="text"/>	<input style="width: 40px; height: 25px;" type="text"/>	<input style="width: 40px; height: 25px;" type="text"/>
		<i>Years</i>	<i>Months</i>
7.3	<input style="width: 95%; height: 40px;" type="text"/>	<input style="width: 40px; height: 25px;" type="text"/>	<input style="width: 40px; height: 25px;" 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

End of Section
00 45 17 Named Subcontractor Bidder's Qualification Statement

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-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 **Supplementary 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 **Instructions 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.

State Of Connecticut 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: Noel Petra
WITNESS: <input type="text"/> <i>(Signature)</i>	Its: Deputy Commissioner
Print Name: <input type="text"/>	Department of Administrative Services
Contractor Attested By:	Contractor:
WITNESS: <input type="text"/> <i>(Signature)</i>	Firm Name: <input type="text"/>
Print Name: <input type="text"/>	By: <input type="text"/> <i>(Signature)</i>
WITNESS: <input type="text"/> <i>(Signature)</i>	Print Name: <input type="text"/>
Print Name: <input type="text"/>	Its: <input type="text"/> , Duly Authorized
Office of the Attorney General:	Date Signed: <input type="text"/>
Approved as to form:	
By: <input type="text"/> <i>(Signature)</i>	
Print Name: <input type="text"/>	
Its: Attorney General / Assistant Deputy Attorney General / Associate Attorney General / Assistant Attorney General	
Date Signed: <input type="text"/>	SEAL

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 , 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.

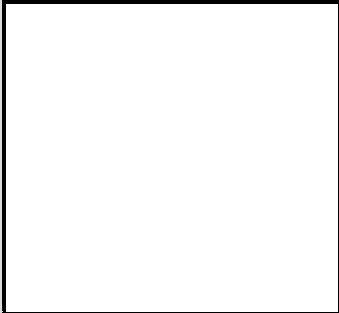
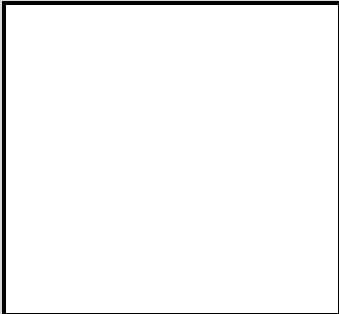
2. The Contractor agrees to begin, prosecute and complete the entire work specified by the Awarding Authority in an orderly manner so that the Subcontractor will be able to begin, prosecute and complete the work described in this subcontract; and, in consideration thereof, upon notice from the Contractor, 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 INSURED Contractor's Legal Name and Address	CONTACT NAME: _____ PHONE (A.C. No. Ext): _____ FAX (A.C. No.): _____ E-MAIL ADDRESS: _____ <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">INSURER(S) AFFORDING COVERAGE</td> <td style="width: 20%;">NAIC #</td> </tr> <tr> <td>INSURER A:</td> <td></td> </tr> <tr> <td>INSURER B:</td> <td></td> </tr> <tr> <td>INSURER C:</td> <td></td> </tr> <tr> <td>INSURER D:</td> <td></td> </tr> <tr> <td>INSURER E:</td> <td></td> </tr> <tr> <td>INSURER F:</td> <td></td> </tr> </table>	INSURER(S) AFFORDING COVERAGE	NAIC #	INSURER A:		INSURER B:		INSURER C:		INSURER D:		INSURER E:		INSURER F:	
INSURER(S) AFFORDING COVERAGE	NAIC #														
INSURER A:															
INSURER B:															
INSURER C:															
INSURER D:															
INSURER E:															
INSURER F:															

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	ADDL. SUIN. INSR. WORD	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) <input type="checkbox"/> Y/N If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	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
 Connecticut Department of Administrative Services**

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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 and "Work Phase".

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.

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.

3.6 In accordance with C.G.S. Section 4a-1, 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.

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.

12.2 Should this Contract be for a public works 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 Sub- contractor'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 not be more than **seven and five-tenths percent (7.5%)** deducted from the amount of each Application for Payment to be retained by the Owner as Retainage until Acceptance of the Work.

28.2.1 The following criteria shall be utilized in the reduction of Retainage withheld: 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 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 DAS Project Manager's estimate of the remaining Work or **two and five-tenths percent (2.5%)**, whichever is greater. All requests for Retainage Reduction shall be done on **CT DAS Form 7048 General Contractor Retainage Reduction Request**, a sample of which can be found at the end of these 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 Section 28.3, a reduction of Retainage below **two and five-tenths 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.

28.3.11 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 Documents 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.

32.1.3 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 Termination for Convenience: Notwithstanding any provision or language in the Contract to the contrary, the State may terminate the Contract for convenience 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 for Convenience 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 for convenience 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 the Work.

33.3 Termination for Cause:

33.3.1 The Commissioner may give notice in writing to the Contractor and its surety of any particular delay, neglect, or default of the Contractor due to one or more of the following:

33.3.1.1 Failure to begin the Work within the time specified for same in the Contract Documents.

33.3.1.2 Failure to perform the Work with sufficient workmen, equipment or materials to ensure the prompt completion of the Work within the time specified in the Contract.

33.3.1.3 Unsuitable performance of the Work or failure to remedy or redo such work as DAS Project Manager shall reject as defective, unsuitable, or noncompliant with Contract requirements.

33.3.1.4 Failure or refusal to remove material rejected as defective, unsuitable, or noncompliant with Contract requirements.

33.3.1.5 Discontinuance of the suitable prosecution of the Work for a period of seventy-two (72) hours, excluding Saturdays, Sundays and holidays, without written authorization to do so from the DAS Project Manager.

33.3.1.6 Failure to recommence discontinued Work within forty-eight (48) hours (excluding Saturdays, Sundays and holidays) after being ordered to do so by the DAS Project Manager.

33.3.1.7 Insolvency, filing for bankruptcy or any act or occurrence that may render the Contractor financially incapable of completing the Work.

33.3.1.8 Failure to satisfy any final judgment against it for a period of thirty (30) days.

33.3.1.9 Making of any assignment for the benefit of creditors.

33.3.1.10 Violation of any provisions of the Contract Documents.

33.3.2 If the Contractor or its surety within a period of ten (10) days after the issuance of such notice does not proceed in conformance with the directions set forth therein, or fails to present a remedial plan of operation, satisfactory to the Commissioner, for remedying the acts or failures complained of in the notice, then the Commissioner may, at his discretion, order the surety to complete the Work or, without violating the Contract, take the right to control and prosecute the Work out of the hands of said Contractor and surety, terminating the Contract.

33.3.3 The Commissioner may appropriate or use any or all stockpiled materials and any and all equipment required by the Contract as may be suitable and necessary for completion of the Work and may enter into an agreement, either by negotiation or public letting, for the completion of said Contract by a party other than the Contractor, according to the terms and provisions thereof, or use such other methods or combinations thereof as in his or her opinion shall be required or desirable for the completion of the Work.

33.3.4 All costs and charges incurred by the Owner in connection with completing the Work, or as a result of the Contractor's default, shall be deducted from any monies due to or which may become due to the Contractor. In case such expense exceeds the sum that would have been payable under the Contract, then the Contractor and the surety shall be liable for, and shall pay to the State, the amount of the excess. 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 the 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 41 00 BID PROPOSAL FORM 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 Connecticut Department of Administrative Services/Construction Services, Office of Legal Affairs, Policy and Procurement, 450 Columbus Blvd, Suite 1302, Hartford, CT 06103-1835 unless otherwise directed in writing. For insurance definitions see Article 1 herein. Presented below is a narrative summary of the insurance required.

35.1.1 Commercial General Liability Insurance: 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 Administrative 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: 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 Insurance: 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 Umbrella Liability Insurance: Umbrella Liability Insurance, including a drop down provision covering any exhausted underlying aggregate limits in the specified amount shown below of combined single limit each occurrence in excess of the coverages described in subsections 35.1.1 Commercial General Liability Insurance, 35.1.3 Automobile Liability, and 35.1.5 Workers' Compensation and Employer's Liability. The State of Connecticut shall be named as an additional insured. The Umbrella Liability Insurance Limits for the Contractor are based on the Contract Value as specified in the following table.

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

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 the BID PROPOSAL FORM 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 the BID PROPOSAL FORM 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 Indemnification and Hold Harmless Provisions:

35.6.1 The Contractor shall indemnify, defend and hold harmless the State and its officers, representatives, agents, servants, employees, successors and assigns from and against any and all (1) Claims arising, directly or indirectly, in connection with the Contract, including the acts of commission or omission (collectively, the "Acts") of the Contractor or Contractor Parties; and (2) liabilities, damages, losses, costs and expenses, including but not limited to, attorneys' and other professionals' fees, arising, directly or indirectly, in connection with Claims, Acts or the Contract. The Contractor shall use counsel reasonably acceptable to the State in carrying out its obligations under this section. The Contractor's obligations under this section to indemnify, defend and hold harmless against Claims includes Claims concerning confidentiality of any part of or all of the Contractor's bid, proposal or any Records, any intellectual property rights, other proprietary rights of any person or entity, copyrighted or uncopyrighted compositions, secret processes, patented or unpatented inventions, articles or appliances furnished or used in the Performance.

35.6.2 The Contractor shall not be responsible for indemnifying or holding the State harmless from any liability arising due to the negligence of the State or any third party acting under the direct control or supervision of the State.

35.6.3 The Contractor shall reimburse the State for any and all damages to the real or personal property of the State caused by the Acts of the Contractor or any Contractor Parties. The State shall give the Contractor reasonable notice of any such Claims.

35.6.4 The Contractor's duties under this section shall remain fully in effect and binding in accordance with the terms and conditions of the Contract, without being lessened or compromised in any way, even where the Contractor is alleged or is found to have merely contributed in part to the Acts giving rise to the Claims and/or where the State is alleged or is found to have contributed to the Acts giving rise to the Claims.

35.6.5 The Contractor shall carry and maintain at all times during the term of the Contract, and during the time that any provisions survive the term of the Contract, sufficient general liability insurance to satisfy its obligations under this Contract. The Contractor shall name the State as an additional insured on the policy and shall provide a copy of the policy to the Agency prior to the effective date of the Contract. The Contractor shall not begin Performance until the delivery of the policy to the Agency. The Agency shall be entitled to recover under the insurance policy even if a body of competent jurisdiction determines that the Agency or the State is contributorily negligent.

35.6.6 Such obligations shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to any party or person described in General Conditions Article 35.

35.6.7 This section shall survive the Termination of the Contract and shall not be limited by reason of any insurance coverage.

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.

36.3 Buy American Act (BAA): Any "public building" or "public work" project funded by the American Recovery and Reinvestment Act of 2009 ("ARRA") requires that "all of the iron, steel, and manufactured goods used in the project" must be "produced in the United States" in accordance with the requirements of the Buy American Act (BAA).

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 A 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

39.1.2.2 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.

ARTICLE 40 **DISCLOSURE OF RECORDS**

40.1 This Contract may be subject to the provisions of C.G.S. Section 1-218. In accordance with this statute, each contract in excess of two million five hundred thousand dollars (\$2,500,000.00) between a public agency and a person for the performance of a governmental function shall (a) provide that the public agency is entitled to receive a copy of records and files related to the performance of the governmental function, and (b) indicate that such records and files are subject to the Freedom of Information Act (FOIA) and may be disclosed by the public agency pursuant to FOIA. No request to inspect or copy such records or files shall be valid unless the request is made to the public agency in accordance with FOIA. Any complaint by a person who is denied the right to inspect or copy such records or files shall be brought to the Freedom of Information Commission in accordance with the provisions of C.G.S. Sections 1-205 and 1-206.

ARTICLE 41 **AUDIT AND INSPECTION OF PLANTS, PLACES OF BUSINESS, AND RECORDS**

41.1 The State and its agents, including, but not limited to, the Connecticut Auditors of Public Accounts, Attorney General and State's Attorney and their respective agents, may, at reasonable hours, inspect and examine all of the parts of the Contractor's and Contractor Parties' plants and places of business which, in any way, are related to, or involved in, the performance of this Contract.

41.2 The Contractor shall maintain, and shall require each of the Contractor Parties to maintain, accurate and complete Records. The Contractor shall make all of its and the Contractor Parties' Records available at all reasonable hours for audit and inspection by the State and its agents.

41.3 The State shall make all requests for any audit or inspection in writing and shall provide the Contractor with at least twenty-four (24) hours' notice prior to the requested audit and inspection date. If the State suspects fraud or other abuse, or in the event of an emergency, the State is not obligated to provide any prior notice.

41.4 All audits and inspections shall be at the State's expense.


41.5 The Contractor shall keep and preserve or cause to be kept and preserved all of its and Contractor Parties' Records until three (3) years after the latter of (i) final payment under this Agreement, or (ii) the expiration or earlier termination of this Agreement, as the same may be modified for any reason. The State may request an audit or inspection at any time during this period. If any Claim or audit is started before the expiration of this period, the Contractor shall retain or cause to be retained all Records until all Claims or audit findings have been resolved.

41.6 The Contractor shall cooperate fully with the State and its agents in connection with an audit or inspection. Following any audit or inspection, the State may conduct and the Contractor shall cooperate with an exit conference.

41.7 The Contractor shall incorporate this entire Section verbatim into any contract or other agreement that it enters into with any Contractor Party.

END

Appendix 1



7048
General Contractor (GC)
Retainage Reduction Request
 Page 1 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="General Contractor Name"/>	General Contractor (GC)	
Subject:	DAS Project Number: <input type="text" value="DAS Project Number"/>		
	DAS Project Name: <input type="text" value="DAS Project Name"/>		
	Reduction of Retainage at: <input type="text" value="Written Percent"/> Percent (<input type="text" value="##"/> %) Project Completion		
Date:	<input type="text" value="Insert Date"/>		

In accordance with the General Conditions, Article 28 Progress Payments,
 hereby requests a reduction of retainage from % to %.

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).

<input type="checkbox"/>	DAS Construction Services Contractor Performance Evaluation Score is a minimum of (60%) Percent.
<input type="checkbox"/>	Timely submission of an appropriate and complete CPM Schedule / 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 payment of the Work.
<input type="checkbox"/>	Timely and proper submission of all required Contract Documents 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 process of the Work.
<input type="checkbox"/>	Proper and adequate supervision on site appropriate to the Project.
<input type="checkbox"/>	The Work completed to date has been installed or finished in a manner acceptable to the Owner.
<input type="checkbox"/>	The progress of the Work is consistent with the approved CPM Schedule.
<input type="checkbox"/>	All approved change orders have been invoiced.
<input type="checkbox"/>	All Change Order requests for payment are current.
<input type="checkbox"/>	The Contractor is maintaining a clean worksite in accordance with the Contract Documents.
<input type="checkbox"/>	Subcontractor payments are current at the time of reduction request.
<input type="checkbox"/>	GC is in compliance with all other provisions of the contract.

General Contractor Certification:	<input type="text" value="Written Name"/>	<input type="text" value="Signature"/>	<input type="text" value="Date"/>
Project Manager Recommendation:	<input type="text" value="Written Name"/>	<input type="text" value="Signature"/>	<input type="text" value="Date"/>
ADPM Approval:	<input type="text" value="Written Name"/>	<input type="text" value="Signature"/>	<input type="text" value="Date"/>
DAS Chief Architect or Authorized Representative:	<input type="text" value="Written Name"/>	<input type="text" value="Signature"/>	<input type="text" value="Date"/>

END

**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; and1.1.3 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; and1.2.3 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; or1.3.6 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; and1.4.5 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-MM-53	Project Town:	Norwalk, CT
Project: Norwalk Roof and HVAC			
Department of Motor Vehicles Branch Office Facility			
Norwalk, 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	7 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 12, 2020



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.

Minimum Rates and Classifications for
Building Construction

ID#: 20-11083

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: BI-MM-53

Project Town: Norwalk

State#: BI-MM-53

FAP#: BI-MM-53

Project: RMV Roof and HVAC Project

CLASSIFICATION	Hourly Rate	Benefits
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**		
1c) Asbestos Worker/Heat and Frost Insulator	40.21	30.99
2) Boilermaker	38.34	26.01
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	35.71	34.34 + a
3b) Tile Setter	34.9	25.87
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	26.7	21.75
3e) Plasterer	33.48	32.06
-----LABORERS-----		
4) Group 1: Laborers (common or general), acetylene burners, carpenter tenders, concrete specialists, wrecking laborers, fire watchers.	30.75	20.84
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofers/mixer/nozzleman (Person running mixer and spraying fireproof only).	31.0	20.84

Project: RMV Roof and HVAC Project

4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	31.25	20.84
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.	31.75	20.84
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	31.5	20.84
4e) Group 6: Blasters, nuclear and toxic waste removal.	33.75	20.84
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	31.75	20.84
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	29.03	20.84
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	28.49	20.84
4i) Group 10: Traffic Control Signalman	18.0	20.84
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.	33.53	25.66
5a) Millwrights	34.94	26.19
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)	39.62	27.25+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	55.12	34.765+a+b
-----LINE CONSTRUCTION-----		
Groundman	26.5	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00
8) Glazier (Trade License required: FG-1,2)	38.18	21.80 + a

As of: March 12, 2020

9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	36.67	35.77
-----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)	40.97	24.80 + 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)	40.64	24.80 + 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)	39.88	24.80 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	39.48	24.80 + a
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	38.87	24.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	38.87	24.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	38.55	24.80 + a
Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24	38.2	24.80 + a
Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	37.79	24.80 + a
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).	37.34	24.80 + a
Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	35.24	24.80 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	35.24	24.80 + a

Project: RMV Roof and HVAC Project

Group 12: Wellpoint operator.	35.18	24.80 + a
Group 13: Compressor battery operator.	34.58	24.80 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	33.41	24.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	32.99	24.80 + a
Group 16: Maintenance Engineer/Oiler.	32.32	24.80 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	36.76	24.80 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	34.26	24.80 + a
-----PAINTERS (Including Drywall Finishing)-----		
10a) Brush and Roller	34.62	21.80
10b) Taping Only/Drywall Finishing	35.37	21.80
10c) Paperhanger and Red Label	34.12	21.05
10e) Blast and Spray	36.62	21.05
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	43.62	32.06
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
Rofer: Cole Tar Pitch	41.5	17.00 + a
Rofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	40.0	17.00 + a
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	44.74	42.48
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)	43.62	32.06

-----TRUCK DRIVERS-----

17a) 2 Axle	29.51	24.52 + a
17b) 3 Axle, 2 Axle Ready Mix	29.62	24.52 + a
17c) 3 Axle Ready Mix	29.67	24.52 + a
17d) 4 Axle, Heavy Duty Trailer up to 40 tons	29.72	24.52 + a
17e) 4 Axle Ready Mix	29.77	24.52 + a
17f) Heavy Duty Trailer (40 Tons and Over)	29.98	24.52 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	29.77	24.52 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	45.57	24.33 + a
19) Theatrical Stage Journeyman	25.76	7.34

Project: RMV Roof and HVAC Project

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.

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.

As of: March 12, 2020

Project: RMV Roof and HVAC Project

~~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: March 12, 2020

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.

In accordance with Connecticut General Statutes, 31-53 Certified Payrolls with a statement of compliance shall be submitted monthly to the contracting agency.	PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS WEEKLY PAYROLL	Connecticut Department of Labor Wage and Workplace Standards Division 200 Folly Brook Blvd. Wethersfield, CT 06109
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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 <small>Trade License Type & Number - OSHA 10 Certification Number</small>	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	FEDERAL WITH-HOLDING	STATE WITH-HOLDING	LIST OTHER		
				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. \$								

***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)

Additional Forms to Be Submitted After Bond Commission Funding Approval

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

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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.

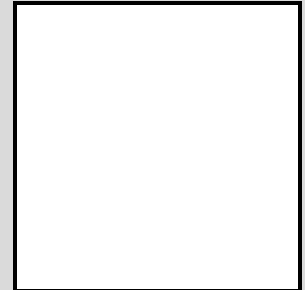
Any alterations which may be made in the terms of the contract, or in the work done or to be done under it, or the giving by the Obligee of any extension of time for the performance of the contract or any other forbearance on the part of either the Obligee or the Principal, one to the other, shall not 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.

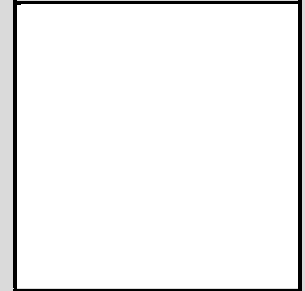
Any alterations which may be made in the terms of the contract, or in the work done or to be done under it, or the giving by the Obligee of any extension of time for the performance of the contract or any other forbearance on the part of either the Obligee or the Principal, one to the other, shall not 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)

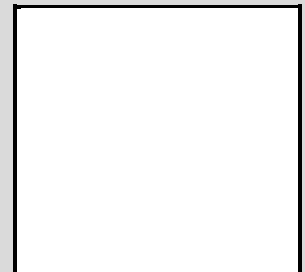
, Its

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. 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:

- 1. Design-Bid-Build (DBB);
- 2. Construction Manager at Risk (CMR)

B. Project Number: BI-MM-53

C. Project Title: Norwalk Roof and HVAC Department of Motor Vehicles Branch Office Facility

D. Project Location: 540 Main Avenue, Norwalk Connecticut, 06851.

E. The Project Description:

- 1. Replacement of the approximately 15,000 S.F. existing roofing system to the existing steel roof deck.
 - a. Design shall comply with Factory Mutual Global requirements.
- 2. Repairs to ceilings and paint finishes damaged by HVAC work.
- 3. Replacement of building's existing four (4) Lennox HVAC units.
- 4. Upgrade the existing interior building's HVAC system's zoning and operation.
- 5. 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:

- 1. **Owner's Name:** The Owner is the State of Connecticut, Department of Administrative Services.
- 2. **Authorized Representative for the Owner: DAS/CS Project Manager Name: Lisa R. Humble**
 - a. **DAS/CS Project Manager's Location:** The DAS/CS Project Manager is located at 450 Columbus Blvd, Suite 1201, Hartford, CT, 06103.
 - b. **Phone: 860-713-5823;**
 - c. **Fax: 860-707-1932;**
 - d. **Email: Lisa.Humble@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 **Department of Motor Vehicles**.
2. **Agency Representative Name and Title:** **Angelo Cavaliere**. The Agency Representative's Title is **Building Maintenance Supervisor**.
 - a. **Agency Representative Location:** The Agency Representative is located at **60 State Street, Wethersfield, CT 06162**.
 - b. **Phone:** **860-263-5311**;
 - c. **Fax:** **860-263-5575**;
 - d. **Email(s):** **angelo.cavaliers@ct.gov**.
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 **Wiss, Janney, Elstner Associates, Inc.**
 - a. **Architect's Location:** The Architect is located at **2 Trap Falls Road, Suite 502, Shelton, CT 06484**.
 - b. **Phone:** **203-447-5927**;
 - c. **Fax:** **203-944-6997**;
 - d. **Email(s):** **planteri@wje.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:** The Construction Administration will be assigned at the pre-construction meeting.
 - a. **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.

J. Work: The Work Includes but is not limited to the following:

- 1 **Restoration of existing site to pre-construction conditions;**

- 2 **Rough Carpentry work associated with roofing replacement;**
 - 3 **Removal of existing roofing system to existing steel roof deck and the furnishing and installation of a new roofing system including membrane, insulation, vapor barrier and base board;**
 - 4 **Replacement of existing pipe supports for roof top equipment**
 - 5 **Replacement of existing HVAC rooftop units;**
 - 6 **Upgrade the existing interior building's HVAC system's zoning and operation.**
- 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.

1.4 **WORK UNDER OTHER CONTRACTS - NA**

1.5 **FUTURE WORK - NA**

1.6 **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. Work of these Phase(s) shall be substantially complete, ready for occupancy within **one hundred and sixty (160)** Calendar Days of commencement of the Work (the "**Contract Time**").
- C. The building will remain occupied during Construction. All interior work shall be performed on Sundays and Mondays unless permission is obtained from Owner to work inside the building on other days of the week.

1.7 **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 **Main Avenue, Norwalk, CT**. 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.

1.8 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.
 2. The building will remain occupied during Construction. All interior work shall be performed on Sundays and Mondays unless permission is obtained from Owner to work inside the building on other days of the week.

1.9 PRODUCTS ORDERED IN ADVANCE - NA

1.10 OWNER-FURNISHED PRODUCTS - NA

1.11 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.**
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

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.
- 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. proposed vehicle and equipment access routes;
 - b. locations of proposed staging/lay-down and storage areas, utility connections;
 - c. delivery access of materials, handicap access;
 - d. building egress, proposed pedestrian traffic flows at exterior of the building;
 - e. office trailer and dumpster locations;
 - f. location of perimeter construction fencing and gates;
 - g. other protection measures around and in the building(s);
 - h. proposed building access points;
 - i. proposed protection measures for trees, shrubs and plantings, interior access-ways;
 - j. 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 **four (4)** 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.** 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.

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 requirements 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 **(7) 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

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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)
 - h. **Schedule (01 32 16):** For the Base Schedule a lump sum payment or 40% of the total schedule budget, with the remainder paid on an even payment over the duration of the project.
5. Round amounts to nearest whole dollar; the total shall equal the Contract Sum.
6. **Unit-Cost Allowances:** Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.
7. **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

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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.
 - 7. Division 01 Section 01 91 00 "Commissioning" defines the commissioning process.

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.

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 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.
 4. 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 (Not Applicable)

END OF SECTION 01 31 00

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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. Progress meetings.
 4. Safety
 5. Coordination
 6. As-built drawings review
 7. 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.
 6. Division 07 Section 07 53 23 "EPDM Membrane Roofing" for pre-construction conferences.

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.

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

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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

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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.

1.4 QUALITY ASSURANCE

- A. Engage a qualified commercial photographer to take photographs during construction.

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 PRECONSTRUCTION PHOTOGRAPHS

- A. Before starting construction, take digital photos of the site and surrounding properties from different points of view, as selected by the Construction Administrator.
 - 1. Take digital photos in sufficient number to show existing site conditions before starting Work.
 - 2. Take digital photos of adjacent existing buildings either on or adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.

3.2 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. Shop Drawings.
 - 2. Product Data.
 - 3. Samples.
 - 4. Quality assurance submittals.
 - 5. Proposed "Substitutions/Equals".
 - 6. Warrantee samples.
 - 7. 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".

11. Division 01 Section 01 91 00 "Commissioning" specifies requirements for submittal of quality assurance documentation related to commissioning.

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.
1. 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:
1. Dimensions.
 2. 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"

1.10 SHOP DRAWINGS FOR ROOFING SYSTEMS:

- A. **Construction Phase Requirements:** During product submittals and shop drawing review for Roofing Systems the Consultant shall verify FM Global requirements are satisfied for all relevant components. The DAS/CS PM and Construction Administer for the Project shall submit the Contractor's roofing systems product information and shop drawings to the Consultant and FM Global. Shop drawings for roofing systems shall comply with all of the requirements in the section above "Shop Drawings". **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):
1. **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. The State Insurance Carrier requires **two (2)** weeks prior notice of roofing system shop drawing reviews.
- C. See Section **00 30 60 General Statement For FM Global Checklist For Roofing Systems** and **Section 50 60 00 FM Global Checklist for Roofing Systems**.

1.11 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.

1.12 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.

1.13 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."

1.14 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. **No Exception Taken:** 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. **Make Corrections Indicated:** 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. **Amend and 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. **Rejected:** 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 hazardous building material reports.
 - 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 50 00 00 "Project-Specific Available Information" for information that is referenced in Section 00 30 00 "General Statements for Available Information".
 - 5. Refer to other Sections for specific requirements and limitations applicable to performing alteration Work with individual parts of the Work.
 - 6. 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. There are no salvageable materials associated with this Project.

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.

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 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. 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.

3.6 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. Meet the following requirements within the SSHO:

Level 3: A minimum of **five (5) years** safety work 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. Competent person training as needed.]

E. 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**.

F. 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 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.

G. 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 **Fourteen (14) 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.**

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 (4) hours**, 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 include type of construction equipment used, Personal Protective Equipment (PPE) used. 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, SHAL 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.

1.18 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 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least **Fifteen (15) Calendar Days** in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, attend a pre-outage coordination meeting with the CA, User Agency Representative, and Public Utilities representative to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 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.

3.4 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).

3.5 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**.

3.6 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).

C. USE OF EXPLOSIVES

Explosives shall not be used or brought to the project site without prior written approval from the CA. Such approval shall not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations. Storage of explosives, when permitted on State property, shall be only where directed and in approved storage facilities. These facilities shall be kept locked at all times except for inspection, delivery, and withdrawal of explosives. Explosive work shall be performed in accordance with

the requirements of C.G.S. § 29-343 through 29-355 and as required by the Office of State Fire Marshal, CT Department of Construction Services.

3.7 EXCAVATIONS

A. Perform soil classification by a competent person in accordance with **29 CFR 1926 Safety and Health Regulations for Construction**.

1. **Utility Locations**

All underground utilities in the work area must be positively identified by and coordinated in accordance with **Division 00, General Conditions, Article 18 Surveys, Permits, And Regulations**. All underground utilities in the work area must be positively identified by a private utility locating service and coordinated with the public utility company. Any markings made during the utility investigation must be maintained by the General Contractor throughout the contract.

2. **Utility Location Verification**

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within three feet of the underground system. Digging within **Two (2) feet (610 mm)** of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility expose the utility by hand digging every **100 feet (30.5 m)** if parallel within **Five (5) feet (1.5 m)** of the excavation.

3. **Shoring Systems**

Trench and shoring systems must be identified in the accepted safety plan and AHA. Manufacture tabulated data and specifications or registered engineer tabulated data for shoring or benching systems shall be readily available on-site for review. Job-made shoring or shielding must have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

4. **Trenching Machinery**

Operate trenching machines with digging chain drives only when the spotters/laborers are in plain view of the operator. Provide operator and spotters/laborers training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Keep documentation of the training on file at the project site.

3.8 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.

3.9 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**.

3.10 WORK IN CONFINED SPACES

- A.** Comply with the requirements in **OSHA 29 CFR 1910.146** and **OSHA 29 CFR 1926.21(b) (6)**. Any potential for a hazard in the confined space requires a permit system to be used.
- 1.** Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.
 - 2.** Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.
 - 3.** Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

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 International Building Code - 2012.
 - 1.2 International Mechanical Code - 2012.
 - 1.3 International Plumbing Code - 2012.
 - 1.4 International Energy Conservation Code - 2012.
 - 1.5 National Electric Code (NFPA 70) - 2014.
 - 1.6 ICC/ANSI A117.1-Accessible and Usable Buildings and Facilities - 2009.

2. Connecticut Fire Safety Code - 2016
 - 2.3 International Fire Safety Code - 2012.
 - 2.4 NFPA 101 - 2012.
 3. Connecticut Fire Prevention Code - 2018.
 - 3.1 NFPA 1 - 2015.
 4. Occupational Safety and Health Administration (OSHA)
 - 4.1 OSHA 29 CFR Part 1910 Occupational Safety and Health Regulations - 2004.
 - 4.2 OSHA 29 CFR Part 1926 Occupational Safety and Health Regulations for Construction - 2004.
- 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

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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.

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 **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.
- 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".

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.

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

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 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:
- 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 lifts and hoists.
 - 4. Temporary project identification signs.
 - 5. Temporary exterior lighting.
 - 6. Collection and disposal of waste and cleaning.
 - 7. Temporary Environmental Controls.
 - 8. Stairs.
- 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. Traffic ways.
 - 9. Identification badges for Contractor's personnel & parking stickers.

1.3 RELATED SECTIONS

- A. Division 01 Section 01 57 30 "Indoor Environmental Control" for additional provisions governing temporary heating, ventilating and air conditioning

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.

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.
 2. **Vision Barriers:** Provide minimum 1/2-inch thick exterior plywood.
 3. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior plywood. **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.
- C. **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.
- D. **Water:** Provide potable water approved by local health authorities.
- E. **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 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. **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.
- G. **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.
- H. **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 TEMPORARY UTILITY INSTALLATION

- A. **Water Service:**
 - 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. Use of Owner's existing electric power service will be permitted
 - 2. Provide connections, extensions of service, and receptacle outlets as required for construction operations.
 - 3. As necessary, provide additional electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Do not overload Owner's service.
 - 4. Comply with NECA 200 and NFPA 70. Maintain temporary service in safe condition and utilize in safe manner.
 - 6. 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 Telephone Service and Data:** Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities.

- D. 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. **Field Office Computer System**
The Contractor shall provide one 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.
3. **Computer Software:**

The Contractor shall provide software for the computer system in accordance with the minimum requirements listed below.

3.1	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.
3.2	The Owner may install and maintain proprietary software on the computer in order to run the Owner's construction management programs.

4. 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.

- 4.1 The Contractor shall provide an uninterruptible power supply (UPS), and full time surge suppression for each field office computer system specified in this Section.
- 4.2 The Contractor shall provide all cables, connections and software required to connect the field office computer system to the printer and the scanner.
- 4.3 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.

- 4.4 The Contractor shall provide appropriate dust covers for all field office desktop computer systems.
 - 4.5 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.
 - 4.6 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 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.
 - 4.7 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.
5. **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 **4 Mbps** unless otherwise approved by the Owner.
6. 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 Lifts and Hoists:**
1. Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- E. **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.

F. **Temporary Exterior Lighting:** Install exterior yard and sign lights so signs are visible when Work is being performed.

G. **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.

H. **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.
6. Traffic Control.

I. **Stairs:** Provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION (listed in Paragraph 1.2 D)

A. **Temporary Fire Protection:** 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.

B. 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.

C. 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".

D. Enclosure Fences: Install an enclosure fence with lockable entrance gates. Locate where indicated on the Construction Documents, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.

1. Provide chain link construction fencing with posts set in a compacted mixture of gravel and earth. Use existing fence to the extent possible.

E. 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.

F. 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".
- G. **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.
- H. **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.
- I. **Parking**
 1. A limited number of parking spaces will be provided by the Owner for the Contractor's use.
- J. **Identification Badges for Contractor's Personnel:**
 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.

3.5 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. Construction Documents and general provisions of the Contract, including General Conditions of the Contract for Construction and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Microbial and fungal contamination control.
 - 2. Indoor air quality and pollution control.
 - 3. Heating, ventilating, and air conditioning.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section 01 45 23.13 "Testing for Indoor Air Quality (IAQ), Baseline IAQ, & Materials" for building flush out requirements.
 - 2. Division 01 Section 01 57 40 "Construction IAQ Management Plan" for a description of the IAQ management plan.

1.3 REFERENCES

- 1. **ASTM International (ASTM):**
 - a. ASTM D5116-2006, Standard Guide for Small-Scale Environmental Chamber Determination of Organic Emissions From Indoor Materials/Products.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 MICROBIAL AND FUNGAL CONTAMINATION CONTROL

- A. Perform, schedule, and sequence Work as required to limit conditions supporting formations of microbes, molds, and fungi.
 - 1. Control water penetration, dampness, and humidity to prevent products not treated for exterior use from becoming soaked or damp.
 - 2. Enclose building prior to installing interior materials and finishes.
 - 3. Do not install interior products subject to moisture absorption until building is enclosed and wet work generating moisture and humidity is complete.
- B. When visible formations are observed and when formations cannot be completely removed by non-abrasive surface cleaning:
 - 1. Remove and replace materials identified as food sources for microbes, molds, and fungi.
 - 2. Correct conditions supporting microbial, mold, and fungal growth.
- C. Remove interior products and finishes, identified as food sources that have absorbed sufficient moisture to become damp whether or not microbial, mold, or fungal growth is observed. Include:
 - 1. Gypsum board cores.
 - 2. Organic materials composed of cellulose fiber or paper.
 - 3. Materials containing sucrose or other binders identified as supporting microbial growth.
- D. Remove fibrous insulation materials subject to retaining moisture such as duct liner, insulation, and other materials that are made wet or damp and cannot immediately be made dry.
- E. Repair or replace ductwork, pans, and other conditions subject to moisture condensation, water penetration, or other water source not drained and made dry.
 - 1. Remove conditions that have become an environment for microbes, molds, or fungi.

2. Do not permit conditions leading to standing water.
- F. Install wet work and allow time needed to dry and cure prior to installing materials such as carpet, acoustical material, textiles, and other material of type that may attract and retain moisture.

3.2 INDOOR AIR QUALITY AND POLLUTION CONTROL

- A. **Product Emission Rate Standards:** Test to ASTM D5116 for maximum indoor air concentration levels.
 1. **Formaldehyde:**
 - a. 0.03 parts per million where no other requirements are specified.
 - b. 0.005 parts per million where products are specified as formaldehyde free.
 2. **Total VOC Emissions for Carpet Tile, Adhesives, and Sealers:** 0.05 mg/m² per hour.
 3. **4 Phenyl Cyclohexene (4-PC) Particulate Emissions for Carpet:** One (1) part per billion.
 4. **Total Particulate Emission Rate Levels:** 50 ug/m³.
 5. **Primary and Secondary Regulated Pollutants:** Conform to USEPA, Code of Federal Regulations, Title 40, Part 50 National Air Ambient Air Quality Standard. Refer to EPA Web Site <http://www.epa.gov/epahome/rules.html#codified>.
 6. **Other Pollutants Not Listed:** Not greater than 1/10 of Threshold Limit Value - Time Weighted Average (TLV-TWA) industrial workplace standard.
- B. **Architectural Coatings - Volatile Organic Compound (VOC) Content Limits:** Conform to US Environmental Protection Agency (EPA) Federal Register 48886/Vol. 63, No.176 Friday, September 11, 1998/ Rules and Regulations. Refer to EPA Web Site: <http://www.epa.gov/ttn/atw/eparules.html>.
- C. Do not use products in combination with or in contact with other products that can be identified as combining to form toxic fumes or sustained odors.
- D. Do not use solvents within interior areas that may penetrate and be retained in absorptive materials such as concrete, gypsum board, wood, cellulose products, fibrous material, and textiles.
- E. Protect construction materials from contamination and pollution from contact with construction dust, debris, fumes, solvents, and other environmentally polluting materials.
- F. Allow furnishings and materials such as carpet, floor tile, acoustical tile, textiles, office furniture, and casework, to air out in clean environment prior to installation.

3.3 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

- A. Heat, dehumidify, and ventilate building during course of Work as necessary to maintain environmental conditions suitable for drying and curing materials and for prevention of conditions suitable for mold and mildew growth.
 1. Ventilate building to remove moisture, dust, fumes, and odors.
 2. Temper and dehumidify air as needed to remove excess moisture.
 3. Do not use propane heaters and other moisture generating heating systems.
- B. Inspect ductwork for refuse, contaminants, moisture and other foreign contamination prior to commissioning. Notify Commissioning Agent (CxA) of satisfactory inspection prior to beginning of Commissioning.
- C. Clean underfloor plenum at access flooring acting as supply air duct, prior to occupancy.

3.4 REMEDIAL ACTION

- A. Promptly take action as necessary to inspect and remediate conditions suspected of supporting microbial, fungal or mold conditions and where contaminated by indoor air pollution.
- B. Notify and consult with Architect prior to beginning remedial action where contamination by hazardous chemicals, microbes, and fungi is suspected.

END OF SECTION 01 57 30

ART 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. Store loose granular material on solid surfaces in a well-drained area; prevent mixing with foreign matter.
 10. 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.
 11. Stone, masonry units and similar materials shall be stored on platforms or dry skids and shall be adequately covered and protected against damage.
 12. 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.
 13. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct and products are undamaged.
 14. 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. Semi-proprietary Specification Requirements: Where Specifications name two (2) or more products or manufacturers, provide one (1) of the products indicated. Comply with the requirements of Division 01 Section 01 25 00 "Substitution Procedures."
 2. 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.

3. 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.
4. 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

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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. 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. **Utilities:** List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
 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. Structural steel.
 - b. Structural decking.
 - c. Miscellaneous structural metals.
 - d. Exterior curtain-wall construction.
 - e. Equipment supports.

- f. 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. Primary operational systems and equipment.
 - b. Air or smoke barriers.
 - c. Water, moisture, or vapor barriers.
 - d. Membranes and flashings.
 - e. Fire protection systems.
 - f. Noise and vibration control elements and systems.
 - g. Control systems.
 - h. Communication systems.
 - i. 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. 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. 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

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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. Comply with the requirements of Division 01 Section 01 91 00 "Commissioning" as they relate to the Work of this Section.
- B.** 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.
- C.** 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. 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.
 - 8. Complete final cleanup requirements.
 - 9. 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 consent of surety to Final Payment.
 - 5. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 - 6. 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.

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. Fuels.
 7. Identification systems.
 8. Control sequences.
 9. Hazards.
 10. Cleaning.
 11. Warranties and bonds.
 12. Maintenance agreements and similar continuing commitments.
- B.** As part of instruction for operating equipment, demonstrate the following procedures and video tape the demonstration:
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 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.
 - c. 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.
 - d. Vacuum and/or dust walls, ceilings, lighting fixtures, ceiling diffusers and other wall and ceiling items.
 - e. 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.
- C. Removal of Protection:** Remove temporary protection and facilities installed for protection of the Work during construction.
- D. 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

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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. Division 01 Section 01 91 00 "Commissioning" specifies requirements for submittals related Commissioning.
 6. 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, Commissioning Agent (CxA), 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.
 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 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. Equipment or system break-in.
 - b. Routine and normal operating instructions.
 - c. Regulation and control procedures.
 - d. Instructions on stopping.
 - e. Shutdown and emergency instructions.
 - f. Summer and winter operating instructions.
 - g. Required sequences for electric or electronic systems.
 - h. 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 DVD must be able to be edited for future changes to the equipment and modifications as they occur.

1.7 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

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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>07 53 23</u>	Single-Ply Membrane Roofing, Base Flashing and Insulation: 30 year unlimited, materials and installation [the manufacturer's no dollar limit (NDL) warranty], and; 2 year General Contractor's warranty for installation.
2.	07 <u>07 92 00</u>	Exterior - Interior Caulking and Sealants: 10 year, material and workmanship.
3.	08 <u>07 72 00</u>	Unit Skylights: 5 year, material and workmanship

Specification / Warranty Table (Continued)

H. Form of Warranty: Warranties shall be submitted in following format:

Warranty			
Commissioner: <i>(Insert Commissioner's Name)</i> Department of Administrative Services DAS Commissioner's Office 450 Columbus Boulevard, Suite 1501 Hartford, CT 06103			
Project Number: <i>(Insert DAS/CS Project Number)</i> Project Title: <i>(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: _____			

- I. Bonds shall be by approved Surety Companies, made out to the Commissioner, Department of Administrative Services on companies' standard form.
- J. 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.
- K. Bonds shall be by approved Surety Companies, made out to the Commissioner, Department of Administrative Services, on company's standard form.
- L. 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

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 equipment and system commissioning, including the following:
 - 1. Completion of commissioning procedures on specific equipment and systems as indicated under "Related Sections" below.
 - 2. Verification of operational and functional performance of specific equipment and systems for compliance with the "Design Intent" as described in the "Related Sections" indicated below.
- B. **Related Sections:** The following Sections contain requirements that relate to this Section:
 - 1. Section 01 31 00 "Project Management And Coordination" specifies procedures for coordinating the Commissioning Process.
 - 2. Division 01 Section 01 33 00 "Submittal Procedures" specifies procedures for submittal of Product Data and Quality Assurance Submittals.
 - 3. Division 01 Section 01 77 00 "Closeout Procedures" specifies general closeout requirements.
 - 4. Division 23 Section 23 08 00 "Commissioning of HVAC" specifies closeout and/or commissioning related requirements for specific pieces of equipment or building operating systems.
 - 5. Division 25 Section 25 08 00 "Commissioning of Integrated Automation" specifies closeout and/or commissioning related requirements for specific pieces of equipment or building operating systems.
 - 6. Division 26 Section 26 08 00 "Commissioning of Electrical Systems" specifies closeout and/or commissioning related requirements for specific pieces of equipment or building operating systems.

1.3 DEFINITIONS

- A. **Basis of Design (BOD):** A document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- B. **Commissioning Agent (CxA):** An entity identified by the Owner who leads, plans, schedules, and coordinates the commissioning team to implement the Commissioning Process.
- C. **Commissioning (Cx) Plan:** A plan that includes a list of all equipment to be commissioned, delineation of roles for each of the primary commissioning participants, and details on the scope, timeline, and deliverables throughout the commissioning process."
- C. **Deficiencies and Resolutions List:** List of noted deficiencies discovered as result of commissioning process.
- E. **Final Commissioning Report:** Overall final commissioning document (see 1.6, I(2) below), prepared by the Commissioning Agent, which details the actual commissioning procedures performed, inspection and testing results, and the final version of the deficiencies and resolutions list indicating that all issues discovered through the commissioning process have been verified as resolved.
- F. **Functional Completion:** Functional Completion is when all remaining TAB (Testing, Adjusting, Balancing) and commissioning responsibilities of the Contractor and their subcontractor's (except for seasonal or approved deferred testing and controls training), have been functionally certified as complete by the Owner's Commissioning Agent (CxA) and the Certificate of Functional Completion has been issued.
- G. **Functional Performance Testing Process:** Documented testing of system parameters, under actual or simulated operating conditions. Functional testing is the dynamic testing of systems (rather than just components).
- H. **Pre-Commissioning Checklists:** Installation and start-up items to be completed by the appropriate party prior to operational verification through Functional Testing.
- I. **Physical Inspection Process:** On-site inspection and review of related system components for conformance to the specifications.

- J. **Seasonal Commissioning Tests:** Functional Tests that are deferred until the system(s) will experience conditions closer to their intended design conditions.
- K. **Trending:** Monitoring using the building control system.

1.4 COORDINATION

- A. **Commissioning Team:** The members of the commissioning team consist of the Commissioning Agent (CxA), the DAS/CS Project Manager (PM), the Construction Administrator (CA), the Contractor, the Architect and Design engineers (particularly the mechanical engineer), the Mechanical Subcontractor, the Electrical Subcontractor, the TAB representative, the Controls Subcontractor, any other installing subcontractors or suppliers of equipment. If known, the Agency's building or plant operator/engineer is also a member of the Commissioning team.
- B. **Management:** The CxA is hired by the Owner. The CxA directs and coordinates the commissioning activities and the reports to the CA. All members of the Commissioning Team work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents. Refer to Section 01 91 00 Part 1.6 and 1.7 for additional management details.
- C. **Scheduling.** The CxA will work with the CA and Contractor according to established protocols to schedule the commissioning activities. The CxA will provide sufficient notice to the CA and Contractor for scheduling commissioning activities. The Contractor will integrate all commissioning activities into their master CPM schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.
 - 1. The CxA will provide the initial schedule of primary commissioning events at the commissioning scoping meeting. The Commissioning Plan—Construction Phase provides a format for this schedule. As construction progresses more detailed schedules are developed by the CxA. The Commissioning Plan also provides a format for detailed schedules.

1.5 DESCRIPTION OF CONSTRUCTION PHASE COMMISSIONING PROCESS

- A. As soon as practicable after the "Contract Start Date" the Commissioning Agent (CxA) will conduct a pre-installation commissioning "kick-off" meeting with the Subcontractors. Parties directly affected by the commissioning work will be required to attend. The CxA will explain the commissioning process in detail, and identify specific commissioning related responsibilities of the various parties.
- B. Commissioning status meetings will be scheduled to occur during construction to monitor progress and to help facilitate the commissioning process. Contractor representatives will be required to attend these meetings.
- C. Once Subcontractors have provided the CxA with written verification indicating completion of installation and startup procedures, the CxA will conduct an on-site physical inspection of the specific systems and equipment.
- D. Upon confirmation of system readiness, the CxA will schedule with the Subcontractors to perform functional compliance with the project specifications and drawings. The CxA will oversee the process and will provide the format and documentation for these tests.
- E. Deficiencies noted during these tests will be documented on the Deficiencies and Resolutions list. When corrected, issues will be resolved at the time of discovery. The responsible Contractor will resolve all other issues at a later date. All deficiencies will be noted by the CxA as either resolved or pending resolution.
- F. The construction commissioning process will be complete when all noted deficiencies have been corrected, proved to be compliance with the project specifications or otherwise resolved to the satisfaction of the Owner and when the CxA has issued the Certificate of Functional Completion

1.6 COMMISSIONING AGENT'S (CxA's) DUTIES AND RESPONSIBILITIES

- A. Meet and communicate with the Owner's representatives, Contractor, Construction Administrator, Subcontractors, equipment manufacturers' representatives, Architect, and others as needed, to facilitate the commissioning process.
- B. Review commissioning related specifications, submittals and construction documents. Communicate noted deficiencies and concerns to the Owner, Architect and Engineer.
- C. Develop detailed and specific Functional Testing procedures for equipment and systems to be commissioned.
- D. Develop testing, adjusting and balancing (TAB) specifications. Oversee the TAB process.

- E. Perform site inspections and verify Construction Manager’s subcontractor readiness for the Functional Testing process. Document deficiencies for future resolution.
- F. Witness contractor performed Functional Testing process as appropriate to verify contractor compliance with the functional testing procedures. Document deficiencies for future resolution.
- G. Provide the Owner, Contractor, Construction Administrator, Architect, and Engineer with a Final Commissioning Report to document the commissioning process and to verify that the commissioning process is complete.
- H. Verify that the Contractor O&M documentation is complete.

I. Commissioning Record in O&M Manuals.

1. The CxA is responsible to compile, organize and index the following commissioning data by equipment into labeled, indexed and tabbed, three-ring binders and deliver it to the Contractor, to be included with the O&M manuals. Three copies of the manuals will be provided. The format of the manuals shall be:

- 1.1 **Tab I-1:** Commissioning Plan;
- 1.2 **Tab I-2:** Final Commissioning Report (see (2) below)
- 1.3 **Tab 01:** System Type 1 (chiller system, packaged unit, boiler system, etc.);
 - 1.3.1 **Sub-Tab A:** Design narrative and criteria, sequences, approvals for equipment in System Type 1;
 - 1.3.2 **Sub-Tab B:** Startup plan and report, approvals, corrections, blank Precommissioning Checklists;
 - .1 **Colored Separator Sheets**—for each equipment type (fans, pumps, chiller, etc.);
 - 1.3.3 **Sub-Tab C:** Functional tests (completed), trending and analysis, approvals and corrections, training plan, record and approvals, blank functional test forms and a recommended recommissioning schedule.
- 1.4 **Tab 02:** System Type 2.....repeat as per above requirements for System 1.

2. **Final Report Commissioning Report Details.** The final commissioning report shall include an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the commissioning authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:

- 2.1 Equipment meeting the equipment specifications;
- 2.2 Equipment installation,
- 2.3 Functional performance and efficiency;
- 2.4 Equipment documentation and design intent; and
- 2.5 Operator training. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

2.6 Pre-Occupancy Commissioning (Cx) Report:

A Pre-occupancy Commissioning (Cx) Report shall be prepared by the Commissioning Agent (CxA) that demonstrates that the project has met all of the requirements spelled out in the following Table:

Twelve (12) Mandatory Requirements [16a-38k-3] Summary Table:		
	Regulation	Summary Description
1.	16a-38k-3(a)	Building Commissioning:
2.	16a-38 -3(b)	Integrated Design Process:
3.	16a-38k-3(d)	ENERGY STAR Products:
4.	16a-38k-3(c)	Energy Performance:
5.	16a-38k-3(e)	Indoor Air Quality Management Plan:
6.	16a-38k-3(f)	Water Usage:

7.	16a-38k-3(g)	Recycling of Materials:
8.	16a-38k-3(h)	Erosion and Sedimentation Control:
9.	16a-38k-3(i)	No Smoking Policy:
10.	16a-38k-3(j)	Integrated Pest Management Plan:
11.	16a-38k-3(k)	Chlorofluorocarbon (CFC)-Based Refrigerants:
12.	16a-38k-3(l)	Minimum Ventilation Requirement:

2.7 Post-Occupancy Commissioning (Cx) Report:

A Post-Occupancy Commissioning (Cx) Report shall be prepared by the Commissioning Agent (CxA) and submitted to the DAS/CS PM for review and approval. The approved Report shall be submitted by the State Agency that is responsible for the ongoing care, operation, and maintenance of the building to the CT OPM Secretary and the DAS Commissioner within one hundred eighty (180) days after one year of occupancy Date of DAS/CS Acceptance of the Work. The Report shall include results of any post-occupancy survey of building occupants, a description of any adjustments made to equipment or building operation and the reasons for which the changes were made, and one year of all energy usage by source and water usage.

3. Other documentation will be retained by the CxA.

1.7 DUTIES AND RESPONSIBILITIES OF OTHERS FOR COMMISSIONING

- A. The commissioning process will require the active participation of persons qualified to represent the Owner, Mechanical Engineer, Electrical Engineer, Construction Manager, Equipment Manufacturers' Representatives, Mechanical Subcontractor, HVAC Subcontractor, Controls Subcontractor, TAB Subcontractor, Electrical Subcontractor, and other specific subcontractors, as deemed appropriate. The CxA will witness the final functional performance commissioning process. Participants shall include in their contracts all costs necessary to participate in and complete the commissioning process.
- B. The Contractor will assure the participation and co-operation of the Subcontractors, as required to complete the commissioning process.
- C. The Owner will assure the participation of their chosen representatives as required to complete the commissioning process.
- D. The Architect will assure the participation of necessary representatives from the Design Team as required to complete the commissioning process. Design team members will provide prompt replies to requests for information issued during the commissioning process.
- E. It is the Contractor's specific responsibility to complete their respective start-up and checkout procedures, and to insure the complete readiness of equipment and systems, prior to the start of the functional performance testing phase. The CxA shall request written confirmation of system readiness for performance testing, from the appropriate Contractor or Subcontractor. Once the CxA is provided with confirmation of all related systems completion, the actual date and times for the functional performance testing process will be confirmed. Contractor and Subcontractors shall provide sufficient time, and qualified representatives, to complete this process at no additional cost to the State.
- F. After a second failure of a system to successfully meet the criteria as set forth in the functional performance testing process, the Contractor shall reimburse the Owner for all costs associated with any additional re-testing efforts made necessary due to remaining Contractor related system deficiencies previously reported by the Contractor as corrected. These costs shall also include the costs (where applicable) for the CxA.
- G. Training on related systems and equipment operation and maintenance shall only be scheduled to commence after final performance commissioning is satisfactorily completed, and systems are verified to be 100 percent complete and functional.

1.8 SUBMITTALS

- A. Refer to Section 01 33 00 Submittal Procedures.
- B. **Pre-Commissioning Checklist Forms:** Submit **two (2)** signed copies of the checklist forms to the CxA upon completion of all listed items.
- C. **Equipment Manufacturer's Startup Forms:** Submit **two (2)** completed copies of the installation and startup checklists provided by the equipment manufacturers to the CxA.
- D. **Test Reports:** Submit **two (2)** copies of test reports for equipment and systems to the CxA.

- E. **Control Schematics:** Submit **two (2)** copies of the control schematics for equipment, systems, and subsystems to the CxA.
- F. **Inspection Records:** Submit **two (2)** copies of the records of inspections for code compliance, and approved permits and licenses to operate the equipment and systems to the CxA.
- G. **Operating Data:** Submit **two (2)** copies of equipment and system operating data including all necessary instructions to facilitate operation to specified performance standards to the Owner.
- H. **Maintenance Data:** Submit **two (2)** copies of equipment and system maintenance data including all necessary information required to maintain the equipment and systems in continuous operation, such as the testing, balancing and adjusting report and the as-built drawings.

1.9 TRAINING OF OWNER PERSONNEL

- A. The Contractor shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.
- B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Agency's personnel for commissioned equipment.
 - 1. The CxA shall interview the Agency's facility manager and lead engineer to determine the special needs and areas where training will be most valuable. The Construction Administrator, Agency's facility manager, and CxA shall decide how rigorous the training should be for each piece of commissioned equipment. The CxA shall communicate the results to the Contractor of Subcontractors and vendors who have training responsibilities.
 - 2. In addition to these general requirements, the specific training requirements of Owner personnel by Subcontractor and vendors are specified in Divisions 21, 22, 23, 25, 26, and 27.
 - 3. The Contractor shall require each Subcontractor and vendor responsible for training to submit a written training plan to the CxA for review and approval prior to training. The plan will cover the following elements:
 - 3.1 Equipment (included in training);
 - 3.2 Intended audience;
 - 3.3 Location of training;
 - 3.4 Objectives;
 - 3.5 Subjects covered (description, duration of discussion, special methods, etc.);
 - 3.6 Duration of training on each subject;
 - 3.7 Instructor for each subject;
 - 3.8 Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.);
 - 3.9 Instructor and qualifications.
 - 4. For the primary HVAC equipment, the Controls Contractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.
 - 5. The CxA shall develop an overall training plan and coordinate and schedule, with the CA, Agency Representative, and Contractor, the overall training for the commissioned systems. The CxA shall develop criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CxA shall recommend approval of the training to the CA using a standard form for submittal to the Contractor. The CA also shall sign the approval form.
 - 6. At one of the training sessions, the CxA shall present a **one (1)** hour presentation discussing the use of the blank functional test forms for re-commissioning equipment.
 - 7. Video recording of the training sessions shall be provided by Contractor. The Contractor shall provide the CA, with video disks cataloged by Contractor, and added to the O&M manuals.
 - 8. The HVAC design engineer shall at the first training session present the overall system design concept and the design concept of each equipment section. This presentation shall be **two (2)** hours in length and include a review of all systems using the simplified system schematics (one-line drawings) including chilled water systems, condenser water or heat rejection systems, heating systems, fuel oil and gas supply systems, supply air systems, exhaust system and outside air strategies.

1.10 DEFERRED TESTING

- A. **Unforeseen Deferred Tests.** If the Contractor determines that any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and Functional Testing may be delayed upon approval of the DAS/CS PM. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.

- B. Seasonal Testing.** During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design intent) as specified in Division 23 shall be completed as part of this contract. The CxA shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate Subcontractors, with the Agency facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and as-built drawings due to the testing will be made.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 91 00

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fabrication and installation of miscellaneous steel elements.
 - 2. Connection to, or alteration of, existing steel elements.
- B. Related Sections:
 - 1. Section 09 97 13 - Steel Coating: For touch up painting of installed steel items and existing steel finishes damaged by the installation of new steel items.

1.2 REFERENCES

- A. Definitions:
 - 1. Installer: Used interchangeably for installer or erector.
 - 2. SSPC: Procedures in SSPC Painting Manual.
 - 3. WPS: Welding Procedure Specification.
- B. Reference Standards: Latest edition as of Specification date.
 - 1. American Institute of Steel Construction (AISC):
 - a. 303: Code of Standard Practice for Steel Buildings and Bridges.
 - b. 360: Specification for Structural Steel Buildings.
 - 2. American Society of Civil Engineers (ASCE)
 - a. ASCE/SEI-7: Minimum Design Loads for Buildings and Other Structures
 - 3. ASTM International (ASTM):
 - a. A29/A29M: Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought.
 - b. A36/A36M: Standard Specification for Carbon Structural Steel.
 - c. A992/A992M: Standard Specification for Structural Steel Shapes.
 - 4. American Welding Society (AWS):
 - a. D1.1/D1.1M: Structural Welding Code - Steel.
 - 5. The Society for Protective Coatings (formerly Steel Structures Painting Council, or SSPC):
 - a. SSPC Painting Manual.

1.3 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including signed and sealed engineering calculations by structural or professional engineer licensed in Project jurisdiction for allowable loads indicated on Drawings and other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.

1.4 SUBMITTALS

- A. Product Data and Test Reports:
 - 1. Structural steel elements
- B. Shop Drawings: Show fabrication and installation details of steel elements, including:
 - 1. Dimensions, shapes, and material using reference standards such as ASTM properties.
 - 2. Details of cuts, connections, splices, camber, openings, and other pertinent data.
 - 3. Weld sizes, lengths, and types by standard AWS symbols, including shop or field weld designation.
 - 4. Indicate elements to receive stand-alone shop coat.
- C. Certificates:
 - 1. Welding consumables - manufacturer's certificates
 - 2. Welder Performance Qualification Record (WPQR):
 - a. Current WPQR (welder certification), qualified in accordance with Clause 4, Qualification, of AWS D1.1/D1.1M, for welders who will perform shop or site welding.

- b. WPQR shall be applicable to each WPS that welder will be designated to perform.
- D. Welding Qualification Data:
- 1. Welding Procedure Specification (WPS) for each weld type, process, parameters (i.e. wire speed, voltage, amperage, etc.), and position, whether prequalified or qualified by testing by AWS D1.1/D1.1M, including the following:
 - a. Certificate of conformance and product information sheet for consumables listed in the WPS.
 - b. Supplemental welding procedures.
- E. Fabricator Qualifications: Evidence that fabricator's *existing company* has minimum five years of continuous experience in similar steel fabrication work; list of at least five representative, successfully-completed projects of similar scope and size, including:
- 1. Project name.
 - 2. Owner's name.
 - 3. Owner's Representative name, address, and telephone number.
 - 4. Description of work.
 - 5. Types of steel fabrication work.
 - 6. Project supervisor.
 - 7. Total cost of steel fabrication work and total cost of project.
 - 8. Completion date.
- F. Installer Qualifications: Evidence that installer's *existing company* has minimum five years of continuous experience in similar steel installation work; list of at least five representative, successfully-completed projects of similar scope and size, including:
- 1. Project name.
 - 2. Owner's name.
 - 3. Owner's Representative name, address, and telephone number.
 - 4. Description of work.
 - 5. Types of miscellaneous steel installation work.
 - 6. Project supervisor.
 - 7. Total cost of miscellaneous steel installation work and total cost of project.
 - 8. Completion date.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualification: Experienced firm that has successfully completed steel fabrication work similar in material, design, and extent to that indicated for Project. Must have successful fabrication with specified materials in local area in use for minimum of five years.
- B. Installer Qualifications: Experienced firm that has successfully completed miscellaneous steel installation work similar in material, design, and extent to that indicated for Project. Must have successful construction with specified materials in local area in use for minimum of five years.
 - 1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond control of Contractor; inform Architect/Engineer in advance of any changes.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver store, and handle materials to prevent damage to materials or structure.
- B. Store elements off ground and spaced with pallets, dunnage, or other supports and spacers. Store to permit easy access for inspection and identification.
- C. Store fasteners in protected place. Clean and re-lubricate bolts and nuts that become dry or rusty before use per manufacturer's written recommendations.
 - 1. Twist-off-type bolt assemblies (ASTM F3125 Grades F1852 and F2280) shall be re-lubricated by the manufacturer only.

- D. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid damage or permanent structure deflection.

1.7 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to installation of steel elements. Notify Architect/Engineer of conditions found to be different than those indicated in Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer how to proceed
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
 - 1. Welding work is to be completed when building is not open to the public.
 - a. Evenings, Sundays or Mondays.
- C. Handle and install materials in strict accordance with safety requirements required by local, state, and federal rules and regulations.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer prior to proceeding with the Work of conditions that may interfere with, preclude proper execution of, or jeopardize the performance of the Work.

PART 2 - PRODUCTS

2.1 STEEL ELEMENTS

- A. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M.
- B. Plates and Bars: ASTM A36/A36M.

2.2 AUXILIARY MATERIALS

- A. Welding Electrodes:
 - 1. Mild Steel: Comply with AWS D1.1 Table 3.1 requirements for Group II or higher steel specifications, and electrodes listed in approved WPSs.
- B. Stand-alone Shop Coat: Fabricator's standard lead-free, shop coat, complying with local VOC emissions requirements.

2.3 FABRICATION

- A. Fabricate and assemble in shop to greatest extent possible. Comply with requirements of AISC 303, including tolerances.
 - 1. Cut, drill, and punch elements cleanly and accurately.
 - a. Remove burrs.
 - 2. Cutting:
 - a. Structural Steel: When thermal cutting is necessary, mechanically thermal cut to greatest extent possible. Grind thermally-cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
 - 3. Holes: Fabricate bolt holes, holes required for securing other work to steel elements, and holes for other work to pass through steel elements.
 - a. Cut, drill, mechanically, or punch holes cleanly and accurately, perpendicular to steel surfaces. Do not thermally cut holes or enlarge holes by burning.
 - b. Drill or punch holes in stainless steel.

4. Grind edges of members to be coated to minimum radius of about 1/32 inch unless otherwise indicated. Members that will be shop coated only do not need to have edges ground.
- B. Welded Connections, Structural Steel: Comply with AWS D1.1/D1.1M for preheating, required profiles, tolerances, weld appearance, weld quality, and for methods used in correcting welding work.
1. Perform welding in accordance with approved WPSs by properly certified welders.
 2. Remove dirt, grease, oil, and foreign matter by pickling, power brushing, degreasing, machining, or grinding, prior to welding.
 3. Preheat base metal and maintain interpass temperatures in accordance with AWS D1.1/D1.1M.
 4. Perform welding in a manner to:
 - a. Minimize distortion of welded pieces.
 - b. Obtain thorough fusion and required profile without cracking.
 5. Remove slag from completed welds, and clean adjacent weld metal by brushing or other suitable means.
- C. Cleaning: After assembly, including welding:
1. Clean and prepare steel surfaces that are to be shop coated according to SSPC-SP 1, Solvent Cleaning followed by SSPC-SP 2, Hand Tool Cleaning.
- D. Apply stand-alone shop coat by suitable means to a minimum dry film thickness of 1 mil. Do not apply stand-alone shop coat to surfaces to be bolted with slip-critical connections, field welded, coated with fire-resistive materials, hot-dipped galvanized, stainless steel, or embedded in concrete or mortar.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer for compliance with requirements and other conditions affecting installation or performance of miscellaneous steel elements.
1. Verify elevations of bearing surfaces and locations of anchor rods, bearing plates, and other embedments.
 2. Ensure that Work done by other trades is complete and ready for steel installation.
 3. Verify that areas and conditions under which Work is to be performed permit proper and timely completion of Work.
 4. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of steel elements. Do not proceed with steel installation until adverse conditions have been corrected and reviewed by Architect/Engineer. Commencing miscellaneous steel Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).
1. Erect temporary protective canopies and walls, as necessary, at walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- B. Protect paving and sidewalk, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- C. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- D. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.
- E. Limit access to Work areas.

- F. Protect from damage, all elements of completed work and original construction to remain.

3.3 INSTALLATION, GENERAL

- A. General:
1. Install miscellaneous steel elements in accordance with requirements of AISC 303.
 2. Position steel elements accurately in location, alignment, and elevation indicated; with edges and surfaces level, plumb, true, and free of rack.
 - a. Maintain erection tolerances specified by AISC 303.
 - b. Perform cutting, drilling, and fitting required to install steel elements.
 3. Provide temporary support for elements during installation to keep elements secure, plumb, and in alignment. Do not remove temporary supports until the installation is complete.
 4. Align and adjust various members forming part of the assembly before permanently fastening.
 - a. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with adjacent elements.
 - b. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - c. Make allowances for difference between temperature at time of installation and mean temperature when structure is completed and in service.
 5. Splice members only where indicated on Drawings or shop drawings approved by Architect/Engineer.
 6. Do not enlarge holes unless approved by Architect/Engineer. If approved, ream holes to enlarge.
- B. Welded Connections, Structural Steel: Comply with AWS D1.1/D1.1M for preheating, required profiles, tolerances, weld appearance, weld quality, and for methods used in correcting welding work.
1. Perform welding in accordance with approved WPSs by properly certified welders. Take precautions for fire hazards at adjacent construction.
 2. Remove dirt, grease, oil, and foreign matter by pickling, power brushing, degreasing, machining, or grinding, prior to welding.
 3. Preheat base metal and maintain interpass temperatures.
 4. Perform welding in manner to:
 - a. Minimize distortion of welded pieces.
 - b. Obtain thorough fusion and required profile without cracking.
 5. Remove slag from completed welds, and clean adjacent weld metal by brushing or other suitable means.
 6. Where existing members are to be welded, shore existing members in accordance with Drawings. Do not heat existing members more than necessary to achieve a satisfactory weld. Place welding work lead as close as possible to weldment being executed.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified special inspector to verify and inspect aspects of the steel installation and to inspect welds. Welding inspection and welding inspector qualifications shall be in accordance with AWS D1.1/D1.1M.
1. Provide testing agency with access to places where Work is being installed to perform inspections.
 2. Provide notice to testing agency of installation schedule.
- B. Welded Connections: Welds will be visually inspected according to AWS D1.1/D1.1M and the requirements of the applicable building code. Acceptance criteria will be in accordance with AWS D1.1/D1.1M.
1. Testing, in addition to visual inspection, will be performed on welds identified in the tail of the weld symbol or elsewhere on Drawings, and may be performed elsewhere at the discretion of the inspector. Welds will be tested by one or more of the following procedures in accordance with AWS D1.1/D1.1M:
 - a. ASTM E165/E165M: Liquid penetrant (PT).
 - b. ASTM E709: Magnetic particle (MT).
 - c. ASTM E164 (reference blocks only): Ultrasonic (UT).
 - d. ASTM E94: Radiographic (RT).
 2. Correct deficiencies in Work that inspection and testing indicate do not comply with Contract Documents.

3.5 REPAIRS AND PROTECTION

- A. Touchup Painting: Immediately after installation, clean exposed areas where stand-alone shop coat is damaged or missing and paint with same material used for stand-alone shop coat to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

3.6 CLEANING

- A. At the end of each workday, clean the Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
- B. After completing the miscellaneous steel Work:
 - 1. Clean all materials resulting from Work that are not intended to be part of the finished Work using appropriate cleaning agents and procedures. Exercise care to avoid damaging surfaces.
 - 2. Repair at no cost to Owner all items damaged during the Work.
 - 3. Remove and legally dispose of debris and surplus materials from Site.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Supply and construction of miscellaneous wood construction.

1.2 REFERENCES

- A. Abbreviations:
1. ALSC: American Lumber Standard Committee.
 2. APA: APA - The Engineered Wood Association.
- B. Definitions:
1. Rough carpentry: Carpentry Work that is not exposed; that is, concealed by other construction.
- C. Reference Standards: Latest edition as of Specification date.
1. American Lumber Standard Committee (ALSC):
 - a. PS 20: Voluntary Product Standard, American Softwood Lumber Standard.
 2. American National Standards Institute (ANSI)/American Wood Council (AWC):
 - a. National Design Specification for Wood Construction (ANSI/AWC NDS).
 3. American National Standards Institute (ANSI)/ASME - The American Society of Mechanical Engineers (ASME):
 - a. ANSI/ASME B18.6.1: Wood Screws (Inch Series).
 4. American Wood Protection Association (AWPA):
 - a. M4: Standard for the Care of Preservative-treated Wood Products.
 - b. T1: User Category System: Processing and Treatment Standard.
 - c. U1: Use Category System: User Specification for Treated Wood.
 5. APA-The Engineered Wood Association (APA):
 - a. Engineered Wood Construction Guide (Construction Guide).
 6. ASTM International:
 - a. A653/A653M: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

1.3 SUBMITTALS

- A. Product Data:
1. Dimension Lumber: Species, grading, and intended use of lumber proposed for use on Project; by grading agency accredited by ALSC Board of Review. Clearly note requested substitutions that differ from those specified.
 2. Treated Wood:
 - a. Chemical treatment manufacturers' literature, including:
 - 1) Compliance with requirements.
 - 2) Written instructions for handling, storing, installing, and finishing treated wood.
 - 3) Written requirements for corrosion protection of fasteners and connectors to be in contact with treated wood.
 - 4) Copies of warranties for each type of treatment.
 - b. Certification by treating plant that treated wood complies with requirements.
 - 1) Indicate type of preservative used and net amount of preservative retained.
 - 2) For treatments requiring drying after treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Site.
 - c. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials to prevent damage to materials or structure.

- B. Deliver materials to Site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.
- C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, and installation. Reject and remove from Site new materials which exhibit evidence of moisture damage.
- D. Store materials in original, undamaged containers in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer.
- E. Stack lumber, plywood, and other panels. Protect from water and weather. Place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- F. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- G. Conspicuously mark damaged materials and damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.

1.5 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of rough carpentry Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Handle and install materials in strict accordance with safety requirements required by manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

1.6 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

PART 2 PRODUCTS

2.1 DIMENSION LUMBER

- A. General: ALSC PS 20; provide lumber of nominal sizes shown on Drawings.
 - 1. Grade: Per applicable rules of lumber grading agency accredited by ALSC Board of Review. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Provide S4S dressed lumber unless otherwise indicated.
 - 3. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2 inch nominal thickness or less, unless otherwise indicated.

2.2 MISCELLANEOUS LUMBER

- A. Miscellaneous Lumber: Provide lumber for support or attachment of other construction, including rooftop equipment bases and support curbs, blocking, cants, nailers, and furring.
 - 1. Construction grade or better, with 19 percent maximum moisture content.
 - a. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails or damage to paneling.

2.3 PLYWOOD PANELS

- A. General: APA PRP-108; provide panels of nominal thicknesses shown on Drawings.
 - 1. Identification: Per APA performance standards. Factory mark each panel with performance ratings.
- B. Sheathing: APA Rated Sheathing, Exposure 1; plywood.
 - 1. Span Rating: Not less than 24/0.

2.4 PRESERVATIVE TREATMENT

- A. Application: Treat the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
- B. Preservative Treatment Requirements: AWWA U1 and T1.
 - 1. User Category: UC4A, except UC2 may be used for lumber and panels that are not in contact with ground and are continuously protected from liquid water.
 - 2. Commodity Specification:
 - a. Dimension lumber: A.
 - 3. Preservative Treatment: Water-borne or Oxine Copper (Cu8); acceptable to authorities having jurisdiction.
- C. Kiln-dry material after treatment to maximum moisture content of 19 percent for lumber. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Mark each treated item with treatment mark of inspection agency approved by ALSC Board of Review or APA.
- E. Field-Applied Preservative: AWWA M4; Copper-Napthenate (CuN), two percent minimum solids solution.

2.5 AUXILIARY MATERIALS

- A. Fasteners: ANSI/AWC NDS.
 - 1. Nails: ASTM F1667; 8d Common, nominal size: 0.131-inch diameter, 2-1/2-inch length.
 - a. Minimum edge distance, end distance, and spacing: Maintain minimum distances and spacings specified by ANSI/AWC NDS to prevent splitting of wood.
 - b. Penetration into Main Member: 1 inch minimum.
 - c. Drill lead holes if necessary to prevent splitting of wood.
 - 2. Wood Screws: TEKS Wood to Metal Screws #12 X 2-3/4".
 - a. Minimum edge distance, end distance, and spacing: Maintain minimum distances and spacings specified by ANSI/AWC NDS to prevent splitting of wood.
 - b. Drill lead holes as required to avoid splitting wood.
 - 3. Where rough carpentry is exposed to weather, in contact with ground, or in area of high relative humidity, use hot-dip galvanized fasteners complying with ASTM A153/A153M or Type 304 stainless steel fasteners.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with framing Subcontractor for compliance with requirements and other conditions affecting installation or performance of rough carpentry Work.
 - 1. Ensure that work done by other trades is complete and ready for rough carpentry Work.
 - 2. Verify that areas and conditions under which rough carpentry Work is to be performed permit proper and timely completion of Work.
 - 3. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of rough carpentry Work and recommend corrections.
 - 4. Do not proceed with rough carpentry Work until adverse conditions have been corrected and reviewed by Architect/Engineer.

5. Commencing rough carpentry Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris, coatings, and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- F. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 INSTALLATION, GENERAL

- A. Install wood construction according to Drawings and Specifications, and minimum requirements of 2016 Connecticut State Building Code. Notify Architect/Engineer of deviations between Drawings and Specifications and minimum code requirements.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
 - 1. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit.
 - 2. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Do not use materials with defects that impair quality of rough carpentry.
- D. Apply field-applied preservative to cut surfaces of preservative-treated lumber and panels. Apply minimum two coats per manufacturer's recommendations. Wipe off excess material.
- E. Securely connect rough carpentry and attach to substrate.
 - 1. Make tight connections between members.
 - 2. Space and install fasteners without splitting wood.
 - 3. Use common wire nails for wood to wood connection.
 - 4. Use TEK self tapping screws for wood to metal connections.
- F. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

3.4 WOOD SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated on Drawings 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.
 - 1. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.5 PLYWOOD INSTALLATION

- A. General: Comply with recommendations of APA Construction Guide.
- B. Wall Panels:
 - 1. Space panels 1/8 inch apart at edges and ends.

2. Fasten to existing steel studs.

3.6 FIELD QUALITY CONTROL

- A. Architect/Engineer may observe in-progress construction for quality and conformance with Construction Documents. Notify Architect/Engineer of Work progress at least weekly.

3.7 CLEANING

- A. At the end of each workday, clean Site and Work areas and place debris and rubbish in appropriate containers.
- B. After completing rough carpentry Work, clean up debris and surplus materials and remove from Site.

3.8 PROTECTION

- A. Protect installed rough carpentry from damage due to exposure to harmful weather, physical abuse, and other causes. Temporary cover rough carpentry Work exposed to weather as soon as practical after installation to prevent deterioration from wetting.

END OF SECTION 06 10 00

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PART 1 - GENERAL

1.1 SUMMARY

- A.** Section Includes:
 - 1. Full tear-off of entire roof system to existing steel roof deck.
 - 2. Removal of flashings and counter flashings.
 - 3. Repairs to steel roof deck.
 - 4. Temporary roofing.

- B.** Related Requirements:
 - 1. Section 07 53 23 EPDM Membrane Roofing.
 - 2. Section 22 14 23 Storm Drainage Piping and Specialties.

1.2 UNIT PRICES

- A.** Work of this Section is affected by metal deck repairs unit price. Refer to Section 01 20 00 Contract Considerations for quantities of these repairs to be included in the base bid.

1.3 DEFINITIONS

- A.** Full Roof Tear-off: Removal of existing roofing system down to existing steel roof deck.

- B.** Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

- A.** Refer to Section 07 53 23 EPDM Membrane Roofing for Pre-Construction / Pre-Installation meeting requirements.

1.5 SUBMITTALS

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

1.6 FIELD CONDITIONS

- A.** Existing Roofing System: Self Adhered EPDM membrane and 3" of polyisocyanurate board insulation that is secured with steel fasteners to the existing steel roof deck.

- B.** Owner will occupy the entire building immediately below reroofing area.
 - 1. Conduct reroofing so Owner's operations are not disrupted.
 - 2. Provide Owner with not less than 72 (Seventy Two) hours' written notice of activities that may affect Owner's operations.
 - 3. Coordinate work activities daily with Owner so Owner has adequate advance notice to place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.

- C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- E. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.
- F. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.
 - 1. Remove only as much roofing in one day as can be made watertight in the same day.

PART 2 - PRODUCTS

2.1 DECK REPAIR MATERIALS

- A. Use repair materials matching existing roofing system materials unless otherwise indicated.
- B. Steel deck repair materials:
 - 1. For repair areas that are one square foot or less in size use 20 gauge, galvanized steel sheets.
 - a. Sheets to overlap deteriorated steel by a minimum of 2 inches.
 - 2. For repair areas greater than one square foot use, 20 gauge, 1-1/2inch deep, wide rib, galvanized steel roof deck to match existing.
 - a. Nest repair deck onto existing.
 - b. Deck to overlap deteriorated area of existing deck by a minimum of four inches.
 - 3. Fasteners to secure repair materials shall be #8 x 1 inch, self-tapping stainless steel, sheet metal screws.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Limit traffic and material storage to areas of existing roofing that have been protected.
 - 2. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
- B. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.
- C. Shut off rooftop utilities and service piping before beginning the Work.
- D. Test existing roof drains to verify that they are not blocked or restricted.
 - 1. Refer to Section 22 14 23 Storm Drainage Piping and Specialties.
- E. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work.
 - 1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- F. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- G. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.
 - 1. Prevent debris from entering or blocking roof drains and conductors.
 - a. Use roof-drain plugs specifically designed for this purpose.

- b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
- 2. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding.
 - a. Do not permit water to enter into or under existing roofing system components that are to remain.

3.2 ROOF TEAR-OFF

- A. Notify Owner each day of extent of roof tear-off proposed for that day.
- B. Lower removed roofing materials to ground and onto lower roof levels, using dust-tight chutes or other acceptable means of removing materials from roof areas.
- C. Full Roof Tear-off: Remove existing roofing and other roofing system components down to the existing steel roof deck.
 - 1. Remove roof insulation.
 - 2. Remove base flashings and counter flashings.
 - 3. Remove flashings at pipes, curbs, mechanical equipment, and other penetrations.
 - 4. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

- A. Inspect deck after tear-off of roofing system.
- B. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Architect.
 - 1. Do not proceed with installation until directed by Architect.
- C. If deck surface is unsuitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify Architect.
 - 1. Do not proceed with installation until directed by Architect.
- D. Provide additional deck securement as directed by the Construction Administrator or Architect/Engineer to meet the requirements of FM Global Loss Prevention Data Sheet I-29.
- E. Replace steel deck as directed by the Construction Administrator or Architect/Engineer.
 - 1. Deck replacement will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.
 - 2. Secure sheet metal to steel deck with a minimum of 4 fasteners.
 - 3. Secure new steel deck to existing deck with fasteners at all upper ribs at the ends of the repair metal and every 16 inches minimum along the length of the repair.

3.4 BASE FLASHING REMOVAL

- A. Remove existing base flashings.
 - 1. Clean substrates of contaminants, such as asphalt, sheet materials, dirt, and debris.
- B. Do not damage metal counter flashings that are to remain.
 - 1. Replace metal counter flashings and wall panels damaged during removal with material of same metal, weight or thickness, and finish as existing. Retain first paragraph below if reusing existing parapet sheathing.

3.5 FASTENER PULL-OUT TESTING

- A. The Owner may retain an independent testing and inspecting agency to conduct fastener pull-out tests according to SPRI FX-1.
- B. Cooperate with the inspecting agency and escort the testing agency to items that are to be tested.

3.6 DISPOSAL

- A. Collect demolished materials and place in containers.
 - 1. Promptly dispose of demolished materials.
 - 2. Do not allow demolished materials to accumulate on-site.
 - 3. Storage or sale of demolished items or materials on-site is not permitted.
- B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 07 01 50

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Surface preparation, supply, and installation of adhered, EPDM membrane roofing system; including roof-deck boards, vapor barrier, and insulation.
- B. Related Sections:
 - 1. Section 07 01 50 - Preparation for Re-roofing
 - 2. Section 07 62 00 - Sheet Metal Flashing and Trim

1.2 REFERENCES

- A. Reference Standards: Latest edition as of Specification date.
 - 1. American National Standards Institute (ANSI)/Single Ply Roofing Industry (SPRI):
 - a. ANSI/SPRI FX-1: Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
 - 2. American Society of Civil Engineers (ASCE)/Structural Engineering Institute (SEI):
 - a. ASCE/SEI 7: Minimum Design Loads for Buildings and Other Structures.
 - 3. ASTM International:
 - a. C1177/C1177M: Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - b. C1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - c. D4637/D4637M: Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane.
 - d. E108: Standard Test Methods for Fire Tests of Roof Coverings.
 - 4. FM Global:
 - a. Class Number 4450: Approval Standard for Class 1 Insulated Steel Deck Roofs.
 - b. Class Number 4470: Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction.
 - c. [Approval Guide](#) (online resource).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that new insulation and roofing materials and building interior are kept continuously dry; that continuous, watertight, new roofing system is provided; and that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready for roofing Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, roofing Work in progress.
 - c. To ensure that subsequent work will not adversely affect completed roofing.
- B. Pre-Construction Conference:
 - 1. Conduct meeting at Site.
 - 2. Review requirements for roofing system, including:
 - a. Construction schedule.
 - b. Availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Site use, access, staging, and set-up location limitations.
 - d. Forecast weather conditions.
 - e. Surface preparation and substrate condition and pretreatment.
 - f. Installation procedures.
 - g. Base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - h. Testing and inspection requirements.
 - i. Temporary protection and repair of roofing system.
 - j. Structural loading limitations of roof deck.
 - k. Governing regulations and requirements for insurance and certificates.

3. Contractor's Site superintendent, roofing-system manufacturer's technical representative, roofing Installer's foreman, Owner's Representative, Architect/Engineer, and testing agency representative shall attend.

1.4 SUBMITTALS

- A. Product Data: Roofing-system manufacturer's literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; and application instructions.
 1. For membrane and base flashing materials, and bonding and cold, fluid-applied adhesives, primer, seaming material, lap sealant, water-cutoff mastic, and fasteners.
 2. Include temperature ranges for storage and application of materials, and special cold-weather application requirements or limitations.
 3. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work; for details and fabrications not shown on Drawings.
 1. Membrane terminations and base flashings. Draw to scale.
 2. Crickets, saddles, and tapered edge strips, including slopes.
 3. Insulation fastening patterns.
 4. Proposed temporary, watertight, tie-off details for each substrate type.
- C. FM Global Submittal: Submit completed form 2688 and all product data to FM Global.
 1. Submit drawings of insulation fastening patterns to show compliance with FM Global wind uplift requirements.
- D. Manufacturer Certificate: Signed by roofing-system manufacturer, certifying that roofing system complies with specified requirements.
 1. Written approval by roofing-system manufacturer for use and performance of membrane over specified board insulation, including that materials supplied for Project comply with requirements of cited ASTM standards. Approval should also indicate materials are suitable for ASTM E108, Class 1A roof and meet specified wind uplift classification.
 2. Submit evidence that roofing system meets requirements.
- E. Installer Qualifications:
 1. Certification signed by roofing-system manufacturer, certifying that Installer complies with manufacturer's requirements to install specified, warranted, roofing system.
 2. Evidence that Installer's *existing company* has minimum five years of continuous experience in similar roofing work; list of at least five representative, successfully-completed projects of similar scope and size, including:
 - a. Project name.
 - b. Owner's name.
 - c. Owner's Representative name, address, and telephone number.
 - d. Description of work.
 - e. EPDM materials used.
 - f. Project supervisor.
 - g. Total cost of roofing work and total cost of project.
 - h. Completion date.
- F. Sample Warranty: Copy of roofing-system manufacturer's warranty, stating obligations, remedies, limitations, and exclusions. Submitted with bid.
- G. Following completion of the Work:
 1. Roofing-system manufacturer's inspection report of completed roofing installation.
 2. Completed warranty from roofing-system manufacturer.
 3. Completed warranty from Installer.
 4. Maintenance program recommended for roofing system.

1.5 QUALITY ASSURANCE

- A.** Installer Qualifications: Experienced firm that has successfully completed roofing work similar in materials, design, and extent to that indicated for Project; that is approved, authorized, or licensed by roofing-system manufacturer to install roofing system; and that is eligible to receive roofing-system manufacturer's warranty. Must have successful installations of specified materials in local area in use for minimum of five years.
 - 1.** Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Architect/Engineer in advance of any changes.

1.6 DELIVERY, STORAGE, AND HANDLING

- A.** Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B.** Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.
- C.** Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which exhibit evidence of moisture during application or which have been exposed to moisture.
- D.** Store materials in original, undamaged containers in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Use canvas tarps for protection of moisture-sensitive roofing materials. Protect stored materials from direct sunlight. Manufacturer's standard packaging and covering are not considered adequate weather protection.
- E.** Store rolled materials on ends only, unless otherwise required by manufacturer's written instructions. Discard rolls that have been flattened, creased, or otherwise damaged.
- F.** Do not store materials at locations where new roofing materials have been installed.
- G.** Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- H.** Conspicuously mark damaged or opened containers, containers with contaminated materials, or wet or damaged materials, and remove from Site as soon as possible.
- I.** Remove and replace materials that cannot be applied within stated shelf life.

1.7 PROJECT CONDITIONS

- A.** Verify existing dimensions and details prior to start of roofing Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer of changes.
- B.** Comply with Owner's limitations and restrictions for Site use and accessibility.
- C.** Ensure that drains are operational at the end of each workday or if precipitation is forecast.
- D.** Environmental Limitations: Install roofing when existing and forecast weather conditions permit roofing system to be installed according to roofing-system manufacturer's written instructions and warranty requirements.
 - 1.** Apply roofing when substrate temperature is falling, and when substrate and ambient temperatures are within range recommended by roofing-system manufacturer.
 - 2.** Do not proceed with installation during inclement weather except for temporary work necessary to protect building interior and installed materials. Remove temporary work and Work that becomes moisture damaged.

- E. Handle and install materials in strict accordance with safety requirements required by roofing-system manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.
- F. Maintain adequate ventilation during preparation and application of roofing materials.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.9 WARRANTY

- A. Manufacturer's Warranty:
 - 1. Written warranty, signed by roofing-system manufacturer, including:
 - a. Repair or replace components of roofing system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in a manner not clearly specified by submitted roofing-system manufacturer's data as an inherent quality of the material for the application indicated.
 - b. Removal and replacement of roof-deck board, base sheet, temporary roof/vapor retarder, insulation, and walkway products. Warranty includes replacing materials as necessary.
 - c. Labor and materials to perform warranty Work.
 - 2. Warranty Period: 30 years from date of completion of roofing system.
- B. Roofing Installer's Warranty:
 - 1. Completed warranty form at the end of the Section, signed by Installer, including:
 - a. Repair or replace components of roofing system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in a manner not clearly specified by submitted roofing-system manufacturer's data as an inherent quality of the material for the application indicated.
 - b. Removal and replacement of roof-deck board, base sheet, temporary roof/vapor retarder, insulation, and walkway products. Warranty includes replacing materials as necessary.
 - c. Labor and materials to perform warranty Work.
 - 2. Warranty Period: Two years from date of completion of roofing system.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Roofing-system manufacturer that has FM Global approval for roofing system identical to that specified for Project. Use one of the following or approved equal:
 - 1. Carlisle SynTec Inc.
 - 2. Firestone Building Products Company.
 - 3. Versico Inc.

2.2 EPDM ROOFING MEMBRANE

- A. General:
 - 1. FM Global Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FM Global Class Numbers 4450 and 4470 as part of roofing system and that are listed in FM Global Approval Guide for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
 - a. Fire: Exterior A
 - b. Hail Resistance: SH.
 - 2. Roofing-system Design: Provide roofing system that is identical to systems that have been successfully tested by qualified testing agency to resist uplift pressure calculated according to FM Global.

3. Roofing-system Design: Provide roofing system that is identical to systems that have been successfully tested by qualified testing agency to resist uplift pressure calculated according to ASCE/SEI 7.
 - a. Uplift Pressure:
 - 1) Field: 60 psf
 - 2) Perimeter: 90 psf
 - 3) Corners: 120 psf
 4. Provide roofing system with an approved FM Global Roof Nav Assembly Number with a minimum 120 psf wind uplift rating. Assemblies include but are not limited to:
 - a. #425179-0-0
 - b. #318921-0-0 with prescriptive enhancement at corners.
 - 1) Provide one fastener with metal plate per square foot from top of insulation into metal deck at corners indicated on Drawings.
 5. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing-system manufacturer based on testing and field experience.
 6. Source Limitations: Obtain components for roofing system from or approved by roofing-system manufacturer.
- B. EPDM Roofing Membrane: ASTM D4637/D4637M, Type I; non-reinforced, uniform, flexible sheet made from EPDM; 90 mils nominal thickness; white-on-black exposed face color.

2.3 OTHER ROOFING-SYSTEM MATERIALS

- A. Roof-deck Boards: As included in FM Global Roof Nav Assembly and approved by membrane manufacturer.
1. Securock Gypsum Fiber Board as manufactured by United States Gypsum
 2. Dens Deck as manufactured by Georgia Pacific
- B. Vapor Retarder: As included in FM Global Roof Nav Assembly and approved by membrane manufacturer.
1. VapAir Seal 725TR as manufactured by Carlisle SynTec Inc.
 2. V-Force as manufactured by Firestone Building Products
 3. F5 Air and Vapor Barrier as manufactured by Mule-Hide Products Co. Inc.
- C. Insulation: As included in FM Global Roof Nav Assembly and approved by membrane manufacturer.
1. General: Provide preformed insulation boards that comply with requirements and referenced standards, selected from insulation manufacturer's standard sizes and of thicknesses indicated on Drawings.
 2. Polyisocyanurate Boards: ASTM C1289, Type II, felt or glass-fiber mat facer on both major surfaces; 20-pounds-per-square-inch-minimum compressive strength.
 3. Products and Manufacturers:
 - a. Polyiso HP-H as manufactured by Carlisle SynTec Inc.
 - b. Polyisocyanurate MP-H as manufactured by Versico LLC
 - c. Iso 95+ GL as manufactured by Firestone Building Products
 4. Insulation Accessories:
 - a. General: Insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
 - b. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
 - c. Tapered Edge and Cant Strips: ASTM C728, perlite insulation board.
- D. Walkways:
1. Flexible Walkway: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick; approved by roofing-system manufacturer.

2.4 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing-system manufacturer for intended use and compatible with membrane roofing and in compliance with FM Global Roof Nav Assembly.
1. Liquid materials shall meet VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil-thick EPDM, partially cured or cured, according to application.

1. Color to match color of roof membrane.
- C. Asphalt Primer: ASTM D41/D41M.
- D. Bonding Adhesive: Manufacturer's standard bonding adhesive.
- E. Cold, Fluid-Applied, Adhesives: Manufacturer's standard cold, fluid-applied, bonding adhesives, formulated to adhere roofing-system component to substrate.
- F. Seaming Material: Manufacturer's standard, semi-cured EPDM flashing laminated to seam tape, and 6-inch-wide-minimum.
 1. Color to match color of roof membrane.
- G. Lap Sealant: Manufacturer's standard single-component sealant, color to match roofing membrane.
- H. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- I. Termination Bars: Roofing-system manufacturer's standard; Type-304-stainless-steel or aluminum bars, approximately 1-inch wide by 1/8-inch thick; with predrilled holes 8 inches on center.
- J. Fasteners, General: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Global Class Number 4470, and acceptable to roofing-system manufacturer.
 1. Designed for fastening roofing-system components to substrate and tested by roofing-system manufacturer for required pullout strength.
- K. Fasteners for Base Flashings:
 1. Wood and Plywood Substrates: 1-inch-minimum long, capped, galvanized-steel nails with ribbed shank of sufficient length to provide 1-inch-minimum embedment or pass through bottom side of wood or plywood. Use Square-Cap Nails-Steel Head with STORMGUARD double hot-dipped zinc coating manufactured by Maze Nails, or approved equal.
 - a. 1-3/4-inch-minimum length, or as noted on details.
 2. Metal substrate: No. 12 x 1 1/2 inch, 410 stainless steel, self-drilling screws with 1-inch, stainless steel washers.
- L. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer and roofing-system manufacturer's representative for compliance with requirements and for other conditions affecting performance of roofing system.
 1. Perform testing according to ANSI/SPRI FX-1 to verify that fastener pull-out values meet or exceed those required by FM Global standards.
 2. Ensure that work done by other trades is complete and ready for roofing Work, including:
 - a. Roof openings and penetrations are in place and set and braced, and roof drains are securely clamped in place.
 3. Verify that areas and conditions under which roofing Work is to be performed permit proper and timely completion of Work.
 4. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of roof system and recommend corrections.
 5. Do not proceed with roofing Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
 6. Commencing roofing Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.

- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- F. Comply with roofing-system manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.
- G. Cover adjacent surfaces with materials that are proven to resist roofing materials.
- H. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 SURFACE PREPARATION

- A. Remove existing roofing system and other materials to expose substrate.
 - 1. Remove only as much of existing roofing as can be prepared and new temporary roof/vapor retarder or new roofing system installed in one day, unless provisions are implemented to maintain watertightness in interim or larger removal areas are approved by Owner's Representative.
 - 2. Provide temporary protection as needed if watertightness is compromised.
 - 3. Do not begin removal of existing roofing system when weather conditions are not conducive to maintaining watertightness or for application of new construction.
 - 4. Refer to Section 07 01 50 - Preparation for Re-roofing for additional requirements.
- B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation, according to roofing-system manufacturer's written instructions. Remove sharp projections.
 - 1. Repair or replace deteriorated sections of substrate per Section 07 01 50 - Preparation for Re-roofing.
- C. Mask adjoining surfaces not receiving roofing system to prevent spillage or migration affecting other construction.
- D. Close off roof drains and other penetrations to prevent materials from entering and clogging drains and conductors, and from spilling or migrating onto adjacent surfaces. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- E. Installer and roofing-system manufacturer's representative shall examine substrate to ensure that it is properly prepared and ready to receive roofing system. Roofing-system manufacturer's representative shall report in writing to Installer and Architect/Engineer conditions which will adversely affect roofing-system installation or performance. Do not proceed with roofing-system installation until these conditions have been corrected and reviewed by Architect/Engineer.
- F. Proceed with installation only after unsatisfactory conditions have been corrected. Commencing installation constitutes acceptance of Work surfaces and conditions.

3.4 ROOFING-SYSTEM INSTALLATION, GENERAL

- A. Install EPDM roofing membrane and base flashings according to roofing-system manufacturer's written instructions.
- B. Install materials in strict accordance with safety requirements required by roofing-system manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations.
 - 1. Follow safety procedures of OSHA and other applicable governing agencies. Assume responsibility for Work area safety at all times.
 - 2. Provide fully-charged fire extinguishers, appropriately sized and rated, and water within 50 feet of work area.

- C. Maintain adequate ventilation during installation of roofing materials. Notify Owner's Representative at least one week in advance of Work with materials with noxious vapors. Review application schedule and venting precautions with Owner's Representative prior to beginning application.
- D. Coordinate installing roofing-system components so insulation and roofing membrane sheets are not exposed to precipitation, or left exposed at the end of the workday or when rain is forecast.
 - 1. Provide tie-offs at the end of each day's Work to cover exposed roofing membrane sheets and insulation with course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning Work on adjoining roofing.
- E. Prohibit foot traffic and equipment movement over roofing system until adhesive has cured.
- F. Cooperate with Architect/Engineer and Construction Administrator in performing inspections and testing of roofing system.

3.5 INSTALLATION OF ROOF-DECK BOARD, VAPOR RETARDER, AND INSULATION

- A. Metal Deck Substrate: Install roof-deck board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt roof-deck boards together.
 - 1. Fasten roof-deck board to top flanges of steel deck according to recommendations in FM Global Approval Guide for specified Windstorm Classification.
- B. Vapor Retarder Installation:
 - 1. Install self-adhering sheets according to roofing-system manufacturer's written instructions and recommendations in ASTM D6135.
 - a. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet roofing in same day. Reprime areas exposed for more than 24 hours.
 - b. Apply and firmly adhere sheets over area to receive roofing. Accurately align sheets and maintain uniform 2-1/2-inch-minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 - 1) When ambient and substrate temperatures range between 25 and 40 degrees F, install self-adhering, rubberized-asphalt sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 degrees F.
 - c. Apply sheets from low point to high point of decks to ensure that side laps shed water.
 - d. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
 - e. Seal exposed edges of sheets at terminations.
 - f. Completely seal at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.
- C. Insulation Installation:
 - 1. Comply with roofing-system manufacturer's written instructions for installing insulation.
 - 2. Coordinate installation so insulation is not exposed to precipitation or left exposed at the end of the workday.
 - 3. Install tapered insulation to conform to slopes indicated.
 - 4. Install insulation with long joints in continuous, straight line; with end joints staggered between rows; and abutting edges and ends between boards.
 - a. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - b. Fill gaps exceeding 1/4 inch with insulation.
 - 5. Install one or more layers of insulation to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer at least 6 inches in each direction.
 - 6. Trim surface of insulation where necessary at roof drains so finished surface is flush with top of drain-bowl flange and does not restrict flow of water.
 - 7. Install and secure preformed, 45-degree insulation cant strips at junctures with vertical surfaces or angle changes greater than 45 degrees.
 - 8. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

9. Install insulation using adhesive or mechanical fasteners in conformance with FM Global Roof Assembly.
 - a. Adhered Insulation: Set each layer of insulation in a cold fluid-applied adhesive or with mechanical fastener.
 - b. Mechanically-Fastened Insulation: Install and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type insulation to deck type.
 - 1) Fasten insulation according to requirements in FM Global Approval Guide for specified Windstorm Classification.
 - 2) Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - c.

3.6 ROOFING MEMBRANE INSTALLATION

- A. Start installation of roofing membrane in presence of roofing-system manufacturer's technical personnel.
- B. Unroll roofing membrane and allow to relax before installing.
- C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by roofing-system manufacturer.
 1. Stagger end laps.
 2. Shingle side laps with slope of roof deck where possible.
- D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by roofing-system manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- E. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Mechanically fasten or adhere perimeter of roofing membrane according to requirements in ANSI/SPRI RP-4.
- G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membrane sheets according to roofing-system manufacturer's written instructions, to ensure a watertight seam installation. Install membrane patch at T-joints.
- H. Repair tears, voids, and lapped seams that are not completely sealed.

3.7 BASE FLASHING INSTALLATION

- A. Base Flashing: Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and adhere to substrates according to roofing-system manufacturer's written instructions.
 1. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
 2. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
 3. Terminate and seal upper edge of sheet flashings and mechanically anchor to substrate as shown on Drawings.
- B. Roof Drains:
 1. Install roofing membrane. Trim to extend 1/2 inch beyond inside edge of drain-bowl flange.
 2. Install water cutoff sealant on drain-bowl flange, below roofing membrane.
 3. Install clamping ring and drain strainer.
 - a. Install clamping ring. Securely fasten clamping ring to provide continuous compression of roofing membrane.
 - b. Install strainer dome.
 4. At the end of the Project, test drains for watertightness and ensure that drains flow freely.

3.8 WALKWAY INSTALLATION

- A. Install walkways on roof membrane at doors; on three sides of hatches; below equipment and supports; at base and top of roof access ladders; at base of HVAC access ladders; below prefabricated, service-line supports; below duct supports, service lines, and condensate lines; and at other locations indicated.
- B. Use only full-size units, except partial units at corners if necessary to provide neat, finished appearance.
- C. Provide 2 inches minimum between adjacent units. Extend walkway 6 inches minimum beyond edges of equipment or supports.
- D. Flexible Walkway: Adhere pads or rolls to substrate with compatible adhesive, in accordance with recommendations of walkway and roofing-system manufacturers.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof inspections and tests, and to prepare reports.
- B. Architect/Engineer and Testing Agency will inspect roofing system at various stages of construction and at completion prior to installation of aggregate surfacing.
- C. Final Roof Inspection: Arrange for roofing-system manufacturer's technical representative to inspect roofing installation on completion and submit report to Architect/Engineer. Notify Architect/Engineer and Owner's Representative 48 hours in advance of date and time of inspection.
- D. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, and describe nature and extent of deterioration and damage in written report, with copies to Architect/Engineer and Owner's Representative.
- E. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional Work with specified requirements.

3.10 CLEANING

- A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
- B. After completing roofing Work:
 - 1. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
 - 2. Repair surfaces stained, marred, or otherwise damaged during roofing Work.
 - 3. Clean up debris and surplus materials and remove from Site.
- C. Waste Management:
 - 1. Collect surplus roofing materials that cannot be reused and deliver to recycling or disposal facility.
 - 2. Treat materials that cannot be reused as hazardous waste and dispose of in an appropriate manner.

3.11 PROTECTION

- A. Protect roofing system from damage and wear during remainder of construction period.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Supply, fabrication, and installation of sheet metal flashing.
- B. Related Sections:
 - 1. Section 07 53 23 - EPDM Membrane Roofing

1.2 REFERENCES

- A. Reference Standards: Latest edition as of Specification date.
 - 1. ASTM International:
 - a. A240/A240M: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - b. B32: Standard Specification for Solder Metal.
 - 2. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
 - a. Architectural Sheet Metal Manual.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready for sheet-metal Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, sheet-metal Work in progress.
 - c. To ensure that subsequent work will not adversely affect completed sheet-metal Work.
 - 3. With interfacing and adjoining construction to provide leakproof, secure, and non-corrosive installation. Coordinate:
 - a. Installation of roof drainage system with installation of roof perimeter flashing.
 - b. Counterflashing installation with base flashing installation.
 - c. Installation of roof-penetration flashing with installation of roofing and other items penetrating roof.

1.4 SUBMITTALS

- A. Product Data: For each product specified.
 - 1. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.
- B. Installer Qualifications: Evidence that Installer's *existing company* has minimum five years of continuous experience in similar sheet-metal Work; list of at least five representative, successfully-completed projects of similar scope and size, including:
 - 1. Project name.
 - 2. Owner's name.
 - 3. Owner's Representative name, address, and telephone number.
 - 4. Description of work.
 - 5. Sheet-metal members installed.
 - 6. Project supervisor.
 - 7. Total cost of sheet-metal work and total cost of project.
 - 8. Completion date.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced firm that has successfully completed sheet-metal work similar in material, design, and extent to that indicated for Project. Must have successful installations of specified materials in local area in use for minimum of five years.

1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Architect/Engineer in advance of any changes.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Sheet-Metal Members: Deliver, store, and handle materials in such a manner as to prevent damage to materials or structure.
- B. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.

1.7 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of sheet-metal Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Environmental Limitations: Install sheet-metal members when existing and forecast weather conditions permit sealants, coatings, and miscellaneous materials to be installed according to sealant, coating, or miscellaneous material manufacturer's written instructions and warranty requirements.
- D. Handle and install materials in strict accordance with safety requirements required by sheet-metal manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.9 WARRANTY

- A. Contractor's Warranty:
 1. Written warranty, signed by Contractor, including:
 - a. Replace sheet-metal Work that does not comply with requirements; that has corroded surface, coating that fails cohesively or adhesively, or other surface defects or imperfections; or that deteriorates in a manner not clearly specified by material supplier's data as an inherent quality of the material for the application indicated.
 - b. Remove and replace sealant that has failed cohesively or adhesively; or that deteriorates in a manner not clearly specified by sealant manufacturer's data as an inherent quality of the material for the application indicated.
 - c. Repair or replacement, to satisfaction of Owner, of other work or items which may have been displaced or damaged as consequence of defective Work.
 - d. Warranty does not include deterioration or damage from changes in sheet-metal environment from that reasonably anticipated at Substantial Completion, or physical damage from adjacent activities.
 2. Warranty Period: Two years after Substantial Completion date.

PART 2 PRODUCTS

2.1 SHEET METAL

- A. Stainless-Steel Sheet: ASTM A240/A240M, Type 304; No. 2D finish; 26 gage.

2.2 AUXILIARY MATERIALS

- A. Miscellaneous Materials:
1. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items required for installation.
 2. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Size fasteners to provide penetration into substrate of at least 1 1/4 inches for nails and 3/4 inches for wood screws.
 - a. Use stainless-steel fasteners.
 - b. Exposed Fasteners: Heads match color of sheet metal by means of plastic caps or factory-applied coating.
 - c. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 1) Blind Fasteners: High-strength stainless-steel rivets.
 3. Sealing Tape: Pressure-sensitive, 100-percent solids, polyisobutylene-compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, non-staining tape.
 4. Elastomeric Sealant: ASTM C920, elastomeric silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet-metal flashing and trim and remain watertight.
 5. Butyl Sealant: ASTM C1311, single-component, solvent-release, butyl-rubber sealant; polyisobutylene-plasticized; heavy-bodied for hooked-type expansion joints with limited movement.
 6. Bituminous Coating: SSPC Paint 12; compounded for 15-mil-dry-film thickness per coat.
 7. Solder: ASTM B32.

2.3 FABRICATION

- A. Custom fabricate to comply with recommendations in SMACNA's Architectural Sheet Metal Manual, that apply to design, dimensions, metal, and other characteristics of item indicated. Conform to dimensions and profiles shown in SMACNA's Architectural Sheet Metal Manual, unless requirements that are more stringent are indicated.
1. Obtain field measurements for accurate fit before fabrication.
 2. Shop fabricate items where practicable.
- B. Fabricate without excessive oil canning, buckling, or tool marks that are visually objectionable in opinion of Architect/Engineer, and true to line and levels indicated, with exposed edges folded back to form hems.
1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant. Rivet joints for additional strength.
 2. Seams for Other than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant and in compliance with recommendations in SMACNA's Architectural Sheet Metal Manual.
- D. Expansion Provisions: Use lapped or bayonet-type expansion provisions where possible; otherwise, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- E. Conceal fasteners and expansion provisions, where possible, on exposed-to-view sheet-metal flashing and trim, unless otherwise indicated.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal, and in thickness not less than that of metal being secured.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer for compliance with requirements and other conditions affecting performance of sheet-metal flashings and trim.
 - 1. Ensure that work done by other trades is complete and ready for sheet-metal Work.
 - 2. Verify that areas and conditions under which sheet-metal Work is to be performed permit proper and timely completion of Work.
 - 3. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of sheet-metal Work and recommend corrections.
 - 4. Do not proceed with installation of sheet-metal flashings and trim until adverse conditions have been corrected and reviewed by Architect/Engineer.
 - 5. Commencing sheet-metal Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- F. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 INSTALLATION

- A. General: Install sheet-metal flashings and trim according to recommendations in SMACNA's Architectural Sheet Metal Manual and as indicated.
- B. Install sheet-metal flashing and trim to fit substrates and to result in watertight performance.
 - 1. Install true to line and levels indicated.
 - 2. Where exposed, install without excessive oil canning, buckling, or tool marks.
 - 3. Provide uniform, neat seams with minimum exposure of solder, welds, or sealant.
 - 4. Do not torch cut sheet metal.
- C. Provide for thermal expansion of exposed flashing and trim.
 - 1. Space movement joints no more than 10 feet apart, with no joint within 24 inches of corner or intersection.
 - 2. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
- E. Anchor sheet-metal flashing and trim and other components of Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required.

1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners
- F. Seal joints with butyl sealant as required for watertight construction.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to width of 1 1/2 inches except where pre-tinned surface would show in finished Work.
- H. Roof Flashing Installation:
 1. General:
 - a. Set units true to line and level as indicated.
 - b. Provide concealed fasteners where possible.
 - c. Install Work with laps, joints, and seams that will be permanently watertight.
 2. Roof Edge Flashing:
 - a. Anchor as shown on Drawings.
 3. Copings:
 - a. Anchor as shown on Drawings.
 - b. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16-inch centers.
 - c. Anchor interior leg of coping with screw fasteners and washers at 18-inch centers.
 4. Counterflashing: Insert counterflashing in reglets or receivers and fit tightly to base flashing.
 - a. Extend counterflashing 4 inches over base flashing.
 - b. Secure in waterproof manner.
 - c. Lap counterflashing joints at least 4 inches and bed with elastomeric sealant.
 5. Roof-Penetration Flashing:
 - a. Seal with butyl sealant and clamp to pipe.

3.4 CLEANING

- A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
- B. After completing sheet-metal Work:
 1. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
 2. Repair surfaces stained, marred, or otherwise damaged during roofing Work.
 3. Clean up debris and surplus materials and remove from Site.

3.5 PROTECTION

- A. Protect sheet-metal flashings and trim from damage and wear during remainder of construction period.

END OF SECTION 07 62 00

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PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Equipment supports.
 - 2. Unit skylights.
 - 3. Safety rail at existing roof hatch
 - 4. Pipe and duct supports.
 - 5. Portable guardrails

- B. Related Requirements:
 - 1. Section 07 53 23 - EPDM Membrane Roofing
 - 2. Section 07 62 00 - Sheet Metal Flashing and Trim
 - 3. Section 23 74 13 - Packaged, Outdoor, Central-Station Air-Handling Units

1.2 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.

1.3 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.
 - a. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.

- C. Samples:
 - 1. Submit color samples of polycarbonate glazing for skylights.

1.4 WARRANTY

- A. Skylight Warranty: Manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Uncontrolled water leakage.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Breakage of polycarbonate glazing.

 - 2. Warranty Period: Five 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.

2.2 EQUIPMENT SUPPORTS

- A. Equipment Supports: Rail-type metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded corner joints, internal bulkhead reinforcement, and integrally formed structure-mounting flange at bottom.
- B. Manufacturers and Model:
 - 1. The Pate Company: ES-2
 - 2. Greenheck Fan Corporation: GESS
 - 3. Thybar Corporation: TEMS-3
- C. Size: 4" wide x 16" high.
- D. Material: Zinc-coated (galvanized) steel sheet, 18 ga thick.
- E. Construction:
 - 1. Curb Profile: Profile as indicated on Drawings compatible with roofing system.
 - 2. Nailer: Factory-installed continuous wood nailers 3-1/2 inches (90 mm), continuous around support perimeter.
 - 3. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
 - 4. Fabricate equipment supports to minimum height of 16 inches (305 mm) above roofing surface unless otherwise indicated.

2.3 UNIT SKYLIGHTS

- A. General: Provide factory-assembled unit skylights that include glazing, extruded-aluminum glazing retainers, gaskets, and inner frames and that are capable of withstanding performance requirements indicated.
- B. Manufacturers
 - 1. Wasco; Wells, ME
 - 2. Bristolite Daylighting Systems; Santa Ana, CA.
 - 3. Duro-Last; Saginaw, MI
- C. Unit Shape and Size: Match size of existing skylights.
 - 1. Outside curb dimensions 32" +/- x 48" +/-.
- D. Polycarbonate Glazing: Thermoformable, extruded monolithic sheets, UV resistant, burglar-resistance rated according to UL 972, and with average impact strength of 12 to 16 ft-lb/in. (640 to 854 J/m) of width when tested according to ASTM D 256, Test Method A (Izod).
 - 1. Double-Glazing Profile: Dome, 25 percent rise.
 - a. Thicknesses: Not less than thicknesses required to exceed performance requirements of OSHA-CFRS Fall Protection.

- b. Inner Glazing Color: As selected by Architect from full range of industry colors.
 - c. Outer Glazing Color: As selected by Architect from full range of industry colors.
 - 2. Self-Ignition Temperature: 650 deg F (343 deg C) or more for plastic sheets in thickness indicated when tested according to ASTM D 1929.
 - 3. Smoke-Production Characteristics: Smoke-developed index of 450 or less when tested according to ASTM E 84, and smoke density of 75 or less when tested according to ASTM D 2843.
 - 4. Burning Characteristics: Tested according to ASTM D 635. Class CC1, burning extent of 1 inch (25 mm) or less for nominal thickness of 0.060 inch (1.5 mm) or thickness indicated for use.
- E. Glazing Gaskets: Manufacturer's standard.
- F. Integral Curb: Extruded-aluminum, self-flashing type.
- 1. Extruded-Aluminum Shapes: ASTM B 221 (ASTM B 221M), alloy and temper to suit structural and finish requirements but with not less than the strength and durability of Alloy 6063-T52.
 - 2. Height: 12 inches (300 mm).
 - 3. Construction: Double wall.
 - 4. Insulation: Manufacturer's standard rigid or semirigid type.
 - a. Exposed Insulation: Cover face of insulation exposed to interior of building with aluminum liner.
- G. Condensation Control: Fabricate unit skylights with integral internal gutters and nonclogging weeps to collect and drain condensation to the exterior.
- H. Thermal Break: Fabricate unit skylights with thermal barrier separating exterior and interior metal framing.
- I. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.
- J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat.
- K. Aluminum Finishes: High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2607 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 1. Color and Gloss: white, semi-gloss.

2.4 ROOF HATCH SAFETY RAILING

- A. Manufacturers
- 1. The BILCO Company; New Haven, CT
 - 2. Babcock-Davis; Brooklyn Park, MN
 - 3. Nystrom; Minneapolis, MN
- B. Safety Railing System: Manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

2.5 PIPE AND DUCT SUPPORTS

- A. Adjustable-Height Roller-Bearing Pipe Supports: Polycarbonate pipe stand base, pipe support, and roller housing, with stainless-steel threaded rod designed for adjusting support height up to 18 inches, accommodating up to 4 inch OD pipe or conduit; with provision for pipe retainer and with manufacturer's support pad or deck plate as recommended for penetration-free installation over roof membrane type; as required for quantity of pipe runs and sizes.

- B. Manufacturers
 - 1. Miro Industries
 - 2. PHP Systems Design
 - 3. OMG Roofing Products

- C. Accessories
 - 1. Pipe retainer strap

2.6 PORTABLE GUARDRAILS

- A. OSHA 29 CFR 1910.23 compliant, fully welded, roof edge guardrail.
- B. Manufactures
 - 1. Safety Rail Company: Spring Park, MN
 - 2. Fall Protection Associates, Inc. Dba Hy-Safe Technology Union Grove, WI
 - 3. Portable Guardrails, Cleveland, OH
- C. Size
 - 1. Length: 8'-0"
 - 2. Height: 3'-6"
 - 3. Mid rail: 1'-9" below center line of top rail
- D. Base Plates
 - 1. Material: ASTM A36 Plate and ASTM A513T-5 DOM TUBE
 - 2. Size: 1 foot by 2 feet (305 by 610 mm).
 - 3. Carrying handle: built in with a center carrying hook for base transporter.
 - 4. Capacity: two railing sections or one railing and one outrigger segment.
 - 5. Holes: Drilled and tapped holes for screw to secure railing in baseplate
 - 6. Base will have 2 holes drilled through at receiver locations for water drainage.
 - 7. Base plate must provide no less than 5 inches (127 mm) of leading edge substrate contact as concentrated load is applied to base.
 - 8. Provide additional base weight as required for system to resist 120 mph wind gusts
- E. Finish: Galvanized steel

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 uncoated aluminum 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. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- D. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.
- E. Install unit skylights level, plumb, and true to line, without distortion.

3.3 REPAIR AND CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions.
- B. Clean off excess sealants.
- C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

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PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Surface preparation and installation of sealant in joints.
- B. Related Sections:

1.2 REFERENCES

- A. Reference Standards: Latest edition as of Specification date.
 - 1. ASTM International:
 - a. C920: Standard Specification for Elastomeric Joint Sealants.
 - b. C1193: Standard Guide for Use of Joint Sealants
 - c. C1248: Standard Test Method for Staining of Porous Substrate by Joint Sealants.
 - d. C1521: Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected; that new materials and building interior are kept continuously dry; and that continuous, watertight, new sealant installation is provided.
Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready for sealant Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, sealant Work in progress.
 - c. To ensure that subsequent work will not adversely affect completed sealant Work.

1.4 SUBMITTALS

- A. Product Data: Sealant manufacturer's literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; and installation instructions.
 - 1. Include temperature ranges for storage and application of materials, and special cold-weather application requirements or limitations.
 - 2. SpecData sheet for substrate cleaner and substrate primer recommended by sealant manufacturer for specific substrate surface and conditions.
 - 3. Include Safety Data Sheets (SDS) for information only; safety restrictions are sole responsibility of Contractor.
- B. Samples: Sealant manufacturer's color sample card, with thin sealant beads, showing range of colors available for each product exposed to view.
- C. Manufacturer's Reports and Certifications:
 - 1. Prior to sealant installation, report from sealant manufacturer with results of sealant compatibility, sealant and substrate staining, and mockup adhesion tests. Report shall:
 - a. State that materials which come into contact with or in close proximity to sealant have been tested.
 - b. Include sealant manufacturer's interpretation of test results relative to material performance, potential staining of sealant and substrates, dirt accumulation of sealant, and dirt runoff from sealant.
 - c. Include sealant manufacturer's recommendations for substrate preparation and primer needed to obtain durable adhesion and installation procedures successfully used in mockups and field tests.
 - 2. Product Certificates: For each sealant product, accessory, related products, joint type, and substrate, sealant manufacturers' written approval of their products' use for specified conditions; based on mockups and field tests.

- D. Installer Qualifications:
1. Certificate signed by sealant manufacturer, certifying that Installer complies with requirements.
 2. Evidence that Installer's *existing company* has minimum five years of continuous experience in similar sealant work; list of at least five representative, successfully-completed projects of similar scope and size, including:
 - a. Project name.
 - b. Owner's name.
 - c. Owner's Representative name, address, and telephone number.
 - d. Description of work.
 - e. Sealant used.
 - f. Project supervisor.
 - g. Total cost of sealant work and total cost of project.
 - h. Completion date.
- E. Sample Warranty: Copy of sealant manufacturer's warranty, stating obligations, remedies, limitations, and exclusions. Submitted with bid.
- F. Following completion of the Work:
1. Sealant manufacturer's inspection report of completed sealant installation.
 2. Completed warranty from sealant manufacturer.
 3. Completed warranty from Installer.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced firm that has successfully completed sealant work similar in material, design, and extent to that indicated for Project; that is approved, authorized, or licensed by sealant manufacturer to install sealant; and that is eligible to receive sealant manufacturer's warranty. Must have successful installations of specified materials in local area in use for minimum of five years.
1. Employ foreman with minimum five years of experience as foreman on similar projects, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Architect/Engineer in advance of any changes.
- B. Mockups: Install ten feet of sealant in each type of joint to verify and set quality standards for materials and installation procedures, and to demonstrate aesthetic effects.
1. Include each type of backing material, sealant, primer and other related products.
 2. Mockups shall be accessible or located as indicated by Owner's Representative.
 3. Notify Owner's Representative and Architect/Engineer seven days in advance of date when mockups will be constructed.
 4. Field-Adhesion Testing: After sealants have cured, perform field-adhesion tests according to ASTM C1521.
 - a. Conduct tests for each type of sealant and joint substrate, with and without primer.
 - b. Arrange for tests to take place with sealant manufacturer's technical representative present.
 - c. Sealants not evidencing adhesive failure from testing, in absence of other indications of non-compliance with requirements, will be considered satisfactory. Use alternate materials or modify installation procedure, or both, for sealants that fail to adhere to substrates.
 5. If Architect/Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved.
 6. Mockups, when approved by Owner's Representative and Architect/Engineer, will become standard for Work.
 7. Do not begin joint sealant Work until mockup is accepted by Owner's Representative and Architect/Engineer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B. Deliver materials to Site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.

- C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which exhibit evidence of moisture during application or which have been exposed to moisture.
- D. Store materials in original, undamaged containers and packaging in clean, dry, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Protect stored materials from direct sunlight. Manufacturer's standard packaging and covering is **not** considered adequate weather protection.
- E. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- F. Conspicuously mark wet or damaged materials and remove from Site as soon as possible.
- G. Remove and replace materials that cannot be applied within stated shelf life.

1.7 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of sealant Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Environmental Limitations: Install sealant when existing and forecast weather conditions permit sealant to be installed according to sealant manufacturer's written instructions and warranty requirements.
 - 1. Do not install sealant when ambient or substrate temperatures are below 40 degrees F or are expected to fall below 40 degrees F in next 12 hours.
 - 2. Do not proceed with installation during inclement weather except for temporary work necessary to protect building interior and installed materials. Remove temporary work and Work that becomes moisture damaged.
- D. Handle and install materials in strict accordance with safety requirements required by sealant manufacturer; Safety Data Sheets (SDS); and local, state, and federal rules and regulations. Maintain Safety Data Sheets (SDS) with materials in storage area and available for ready reference on Site.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.9 WARRANTY

- A. Manufacturer's Warranty:
 - 1. Written warranty, signed by sealant manufacturer, including:
 - a. Repair or replace sealant that does not comply with requirements; that does not remain water-tight; that fails in adhesion, cohesion, or general durability; or that deteriorates in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated.
 - b. Removal and replacement with new bond breaker materials.
 - c. Materials to perform warranty Work.
 - d. Warranty does not include sealant deterioration or failure due to the following.
 - 1) Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.
 - 2) Deterioration or failure of sealant due to failure of substrate prepared according to requirements.

- 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.
2. Warranty Period: Ten years from date of Substantial Completion.

B. Installer's Warranty:

1. Completed warranty form at the end of the Section, signed by sealant Installer, including:
 - a. Repair or replace sealant that does not comply with requirements; that does not remain water-tight; that fails in adhesion, cohesion, or general durability; or that deteriorates in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated.
 - b. Removal and replacement with new bond breaker materials.
 - c. Labor and materials to perform warranty Work.
 - d. Warranty does not include sealant deterioration or failure due to the following.
 - 1) Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.
 - 2) Deterioration or failure of sealant due to failure of substrate prepared according to requirements.
 - 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.
2. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ELASTOMERIC JOINT SEALANTS

A. General:

1. Comply with ASTM C920 and other requirements indicated.
2. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing on similar projects, mockups and preconstruction testing for Project, and field experience.
3. Select products based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.
4. Source Limitations: Obtain each type of joint sealant through one source from single manufacturer.
5. Colors of Exposed Joint Sealants: Selected and approved in writing by Owner's Representative, from sealant manufacturer's full range.

B. Single-component, Non-sag, Silicone Sealants:

1. 795 Silicone Building Sealant manufactured by Dow Corning Corporation.
2. 864 NST manufactured by Pecora Corporation.
3. SCS2000 SilPruf manufactured by Momentive Performance Materials Inc.

2.2 SECONDARY SEALS

- A. Backerseal as manufactured by Emseal.**

2.3 AUXILIARY MATERIALS

- A. General:** Sealant-backer materials, primers, surface cleaners, masking tape, and other materials recommended by sealant manufacturer, that are non-staining and compatible with substrates; based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.
1. Provide bi-cellular backer rods

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer and sealant manufacturer's representative for compliance with requirements and for other conditions affecting installation or performance of sealant.
 - 1. Verify dimensions of sealant joints at Site by field measurement so that proper sealant profiles will be accurately maintained.
 - 2. Ensure that work done by other trades is complete and ready for sealant Work.
 - 3. Verify that areas and conditions under which sealant Work is to be performed permit proper and timely completion of Work.
 - 4. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of sealant, including joints with widths less than those allowed by sealant manufacturer for applications indicated, and recommend corrections.
 - 5. Do not proceed with sealant Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
 - 6. Commencing sealant Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- F. Comply with sealant manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.
- G. Cover adjacent surfaces with materials that are proven to resist sealant.
- H. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 SURFACE PREPARATION

- A. Remove existing sealant and other foreign material from joints.
- B. Repair damaged or deteriorated substrate surfaces according to sealant manufacturer's written instructions and as approved by Architect/Engineer.
- C. Clean joint substrates immediately before installing sealant, to comply with sealant manufacturer's written instructions based on mockups and preconstruction testing.
 - 1. Remove from substrate foreign material that could interfere with adhesion of sealant, including dirt, dust, existing sealant, oil, grease, and surface coatings.
 - 2. Provide dry substrate; prevent wetting of substrate prior to sealant installation.
 - 3. Clean porous substrates, such as concrete, masonry, stone, wood, by brushing, grinding, blast-cleaning, mechanical-abrading, or combination of methods to produce clean, sound substrate capable of developing optimum bond with sealant. Remove laitance and form-release agents from concrete. Remove loose particles remaining after cleaning operations by vacuuming or blowing out joints with oil-free, compressed air.

4. Clean nonporous surfaces, such as metal, with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealant.
5. Joints with silicone sealant and preformed sealant seals should generally be masked as subsequent cleanup of spillage and smears may be very difficult.

3.4 INSTALLATION OF SEALANT

- A. General: Comply with sealant manufacturer's written installation instructions for products and applications indicated, based on mockups and preconstruction testing.
- B. Joint Priming: Prime joint substrates where recommended in writing by sealant manufacturer, based on mockups and preconstruction testing. Apply primer to comply with sealant manufacturer's written instructions.
 1. Confine primer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.
 2. Limit priming to areas that will be covered with sealant in same day. Unless recommended otherwise by sealant manufacturer, reprime areas exposed for more than 24 hours.
- C. Install sealant backer and position to produce cross-sectional shape and proper depth of installed sealant.
 1. Use properly-sized backer. Do not use multiple-backer units or braided-backer units to accommodate wide joints.
 2. Install backer with device that will provide consistent depth between substrate surface and outer surface of backer.
 3. Do not leave gaps between ends of sealant backers.
 4. Do not stretch, twist, puncture, or tear sealant backers.
 5. Remove wet backers and replace with dry materials.
- D. Install secondary seal joints designated on Drawings.
- E. Install sealant immediately after installing backer material; to produce uniform, cross-sectional shape and depth; to directly contact and fully wet joint sides and backer material; and to completely fill recesses in joint configuration.
 1. Install sealant flush with surface.
 2. Immediately after sealant application and before skinning or curing begins, tool joint with slightly concave surface, compressing sealant into joint to form smooth, uniform sealant bead; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Do not use tooling agent.
 3. Remove excess sealant from surfaces adjacent to joints.

3.5 INSTALLATION OF SECONDARY SEALS

- A. General: Comply with seal manufacturer's written installation instructions for products and applications indicated.

3.6 FIELD QUALITY CONTROL

- A. At completion of Project, observe installed sealant for damage or deterioration. If damage or deterioration occurs, neatly cut out and remove damaged or deteriorated sealant, prepare and prime surfaces, and install new sealant. Replace sealant immediately so new sealant is indistinguishable from original Work.

3.7 CLEANING

- A. As sealant Work progresses, clean off excess sealant or sealant smears by methods and with cleaning materials approved in writing by sealant manufacturer and manufacturers of products in which joints occur. Exercise care to avoid scratching or damage to surfaces.
- B. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
- C. After completing sealant Work:
 1. Repair surfaces stained, marred, or otherwise damaged during sealant Work.

2. Clean up debris and surplus materials and remove from Site.

3.8 PROTECTION

- A. Protect sealant during and after curing period from contact with contaminating substances and from damage, so sealants are without deterioration or damage at time of Substantial Completion.

END OF SECTION 07 92 00

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PART 1 GENERAL

1.1 SUMMARY

- A. Section includes repair of gypsum board surfaces.

1.2 SUBMITTALS

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

1.3 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.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.1 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
CertainTeed Corp.
Georgia-Pacific Gypsum LLC.
National Gypsum Company.
USG Corporation.
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
Thickness: 5/8 inch (15.9 mm).
Long Edges: Tapered.

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. Protective Coating: ASTM A 653/ A 653M, G60 (Z180), hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C 645.
 - 1. Steel Studs and Tracks:
 - a. Minimum Base-Metal Thickness: 22 gauge.
 - b. Depth: As indicated on Drawings.

2.3 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
All-purpose compound.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
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.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FRAMING REPAIR

- A. Repair steel framing to match original conditions.

3.3 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.
- D. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.4 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.

3.5 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.
Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

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PART 1 - GENERAL**1.1 SUMMARY**

- A. Section Includes: Repairs at acoustical tile ceilings.

1.2 SUBMITTALS

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

PART 2 - PRODUCTS

- 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: Class A according to ASTM E 1264.
 - 2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL TILES

- A. Acoustical Tile Standard: Manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264.
- B. Type: Armstrong Model #1734 to match existing.
 - 1. Size: 24" x 24" x 5/8"
 - 2. Edge: Beveled tegular
 - 3. Texture: Medium fine fissured

2.3 METAL SUSPENSION SYSTEM

- A. Reuse existing to the greatest extent possible. Provide supplemental grid components and ties as necessary and as shown on the Drawings.
- B. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, fully concealed, metal suspension system that complies with applicable requirements in ASTM C 635/C 635M.

-
- C. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, pre-painted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation.

2.4 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.
- B. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: To match existing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated.
- B. Layout openings for penetrations centered on the penetrating items.

3.2 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings according to ASTM C 636/C 636M, seismic design requirements, and manufacturer's written instructions.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
- C. Arrange directionally patterned acoustical tiles to match existing.

END OF SECTION 09 51 23

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems at interior surfaces of gypsum board wall surfaces.
- B. Related Sections:
 - 1. Section 09 29 00 - Gypsum Board Panels

1.2 REFERENCES

- A. Master Painters Institute: Maintenance Repainting Manual

1.3 COORDINATION

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
 - 1. With Owner's Representative.
 - 2. With other trades to ensure that Work done by other trades is complete and ready to receive coating.
 - 3. With other trades to avoid or minimize work on, or in immediate vicinity of, application Work in progress. Ensure that dust from other operations will not adversely affect quality of completed coating.
 - 4. Schedule surface preparation and coating application Work so that dust and other contaminants from surface preparation Work will not affect wet, newly-coated surfaces.

1.4 SUBMITTALS

- A. Product Data: Coating manufacturer's literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; mixing and application instructions; safety precautions for handling, storing, applying, and disposing of materials; and instructions for protecting surrounding areas from overspray. Indicate surfaces to which materials will be applied. Include:
 - 1. VOC content of components.
 - 2. Color chart.
 - 3. Decoding information to verify shelf life of materials.
- B. Samples: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 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 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. 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 top-coat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: To match existing items to be painted, unless otherwise specified.

2.2 COATING FOR GYPSUM BOARD

- A. Primer:
 - 1. Benjamin Moore: Fresh Start Multi-Purpose Interior Primer N023 (1.2 mils. DFT)
 - 2. Sherwin Williams: Drywall Primer (1.5 mils. DFT).
 - 3. PPG Pittsburgh Paints: PVA Interior Latex Primer (1.5 mils. DFT).
- B. Intermediate Coat:
 - 1. Benjamin Moore: Regal Select Interior Paint Acrylic Latex (1.5 mils. DFT).
 - 2. Sherwin Williams: Duration Home Interior Acrylic Latex (1.6 mils. DFT).
 - 3. PPG Pittsburgh Paints: Manor Hall Interior Latex Paint (1.8 mils DFT).
- C. Finish Coat:
 - 1. Benjamin Moore: Regal Select Interior Paint Acrylic Latex (1.5 mils. DFT).
 - 2. Sherwin Williams: Duration Home Interior Acrylic Latex (1.6 mils. DFT).
 - 3. PPG Pittsburgh Paints: Manor Hall Interior Latex Paint (1.8 mils DFT).
- D. Colors: To match existing adjacent wall surfaces
- E. Gloss: To match adjacent wall surfaces

2.3 INTERIOR SEALANT

- A. Acrylic latex sealant by paint manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Applicator and coating manufacturer's representative for compliance with requirements and other conditions affecting application or performance of coating.
 - 1. Ensure that work done by other trades is complete and ready for coating Work.
 - 2. Verify that areas and conditions under which coating Work is to be performed permit proper and timely completion of Work.
 - 3. Verify compatibility with and suitability of substrates, including existing coatings.
 - 4. Verify adhesion of existing coatings.
 - 5. Notify Architect/Engineer in writing of conditions which may adversely affect application or performance of coating and recommend corrections.
 - 6. Do not proceed with coating Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
 - 7. Commencing coating Work constitutes acceptance of Work surfaces and conditions.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.

3.2 PROTECION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.
- B. Prevent construction debris, coatings, and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.
- D. Limit access to Work areas. Provide "Wet Paint" signs to protect newly coated surfaces.
- E. Erect temporary protective canopies, as necessary, over walkways and at points of pedestrian and vehicular access that must remain in service during Work.
- F. Take precautions to protect against air-borne materials and runoff.
- G. Masking and Preparation:
 - 1. Comply with coating manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.
 - 2. Cover adjacent surfaces with materials that are proven to resist coating system.
 - 3. Mask off or protect from spatter, overspray, or other damage surfaces not scheduled to receive coating.
 - 4. Remove masking and other protective measures at completion of coating Work.
- H. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 SURFACE PREPARATION FOR PAINTING

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, downspouts 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.
- 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. Schedule surface preparation and coating application so that dust and other contaminants from preparation activities will not soil newly-coated surfaces.
- E. New and Existing Gypsum Board
 - 1. Remove grease, oil, dirt, and other contaminants that might impair bond of coating.
 - 2. Remove loose or deteriorated paint, and other loose foreign matter.
 - 3. Lightly sand existing coating to remove sheen and slightly roughen.
 - 4. Feather edges of existing coating by sanding.

3.4 APPLICATION

- A. General: Prepare and apply materials according to coating manufacturer's written instructions, at recommended rates and coverages.

- B.** Test prepared surfaces for moisture and other conditions as recommended by coating manufacturer. Verify that ambient air and substrate surface temperatures, relative humidity, and dew point are within ranges recommended by coating manufacturer and are forecast to remain within these ranges during coating curing period.
- C.** Mix materials thoroughly to uniform, smooth consistency. Do not thin or dilute unless permitted by coating manufacturer; use recommended thinners within recommended limits.
 - 1.** Stir as required during application.
 - 2.** If surface film forms, do not stir film into material. Remove film and strain coating material before using.
 - 3.** Maintain containers used for mixing and applying coating in clean condition, free of foreign materials and residue.
- D.** Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1.** Use applicators and techniques suited for paint and substrate indicated.
 - 2.** Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
- E.** If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- F.** 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.

3.5 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.

3.6 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.

END OF SECTION 09 91 00

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Surface preparation and application of coating system on exterior steel surfaces.

1.2 REFERENCES

- A. Reference Standards: Latest edition as of Specification date.
1. ASTM International:
 - a. D3359: Standard Test Methods for Measuring Adhesion by Tape Test.
 - b. D4541: Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.
 2. SSPC: The Society for Protective Coatings:
 - a. SSPC-SP 2: Hand Tool Cleaning.
 - b. SSPC-SP 3: Power Tool Cleaning.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate Work to ensure that adjacent areas are not adversely affected. Coordinate:
1. With Owner's Representative.
 2. With other trades:
 - a. To ensure that work done by other trades is complete and ready for coating Work.
 - b. To avoid or minimize work on, or in immediate vicinity of, coating Work in progress.
 - c. To ensure that subsequent work will not adversely affect completed coating.
- B. Review repair and surface treatment materials and primers specified in other sections to ensure compatibility with steel coating to be used. Notify Architect/Engineer in writing of concerns with materials or primers installed by others and recommended remedies.
- C. Sequence surface preparation and coating application Work so that dust and other contaminants from surface preparation Work will not adversely affect wet, newly-coated surfaces.
- D. A/E to inspect existing steel surfaces following preparation work. Do not begin primer application without authorization by A/E.

1.4 SUBMITTALS

- A. Product Data: Coating manufacturer's literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; mixing and application instructions; safety precautions for handling, storing, applying, and disposing of materials; and instructions for protecting surrounding areas from overspray. Include:
1. Surfaces to which materials will be applied.
 2. VOC content of components.
 3. Coating manufacturer's color chart showing full range of colors available.
 4. Decoding information to verify shelf life of materials.
 5. Include Safety Data Sheets for information only.
- B. Samples: 8-inch-square samples, on rigid backing, of each coating system and color and gloss of finish coat to be applied. For review of color and texture only.
1. Provide step samples, defining each separate coat. Use representative colors when preparing samples for review. Resubmit until required color, sheen, and texture are achieved.
 2. Label each sample for location and application.
 3. Provide list of materials and applications for each coat of each sample.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Experienced firm that has successfully completed coating work similar in material, design, and extent to that indicated for Project; and that is approved by coating manufacturer to apply coating. Must have successful applications of specified materials in local area in use for minimum of five years.
 - 1. Employ foreman trained with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Applicator; inform Architect/Engineer in advance of any changes.
- B. Mockups: Prepare surface and apply coating system to representative member designated by Architect/Engineer to demonstrate surface preparation, aesthetic affects, and quality of materials and execution. Leave portion of prepared surface and each coating layer exposed to view.
 - 1. Coating manufacturer's representative shall observe mockup and approve in writing surface preparation and coating application.
 - 2. Owner may, at its expense, verify coating thickness and perform adhesion and pull-off tests. Contractor shall, at no cost to Owner, repair coating and substrate damaged by testing.
 - 3. If Architect/Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Pay for additional testing requested by Owner. Do not proceed with coating Work until mockup is approved.
 - 4. Approved mockup will be acceptance standard for remainder of coating Work.
 - 5. Approved mockup may become part of completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with:
 - 1. Manufacturer's name.
 - 2. Product brand name, type, and color.
 - 3. VOC content.
 - 4. Color name and number.
 - 5. Date of manufacture and batch number.
 - 6. Directions for storing, handling, mixing with other components, and application, including precautions.
 - 7. Thinning instructions if applicable.
- C. Store materials in original, undamaged containers and, if permitted, partially-used materials in tightly-covered containers in clean, dry, well-ventilated, protected location on raised platforms with weather-protective coverings, within temperature range required by manufacturer. Protect stored materials from direct sunlight, heat, sparks, and flames.
- D. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- E. Conspicuously mark damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.
- F. Remove and replace materials that cannot be applied within stated shelf life.

1.7 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of coating Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Applicator of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.

- C. Environmental Limitations: Apply coating when existing and forecast weather conditions permit coating to be applied according to coating manufacturer's written instructions.
 - 1. Do not apply when substrate and ambient temperatures are less than 50 degrees F or more than 95 degrees F, or outside of range recommended by coating manufacturer. Maintain minimum substrate and ambient temperatures for at least 24 hours before and after coating application.
 - 2. Do not apply to damp or wet substrates; in snow, rain, fog, or mist; when relative humidity exceeds 80 percent or maximum value recommended by coating manufacturer; or when substrate temperature is less than 5 degrees F above dew point.
- D. Handle and install materials in strict accordance with safety requirements required by coating manufacturer; Safety Data Sheets; and local, state, and federal rules and regulations. Maintain Safety Data Sheets with materials in storage area and available for ready reference on Site.
- E. Maintain adequate ventilation during preparation and application of coating materials.

1.8 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

1.9 WARRANTY

- A. Contractor Warranty:
 - 1. Written warranty, signed by Contractor, including:
 - a. Repair or remove and replace coating that does not comply with requirements; that fails in adhesion, cohesion, or general durability; that cracks, checks, fades, or chinks; where visible rust occurs; or that deteriorates in a manner not clearly specified by submitted coating manufacturer's data as an inherent quality of the material for the application indicated.
 - 2. New coating shall closely match color of existing coating. Extend new coating to reveals, surface edges, or other natural termination points to minimize differences in appearance between new and existing coating.
 - 3. Warranty includes:
 - a. Adhesive or cohesive failure of existing coating that remains in place.
 - b. Providing access to warranty Work.
 - c. Necessary surface preparation work.
 - 4. Warranty Period: Two years after Substantial Completion date.

PART 2 PRODUCTS

2.1 STEEL COATING MATERIALS

- A. Source Limitations: Obtain materials through one source from single coating manufacturer, or from sources approved by coating manufacturer.
- B. Material Compatibility: Provide primers, intermediate coats, finish coats, and related materials that are compatible with one another and substrates indicated under conditions of application and service, as demonstrated by manufacturer based on testing and field experience.
- C. Material Quality: Provide manufacturer's best-quality coating materials that are factory formulated and are recommended by manufacturer for application indicated. Material containers not displaying manufacturer's product identification are not acceptable.
- D. Existing Steel: Use one of the following systems:
 - 1. Tnemec Co., Inc.:
 - a. Primer: Chembuild Series 135 (5.0 mils DFT).

3.3 SURFACE PREPARATION

- A. Substrate: Clean and prepare substrate according to coating manufacturer's written instructions. Provide clean, dust-free, dry, and sound substrate for coating application.
 - 1. Remove loose rust, loose or deteriorated paint, and other loose foreign matter in accordance with SSPC-SP 2 or SSPC-SP 3.
 - 2. Lightly sand existing coating to remove sheen and slightly roughen.
 - 3. Feather edges of existing coating by sanding, grinding, or as recommended by coating manufacturer.
 - 4. Remove grease, oil, dirt, and other contaminants that might impair bond of coating. Use cleaner/de-greaser or chemical removal as necessary; rinse thoroughly with copious amounts of clean water.
- B. Applicator and coating manufacturer's representative shall examine substrate to ensure that it is properly prepared and ready to receive coating.
 - 1. Coating manufacturer's representative shall report in writing to Applicator and Architect/Engineer conditions which may adversely affect coating system application or performance and recommend corrections.
 - 2. Do not proceed with coating application until unsatisfactory conditions have been corrected and reviewed by Architect/Engineer.
 - 3. Commencing coating application constitutes acceptance of Work surfaces and conditions.
- C. A/E to inspect existing steel surfaces following preparation work. Do not begin primer application without authorization by A/E.

3.4 APPLICATION

- A. General: Prepare and apply materials according to coating manufacturer's written instructions, at recommended rates and coverages.
- B. Test prepared surfaces for moisture and other conditions as recommended by coating manufacturer. Verify that ambient air and substrate surface temperatures, relative humidity, and dew point are within ranges recommended by coating manufacturer and are forecast to remain within these ranges during coating curing period.
- C. Mix materials thoroughly to uniform, smooth consistency. Do not thin or dilute unless permitted by coating manufacturer; use recommended thinners within recommended limits.
 - 1. Stir as required during application.
 - 2. If surface film forms, do not stir film into material. Remove film and strain coating material before using.
 - 3. Maintain containers used for mixing and applying coating in clean condition, free of foreign materials and residue.
- D. Apply coating by roller, spray, or brush. Use applicator and technique best suited for substrate and type of material being applied.
 - 1. Apply materials as soon as practicable after completion of surface preparation or full curing of previous material application.
 - 2. Do not coat over conditions detrimental to formation of durable coating film, such as dirt, rust, scale, grease, or moist or scuffed surfaces.
 - 3. Apply primer and finish coat as recommended by paint manufacturer.
 - a. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance, if approved by Architect/Engineer.
 - b. Ensure that edges, corners, and crevices receive minimum dry film thickness.
 - c. Brush Application: Work material into surface in even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw lines at edges and color breaks.
 - d. Roller Application: Keep cover wet; do not dry roll. Apply material in sections. Lay on required amount of material, working material into grooves and rough areas. Then level material, working it into surface.
 - e. Spray Application: Use spray application only when permitted by manufacturer's written instructions and authorities having jurisdiction. Apply material to provide equivalent hiding of brush-applied coat. Do not double back, building up film thickness of two coats in one application.
 - 4. Do not coat over UL, FMG, or other labels.

3.5 FIELD QUALITY CONTROL

- A. Material Coverage Rates.
 - 1. At beginning of application, calibrate material coverage rate with wet-mil thickness equivalent to minimum specified dry-mil thickness. Measure wet-mil thickness with thickness gauge.
 - 2. Measure wet-mil thickness at least once for every 10 square feet of surface coated. Adjust coverage rate to maintain minimum thickness.

- B. Owner may, at its expense, perform the following tests. Contractor shall provide access to test locations determined by Architect/Engineer.
 - 1. Measure dry-film thickness of coating. Coating thickness is acceptable if within specified range.
 - 2. Perform adhesion tests per ASTM C3359, Test Method A, after coating has cured. Coating adhesion is acceptable if no peeling or coating removal occurs (Rating 5A).
 - 3. Perform pull-off tests per ASTM D4541, after coating has cured. Coating application is acceptable if test results are at least 100 pounds per square inch.
 - 4. If coating application is acceptable, Owner will pay Contractor to repair substrate and coating as necessary at test locations.
 - 5. If coating application is unacceptable, Architect/Engineer will determine remedy. Contractor shall remove and replace unacceptable coating or perform other remedial actions at no cost to Owner. Contractor shall also repair substrate and coating at test locations with unacceptable results at no cost to Owner. Contractor may, at own expense, perform additional measurements and testing to determine limits of areas with unacceptable coating.

- C. Completed Work shall match approved mockup for color, texture, and coverage, in opinion of Architect/Engineer, and shall be free from flow-lines, streaks, blisters, and other surface imperfections. Remove, refinish, or recoat Work not complying with specified requirements.

3.6 CLEANING

- A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.

- B. After completing coating Work:
 - 1. Clean spillage, overspray, and spatter from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
 - 2. Repair surfaces stained, marred, or otherwise damaged during coating Work.
 - 3. Clean up debris and surplus materials and remove from Site.

- C. Waste Management:
 - 1. Collect surplus coating materials that cannot be reused and deliver to recycling or disposal facility.
 - 2. Treat materials that cannot be reused as hazardous waste and dispose of in an appropriate manner.

END OF SECTION 09 97 13

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. Pipes, tubes, and fittings.
 - 2. Piping specialties.
 - 3. Piping and tubing joining materials.
 - 4. Manual gas shutoff valves.
 - 5. Pressure regulators.
 - 6. Dielectric fittings.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Piping specialties.
 - 2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - 3. Pressure regulators. Indicate pressure ratings and capacities.
 - 4. Dielectric fittings.
- B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
 - 1. Shop Drawing Scale: 1/4 inch per foot.
- C. Delegated-Design Submittal: For natural-gas piping and equipment 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 fabrication and assembly of seismic restraints.
 - 2. Design Calculations: Calculate requirements for selecting seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.
- B. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.
- C. Qualification Data: For qualified professional engineer.
- D. Welding certificates.

- E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For pressure regulators to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- C. 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.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.
- B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating and protect from direct sunlight.

1.9 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:
 - 1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of natural-gas service.
 - 2. Do not proceed with interruption of natural-gas service without Construction Manager's and Owner's written permission.

1.10 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.
- B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 08 31 13 "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Minimum Operating-Pressure Ratings:
 - 1. Piping and Valves: 100 psig minimum unless otherwise indicated.
 - 2. Service Regulators: 65 psig minimum unless otherwise indicated.
- B. Natural-Gas System Pressure within Buildings: 0.5 psig or less.
- C. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

2.2 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.

2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - a. Material Group: 1.1.
 - b. End Connections: Threaded or butt welding to match pipe.
 - c. Lapped Face: Not permitted underground.
 - d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
 - e. Bolts and Nuts: ASME B18.2.1 (bolts), ASME B18.2.2 (nuts) carbon steel aboveground and stainless-steel underground.
 - f. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.3 PIPING SPECIALTIES

- A. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.4 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for natural gas.
- B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.5 MANUAL GAS SHUTOFF VALVES

- A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.
- B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
 1. CWP Rating: 125 psig.
 2. Threaded Ends: Comply with ASME B1.20.1.
 3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
 4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
 6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.
- C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.
 1. CWP Rating: 125 psig.
 2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
 3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 4. Service Mark: Initials "WOG" shall be permanently marked on valve body.
- D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
 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. A.Y. McDonald Mfg. Co.
 - b. Apollo Valves; Conbraco Industries, Inc.

- c. BrassCraft Manufacturing Co.; a Masco company.
 - d. Lyall, R. W. & Company, Inc.
 - e. Perfection Corporation.
 2. Body: Bronze, complying with ASTM B 584.
 3. Ball: Chrome-plated bronze.
 4. Stem: Bronze; blowout proof.
 5. Seats: Reinforced TFE; blowout proof.
 6. Packing: Threaded-body packnut design with adjustable-stem packing.
 7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 8. CWP Rating: 600 psig.
 9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- E. Bronze Plug Valves: MSS SP-78.
 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. A.Y. McDonald Mfg. Co.
 - b. Lee Brass Company.
 - c. Hammond
 - d. NIBCO
 2. Body: Bronze, complying with ASTM B 584.
 3. Plug: Bronze.
 4. Ends: Threaded, socket, or flanged as indicated in "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 5. Operator: Square head or lug type with tamperproof feature where indicated.
 6. Pressure Class: 125 psig.
 7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- F. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.
 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. A.Y. McDonald Mfg. Co.
 - b. Mueller Co.
 - c. Xomox Corporation.
 2. Body: Cast iron, complying with ASTM A 126, Class B.
 3. Plug: Bronze or nickel-plated cast iron.
 4. Seat: Coated with thermoplastic.
 5. Stem Seal: Compatible with natural gas.
 6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 7. Operator: Square head or lug type with tamperproof feature where indicated.
 8. Pressure Class: 125 psig.
 9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

- G. Cast-Iron, Lubricated Plug Valves: MSS SP-78.**
 - 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. A.Y. McDonald Mfg. Co.
 - b. Homestead Valve.
 - c. Milliken Valve Company.
 - d. Mueller Co.
 - 2. Body: Cast iron, complying with ASTM A 126, Class B.
 - 3. Plug: Bronze or nickel-plated cast iron.
 - 4. Seat: Coated with thermoplastic.
 - 5. Stem Seal: Compatible with natural gas.
 - 6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - 7. Operator: Square head or lug type with tamperproof feature where indicated.
 - 8. Pressure Class: 125 psig.
 - 9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - 10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.6 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.**
- B. Dielectric Unions:**
 - 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. A.Y. McDonald Mfg. Co.
 - b. Capitol Manufacturing Company.
 - c. Jomar Valve.
 - d. Matco-Norca.
 - e. WATTS.
 - f. Wilkins.
 - g. Zurn Industries, LLC.
 - 2. Description:
 - a. Standard: ASSE 1079.
 - b. Pressure Rating: 125 psig minimum at 180 deg F.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:**
 - 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. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. Matco-Norca.
 - d. WATTS.
 - e. Wilkins.
 - f. Description:
 - g. Standard: ASSE 1079.

- E. Install pressure gage upstream and downstream from each service regulator. Pressure gages are specified in Section 22 05 19 "Meters and Gages for Plumbing Piping."

3.4 INDOOR PIPING INSTALLATION

- A. Comply with NFPA 54 for installation and purging of natural-gas piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- G. Locate valves for easy access.
- H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Verify final equipment locations for roughing-in.
- L. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- M. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- N. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- O. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- P. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.
 - 1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
 - 2. Prohibited Locations:
 - a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - b. Do not install natural-gas piping in solid walls or partitions.
- Q. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- R. Connect branch piping from top or side of horizontal piping.
- S. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
- T. Do not use natural-gas piping as grounding electrode.
- U. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

3.5 VALVE INSTALLATION

- A. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

3.6 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - 2. Cut threads full and clean using sharp dies.
 - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 - 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints:
 - 1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
 - 2. Bevel plain ends of steel pipe.
 - 3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- E. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

3.7 HANGER AND SUPPORT INSTALLATION

- A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
 - 4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, 1/2 inch.
 - 5. NPS 4 and Larger: Maximum span, 10 feet; minimum rod size, 5/8 inch.

3.8 CONNECTIONS

- A. Install piping adjacent to appliances to allow service and maintenance of appliances.
- B. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- C. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.9 LABELING AND IDENTIFYING

- A. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 PAINTING

- A. Comply with requirements in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting" for painting interior and exterior natural-gas piping.
- B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel (semigloss).
 - d. Color: Gray.
- C. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 1. Latex Over Alkyd Primer System: MPI INT 5.1Q.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (semigloss).
 - d. Color: Gray.
 2. Alkyd System: MPI INT 5.1E.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd (semigloss).
 - d. Color: Gray.
- D. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 1. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.
 2. The gas purge procedure shall be reviewed and approved by OSFM.
- C. Natural-gas piping will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.12 PIPING SCHEDULE

- A. Refer to Piping Schedule on Drawings.

3.13 GAS SHUTOFF VALVE SCHEDULE

- A. Refer to Valve Schedule on Drawings.

END OF SECTION 22 11 25

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the replacement existing domes and clamps at roof drains and over flow drains and cleaning of existing rain leaders.
- B. Related Sections:
 - 1. Section 07 53 23: EPDM Membrane Roofing

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations, and recommendations for each product and material used.

1.3 DELIVERY, HANDLING AND STORAGE

- A. Handle products carefully to avoid damage to ends or roof drain components.

PART 2 PRODUCTS

2.1 METAL ROOF DRAINS

- A. Roof Drain Accessories sized to fit existing drains.
 - 1. Domes: Cast Iron
 - 2. Combination flashing ring and gravel stop: Cast iron.

PART 3 EXECUTION

3.1 DRAIN CLEANING

- A. Clean entire drain and flashing assembly to remove all adhesive, rust, bitumen, soil, etc., prior to the installation of the new roof membrane and flashing system. All cleaning solvents shall be acceptable to the roof manufacturer. Drain assembly shall be cleaned to the satisfaction of the Construction Administrator.
 - 1. Plug drain to prevent contamination of pipes.
 - 2. Furnish flashing clamp and dome to the work of Section 07 53 23 EPDM Membrane Roofing for setting and flashing of the drain.

3.2 DRAIN CLEARING

- A. Clear existing rain leaders of obstructions to 50 feet past the point where sewer line leaves the building.

END OF SECTION 22 01 34

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PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Division shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install all work of this Division as shown on the drawings, as specified herein, and/or as required by job conditions.
- B. Requirements given herein may be affected by other related requirements of the project specification. Correlation of the contract requirements is the responsibility of the contractor.
- C. Perform the work in accordance with the above requirements and the provisions of all applicable codes and laws.
- D. Standard Specifications and Abbreviations
 - 1. The following abbreviations used in the Specifications refer to organizations publishing specifications and standards. These shall be construed to mean the latest standard adopted and published at the date of advertisement for bids and such specifications are made part of the Contract Documents to the same extent as if written out in full.

ADC-Air Diffusion Council
AHDGA-American Hot Dip Galvanizing Association
AISC-American Institute of Steel Construction
AMCA-Air Moving and Conditioning Association
ANSI-American National Standards Institute
ARI-American Refrigeration Institute
ASHRAE-American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME-American Society of Mechanical Engineers
ASSE-American Society of Sanitary Engineers
ASTM -American Society for Testing Materials
AWS-American Welding Society
AWWA-American Water Works Association
FIA-Factory Insurance Association
FM-Factory Mutual
FS-Federal Specifications
MCAA-Mechanical Contractors Association of America
MSS-Manufacturers Standardization Society of Valve and Fittings Industry
NBFU-National Board of Fire Underwriters
NBS-National Bureau of Standards
NEC-National Electrical Code
NEMA-National Electrical Manufacturers Association
NFPA-National Fire Protection Association
NSF-National Sanitation Foundation
OSHA-Occupational Safety Health Act
PDI-Plumbing and Drainage Institute
PPI-Plastics Pipe Institute
SMACNA-Sheet Metal and Air Conditioning Contractors National Association, Inc.
SSPC-Steel Structures Painting Council
STI-Steel Tank Institute
UL-Underwriters Laboratories, Inc.
USDC-United States Department of Commerce
USPHS-United States Public Health Service

- 2. Conform to ANSI - 31.1.0 and addenda for basic materials and methods of installation for closed piping systems with pressures in excess of 30 PSI, and for pipe welding regardless of system pressures.
- 3. Conform to ASME Boiler and Pressure Vessel Code Section VIII and FM requirements for construction of unfired pressure vessels.

- E. Where the word "provided" is used in this document, it shall be understood to mean, "provided and installed."

1.2 SUMMARY

- A. This Section includes the following:
 1. HVAC demolition.
 2. Equipment installation requirements common to equipment sections.
 3. Painting and finishing.
 4. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. Where the word "provided" is used in this document, it shall be understood to mean "provided and installed."
- G. The following are industry abbreviations for rubber materials:
 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 2. NBR: Acrylonitrile-butadiene rubber.

1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

1.5 INTENT

- A. It is the intention of the specifications and drawings to provide for finished work, tested and ready for operation.
- B. Items and services not shown on drawings, but mentioned in specifications, or vice versa, or items and services necessary to render the work complete and ready for operation, even if not specified, shall be provided without additional cost.
- C. Where conflicts occur between drawings and specifications, or within either document, the Contractor shall ask for and obtain a written clarification from the Architect prior to submitting his bid. Otherwise, the items or arrangements of superior quality, greater quantity or higher cost shall prevail and be included in the contract price.

1.6 WORK INCLUDED

- A. The work under this Division shall include all labor, material, equipment plant, services and administrative tasks required to complete and make operable the mechanical work shown on the Drawings, required for proper operation and/or specified herein, including but not limited to, the following:
1. Preparation and submission of shop drawings, diagrams and illustrations.
 2. Procuring all necessary permits and approvals, and paying all required fees and charges in connection with the work of this Division.
 3. Protection, testing, cleaning, adjustment and guarantee of the work of this Division to safely, properly and continuously operate.
 4. As-built drawings, operating and maintenance instructions and manuals.
 5. Identification labels, tags, charts and diagrams.
 6. Maintain existing services to heating, etc. (temporary services during construction).
 7. Coordination.
 8. Project record documents.
 9. Operation and Maintenance Data.
 10. Cutting and patching.
 11. Cooperation with and full participation in the commissioning process.

1.7 WORK NOT INCLUDED

- A. Finish patching of all construction cut under this Division.
- B. Waterproofing of roof penetrations for the work of this Division.
- C. Concrete and masonry work except as specified.
- D. Painting, except as noted.
- E. Removal, patching, or otherwise handling of hazardous materials.

1.8 SITE INVESTIGATION

- A. Examine the drawings and specifications of all trades, and the site, and from these investigations be responsible for the nature and location of work, general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, etc.

1.9 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of systems and work required. Do not scale the Drawings. Consult the architectural drawings and details, and the drawings of other trades, for exact location of equipment.
- B. Drawings shall be used in layout of work. Check reference drawings to verify spaces in which the work will be installed. Maintain maximum headroom and space conditions. Where headroom or space conditions appear inadequate, Architect shall be notified before proceeding with installation.
- C. If directed by the Architect, make minor modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- D. The drawings are schematic and diagrammatic.
 1. Symbols and diagrams are used to indicate the various items of work and the complete systems, but not necessarily have dimensional significance, neither do they necessarily delineate all related and subsidiary parts and equipment.
 2. The work shall be installed complete and ready for operation in conformity with the intent expressed on the drawings and in the specifications.

3. Coordinate the work with the requirements of the architectural and structural drawings for dimensions, locations and clearances.
4. Locations of items exposed to view shall be taken from the architectural drawings or located as directed.

1.10 COORDINATION WITH OTHER TRADES

- A. Closely schedule the work so that work will be installed at the proper time without delaying the completion of the entire project.
- B. Where the work will be installed in close proximity to the work of other trades, or where there is evidence that the work will interfere with the work of other trades, arrange space conditions to make a satisfactory adjustment. If work is installed before coordinating with other trades, make necessary changes to the work to correct the condition without additional cost to the owner.
- C. Prepare complete set of drawings showing all necessary slab openings and structural supports that require structural framing. Drawings shall clearly indicate sizes and location relative to established column lines. Drawings shall be completed in sufficient time to allow for structural steel fabrication so as not to delay project schedule.
- D. Shop drawing submissions shall demonstrate a knowledge of the work of other trades, and shall show the locations of the work of other trades which affects the work of this contract.

1.11 EQUIPMENT DEVIATIONS

- A. It is the intent of these specifications that wherever a manufacturer of a product or a catalog number is specified, and terms "or equal" or "or approved equal" are used, the substituted item must conform in all essential respects to the specified item including operating efficiency, noise generated, and method of operation. Consideration will not be given claims that the substituted item meets performance requirements with lesser construction. Performance as delineated in schedules and in the specifications shall be interpreted as minimum performance.
- B. When such approved deviation requires a different quantity and or arrangement of equipment from that specified or indicated on the drawings, provide required equipment, wiring, piping, connections, valves, and structural supports, and any other additional equipment required by the deviation, at no additional cost to the Owner.
- C. When an item of equipment is proposed, other than that detailed or specified on the drawings, which requires any additional equipment or redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical, plumbing or architectural design, such costs shall be incurred by the Contractor without cost to the Owner.
- D. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at no cost to the Owner. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.12 EQUIPMENT AND SYSTEMS CRITERIA

- A. The criteria of design and performance to produce the required operation is based on equipment shown or scheduled.
 1. The equipment must conform to the structural design provisions for loads applied to the structure, to the dimensions established by drawings for mechanical spaces and other clearances, and for inlet and outlet locations and proper relationship to associated equipment, piping and ducts.
- B. The descriptions cover basic equipment and operation but not all the details of design and construction.
 1. The use of singular in descriptions does not limit the quantities of items to be furnished to provide the operation specified. Furnish all equipment required to produce specified performance under installed conditions.

2. Factory wiring, interconnections, piping and connections shall conform to these specifications for the field work.
 3. Provide all trim, enclosures and accessories required to make a complete installation.
- C. Acoustical performance of equipment and systems.
1. Noise levels from operation of motor driven equipment, whether air-borne or structure-borne, and noise levels created by or within air-handling equipment and air distribution and control media shall not exceed sound pressure levels determined by the noise criterion curves in the ASHRAE Guide as follows:

<u>Location</u>	<u>Noise Criterion</u>
??Offices	NC 35
??Corridors	NC 40
??Toilets	NC 40
 2. Testing for conformance to the above requirements will be provided by an acoustical consultant retained by the Owner.
 - a. Octave band sound pressure levels will be obtained for ambient room conditions with equipment not operating and also with the installed equipment operating per plans and specifications.
 - b. For testing purposes, sound pressure levels will be measured 3'-0" above the floor.

1.13 GENERAL CONFORMANCE

- A. Obtain all general conformances in accordance with Division 1 - General Requirements.
- B. Submit to the Architect for review a list of manufacturers of equipment proposed for the work. Intent to use exact make specified does not relieve the Contractor of responsibility for submitting the required list.
- C. Where any specific materials, process or method of construction, or manufactured article is specified by name or by reference to catalog number of a manufacturer, or other standards, the intent is not to take precedence over the basic duty and performance specified, noted on drawings, or as required for intended results. In all cases, verify the duty specified with the specific characteristics of the equipment offered for review.
- D. Equipment of one type, shall be products of one manufacturer.

1.14 SUBMITTALS

- A. Manufacturer's Drawings.
 1. Equipment listed in each section, include material specifications, operating characteristics and finishes.
- B. Installation Drawings.
 1. Coordinated scale drawings of equipment including interconnecting piping and ductwork.
 2. Coordinate space requirements for equipment and services.
 3. Include connections, anchorages and fastenings.
 4. Make allowance for clearances for access to and maintenance of equipment.
- C. Wiring and Control Diagrams.
 1. Electric wiring diagrams and automatic control diagrams and sequences of operation. The wiring diagrams must be complete and coordinated with the equipment actually installed.
- D. Provide composite shop drawings showing work of all related construction, when required to ensure full coordination and proper fitting of the work, and when directed by the Architect.
- E. Provide drawings showing dimensions and locations of concrete work required for the mechanical work.
- F. Samples.

1. Color samples for prefinished items.
- G. Reports:**
1. Manufacturer's certified pressure tests on vessels.
 2. Manufacturer's certified performance tests on operating equipment.
 3. Field pipe testing reports and certificates of approval.
 4. Welder's certificates and field test report.
 5. Field operating test results for operating equipment.
 6. Performance report on the balancing of air and water systems.
 7. Performance report and calculations for vibration isolation equipment.
 8. Manufacturer's certified reports on motorized equipment alignment and installation.
- H. If submissions of catalog cuts of standard manufactured items show different types, options, finishes, performance requirements, or other variations, those features proposed shall be clearly identified.**
1. If any variations from the catalog description are proposed or required, such variations must be clearly noted on the cut.
 2. Shop drawings shall clearly indicate all details, sectional views, arrangements, working and erection dimensions, kinds and quality of materials and their finishes, and other information necessary for proper checking and for fabrication and installation of the items, and shall include all information required for making connections to other work.
 3. Shop drawings shall be numbered consecutively, and drawings related to various units comprising a proposed assembly shall be submitted simultaneously so that units may be checked individually and as an assembly.
 4. Keep on the site, in good order, a complete up-to-date set of approved shop drawings. All shop drawings shall be available for inspection by the Architect.
 5. On product data submittals, clearly indicate model numbers, dimensions, weights, electrical requirements, accessories and performance data. Submittals not properly prepared will be rejected without further review.
 6. The review of shop drawings will be general, and shall not be construed as permitting any departure from the contract requirements other than those specifically brought to the Architect's attention and so approved.
 - a. If the shop drawings show any variations from contract requirements because of standard shop practices or other reasons, such variations shall be clearly identified on the drawings in order that, if acceptable, suitable action may be taken for proper adjustment in other work affected thereby.
 - b. Failure to identify such variations will not relieve the Contractor of responsibility for executing the work in accordance with the Contract even though such shop drawings have been reviewed and the work installed.
 - c. Review shall not relieve the Contractor of responsibility for any error in details, dimensions, etc., that may exist on shop drawings nor for the furnishing of materials or work required by the Contract and not indicated on the shop drawings.
 - d. Review shall not be construed as acceptable departure from details or instructions previously furnished by the Architect.
 - e. Review with a requirement for resubmission is a review contingent upon satisfactory resubmission within 30 days. Failure to comply shall result in a revocation of the contingent review.
- I. Shop Drawing Schedule**
1. The Contractor shall submit, within 30 days of the award of his contract, a schedule of all proposed shop drawing submissions.
 2. The schedule shall include the following information.

- a. Item to be submitted
 - b. Date of submission
 - c. Latest date for review
 - d. Manufacturers of the specified item.
3. Items not specifically listed as "approved equal" should be listed for consideration at this time.
 4. Shop drawings require a minimum of 10 business days from the date they have been received by the Consulting Engineer's office to adequately review the submittal. If there is any submittal which requires to be expedited sooner than the 10 business days, the Engineer shall be informed in writing at the beginning of construction with a list of those submittals.

1.15 GUARANTEES AND SERVICES

- A. All workmanship, installation materials and equipment shall be maintained and serviced for the guarantee period at no additional cost to the Owner.
- B. Leave entire system installed under this Contract in perfect working order, and, without additional charge, replace any work or material which develops defects within the guarantee period, including all other work damaged as a result of such defects.
- C. Non-durable, expendable items such as air filter media are not subject to replacement after the date of acceptance.
- D. The guarantee period shall be extended as follows:
 1. For heating systems, one year plus the time necessary to include one continuous heating season from November 1st to April 1st.
 2. For air-conditioning systems, one year plus the time necessary to include one continuous cooling season from May 1st to October 1st.
- E. Manufacturers' Warranties
 1. The manufacturer shall warrant that the equipment which he has furnished is free from defects in material and workmanship. Obligations under this warranty shall be as follows:
 - a. The equipment manufacturer or supplier shall provide and pay for all labor, parts, accessories, materials, freight and other services to repair or replace any equipment or part thereof which, in the course of installation, start-up and testing is found to be defective.
 - b. For a period of eighteen months from the date of acceptance by the Owner, the manufacturer shall replace any defective equipment or part thereof; freight costs for return of defective parts, labor for parts replacement, and replacement of lost refrigerant, are the responsibility of the installing contractor.
 - c. The manufacturer shall provide an additional warranty on all equipment as indicated in their respective specification section.
 - d. Performance - where equipment is specified by size, guarantee that it will have the capacity specified in the system in which it is installed.
 2. The final acceptance of the equipment will be made after the manufacturer has adjusted his equipment, balanced the various systems, demonstrated that it fulfills the requirements of the drawings and specifications, and has furnished all the required certificates of inspection and acceptance.

1.16 SYSTEM MAINTENANCE

- A. Contractor shall provide routine and preventive maintenance during the warranty period.
- B. Contractor shall submit to Engineer for review a comprehensive plan covering items to be maintained and service to be performed. Plan shall include checklist for use by maintenance personnel.
- C. Owner's representative(s) shall accompany contractors' maintenance personnel, and receive instructions on proper maintenance of equipment.

- D. Maintenance performed shall include a complete check out of each piece of equipment at least twice during warranty period. The first shall occur approximately half way through the warranty period (change of season) and the second at the conclusion of the warranty period and prior to commencement of the owner's maintenance. Each system and/or piece of equipment shall be inspected, operated through its complete range of operation, and adjusted as required. This inspection shall be the same as performed at the initial start-up of the item or system. In addition, there shall be monthly maintenance inspections of each piece of equipment.
- E. During the monthly inspections, equipment shall be checked for items such as dirty filters, belt wear, lubrication, unusual sounds or unusual operating conditions. Monthly inspections shall also include recording of system operating temperatures and pressures.
- F. Contractor shall include all labor and material to perform the maintenance, including replaceable items such as filters and belts.
- G. Maintenance on the following items shall be included:
 - 1. Fans, air handling units
 - 2. Filters
 - 3. Temperature controls
 - 4. Actuators

1.17 PERMITS AND CERTIFICATES

- A. Prior to proceeding with any installation, prepare and submit to the proper authorities, for their review, all required working drawings. Provide all necessary notices, obtain all permits and pay all local, state and federal taxes, fees and other costs in connection with the work.
- B. The contractor shall be responsible for performing all controlled inspections required by applicable Administrative building Code.

1.18 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors and Frames."
- D. It is the intent of these specifications that wherever a manufacturer of a product or a catalog number is specified, and terms "or equal" or "or approved equal" are used, the substituted item must conform in all essential respects to the specified item including operating efficiency, noise, physical size, capacity, quality, and material.

1.19 COORDINATION DRAWINGS

- A. Sheet metal and plumbing shop drawings that have been coordinated with architectural and structural drawings shall be submitted to Engineer for review. Drawings must be returned from Engineer either "Reviewed" or "Furnish as corrected" prior to being used as basis for coordination drawings. Refer to Section 23 31 13 for sheet metal shop drawing and 232113 for piping shop-drawing requirements.
- B. The contractor shall submit for review sheet metal shop standards. Any sheet metal shop drawings submitted prior to the submission of the shop standards shall be returned "not reviewed".
- C. After sheet metal and piping drawings have been revised per Engineers comments, reproducible copies shall be sent to the others trades in the following sequence for the inclusion of their work:
 - 1. Plumbing contractor
 - 2. Electrical work
 - 3. Mechanical piping

4. Life support subcontractor
- D. After all trades have included their work on the coordination drawing and noted conflicts, all trades shall meet to resolve conflicts and agree to acceptable solutions. Each trade shall sign coordination drawings. Items not shown on coordination drawing is responsibility of omitting contractor and contractor is subject to additional costs incurred by other trades.
 - E. The Architect and Engineer are not part of the coordination drawing process. The Engineer will provide assistance relative to acceptability of installations.
 - F. Submit final signed coordination drawing to engineer for review. Engineer will review for acceptability of installations.
 - G. Any work fabricated or installed prior to sign off by all trades shall be removed and re-installed in conformance with coordination drawings.
 - H. Each contractor (mentioned above) is responsible for the coordination of his sub-contractors.
 - I. The overall coordination of the coordination process is the responsibility of the general contractor and/or construction manager.
 - J. The overall coordination of the coordination process is the responsibility of the general contractor and/or construction manager. The Engineer is not responsible for the coordination process. The Engineer will respond to questions that arise from the coordination process. Drawings submitted will be reviewed for clearly identified conflicts only. Solutions to conflicts will not bear additional cost.
 - K. Drawings shall be submitted in both hard copy and electronic (AutoCAD version as required by the Owner) version or AutoCAD Version 2010 if not specified. Number of copies of each as requested by the Owner.
 - L. Electronic drawing files shall be generated by the Contractor.

1.20 AS BUILT DRAWINGS/RECORD DRAWINGS

- A. Provide a complete set of as-built drawings reflecting as installed conditions. As-built drawings shall indicate all installed conditions of systems within this discipline. Drawings shall be of similar scale as the construction documents and include details as necessary to clearly reflect the installed condition. Drawings shall be bound in a complete and consecutive set. Supplemental sketches and loose paperwork will not be acceptable and will be returned for revision. The contractor shall comply with the engineer's comments to produce a clear and concise set of drawings.
- B. Provide "As-Built Drawings" indicating in a neat and accurate manner a complete record of all revisions of the original design of the work.
- C. Drawings shall be submitted in both hard copy and electronic (AutoCAD and Revit version as required by the Owner) version or AutoCAD Version 2010 if not specified. Number of copies of each as requested by the Owner. PDFs inserted into an AutoCad file are not acceptable.
- D. Indicate the following installed conditions:
 - 1. All changes and an accurate record from the contract drawings or appropriate shop drawings, of all deviations, between the work shown and work installed.
 - 2. Ductwork mains and branches, size and location; locations of dampers and other control devices; filters, boxes, coils and terminal units requiring periodic maintenance or repair.
 - 3. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart.
 - 4. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 - 5. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
 - 6. Contract modifications, actual equipment and materials installed.
 - a. Submit for review bound sets of the required drawings, manuals and operating instructions.
- E. Electronic drawing files shall be generated by the Contractor.

PART 2 - PRODUCTS

2.1 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Furnish manufacturers operating and maintenance instructions, parts lists and sources of supply for replacements in accordance with Division 1 - General Requirements.
- B. Provide the following:
 - 1. Complete sets of final and correct shop drawings, maintenance and replacement parts manuals, and operating instructions, for equipment supplied.
 - 2. Bind each set within a common binder. Index and organize with a table of contents, to permit quick and convenient reference.
 - 3. Three days of instruction in operation and maintenance of equipment to Owner's maintenance force. Design a 2-week period, convenient to Owner, during which qualified personnel, including manufacturers' technicians and engineers will be available for Owner's instruction.
- C. Master Operating Manual (submit in quadruplicate)
 - 1. Complete sets of final and correct shop drawings, maintenance and replacement parts manuals, and operating instructions, for equipment supplied.
 - 2. Manufacturer's mechanical and electrical equipment parts lists of all components of the systems listed on the equipment schedules, control diagrams and wiring diagrams of controllers.
 - a. List shall give system number, unit number, manufacturer's model number, and manufacturer's drawing numbers.
 - 3. Step by step operating instructions for each system including preparation for starting, summer operation, winter operation, shutdown and draining.
 - 4. Maintenance instructions for each type of equipment.
 - 5. List of nearest local suppliers for all equipment.
 - 6. Manufacturer's literature describing each piece of equipment listed on the equipment schedules, control diagrams and wiring diagrams of controllers and a copy of the air balance report.
 - 7. As-installed control diagrams by the control manufacturer.
 - 8. Description of sequence operation by the control manufacturer.
 - 9. Recommended trouble shooting procedures in the event of foreseeable mechanical system failure.
 - 10. Copies of the following test reports:
 - a. Air Balance.
 - b. System Performance.
 - c. Required Pressure Tests.

PART 3 - EXECUTION

3.1 HVAC DEMOLITION

- A. Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
 - 1. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - 2. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
 - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.

4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.3 PAINTING

- A. Painting of HVAC systems, equipment, and components is specified in Division 9 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.
- C. Inside of all ductwork where visible through registers and grilles: one coat of flat black paint.

3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 5 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.5 COORDINATION AND LAYOUT

- A. Study Drawings and Specifications to insure completeness of work required.
 1. Include supplementary items normal to manufacturers' requirements or standard accepted trade practices as necessary to complete work, though not specifically indicated or specified.
- B. Verify measurements and conditions in field before starting work.
- C. Examine materials to which work is to be applied and notify the Architect, in writing, of any conditions existing, which are detrimental to proper and expeditious installation of work.
 1. Starting of work shall be construed as acceptance of conditions.
- D. Confer with other trades, install work to avoid interference with other trades, and possible necessary adjustments to conform to structural conditions and work of other trades.
- E. Coordinate and set inserts and locate openings in floors and walls in new construction.
 1. Locate pipes and ducts to avoid interference with other work shown on the drawings and as directed by the Architect.
 2. Keep all concealed pipes and ducts within the enclosing construction provided.
 3. Arrange exposed work neatly in parallel runs and parallel with walls or structure, with uniformly spaced hangers and supports, and within the spaces assigned for each kind of work.
- F. Make coordinated layouts showing concrete work required for housekeeping pads, equipment bases and inertia masses, which are cast in place, including the location of anchors and dowels.

1. Coordinate the scheduling and placing of the concrete to suit the mechanical work schedules.
2. Concrete housekeeping pads are to cover the full area of each piece of equipment.
3. Concrete bases are to be of dimension and heights to suit the equipment.
4. The forming and placing of concrete will be provided under this specification section.

3.6 MAINTENANCE OF EQUIPMENT AND SYSTEM PRIOR TO FINAL ACCEPTANCE

- A. Maintain all equipment and systems installed until final acceptance by the Architect and the Owner, and take such measures as necessary to insure adequate protection of all equipment and materials during delivery, storage, installation and shut-down conditions.
 1. This responsibility shall include all provisions required to meet the conditions incidental to the delays pending final test of systems and equipment.
- B. After installation of systems has been completed, operate the system to determine the capability of the equipment and controls to conform to the requirements of the drawings and specifications prior to performance testing.

3.7 EQUIPMENT INSTALLATION

- A. Locate and set equipment anchor bolts, dowels and aligning devices for all equipment requiring them. Refer to concrete work coordination.
 1. Level the equipment and grout solid between the equipment and the surface below. Grout to be premixed Embecco or Five Star Grout mixed in accordance with manufacturer's specifications.
- B. The field assembly, installation and alignment of equipment is to be done under field supervision provided by the manufacturer or with inspections, adjustments and reviewed by the manufacturer.
- C. Equipment startup.
 1. Each manufacturer of equipment shall provide qualified personnel to inspect, review and to supervise the operating tests of the equipment.
- D. Equipment and system test operation.
 1. Notify the Architect in advance of beginning the equipment and system test operation.
 2. Each piece of equipment shall be operated in its system as long as required to provide proper functioning.
 3. Perform an operating test of each complete system for twenty-four hours continuous operation as a minimum, or as long as required to provide coordination and proper functioning of all related systems and controls.
 4. The operating criteria for each test shall be determined in advance with the Architect's acceptance whenever seasonal conditions will not produce a full design load on any equipment or system.
 5. Certify to the Owner that all equipment is functioning properly.
 6. Should the apparatus fail to meet the contract requirements, adjust, repair or replace all defective or inoperative parts and again conduct the complete performance tests.

3.8 WORK RELATING TO CONTROLS AND INSTRUMENTS

- A. Under Sections 230993 as applicable, provide control wiring for the following:
 1. All circuits actuated by a temperature control system component.
 2. All circuits which actuate a temperature control component.
 3. All control panel wiring to terminal strips and field wiring from terminal strips to field mounted devices.
 4. All wiring from the "AUTO" side of hand-off-auto switches on units being controlled by Sections 230900
 5. Wiring of electro-mechanical devices required to be located on or in temperature control panels.

6. Wiring of DDC trunk, communication, and sensor cable wiring.
 7. Wiring shall comply with material and workmanship standards of Division 26.
 8. All 120 volt power wiring to vav boxes, damper actuators, line voltage thermostats, valve actuators, relay's, etc. not powered by 24 volt power is work of this division. Wiring shall comply with material and workmanship standards of Division 26.
- B.** Under Division 26, perform the following work under supervision of Sections 230993
1. Wiring of all devices and circuits carrying voltages greater than 120 volts.
 2. Wiring of line and load power feeds to all disconnects, starters, and electric motors.
 3. Wiring of 115 volt power feeds to all temperature control panels.
 4. Power wiring to all motors 110 volt to 480 volt.
 5. Furnish smoke detectors for mounting in ducts.
 6. Specific power feeds shown or specified in Div 26 documents.

3.9 CLEANING AND ADJUSTING

- A.** Lubricate equipment as recommended by the manufacturer, during temporary construction use, and provide complete lubrication just prior to acceptance.
- B.** Permanent equipment operated during construction shall not be abused or be used in service different from its design application.
1. Temporary disposable filters shall be used during temporary operation.
 2. All expendable media, including belts used for temporary operation and similar expendable materials shall be replaced just prior to acceptance.
 3. Packing boxes of equipment operated during construction must be replaced just prior to system acceptance, using materials and methods specified by the supplying manufacturer.
- C.** Equipment furnished with factory finishes shall be retouched and repainted as required to present a new appearance.
- D.** Provide and maintain protection for all of the work whether completed or in progress.
1. Provide coverings and enclosures as required.
- E.** New and existing operating equipment and systems shall be clean and dust free inside and out.
1. Concealed and unoccupied areas such as plenums, pipe and duct spaces and Equipment Rooms shall be free of rubbish and swept clean at time of acceptance.

3.10 TESTING AND BALANCING

- A.** Tests shall be performed in accordance with Division 1 - General Requirements, and the following.
- B.** Provide the services of an independent air balancing and testing firm which specializes in balancing and testing of heating, ventilating and air conditioning systems, and which is acceptable to the Owner.
1. All instruments used shall be accurately calibrated and maintained in good working order. If requested, the balancing shall be conducted in the presence of the Architect/Owner.
- C.** Balancing shall not begin until the system has been completed and is in full working order.
1. After completion of the balancing and testing submit copies of the results to the Architect.
- D.** Perform tests and make necessary adjustments to obtain the flow and distribution of air and water required to produce the operating criteria called for by the contract documents, in accordance with the latest standards of the National Environmental Balancing Bureau and the Associated Air Balance Council.
1. Occupied spaces shall be draft free upon completion.
 2. Provide any necessary baffles at registers and diffusers.
 3. Maintain the specified acoustical performance of the systems.

4. Mark final position of dampers and balancing valves.
- E. Upon completion of the installation, test and balance all equipment and systems under field operating conditions to demonstrate its compliance with specification requirements.
 1. Submit three copies of the test report to the Architect. Refer to specification sections for details of report requirements.
- F. Should any part of the system fail to meet the contract requirements, adjust, repair or replace all defective or inoperative parts again conduct the complete performance tests.
- G. The Architect and Owner shall be notified, in writing, at least 48 hours prior to scheduled test dates.

3.11 PAINTING

- A. Thoroughly clean all surfaces, requiring prime painting, of rust, loose scale, oil and grease.
 1. Dry surfaces before painting.
 2. Do not paint controls, nameplates, or labels.
- B. Paint all equipment not painted at the factory with one prime coat.
- C. Provide field painting as follows:
 1. All exposed iron work, including uninsulated ferrous piping and conduit system components, hangers, supports, equipment bases, and apparatus; prime coat, red oxide primer.
 2. Un-insulated ductwork and casing exposed to view and exposed galvanized surfaces of conduit and piping and of equipment prime painted at the shop as indicated on the drawings to be painted Prime coat, zinc chromate for galvanized surfaces.
 3. Inside of all ductwork/plenums where visible through registers and grilles: One coat of flat black paint specifically designed for metal surfaces. Paint shall be low VOC.
 4. Inside of all outdoor air intake plenums where visible through louvers: One coat of flat black paint specifically designed for exterior metal surface. Paint shall be low VOC.

3.12 CONNECTIONS TO EQUIPMENT

- A. Provide mechanical connections to equipment and fixtures requiring such connections which are supplied by Owner or under other divisions.
- B. Provide unions, nipples, adapters, valves, flexible connections, and other trim required for final connections for each such fixture or item of equipment, as required for complete and perfect operation.

3.13 WORKMANSHIP

- A. Perform all work in a practical, neat and workmanlike manner with mechanics skilled in work, and using the best practices of the trade involved.
- B. No work shall be concealed until it has been inspected and approved by the Architect.
- C. Workmanship or materials not meeting with requirements of the specifications and drawings and satisfaction of the Architect shall be rejected and immediately replaced in an acceptable manner, without additional cost to the Owner.

3.14 LUBRICATION

- A. All equipment furnished, installed or connected under this division, shall be inspected for proper lubrication when connected and before operation of the equipment is begun.
- B. The Contractor for the work of this division will be held responsible for any damage to equipment that is operated without having been properly lubricated.

3.15 REMOVALS AND RELOCATIONS

- A. All components of abandoned systems and abandoned portions of systems shall be removed, and, unless specifically noted to be relocated and reused, become the Owner's property. Contractor shall dispose of removed materials as directed by the Owner.

- B. Where portions of systems noted for removal remain in use, permanently seal the point of disconnection so as not to interfere with the system operation.
- C. Where interferences between the existing system components and new work require relocation of the existing components to clear that interference, they may be reused, except where specifically noted to the contrary, providing that their condition is noted by the Owner's representative and they are approved by him as equivalent to new.
- D. Where existing system components are required to be replaced, all new components shall be provided.
- E. System components include all accessories, cables, controls, conduits, hangers, bases and supports and outlets.
- F. The work specified under this contract specifically excludes the removal or patching of "hazardous materials." This includes but is not limited to asbestos, PCBs or any other material having been designated by the Environmental Protection Agency as a hazardous material. If this contractor finds anything, which is suspected of being a hazardous material, it should be immediately brought to the Owner's attention.

3.16 USE OF PREMISES AND CLEANING

- A. Remove and dispose of all waste materials and rubbish due to all construction operations under the contract, except as otherwise noted, and keep the building free from rubbish and dirt caused by his and/or his subcontractors' employees.
 - 1. During the entire progress of the work, rubbish removal shall be made frequently so as to prevent any potential safety or health hazard.
- B. Upon completion of the work, remove all protection, paint, putty, and other stains from all fixtures and glass and leave the premises thoroughly broom cleaned.

3.17 CUTTING, ALTERING AND PATCHING

- A. Provide all cutting, chasing, drilling, altering and rough patching required for the work of this division.
 - 1. Including the restoring of existing work cut for or damaged by installation of new work, and where present work is removed.
 - 2. All materials and workmanship required in connection with cutting, altering and rough patching shall match the existing work in every respect.
- B. Do all shoring, bracing, cutting, patching, piecing out, filling in, repairing and refinishing of all present work as made necessary by the alteration and the installation of new work.
- C. All holes and openings occurring in the existing floors after equipment, partitions, floors, steel work, conduits and pipes are removed or installed shall be closed up with materials similar to the adjacent work.
- D. The size and location of items requiring an opening, chase or other provisions to receive it shall be given by the trade requiring same in ample time to avoid undue cutting of any new work to be installed. These provisions shall not relieve the Contractor from keeping informed as to the required opening, chases, etc., nor from responsibility for the correctness thereof, nor for cutting and repairing after the new work is in place.
- E. Include all cutting, repairing and patching in connection with the work that may be required to make the several parts come together properly and fit it to receive or be received by the work of other trades, as shown on the drawings and/or specified, or reasonably implied by the drawings and specifications.
- F. All repairing, patching, piecing-out, filling-in, restoring and refinishing shall be neatly done by mechanics skilled in their trade to leave same in condition satisfactory to the Owner.
- G. Materials and their methods of application for patching shall comply with applicable requirements of the specifications.
 - 1. Materials and workmanship not covered by the specifications and items of work exposed to view adjoining existing work to remain shall conform to similar materials and workmanship existing in or adjacent to the spaces to be altered.

- H. Cutting, repairing and patching shall include all items shown on the drawings, specified in the specifications or required by the installation of new work or the removal of existing work.
- I. Remove partitions, walls, suspended ceilings, etc., as necessary to perform the required alterations or new construction work.
 - 1. Avoid damage to construction and finishes that are to remain.
- J. Protect and be responsible for the existing building, facilities and improvements.
 - 1. Any disturbance or damage to the work, the existing building, and improvements, or any impairments of facilities resulting from the construction operations, shall be promptly rectified, with the disturbed, damaged, or impaired work, restored, repaired or replaced at no extra cost.
- K. All alterations which are not indicated on the drawings nor specified herein but necessary to make good existing work disturbed by reason of the work shall be restored to a condition satisfactory to the Owner.
- L. All holes in masonry floors and walls are to be core drilled.
- M. Disturbed concrete and /or cement floor areas shall be patched with approved type latex mortar.
 - 1. When cement mortar is used for patching, the surfaces shall be depressed a minimum depth of 1".
- N. Reinstall all weather protection work in waterproof manner.
- O. Openings in roofs.
 - 1. Openings in roofs shall be kept properly plugged and caulked at all times, except when being worked on, to preclude the possibility of flooding due to storms or other causes. After completion of work, openings shall be permanently sealed.
- P. Temporary openings.
 - 1. All temporary openings cut in walls, floors or ceilings for pipe or ductwork shall be closed off with transite or an equally non-combustible material except when mechanics are actually working at the particular opening.

3.18 TEMPORARY HEAT

- A. Provide all labor, fuels, materials, tools, appliances and equipment and perform all operations necessary to maintain sufficient temporary heat to insure uninterrupted progress in the work and to protect all work and materials against injury from dampness and cold until issuance of the Architect's Final Certificate. The contractor shall assume the cost of the fuel, the cost of other operating supplies used for temporary heating and the costs involved in the operation and maintenance of the temporary wiring and electricity. If the adaptation of the temporary heating system to the contractor's temporary heating needs makes necessary the installation of temporary control valves, gauges, or piping, or the installation of temporary radiation units, the contractor shall bear the costs of such adaptations. In addition to the foregoing, the contractor shall provide temporary heat to the extent itemized below, but not limited to the following:
 - 1. During the placing, setting and curing of all concrete, an ambient temperature of 50°F in the areas involved.
 - 2. During the placing, setting and/or curing of interior masonry, metal furring, plaster, tile; and taping and spackling of drywall an ambient temperature of 60° F shall be maintained in the space involved.
 - 3. In spaces where resilient floor coverings or temperature sensitive material are stored an ambient temperature of 70°F shall be maintained, and such temperature of 70°F shall be maintained, and such temperature shall be maintained 48 hours before, during and 48 hours after installation in each space where such covering is required.
 - 4. Except as noted above, all areas in which work is in progress, shall be maintained at 45°F during working hours.
- B. The building will be considered in an enclosed condition when roofing and exterior walls are in place and openings in exterior walls and roof have been provided with temporary or permanent closures.

- C. The medium and procedure of providing temporary heat at all times shall be subject to the acceptance of the Owner and Architect.
- D. Prior to the building being in an enclosed condition, temporary heat may be provided by approved type of heating and devices complete with covers, vents and/or smoke connections to the outer air so that all human hazards may be eliminated and the surfaces of the buildings protected against damage by deleterious substances resulting from the heating operations.
- E. Only heaters employing tanked gas will be permitted. The use of oil or coke as fuels will not be accepted. Provide thermal protection under heating units.
- F. Prior to starting the metal lathing, or drywall spackling, the work shall be sufficiently advanced for the building to be enclosed and for temporary heat to be produced by the permanent heating system.
- G. After the building is enclosed and the permanent heating system or portion of the system is substantially complete and acceptable to the Owner for temporary heating use, the contractor may, at the Owner's discretion, be permitted to use such heating facilities for temporary heat.
- H. The contractor in using the permanent heating system for temporary heating agrees to the following:
 - 1. After the Architect and the Owner approve and accept the project heating system, or portion thereof, for temporary heating purposes, the heating system shall be turned over to the contractor. When the contractor has no further need for temporary heat, the heating system shall be returned to the Owner.
 - 2. The contractor shall assume the cost of the fuel, the cost of other operating supplies used for temporary heating and the costs involved in the operation and maintenance of the temporary wiring and electricity. If the adaptation of the temporary heating system to the contractor's temporary heating needs makes necessary the installation of temporary control valves, gauges, or piping, or the installation of temporary radiation units, the contractor shall bear the costs of such adaptations.
 - 3. That portion of the project's heating system and other related mechanical equipment termed the temporary heating system shall be limited to equipment and the necessary piping, traps, valves, strainers, controls, pumps, starters, wiring and all other apparatus and equipment necessary to cause the temporary heating system to function correctly.
- I. The cost of maintenance of the temporary heating system for temporary heating is the responsibility of the contractor.
- J. The permanent boilers, piping and air handling systems may not be utilized for temporary heating without the operation of the permanent water treatment system and approval from the Building Owner.
- K. These provisions for temporary heating do not alter the requirements of the "General and Supplementary General Conditions" with respect to "Guarantees" and/or any "General Guaranty" contained herein.

3.19 PENETRATIONS THROUGH FIRE SEPARATIONS AND NON-RATED ASSEMBLIES

- A. Pack annular space between duct (insulation), sleeve and pipe (insulation) and / or conduit in fire rated and non-rated construction with fire retardant putty, sealant and / or caulk. Material shall be non-asbestos based and installed in accordance with manufacturers instructions for fire rating required.
- B. Penetrations of multiple items and penetrations with annular space greater than 1/2" shall be provided with a backing material in accordance with manufacturer's instructions and as part of a UL listed assembly.
- C. Fire retardant sealer and system shall meet ASTM E-84, ASTM E-814, and UL-1479.
- D. All fire stopping shall be provided by one (1) manufacturer. Refer to Division 07 and architectural drawings for all requirements.

E. MANUFACTURER	MODEL
Dow Corning	Firestop 2001
Nelson	CLK,FSP
Standard Oil	
Fyre Putty	3MCP-25

3.20 SHUTDOWN OF EXISTING BUILDING SYSTEMS

- A. Do not interrupt existing services or systems in the building unless absolutely necessary. Such interruptions and interferences must be made as brief as possible and only after coordination with the Owner. The Owner requires a minimum of seven (7) days notice. Obtain prior permission, in writing.
- B. Where the work makes temporary interruptions unavoidable, they shall be made during off hours. "Off hours" shall be dictated by the Owner.
- C. Arrange to work continuously, including overtime, if required, to assure that systems will shut down only during the time actually required to make the necessary connections to existing work.

END OF SECTION 23 00 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A.** Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Fiberglass pipe hangers.
 - 4. Metal framing systems.
 - 5. Fiberglass strut systems.
 - 6. Thermal-hanger shield inserts.
 - 7. Fastener systems.
 - 8. Pipe stands.
 - 9. Equipment supports.
- B.** Related Sections:
 - 1. Section 232113 "Hydronic Piping"
 - 2. Section 23 05 48 "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.

1.3 DEFINITIONS

- A.** MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A.** Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B.** Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 ACTION SUBMITTALS

- A.** Product Data: For each type of product indicated.
- B.** Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - 1. Trapeze pipe hangers.
 - 2. Metal framing systems.
 - 3. Fiberglass strut systems.
 - 4. Pipe stands.
 - 5. Equipment supports.

- C. Delegated-Design Submittal: For trapeze hangers 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 fabrication and assembly of trapeze hangers.
 - 2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with these specifications, metal pipe hanger and support systems shall be one of the
 - 1. Anvil International
 - 2. ERICO, Inc.
 - 3. PHD
 - 4. Hubbard Enterprises

2.2 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Metallic Coatings:
 - a. Corrosive/Moist/Exterior environments: Hot dipped galvanized.
 - b. General Service: Electro galvanized.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. MSS SP-58 Continuous-thread hanger rod, nuts, and washers:
 - a. Corrosive/Moist/Exterior environments: Carbon-Steel Hot dipped galvanized.
 - b. General Service: Carbon-Steel Electro galvanized.
- B. Stainless-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 3. MSS SP-58 Stainless-Steel continuous-thread hanger rod, nuts, and washers.
- C. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. MSS SP-58 Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes.

- B. Metallic Coatings:**
 - 1. Corrosive/Moist/Exterior environments: Hot dipped galvanized.
 - 2. General Service: Electrogalvanized.
- C. MSS SP-58 Continuous-thread hanger rod, nuts, washers, and U-bolts:**
 - 1. Corrosive/Moist/Exterior environments: Carbon-Steel Hot dipped galvanized.
 - 2. General Service: Carbon-Steel Electrogalvanized.

2.4 METAL FRAMING SYSTEMS

- A. MFMA Manufacturer Metal Framing Systems:**
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.
 - c. Flex-Strut Inc.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut Corporation; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
 - 3. Standard: MFMA-4.
 - 4. Channels: Continuous slotted steel channel with inturned lips.
 - 5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - 6. Hanger Rods: Continuous-thread rod, nuts, and washer made of:
 - a. Hostile/Corrosive/Moist/Exterior environments: Carbon-Steel.
 - b. General Service: Carbon-Steel.
 - 7. Metallic Coatings:
 - a. Corrosive/Moist/Exterior environments: Hot dipped galvanized.
 - b. General Service: Electrogalvanized.
 - 8. All hanger rod and channel ends; exposed and $\leq 12'$ above finished floor; shall be provided with plastic caps and plastic channel safety end caps. Color shall be same throughout the project; yellow, orange or red.
- B. Non-MFMA Manufacturer Metal Framing Systems:**
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International; a subsidiary of Mueller Water Products Inc.
 - b. Empire Industries, Inc.
 - c. ERICO International Corporation.
 - d. Haydon Corporation; H-Strut Division.
 - e. NIBCO INC.
 - f. PHD Manufacturing, Inc.
 - g. PHS Industries, Inc.
 - 2. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
 - 3. Standard: Comply with MFMA-4.
 - 4. Channels: Continuous slotted steel channel with inturned lips.
 - 5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.

6. Hanger Rods: Continuous-thread rod, nuts, and washer made of:
 - a. Corrosive/Moist/Exterior environments: Carbon-Steel.
 - b. General Service: Carbon-Steel.
7. Metallic Coatings:
 - a. Corrosive/Moist/Exterior environments: Hot dipped galvanized.
 - b. General Service: Electrogalvanized.
8. All hanger rod and channel ends; exposed and $\leq 12'$ above finished floor; shall be provided with plastic caps and plastic channel safety end caps. Color shall be same throughout the project; yellow, orange or red.

2.5 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig-minimum, compressive-strength insulation insert encased in sheet metal shield.
- B. Rigid Insulation Blocks: High density, rigid fiberglass material intended for use as thermal insulation.
 1. Flame-spread index shall be 25 or less, and smoke-developed index shall be 50 or less as tested by ASTM E 84.
 2. Factory-Applied Jacket: ASJ-SSL. Requirements are specified in "Factory-Applied Jackets" Article.
- C. Insert Length: Extend 2 inches beyond sheet metal shield, with a minimum length of 16 inches.
- D. For Trapeze or Clamped Systems: Shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Shield shall cover lower 180 degrees of pipe.

2.6 FASTENER SYSTEMS

- A. Mechanical-Wedge Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 1. Manufacturers:
 - a. Powers Fasteners.
 - b. B-Line Systems, Inc.; a division of Cooper Industries Model AWA
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head.
 - e. MKT Fastening, LLC.
- B. Mechanical Anchor: Steel threaded fastening system for suspending threaded rod vertically overhead; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 1. Manufacturers:
 - a. Powers Fasteners. Model Vertigo; Wood Vertical Hanger and Wood Side
 - b. B-Line Systems, Inc.; a division of Cooper Industries Model ARS, ARSW
 - c. Simpson Strong-Tie

2.7 PIPE STANDS

- A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
 1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
- C. Low-Type, Single-Pipe Stand: One-piece plastic base unit with plastic roller, for roof installation without membrane penetration.

1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
- D. High-Type, Single-Pipe Stand:
 1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
 2. Base: Plastic.
 3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
 5. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
- E. High-Type, Multiple-Pipe Stand:
 1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
 2. Bases: One or more; plastic.
 3. Vertical Members: Two or more protective-coated-steel channels.
 4. Horizontal Member: Protective-coated-steel channel.
 5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
 6. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
- F. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.8 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.
- B. Metallic Coatings:
 1. Corrosive/Moist/Exterior environments: Hot dipped galvanized.
 2. General Service: Electro galvanized.

2.9 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars
- B. Metallic Coatings:
 1. Corrosive/Moist/Exterior environments: Hot dipped galvanized.
 2. General Service: Electro galvanized.
- C. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION**3.1 HANGER AND SUPPORT INSTALLATION**

- A.** Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B.** Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1.** Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2.** Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C.** Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- D.** All hanger rod and channel ends; exposed and $\leq 12'$ above finished floor; shall be provided with plastic caps and plastic channel safety end caps. Color shall be same throughout the project; yellow, orange or red.
- E.** Thermal-Hanger Shield Installation: Install in all pipe hangers and shields for insulated piping.
- F.** Fastener System Installation:
 - 1.** Powder-actuated fasteners are not acceptable.
 - 2.** When possible, install concrete inserts before placing concrete.
 - 3.** Install mechanical-wedge type anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
 - 4.** Pin/nail anchors, spikes, expansion shields, expansion anchors, dropin anchors, wedge bolts, self tapping screw anchors, and friction clamps are not acceptable.
- G.** Pipe Stand Installation:
 - 1.** Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 - 2.** Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 07 72 00 "Roof Accessories" for curbs.
- H.** Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- I.** Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- J.** Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- K.** Install lateral bracing with pipe hangers and supports to prevent swaying.
- L.** Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- M.** Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- N.** Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- O.** Insulated Piping:
 - 1.** Attach clamps and spacers to piping. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2.** Install MSS SP-58, Type 39, protection saddles. Fill interior voids with insulation that matches adjoining insulation.
 - 3.** Install MSS SP-58, Type 40, protective shields. Shields shall span an arc of 180 degrees.

- a. Thermal-hanger shield inserts shall be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
- 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
- 5. Insert Material: Length at a minimum of 1" longer; in each direction; than protective shield length.
- P. All pipe hangers shall be sized to accommodate the pipe, pipe insulation thickness and protective shields and saddles. Insulation shall be continuous through all hangers and penetrations.
 - 1. Insulation may not be continuous through the hanger when riser clamps and pipe clamps are utilized for vertical support. Insulation shall be continuous around the pipe clamp and continue 3" on the method of support; threaded rod, pipe stand.
 - 2. Insulation shall be continuous through the hanger when pipe clamps are utilized for horizontal suspension. Full circumference protective shield shall be utilized.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting"
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel electrogalvanized pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.
- F. Use carbon-steel hot dipped galvanized pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for corrosive/moist/exterior service applications.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 - 4. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated and insulated, stationary pipes NPS 1/2 to NPS 8.
 - 5. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For floor mounting of insulated , stationary pipes below 100°F NPS 3/8 to NPS 3.
 - 6. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 - 7. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
 - 8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
 - 9. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
 - 10. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 - 11. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Wedge type mechanical expansion anchor: For upper attachment to suspend hangers from concrete.

2. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete.
 3. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape. Retaining strap/clip required.
 4. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 5. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 6. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 7. C-Clamps (MSS Type 23): For structural shapes. Only acceptable for support of pipes less than or equal to NPS 2. Retaining strap/clip required.
 8. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 9. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 10. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 11. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 12. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 13. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 14. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 15. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 16. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- L. Saddles and Shields:** Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length indicated in above sections.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- M. Spring Hangers and Supports:** Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for

erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

- a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- N.** Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
1. Each pipe shall be provided with a U-bolt to retain the pipe on the hanger.
 2. Each insulated pipe shall be provided with a 360 degree insulation shield at each U-bolt.
- O.** Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- P.** Use mechanical-wedge type anchors in concrete after concrete is placed and completely cured instead of building attachments where required in concrete construction.
1. Powder-actuated fasteners are not acceptable.
 2. When possible, install concrete inserts before placing concrete.
 3. Install mechanical-wedge type anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
 4. Pin/nail anchors, spikes, expansion shields, expansion anchors, dropin anchors, wedge bolts, self tapping screw anchors, and friction clamps are not acceptable.

END OF SECTION 23 05 29

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. This Section includes the following:
 - 1. Isolation pads.
 - 2. Isolation mounts.
 - 3. Restrained elastomeric isolation mounts.
 - 4. Freestanding and restrained spring isolators.
 - 5. Housed spring mounts.
 - 6. Elastomeric hangers.
 - 7. Spring hangers.
 - 8. Spring hangers with vertical-limit stops.
 - 9. Roof curbs
 - 10. Restrained non-isolated roof curbs.
 - 11. Isolated flashable roof rail system.
 - 12. Non-isolated flashable roof rail system.
 - 13. Vibration isolation roof-curbs.
 - 14. Restraining braces and cables.
 - 15. Steel and inertia, vibration isolation equipment bases.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Refer to structural drawings for wind speed and seismic design criteria.
- B. Importance Factor:
 - 1. The component importance factor, I_p , shall be taken as 1.5 if any of the following conditions apply:
 - a. The component is required to function for life-safety purposes after an earthquake, including fire protection sprinkler systems and egress stairways.
 - b. The component conveys, supports, or otherwise contains toxic, highly toxic, or explosive substances where the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction and is sufficient to pose a threat to the public if released.
 - c. The component is in or attached to a Risk Category IV structure and it is needed for continued operation of the facility or its failure could impair the continued operation of the facility.
 - d. The component conveys, supports, or otherwise contains hazardous substances and is attached to a structure or portion thereof classified by the authority having jurisdiction as a hazardous occupancy.
 - 2. All other components shall be assigned a component importance factor, I_p , equal to 1.0.
- C. Wind-Restraint Loading:
 - 1. Basic Wind Speed: 120 mph.

2. Refer to structural drawings for wind speed and seismic design criteria.
 3. All outdoor equipment subject to wind loads must have attachment calculations stamped by a professional engineer registered in the state that the project is located.
- D. Seismic-Restraint Loading:
1. Seismic Design Category (SDC): B
 2. Seismic Use Group (SUG): II.
 3. In Seismic Design Categories A & B: HVAC systems are exempt from requirements for seismic bracing, except for ductwork and piping crossing seismic joints.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
 3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.
- B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details 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. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic and wind forces required to select vibration isolators, seismic and wind restraints, and for designing vibration isolation bases.
 - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
 2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system has been examined for excessive stress and that none will exist.
 3. Vibration Isolation Base Details: Detail overall dimensions, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.
 - a. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - b. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
 - c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.
- B. Qualification Data: For professional engineer.
- C. Welding certificates.

- D. Field quality-control test reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer. Registered in the project state.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amber/Booth Company, Inc. (AB)
 - 2. Kinetics Noise Control. (KNC)
 - 3. Mason Industries. (MI)
 - 4. Vibration Eliminator Co., Inc. (VE)
 - 5. Vibration Mountings & Controls, Inc. (VM&C)
 - 6. Novia, A Division of Carpenter & Patterson (N)
- B. Pads, Type NP (Neoprene Pad): Arranged in a single layer of 3/4" thick ribbed or waffled neoprene for uniform loading over pad area, molded with a nonslip pattern and factory cut to sizes that match requirements of supported equipment.
 - 1. Resilient Material: Oil- and water-resistant neoprene.
Type NP isolators shall be one of the following products:
Type Super W.....MI
Type NGD.....KNC
Type 400N.....VE
Series Maxi-Flex.....VM&C
Type NPW.....N
- C. Elastomeric Hangers Type HN (Hanger Neoprene): Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.
- D. Type HN isolators shall be one of the following products:
 - Type BRD.....AB
 - Type HD.....MI
 - Type RH.....KNC
 - Type 3C.....VE
 - Type RHD.....VM&C
 - Type NH.....N
- E. Spring Hangers Type HSN (Hanger Spring and Neoprene): Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
 - 1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.

2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
Type HSN isolators shall be one of the following products:
Type HRSA.....AB
Type 30N.....MI
Type SRH.....KNC
Type SNRC.....VE
Type RSH 30A or RSHSC.....VM&C
Type RSH.....N
- F. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

2.2 RESILIENT PENETRATION SLEEVE/SEAL

- A. Resilient penetration sleeve/seals shall be field-fabricated from a pipe or sheet metal section that is 1/2" to 3/4" larger than the penetrating element in all directions around the element, and shall be used to provide a sleeve through the construction penetrated. The sleeve shall extend 1" beyond the penetrated construction on each side. The space between the sleeve and the penetrating element shall be packed with glass fiber or mineral wool to within 1/4" of the ends of the sleeve. The remaining 1/4" space on each end shall be filled with acoustical sealant to form an airtight seal. The penetrating element shall be able to pass through the sleeve without contacting the sleeve. Alternatively, prefabricated sleeves accomplishing the same result are acceptable.
Type SWS.....M.I.

2.3 RESILIENT LATERAL SUPPORTS

- A. These units shall either be a standard product of the vibration isolator manufacturer, or be custom fabricated from standard components. These units shall incorporate neoprene isolation elements similar to Type FN that are specifically designed to provide resilient lateral bracing of ducts or pipes.
Resilient lateral supports shall be one of the following products or approved equal:
Type Custom.....A.B.
Type ADA.....M.I.
Type RGN.....K.N.C.
Type VERG or VPL.....V.E.
Type MDPA.....V.M.&C.

2.4 FLEXIBLE DUCT CONNECTIONS

- A. Refer to specification section 23 33 00 for requirements.

2.5 GROMMETS

- A. Grommets shall be made of neoprene or neoprene impregnated duck that is specially formed to prevent bolts from directly contacting the isolator base plate, and shall be sized so that they will be loaded within the manufacturer's recommended load range. Grommets shall either be custom made by combining a neoprene washer and sleeve, or be one of the following products or an approved equal:
 - Type Isogrommets..... MBIS, Inc. (Bedford Heights, OH)
 - Type WB..... Barry Controls (Brighton, MA)
 - Type HG..... Mason Industries Inc. (Hauppauge, NY)

2.6 ACOUSTICAL SEALANT

- A. Sealants for acoustical purposes as described in this specification shall be silicone or one of the resilient, nonhardening sealants indicated below:
 - Acoustical sealant..... D.A.P.
 - BR-96 or AC-20 (AC-20 FTR - Fire Rated) Pecora
 - Sonoloc..... Sanborn
 - Acoustical Sealant #834 (Acrylic Latex)..... Tremco
 - Acoustical sealant..... U.S.G.

2.7 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanized metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation devices to indicate capacity range.

2.8 ROOF-CURB - Type RC

- A. Prefabricated metal roof curb shall be used at all roof penetrations including but not limited to HVAC units, duct openings, pipe penetrations, and exhaust fans unless otherwise noted.
- B. Prefabricated metal roof curb shall be used at all roof penetrations including but not limited to HVAC units, duct openings, pipe penetrations, and exhaust fans unless otherwise noted.
- C. Description: Factory-assembled, fully enclosed, non-isolated curbs that bear directly on the roof structure and are flashed and waterproofed into the roof's membrane waterproofing system insulated, air- and watertight curb designed to support equipment and to withstand wind forces.
- D. Curb Assembly: Curbs shall be manufactured from minimum 14-gauge Minimum galvanized sheet metal, reinforced and cross braced as required. All side and end seams between sheets shall be continuously welded, corner joints to be bolted.
 - 1. Shall be insulated with 1-1/2" thick 3 lb. density GREENGUARD rigid fiberglass board encapsulated top and bottom or shall have provision for up to 2-inches (51-mm) external insulation.
 - 2. Galvanized steel duct supports shall be provided as required. Supports shall be capable of supporting the ductwork and equipment with a maximum deflection over the width of the curb of L/360.
 - 3. Provide 22-gauge minimum galvanized pans for roof top units that require pans under condensing sections.
 - 4. Curbs shall be fully assembled at the factory and shipped as one piece (size permitting).
 - 5. The curb assembly shall have a means for attaching to building structure and a wood nailer around the full perimeter for attaching roof materials.
 - 6. Curb height to be 14" above finished roof or as shown on drawings and shall accommodate designed deck slope to provide level mounting surface for specified equipment above.

2.9 RESTRAINED NON-ISOLATED ROOF-CURB - Type SRC

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Novia SeisCurb
 2. Amber/Booth Company, Inc.
 3. Kinetics Noise Control.
 4. Mason Industries.
- B. Prefabricated metal roof curb shall be used at all roof penetrations including but not limited to HVAC units, duct openings, pipe penetrations, and exhaust fans unless otherwise noted.
- C. Description: Factory-assembled, fully enclosed, non-isolated curbs that bear directly on the roof structure and are flashed and waterproofed into the roof's membrane waterproofing system insulated, air- and watertight curb designed to support equipment and to withstand seismic and wind forces.
- D. Curb Assembly: Curbs shall be manufactured from minimum 14-gauge Minimum galvanized sheet metal, reinforced and cross braced as required. All side and end seams between sheets shall be continuously welded, corner joints to be bolted.
1. Shall be insulated with 1-1/2" thick 3 lb. density GREENGUARD rigid fiberglass board encapsulated top and bottom or shall have provision for up to 2-inches (51-mm) external insulation.
 2. Galvanized steel duct supports shall be provided as required. Supports shall be capable of supporting the ductwork and equipment with a maximum deflection over the width of the curb of L/360.
 3. Provide 22-gauge minimum galvanized pans for roof top units that require pans under condensing sections.
 4. Curbs shall be fully assembled at the factory and shipped as one piece (size permitting).
 5. The curb assembly shall have a means for attaching to building structure and a wood nailer around the full perimeter for attaching roof materials.
 6. Curb height to be 14" above finished roof or as shown on drawings and shall accommodate designed deck slope to provide level mounting surface for specified equipment above.
 7. Curb flange shall be constructed to match configuration of roof panel. Side flange shall extend to the next natural seam in the roof panels and conform to seam configurations.

2.10 VIBRATION ISOLATION ROOF-CURB – Type IRC

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Amber/Booth Company, Inc.
 2. Kinetics Noise Control.
 3. Mason Industries.
 4. Vibration Eliminator Co., Inc.
- B. Curb type isolator with integral spring isolators, designed to provide a complete roof curb installation. The vibration isolation curbs shall be complete assemblies designed to resiliently support equipment at the specified elevation and shall constitute a fully enclosed air- and weather-tight system. The isolation curb shall consist of an upper support rail with supply and return duct supports on which the equipment and duct openings rest and a lower support curb which is attached to the roof structure, separated by free-standing, un-housed, laterally stable steel springs.
- C. The upper support rail shall provide continuous structural support for the rooftop equipment and shall be designed to provide isolation against casing radiated vibration in the rooftop equipment housing and structure borne vibration from rotating and mechanical equipment in the rooftop package. The upper support rail shall consist of a structural channel with sufficient elevation above the spring to preclude interference with the rooftop equipment and permit access to inspect the isolation system after placement of the rooftop equipment. Attachment to of the RTU by weather seal attachment bolt heads is not permitted.
- D. The lower support curb shall be a formed channel fabricated of heavy gauge galvanized steel with a continuous 1-1/2 inch x 1-1/2 inch (38 mm x 38 mm) nominal wood nailer attached to the isolation support pedestals. The isolation support pedestal shall be bolted or welded to the building support steel

to suitably transfer wind load forces to the building structure. The lower support curb shall have a minimum elevation of 14 inches (356 mm) from the top of the wood nailer to the base of the curb.

- E. Spring components shall be 2 inch deflection, free-standing, un-housed, laterally stable steel springs. Springs shall have a lateral stiffness greater than 1.2 times the rated vertical stiffness and shall be designed for a typical 50% overload to solid. All springs shall have a polyester powder coated finish and be color coded to indicate load capacity. Spring coils shall rest on minimum 0.25 inch (6 mm) neoprene noise pads.
- F. The isolation curb system shall be complete with cross-bracing as required as a part of the upper and lower assemblies. Supply air and return duct shall be flexibly attached by the contractor to prevent transmission of vibration to the building structure. Airborne noise control packages, if required, shall be supported by the roof structure within the curb and shall have no rigid contact with the isolation curb.
- G. Vibration isolators shall be selected by the manufacturer for each specific application to comply with deflection requirements as shown on the Vibration Isolation Schedule or as indicated on the project documents.

2.11 NON-ISOLATED FLASHABLE ROOF RAIL SYSTEM – Type FRR

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Novia FRR-0
 - 2. Amber/Booth Company, Inc.
 - 3. Kinetics Noise Control.
 - 4. Mason Industries.
- B. Description: Non-isolated rails that bear directly on the roof structure and are flashed and waterproofed into the roof's membrane waterproofing system. Field fabricated rails with external isolators shall not be used.
 - 1. Waterproofing shall be achieved by use of a continuous bottom counter flashing. The seal shall be protected from exposure to the elements by the top flashing.
- C. Rails shall include the following features:
 - 1. Rails shall be manufactured from 14-gauge minimum galvanized sheet metal, reinforced and cross braced on ends.
 - 2. Provide galvanized steel bridging members as required or as shown on the drawings to support equipment mounted between the rails. Bridging steel shall be designed for a maximum deflection at mid-span of $L/360$.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic- and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL DEVICE INSTALLATION

- A. Equipment Restraints:
 - 1. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
- B. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- C. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- E. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Use wedge type anchors only.
 - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 5. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 INSTALLATION OF VIBRATION ISOLATION EQUIPMENT

- A. General
 - 1. Locations of all vibration isolation devices shall be selected for ease of inspection and adjustment as well as for proper operation.
 - 2. Installation of vibration isolation equipment shall be in accordance with the manufacturer's instructions.
- B. Isolators
 - 1. All vibration isolators shall be aligned squarely above or below mounting points of the supported equipment.
 - 2. Isolators for equipment with bases shall be located on the sides of the bases which are parallel to the equipment shaft unless this is not possible because of physical constraints.
 - 3. Locate isolators to provide stable support for equipment, without excess rocking. Consideration shall be given to the location of the center of gravity of the system and the location and spacing of the isolators. If necessary, a base with suitable footprint shall be provided to maintain stability of supported equipment, whether or not such a base is specifically called for herein.
 - 4. If a housekeeping pad is provided, the isolators shall bear on the housekeeping pad and the isolator base plates shall rest entirely on the pad. Anchors shall be located a minimum of 6" from the edge of the pad.
 - 5. Hanger rods for vibration-isolated support shall be connected to major structural members, not the floor slab between major structural members. Provide suitable intermediate support members as necessary.
 - 6. Vibration isolation hanger elements shall be positioned as high as possible in the hanger rod assembly, but not in contact with the building structure, and so that the hanger housing may rotate a full 360° about the rod axis without contacting any object.
 - 7. Parallel running pipes may be hung together on a trapeze that is isolated from the building. Isolator deflections must be the greatest required by the provisions for pipe isolation for any single pipe on the trapeze. Do not mix isolated and unisolated pipes on the same trapeze.
 - 8. Pipes, ducts and equipment shall not be supported from other pipes, ducts and equipment.
 - 9. Resiliently isolated pipes, ducts and equipment shall not come in rigid contact with the building construction or rigidly supported equipment.

10. Limit stops shall be out of contact during normal operation. Adjust isolators to provide 1/4" clearance between the limit stop brackets and the isolator top plate, and between the travel limit nuts and travel limit brackets.
11. Adjust all leveling bolts and hanger rod bolts so that the isolated equipment is level and in proper alignment with connecting ducts or pipes.

C. Bases

1. No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators and such direct support is approved by the equipment manufacturer. This provision shall apply whether or not a base frame is called for on the schedule. In the case that a base frame is required for the unit because of the equipment manufacturer's requirements and is not specifically called for on the equipment schedule, a base frame recommended by the equipment manufacturer shall be provided at no additional expense.
2. Unless otherwise indicated, there is to be a minimum operating clearance of 1" between steel rails, steel frame bases or inertia bases and the floor beneath the equipment. The isolator mounting brackets shall be positioned and the isolators adjusted so that the required clearance is maintained. The clearance space shall be checked by the Contractor to ensure that no construction debris has been left to short circuit or restrict the proper operation of the vibration isolation system.
3. Isolation bases shall be installed in strict accordance with the manufacturer's instructions.

D. Flexible Duct Connections

1. Prior to installation of the flexible connection, sheet metal ducts and plenum openings shall be squarely aligned with the fan discharge, fan intake, or adjacent duct section, and the gap between connected parts shall be uniform. Flexible duct connections shall not be installed until this provision is met. There shall be no metal-to-metal contact between connected sections, and the fabric shall not be stretched taut.

E. Grommets

1. Where grommets are required at hold down bolts of isolators, bolt holes shall be properly sized to allow for grommets. The hold down bolt assembly shall include washers to distribute load evenly over the grommets. Bolts and washers shall be galvanized.

F. Resilient Penetration Sleeve/Seals

1. Maintain an airtight seal around the penetrating element and prevent rigid contact between the penetrating element and the building structure. Fit the sleeve tightly to the building construction and seal airtight on both sides of the construction penetrated with acoustical sealant.

3.5 ROOF EQUIPMENT CURBS

- A.** Contractor shall coordinate project requirements for roof pitch prior to submitting on curbs. Curbs shall be manufactured to accommodate architectural roof pitch in lieu of blocking or additional structural steel. Equipment shall be mechanically fastened to the roof curb. Roof curbs shall be seismic rated where required by the seismic design category indicated in this specification section.

3.6 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A.** Install flexible connections in piping and ductwork where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in this section and in Section 23 21 13 "Hydronic Piping" for piping flexible connections.

3.7 FIELD QUALITY CONTROL

- A.** Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B.** Perform tests and inspections.
- C.** Tests and Inspections:
1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.

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2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post connection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 5. Test to 90 percent of rated proof load of device.
 6. Measure isolator restraint clearance.
 7. Measure isolator deflection.
 8. Verify snubber minimum clearances.
 9. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.8 ADJUSTING

- A. Adjust isolators after piping system is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.9 HVAC VIBRATION-CONTROL SCHEDULE

- A. Refer to schedule on drawings.

END OF SECTION 23 05 48

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. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Duct labels.
 - 4. Air Control Device Identification
 - 5. Warning tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 5 by 3 inch.
 - 6. Minimum Letter Size: 1 inch for name of units if viewing distance is less than 24 inches, 2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 7. Fasteners: Stainless-steel rivets or self-tapping screws; adhesive for locations where screws or rivets would void warranty of equipment.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, equipment description, and electrical panel designation serving the equipment.

- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.
- D. Plastic labels shall be plenum rated when located in plenums.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Red.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 5 by 3 inch.
- F. Minimum Letter Size: 1 inch for name of units if viewing distance is less than 24 inches, 2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws; adhesive for locations where screws or rivets would void warranty of equipment.
- H. Label Content: Include caution and warning information, plus emergency notification instructions.
- I. Plastic labels shall be plenum rated when located in plenums.

2.3 DUCT LABELS

- A. Stencils: Minimum letter height of 2 inches for ducts; and minimum letter height of 1 inch for access panel and door labels, equipment labels, and similar operational instructions.
 - 1. Stencil Material: Fiberboard or metal.
 - 2. Paint: Exterior, acrylic enamel in colors as indicated.
- B. Label Contents: Include identification of duct service using same designations as used on Drawings, duct size, and an arrow indicating flow direction.

2.4 AIR CONTROL DEVICE IDENTIFICATION

- A. Identifying Ribbons: Nylon
 - 1. Size: Minimum 1-inch-wide by minimum 12 inches long, free hanging length.
 - 2. Fasteners: Hand tied.
 - 3. Color: Orange or Yellow.
- B. Nylon ribbons shall be plenum rated when located in air plenums.

2.5 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: Approximately 4 inches high by 7 inches long.
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER", "CAUTION" or "DO NOT OPERATE".
 - 4. Color: Red background with white lettering.
- B. Plastic labels shall be plenum rated when located in plenums.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible. Where equipment is located within finished spaces, equipment labels shall not be located on the face of the equipment; where possible, the label shall be located on the least conspicuous side.
- C. All motor driven equipment, HVAC components, and major electrical boxes shall be individually numbered. (Example: For unit heaters, use UH-1, UH-2, etc., even though both units are of the same size and type.) All designations shall be unique, integrated with and distinguished from existing designations.
- D. The Contractor shall make it possible for the personnel operating and maintaining the equipment and systems in this project to readily identify the various pieces of equipment, valves, piping, etc., by marking them. All items of equipment such as fans, pumps, etc., shall be clearly marked using engraved nameplates as hereinafter specified. The item of equipment shall indicate the same number as shown on the Drawings.

3.3 DUCT LABEL INSTALLATION

- A. Stenciled Duct Label: Stenciled labels, showing service and flow direction.
- B. Lettering and arrows color shall meet the facilities standards, if no standard exists, confirm the following color scheme is acceptable prior to commencement of work:
 - 1. Blue: For outside air supply ducts.
 - 2. Yellow: For hot air supply ducts, cold air supply ducts and combined hot/cold air supply ducts.
 - 3. Green: For exhaust, relief, return, and mixed air ducts.
 - 4. Red: For hazardous material exhaust.
- C. Locate labels/stencils:
 - 1. Near points where ducts enter into concealed spaces.
 - 2. At maximum intervals of 25 feet in each space where ducts are exposed or concealed by removable ceiling system.
 - 3. At all changes of direction.
 - 4. Both sides of penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 5. Near major equipment items and other points of origination and termination.
- D. Labeling/stenciling of all exposed ductwork shall be coordinated with the architect and engineer prior to the commencement.

3.4 AIR CONTROL DEVICE IDENTIFICATION INSTALLATION

- A. Install identifying ribbons on all control devices in duct systems including but not limited to manual volume/balance dampers, splitter dampers, cable operated dampers, automatic control dampers, and barometric dampers when located above accessible and inaccessible ceilings.
- B. Ribbon tied on to control device for the purpose of visibly identifying device locations.
- C. Attach ribbons at the time each control device is installed.
- D. Ribbon shall hang down a minimum of 12" from control device.

3.5 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

- B. Markings shall be provided in locations required by and meeting the color requirements of the "Safety Code Color for Marking Physical Hazards", ANSI Z53.1, latest revision.

END OF SECTION 23 05 53

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. Balancing contractor shall provide all services required to test, adjust and balance:
 - 1. Each piece of equipment and system indicated on the contract documents, drawings and in the specifications and all air inlets and outlets.
- B. Section Includes:
 - 1. Balancing Air Systems:
 - a. Variable-air-volume single zone systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 15 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.
- F. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC NEBB or TABB.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC NEBB or TABB.
 - 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC NEBB or TABB as a TAB technician.

- B. TAB Conference: Meet with Architect, Construction Manager, and Commissioning Authority (if Commissioning is part of the project) on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide 14 days' advance notice of scheduled meeting time and location.
 - 1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Architect.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

- A. Notice: Provide 14 days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- E. Examine equipment performance data including fan curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.

- H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- J. Examine operating safety interlocks and controls on HVAC equipment.
- K. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.
 - 5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 6. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
- C. Mark equipment and balancing devices, including damper-control positions, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Section 23 31 13 "Metal Ducts."

3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SINGLE ZONE SYSTEMS

- A.** Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up a rooftop unit.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - 6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B.** Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - 2. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 - 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C.** Measure air outlets and inlets without making adjustments.
 - 1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D.** Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
 - 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 - 2. Adjust patterns for all the register, grille and diffuser baffles, pattern controllers, and vanes of adjustable outlets to those indicated on the registers, grilles and diffusers shop drawing for proper distribution without drafts.
- E.** TABB Contractor shall allow for one sheave replacement for each belt drive fan.

3.6 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating.
 - 5. Nameplate and measured voltage, each phase.
 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record compressor data.

3.8 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Measure, adjust, and record the following data for each refrigerant coil:
 - 1. Dry-bulb temperature of entering and leaving air.
 - 2. Wet-bulb temperature of entering and leaving air.
 - 3. Airflow.
 - 4. Air pressure drop.
 - 5. Refrigerant suction pressure and temperature.

3.9 TOLERANCES

- A. Set HVAC system's air flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Design value to plus 10 percent.
 - 2. Air Outlets and Inlets: Design value to plus 10 percent.

3.10 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.11 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.

- B. Final Report Contents:** In addition to certified field-report data, include the following:
1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data:** In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams:** Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Terminal units.
 4. Balancing stations.
 5. Position of balancing devices.
- E. Air-Handling-Unit Test Reports:** For air-handling units with coils, include the following:
1. Unit diagram static pressure profile across all components.
 - a. Schematic diagram of unit and all components.
 - b. Static pressure upstream and downstream of all components indicated on the diagram.

- c. Include all components, damper, coils, fans, wheels.
 - 2. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 - 3. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - 4. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Cooling-coil static-pressure differential in inches wg.
 - g. Outdoor airflow in cfm.
 - h. Return airflow in cfm.
 - i. Outdoor-air damper position.
 - j. Return-air damper position.
 - k. Vortex damper position.
- F. Apparatus-Coil Test Reports:
 - 1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft..
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Refrigerant expansion valve and refrigerant types.
 - i. Refrigerant suction pressure in psig.
 - j. Refrigerant suction temperature in deg F.
- G. Gas-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:
 1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Fuel type in input data.
 - g. Output capacity in Btu/h.
 - h. Ignition type.
 - i. Burner-control types.
 - j. Motor horsepower and rpm.
 - k. Motor volts, phase, and hertz.
 - l. Motor full-load amperage and service factor.
 - m. Sheave make, size in inches, and bore.
 - n. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 2. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Entering-air temperature in deg F.
 - c. Leaving-air temperature in deg F.
 - d. Air temperature differential in deg F.
 - e. Entering-air static pressure in inches wg.
 - f. Leaving-air static pressure in inches wg.
 - g. Air static-pressure differential in inches wg.
 - h. Low-fire fuel input in Btu/h.
 - i. High-fire fuel input in Btu/h.
 - j. Manifold pressure in psig.
 - k. High-temperature-limit setting in deg F.
 - l. Operating set point in Btu/h.
 - m. Motor voltage at each connection.
 - n. Motor amperage for each phase.
 - o. Heating value of fuel in Btu/h.

- H. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- I. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- J. Air-Terminal-Device Reports:
 - 1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Utilize the Register, grille, and diffuser layout floor plans submittal.
 - c. Schedule: Indicate drawing designation, room location, size, and accessories furnished.
 - d. Indicate air patterns for all air terminal devices.
 - e. Apparatus used for test.

- f. Area served.
- g. Make.
- h. Type and model number.
- i. Effective area in sq. ft..
- 2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Air velocity in fpm.
 - c. Preliminary air flow rate as needed in cfm.
 - d. Preliminary velocity as needed in fpm.
 - e. Final air flow rate in cfm.
 - f. Final velocity in fpm.
 - g. Space temperature in deg F.
- K. Instrument Calibration Reports:
 - 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.12 INSPECTIONS

- A. Initial Inspection:
 - 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 - 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - c. Verify that balancing devices are marked with final balance position.
 - d. Note deviations from the Contract Documents in the final report.
- B. Final Inspection:
 - 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Commissioning Authority.
 - 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Construction Manager.
 - 3. Architect shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
 - 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
 - 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
 - 1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

3.13 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 05 93

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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. Insulation Materials:
 - a. Flexible elastomeric.
 - b. Mineral fiber.
 - 2. Adhesives.
 - 3. Mastics.
 - 4. Sealants.
 - 5. Factory-applied jackets.
 - 6. Field-applied jackets.
 - 7. Tapes.
 - 8. Securements.
 - 9. Corner angles.
 - 10. Flexible insulation cladding
- B. Related Sections:
 - 1. Division 23 Section "Metal Ducts" for duct liners.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. Insulation schedule indicating insulating material and thickness, service, location (interior, exterior), jacket type, and fastening method.
- C. Qualification Data: For qualified Installer.
- D. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- E. Field quality-control reports.
- F. Products of one type, shall be by one manufacturer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

- C. Store tapes, adhesives, mastics, cements, and insulation materials in ambient conditions in accordance with the recommendations of the manufacturer.
- D. Follow manufacturer's recommended handling practices.
- E. Products shall contain no polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Octa-BDE or Deca-BDE fire retardants; whenever available.
- F. Fiber Glass and Mold: Contractor shall take precaution to protect insulation materials from moisture exposure or physical damage. Any fiber glass insulation that becomes wet or damaged shall be replaced at no additional cost.
 - 1. HVAC duct work insulation used in the air stream must be discarded if exposed to liquid water.
- G. Insulation shall comply with the International Energy Conservation Code.

1.5 DEFINITIONS

- A. Thermal Conductivity (k value): BTU-in. / (hr · ft² · °F)
- B. UL Environment / GREENGUARD provides independent, third-party, Indoor Air Quality (IAQ) certification of products for emissions of respirable particles and Volatile Organic Compounds (VOC's), including formaldehyde and other specific product-related pollutants. Certification is based upon criteria used by EPA, OSHA and WHO.
- C. IAQ: Indoor Air Quality
- D. EPA: Environmental Protection Agency
- E. WHO: World Health Organization
- F. ASJ+: All Service Jacket composed of aluminum foil reinforced with glass scrim bonded to a kraft paper interleaving with an outer film layer leaving no paper ex-posed.
- G. ASJ: All Service Jacket
- H. SSL+: Self-sealing Advanced Closure System
- I. SSL: Self-Sealing Lap
- J. FSK: Foil-Scrim-Kraft; jacketing
- K. PSK: Poly-Scrim-Kraft; jacketing
- L. PVC: Polyvinyl Chloride
- M. FRP: Fiberglass Reinforced Plastic
- N. ECOSE® Technology: a revolutionary new binder system based on rapidly renewable bio-based materials rather than petroleum-based chemicals commonly used in other fiber glass insulation products. ECOSE Technology reduces our binder embodied energy by up to 70% and does not contain phenol, formaldehyde, acrylics or artificial colors.
- O. The UL Environment / GREENGUARD Certification Program (formerly known as GREENGUARD Indoor Air Quality Certification) gives assurance that products designed for use in indoor spaces meet strict chemical emissions limits, which contribute to the creation of healthier interiors. Achieving UL Environment / GREENGUARD Certification gives credence to manufacturers' sustainability claims, backing them with empirical scientific data from an unbiased, third-party organization.
- P. UL Environment / GREENGUARD GOLD Certification: (Formerly known as GREENGUARD CHILDREN & SCHOOLS Certification) offers stricter certification criteria, considers safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities. It is referenced by both The Collaborative for High Performance Schools (CHPS) and the Leadership in Energy and Environmental Design (LEED) Building Rating Systems.
- Q. UL Environment / GREENGUARD Formaldehyde Free Verification Requirements: for a product to be verified as formaldehyde free, product samples must have a measured emission factor of less than or equal to 5 µg/m² h at 24 elapsed hours or 3 µg/m² h at 336 elapsed hours. An emission factor of 5 µg/m² h, corresponds to a chamber concentration of 2.5 µg/m³ for a typical building ratio of 0.5 m²/m³. This chamber concentration is comparable to, or below typical outdoor air concentrations. This demonstrates that the formaldehyde exposure from products labeled as formaldehyde free will not contribute to airborne formaldehyde concentrations at greater levels than those found in the natural outdoor environment.

- R. Underwriter's Laboratories Environment (UL Environment / GREENGUARD): offers independent green claims validation, product assessment and certification. UL Environment / GREENGUARD provides third-party credibility for sustainable products.
- S. EUCEB: exonerated fiber from a health and safety standpoint by the European Certification Board process.
- T. Recycled content – post-consumer: materials such as bottled glass collected at curbside or other collection sites after consumer use and used in the manufacturing process to create a new product rather than being placed in a landfill or incinerated.
- U. Recycled content – pre-consumer (aka post-industrial): materials used or created from one manufacturing process which are collect-ed as scrap and placed back into another manufacturing process rather than being placed in a landfill or incinerated.
- V. Polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Oc-ta-BDE or Deca-BDE fire retardants: have been linked to adverse health effects after exposure in low concentrations.
- W. UL Classified: UL has tested and evaluated samples of the product with respect to certain properties of the product. UL Classifies products to:
 - X. Applicable UL requirements
 - Y. Standards for safety
 - Z. Standards of other National and International organizations

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

- F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Insulation shall be formaldehyde-free or GREENGUARD Gold Indoor Air Quality Certified and meet the GREENGUARD Gold standards for low Volatile Organic Compound (VOC) emissions. Comply with ASTM C 553, Type I and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; SoftTouch Duct Wrap.
 - b. Johns Manville; Microlite EQ.
 - c. Knauf Insulation; Friendly Feel Duct Wrap with ECOSE Technology.
 - d. Owens Corning; SOFTR All-Service Duct Wrap.
- H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Insulation shall be formaldehyde-free or GREENGUARD Gold Indoor Air Quality Certified and meet the GREENGUARD Gold standards for low Volatile Organic Compound (VOC) emissions. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ for all exposed locations, FSK (attic locations). Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; CertaPro Commercial Board - CB 300.
 - b. Johns Manville; 800 Series Spin-Glas - Type 814.
 - c. Knauf Insulation; Insulation Board with ECOSE technology - 3.0 pcf.
 - d. Owens Corning; Fiberglas 703 Series.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Aeroflex USA Inc.; AeroSeal.
 - b. Armacell LCC; 520 Adhesive.
 - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. Marathon Industries, Inc.; 225.
- D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. Marathon Industries, Inc.; 225.

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. Marathon Industries, Inc.; 590.
 - 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - 5. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-30.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-35.
 - c. Marathon Industries, Inc.; 501.
 - 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
 - 3. Service Temperature Range: 0 to 180 deg F.
 - 4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 - 5. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; Encacel.
 - b. Foster Products Corporation, H. B. Fuller Company; 60-95/60-96.
 - c. Marathon Industries, Inc.; 570.
 - 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 - 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 - 4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 - 5. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. Marathon Industries, Inc.; 550.
 - 2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 200 deg F.
 - 4. Solids Content: 63 percent by volume and 73 percent by weight.
 - 5. Color: White.

2.4 SEALANTS

- A. Joint Sealants:
 - 1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-76.

- b. Foster Products Corporation, H. B. Fuller Company; 30-45.
 - c. Marathon Industries, Inc.; 405.
 - d. Pittsburgh Corning Corporation; Pittseal 444.
 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 3. Permanently flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 100 to plus 300 deg F.
 5. Color: White or gray.
 - B. FSK and Metal Jacket Flashing Sealants:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-76-8.
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
 - c. Marathon Industries, Inc.; 405.
 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 3. Fire- and water-resistant, flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 5. Color: Aluminum.
 - C. ASJ Flashing Sealants, and Vinyl Jacket Flashing Sealants:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products, Division of ITW; CP-76.
 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 3. Fire- and water-resistant, flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 5. Color: White.

2.5 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 1. ASJ + SSL+: All Service Jacket with Advance Closure System self sealing lap. All Service Jacket composed of aluminum foil reinforced with glass scrim bonded to a kraft paper interleaving with an outer film layer leaving no paper exposed; conforming to ASTM C 1136 Type I,II,III,IV and VII;vapor retarder;with a self-sealing adhesive.
 2. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 3. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 4. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 5. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
 6. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96, Procedure A, and complying with NFPA 90A and NFPA 90B.
 7. PSK facing by Knauf Insulation: White polypropylene skrim kraft complying with ASTM C1136 Type II.
 8. Fire Retardant: products shall contain no polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Octa-BDE or Deca-BDE; whenever available.

2.6 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

- B.** FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C.** Metal Jacket:
 - 1.** Products: Subject to compliance with requirements, provide one of the following:
 - a.** Childers Products, Division of ITW; Metal Jacketing Systems.
 - b.** PABCO Metals Corporation; Surefit.
 - c.** RPR Products, Inc.; Insul-Mate.
 - 2.** Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105 or 5005, Temper H-14.
 - a.** Sheet and roll stock ready for shop or field sizing.
 - b.** 0.024" thickness.
 - c.** Moisture Barrier for Indoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
 - d.** Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
 - e.** Factory-Fabricated Fitting Covers:
 - 1)** Same material, finish, and thickness as jacket.
 - 2)** Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3)** Tee covers.
 - 4)** Flange and union covers.
 - 5)** End caps.
 - 6)** Beveled collars.
 - 7)** Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
 - 3.** Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - a.** Sheet and roll stock ready for shop or field sizing.
 - b.** Material, finish, and thickness are indicated in field-applied jacket schedules.
 - c.** Moisture Barrier for Indoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
 - d.** Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
 - e.** Factory-Fabricated Fitting Covers:
 - 1)** Same material, finish, and thickness as jacket.
 - 2)** Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3)** Tee covers.
 - 4)** Flange and union covers.
 - 5)** End caps.
 - 6)** Beveled collars.
 - 7)** Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
- D.** Self-Adhesive Outdoor Jacket: 45 to 60-mil-thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white aluminum-foil facing.
 - 1.** Products: Subject to compliance with requirements, provide one of the following:
 - a.** Polyguard; Alumaguard 60.
 - b.** Flex-Clad 400
 - c.** K-FLEX CLAD® IN

2.7 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
 - b. Compac Corp.; 104 and 105.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - b. Compac Corp.; 110 and 111.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
 - d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
 - b. Compac Corp.; 120.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 488 AWF.
 - d. Venture Tape; 3520 CW.
 2. Width: 2 inches.
 3. Thickness: 3.7 mils.
 4. Adhesion: 100 ounces force/inch in width.
 5. Elongation: 5 percent.
 6. Tensile Strength: 34 lbf/inch in width.
 7. Comply with UL 181-A.

2.8 SECUREMENTS

- A. Bands:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Products; Bands.
 - b. PABCO Metals Corporation; Bands.

- c. RPR Products, Inc.; Bands.
 - 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 3/4 inch wide with wing or closed seal.
 - 3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing or closed seal.
 - 4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Insulation Pins and Hangers:**
- 1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; CD.
 - 3) Midwest Fasteners, Inc.; CD.
 - 4) Nelson Stud Welding; TPA, TPC, and TPS.
 - 2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) AGM Industries, Inc.; CH-10.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.
 - 3. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- C. Staples:** Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- D. Wire:** 0.062-inch soft-annealed, stainless steel.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. C & F Wire.
 - b. Childers Products.
 - c. PABCO Metals Corporation.
 - d. RPR Products, Inc.

2.9 CORNER ANGLES

- A. PVC Corner Angles: 30 mils thick, minimum 1-1/2 inch by 1-1/2 inch, PVC according to ASTM D 1784, Class 16354-C.

2.10 FLEXIBLE INSULATION CLADDING

A. Manufacturers:

- 1. Polyguard Alumaguard Cool Wrap and All Weather

- J. Where vapor barrier is indicated, for joints, seams, and penetrations; insulate hangers, supports, anchors, and other projections with appropriate insulation material finishing it with a vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 25 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Handholes.
 - 5. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend exterior jacket of outdoor insulation outside roof flashing to at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 - 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
 - 1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- F. Insulation Installation at Floor Penetrations:
 - 1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 - 2. Pipe: Install insulation continuously through floor penetrations.
 - 3. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 - 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install mitered sections of pipe insulation.
 - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 3. Install insulation to flanges as specified for flange insulation application.
 - 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 MINERAL-FIBER INSULATION INSTALLATION

- A. Insulation Installation on Straight Pipes and Tubes:**
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
 4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:**
1. Install preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:**
1. Install preformed sections of same material as straight segments of pipe insulation when available.
 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
- D. Insulation Installation on Valves and Pipe Specialties:**
1. Install preformed sections of same material as straight segments of pipe insulation when available.
 2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 4. Install insulation to flanges as specified for flange insulation application.
- E. Blanket Insulation Installation on Ducts and Plenums:** Secure with adhesive and discharge-weld insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, place pins 18 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not over compress insulation during installation to less than 75% stated thickness.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section

- with 1/2-inch outward-clinching staples, 6 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
- a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- F. Board Insulation Installation on Ducts and Plenums:** Secure with adhesive and discharge-weld insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 12 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, space pins 12 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions. Refer to sections above for vapor stops.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
 5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
 7. Install PVC corner angles on all edges of insulated ductwork; 6ft and less above finished floor; within mechanical rooms. PVC corner angles shall be underneath the flexible insulation cladding.
 8. Install flexible insulation cladding on all insulated ductwork 6ft and less above finished roof.

3.7 FIELD-APPLIED JACKET INSTALLATION

- A. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.8 FINISHES

- A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
 - 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
 - 2. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
 - 3. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 DUCT AND PLENUM INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, exposed supply and outdoor air.
 - 3. Indoor, concealed return located in nonconditioned space.
 - 4. Indoor, exposed return located in nonconditioned space.
 - 5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
 - 6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
 - 7. Outdoor, concealed supply and return.
 - 8. Outdoor, exposed supply and return.
 - 9. Flexible duct connectors shall be insulated with blanket type insulation to allow movement.
 - 10. And all systems/requirements indicated on the drawings schedules.

- B.** Items Not Insulated: unless otherwise noted.
 - 1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1
 - 2. Factory-insulated flexible ducts.
 - 3. Factory-insulated plenums and casings.
 - 4. Vibration-control devices.
 - 5. Factory-insulated access panels and doors.

3.11 FIELD-APPLIED JACKET SCHEDULE

- A.** Refer to schedule on drawings and specification requirements.

END OF SECTION 23 07 00

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. This Section includes control sequences for HVAC systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Floor plans.
 - 2. Flow and Control Diagrams.

1.3 DEFINITIONS

- A. DDC: Direct digital control; interchangeable with BMS
- B. VAV: Variable air volume.
- C. BMS: Building Management System; interchangeable with DDC
- D. VFD: Variable Frequency Drive

1.4 GENERAL

- A. Controls contractor shall have a meeting with the architect, engineer, and owner prior to programming to discuss capabilities, schedules and sequences.
- B. Controls contractor shall allocate programming hours (not less than 20 hours) for programming of the facilities program schedules.
- C. Contractor shall provide all required control devices, meters, hardware and software to achieve the specified sequences of operation as outlined in these specifications and as detailed on drawings whether indicated and/or implied. Refer to drawing for general I/O points. All points may not be listed and are indicated for general description.
- D. Controllers shall monitor and report all control function alarm points.
- E. Controllers shall monitor and report status of all equipment for use in sequence of operations, trending and verification.
- F. All setpoints including but not limited to temperature, time, CO, CO₂, enthalpy, wet bulb, pressure, etc. shall be adjustable.
- G. All safeties shall operate whether the starters or VFD's are in the hand or automatic mode.
- H. Thermostats shall provide local temperature adjustment via a knob or slider bar. The temperature adjustment range shall be individually adjustable for each thermostat.
- I. Thermostats shall also provide an occupancy override function. Activation of timed override switch on zone thermostats shall only reset zone heating and cooling setpoints to "occupied" values, but shall not affect otherwise scheduled Unoccupied operating mode of air handling unit. This allows the user to override the Unoccupied scheduled setpoints and put the system into an occupied setpoints mode for set duration and reset to normal operation at the end of the period or whenever the override button is held for more than 5 seconds (adjustable). The override duration is individually adjustable for each thermostat through the RTU controller or the same range can be applied to all thermostats globally.
- J. The contractor and equipment manufacturers shall provide all parts, sensors, hardware and accessories for a complete and operational system. If alternate/additional sensors/relays or hardware is required by deviating from the basis of design, the contractor is to provide all required hardware, installation and communication wiring for these devices.

1.5 SAFETIES (ALL AIR HANDLING UNITS AND DUCTWORK)

- A. Existing Supply or return duct mounted smoke detectors; upon sensing products of combustion, or signal received from central fire alarm system, shall shut down the associated air handling system

supply, return and relief fans with the HOA switch in both the "hand" and "auto" positions. Reset of smoke detector initiation shall be manual. Initiate an alarm upon shut down via duct smoke detector.

- B. Upon building wide shutdown of air handling units from central fire alarm system, after the fire alarm is reset to normal mode Local controls shall automatically stage the re-start up of air handling units to eliminate simultaneous starting.
- C. Supply duct mounted high limit pressure sensors (hard wired into safety circuits) shall shut down both supply when the duct static pressure exceeds 4" w.c. (adjustable) and return fans if discharge or inlet static pressures exceed pressure classification ratings of the ductwork or fans.
- D. Following a safety shut-down, a manually initiated restart command shall restart the system as previously described under Normal Operating Mode.

1.6 CONTROL OF OUTSIDE AIR GENERAL (ALL AIR HANDLING UNITS)

- A. Outside air is controlled to satisfy whichever of the following predominates:
 - 1. The outside air volume required to satisfy the economizer cycle.
 - 2. The outside air volume required to maintain a CO₂ differential as described below.
 - 3. OA intake will be limited to a maximum of the "design OA cfm" which is shown in the Schedule of Air Handling Units. This limit is not applicable to the economizer cycle.
 - 4. The outside air volume required to provide make-up air for the exhaust systems associated with each air handler and maintain a positive building pressure.

1.7 CARBON DIOXIDE CONTROL GENERAL (ALL AIR HANDLING UNITS)

- A. RTU controller shall monitor return and room air CO₂ sensor and modulate outside air dampers from units minimum to maximum scheduled. CO₂ control shall be overridden during economizer. RTU Controller shall continually poll space mounted CO₂ sensors and override return air CO₂ sensor to maintain desired levels of outside air within the building.
- B. RTU shall monitor mixed air temperature and modulate outdoor air dampers to maintain a minimum of mixed air temperature of 50°F (adjustable). CO₂ control shall be overridden during economizer.
- C. The outside air dampers shall modulate to maintain room carbon dioxide levels a maximum of 800 PPM (adjustable) above ambient CO₂ levels, at all times. An alarm shall be generated if any room CO₂ sensor level rises 10% (adjustable) or more than 1200 ppm (adjustable).
- D. Ambient CO₂ levels to be provided by the outdoor air CO₂ sensor located at the exterior for monitoring.
- E. In units with multiple CO₂ sensors, if RTU Controller fails to read a signal from any of the CO₂ sensors or the sensor fails, an alarm shall be generated and remaining sensor(s) shall maintain control of outside air. If only a single sensor resides or failure of remaining multiple sensors, and signal or sensor failure occurs, then the units outside air dampers shall remain at last known position and an alarm shall be generated. Operator may override any failed CO₂ sensor.

1.8 ENTHALPY ECONOMIZER

- A. Provide each air handling unit with an enthalpy controlled economizer. When outside air enthalpy is less than return air enthalpy and at least one zone calling for cooling, a PID loop comparing actual supply temperature to its calculated setpoint, shall utilize outside air prior to staging of RTU compressors. Position of outside air damper shall be overridden by CO₂ sensors if indoor levels of CO₂ are outside of defined range. When the outdoor enthalpy exceeds the return air enthalpy, the economizer cycle shall be disabled, the cooling coil control valve shall modulate to maintain the supply air temperature setpoint, and the outside air damper shall return to control off the carbon dioxide sensor. Position of outside air dampers shall be overridden by mixed air low limit and supply air setpoint.
- B. If outside air enthalpy is above return air enthalpy and CO₂ levels are satisfied, outside air dampers shall be at the position required for proper make-up air and building pressurization.

1.9 EVENT INITIATED TRENDING

- A. Packaged roof top units shall be capable of trending data through internal controls.

1.10 TOILET EXHAUST FANS

- A. The fans shall be enabled and disabled based on a predetermined unit operating schedule. The exhaust fan shall be started and stopped automatically when the starter "hand-off-auto" switch is in either the "hand" or "off" position. The automatic control damper shall be interlocked to open when the fan starts.

1.11 IT ROOM AIR CONDITIONING

- A. Space air conditioning units shall be started locally through unit supplied thermostats and controls to maintain space set point. Units controls shall sequence evaporator fan and refrigeration cycle to maintain space set point.
- B. 7-day programmable thermostat shall be provided to permit space set back temperature by owner.

1.12 VARIABLE AIR VOLUME SYSTEMS (GAS FIRED DX)**A. General**

- 1. The unit shall be enabled and disabled based on a predetermined unit operating schedule through the RTU control panel located in the mechanical room. All control functions shall be accomplished through the control panel and/or local zone thermostats.

B. Disabled Mode

- 1. When the unit is disabled, the supply fan shall be off, and the relief air and outside air dampers shall be closed. Gas furnace & DX cooling coil shall be off.

C. Cooling Mode

- 1. A temp sensor downstream from the cooling coil, as reset by a return air sensor, remote zone calling for cooling and subject to maintain maximum return relative humidity at 55% will, through its controller, modulate the dx coil and compressors. The cooling coil shall modulate to maintain a supply air temperature setpoint of 55°F (adjustable). Controller shall employ a dynamic self-tuning algorithm.
- 2. The controller shall continuously monitor the position of all terminal box dampers in zones associated with the air handling unit. The control system shall use this information to reset the supply air discharge temperature between a minimum of 55 F and a maximum of 65 F, and to reset the supply plenum static pressure setpoint.
- 3. When all terminal box dampers are at least partially closed, the supply air static pressure setpoint shall be reset downwards. If at least one (1) terminal box damper is open fully and is calling for further cooling, the supply air static pressure setpoint shall be reset toward its design value. If the supply air static pressure reaches its design value and a zone is still calling for additional cooling, the supply air temperature shall be reset down toward its design value of 55 F (adjustable).

D. Heating Mode:

- 1. On a call for heating, the fan discharge supply air temperature sensor modulates gas furnace modulating gas valve(s) in sequence. Employ a supply temperature reset schedule as with occupied summer.
- 2. When the mixed air temperature is below 52°F, the gas furnace control valve shall modulate to maintain 55°F discharge air.

E. Dehumidification Mode

- 1. RTU hot gas reheat coil shall be used for dehumidification.
- 2. Compressor will energize to pre-cool and pre-dehumidify the return air.
- 3. Supply air temperature shall reset down 1°F (adj.) and RTU hot gas reheat coil shall modulate to maintain supply air discharge set point.
- 4. If after 10-Minutes, the return air relative humidity set point has not been reached, the supply air shall continue to be reset down 1°F (adj.) at 10-minute intervals until the relative humidity set point has been reached and maintained for a minimum of 10-minutes.

F. Occupied Schedule (VAV Zone Control with Occupancy Sensors)

- 1. Occupancy Sensor in Occupied mode

- a. Winter: Space sensor shall modulate vav box cfm based on an independent occupancy schedule to maintain space setpoint of 68°F (adjustable).
- b. Summer: Space sensor shall modulate vav box cfm based on an independent occupancy schedule to maintain space setpoint of 75°F (adjustable).
- 2. Occupancy sensor in unoccupied mode
 - a. Winter: Space sensor shall modulate vav box cfm based on an independent occupancy schedule to maintain space setpoint of 64°F (adjustable).
 - b. Summer: Space sensor shall modulate vav box cfm based on an independent occupancy schedule to maintain space setpoint of 78°F (adjustable).
- G. Unoccupied Schedule
 - 1. Outside air and relief air dampers shall be closed. Reset the space air temperature sensors to maintain space temperature at 80°F (adjustable) during a call for cooling and 62° F (adjustable) during a call for heating.
- H. Cooldown or Warmup (Optimal schedule)
 - 1. Prior to occupied operation (adjustable lead time), the supply and relief fans start and run under duct pressure control with VAV boxes open.. After a 3 minute run time, the system reverts to a cooldown or warmup mode, depending upon return air and/or space temperature.
 - 2. If the room temperature is above 80°F (adj), cool down commences. Air handling unit DX cooling compressors shall modulate under control of return air temperature. Normal occupied cooling resumes after room air temperature comes down to 75°F (adjustable).
 - 3. If the room temperature is below 68°F (adj), warmup commences. Warmup terminates when all room temperatures have remained above 70°F for a preset time period (try 30 minutes initially). Adjust the time delay as needed to allow for thermal capacitance of building construction materials.
 - 4. Once all spaces are satisfied, the air handling unit shall revert to the calculated supply air setpoint.

1.13 DESIGN CONDITIONS

A. Outdoor Design Conditions:

Winter design dry bulb	0°F
Summer design dry bulb	85°F
Coincident wet bulb	74°F

B. Indoor Design Conditions:

Space Design Conditions				
Space Type	Summer		Winter	
	DB °F	RH %	DB °F	RH %
Offices	75	50±5	68	NC
Classrooms	75	50±5	68	NC
Toilet rooms/Locker Rooms	75	50±5	68	NC
Storage Rooms	80	50±5	65	NC
Mechanical Rooms	NC	50±5	60	NC
Electrical Rooms	90	50±5	NC	NC
Circulation	85	NC	68	NC
IDF	74	NC	74	NC

- 1. NC – indicates no control over conditions will be provided.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 23 09 93

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PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the following:

1. Condensate-drain piping.

1.2 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature:

1. Condensate-Drain Piping: 150 deg F.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Hydronic specialties.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Water-Treatment Chemicals: Furnish enough chemicals for initial system startup and for preventive maintenance for one year from date of Substantial Completion.

1.7 QUALITY ASSURANCE

A. Comply with the 2012 International Mechanical Code.

1.8 PRODUCTS

1.9 COPPER TUBE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Elkhart Products
2. Mueller Streamline
3. Nibco
4. Cambridge-Lee Industries
5. Cerro Flow Products

B. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

C. Wrought-Copper Fittings: ASME B16.22.

D. Wrought-Copper Unions: ASME B16.22.

1.10 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

- B. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAG-1, silver alloy for joining copper with bronze or steel.

1.11 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. Hart Industries International, Inc.
 - d. Jomar International Ltd.
 - e. Matco-Norca, Inc.
 - f. McDonald, A. Y. Mfg. Co.
 - g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - h. Wilkins; a Zurn company.
 - 2. Description:
 - a. Standard: ASSE 1079.
 - b. Pressure Rating: 125 psig minimum at 180 deg F.
 - c. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. Matco-Norca, Inc.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - e. Wilkins; a Zurn company.
 - 2. Description:
 - a. Standard: ASSE 1079.
 - b. Factory-fabricated, bolted, companion-flange assembly.
 - c. Pressure Rating: 125 psig minimum at 180 deg F.
 - d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric Nipples:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Elster Perfection.
 - b. Grinnell Mechanical Products.
 - c. Matco-Norca, Inc.
 - d. Precision Plumbing Products, Inc.
 - e. Victaulic Company.
 - 2. Description:
 - a. Standard: IAPMO PS 66
 - b. Electroplated steel nipple complying with ASTM F 1545.
 - c. Pressure Rating: 300 psig at 225 deg F.
 - d. End Connections: Male threaded [**or grooved**]

- e. Lining: Inert and noncorrosive, propylene.
- f. 6" Long

PART 2 - EXECUTION

2.1 PIPING APPLICATIONS

- A. Condensate-Drain-Piping, outdoor, aboveground, shall be the following:
 - 1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered.

2.2 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
- B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- C. Install piping at indicated slopes.
- D. Install fittings for changes in direction and branch connections.
- E. Select system components with pressure rating equal to or greater than system operating pressure.
- F. Reduce pipe sizes using eccentric or concentric reducer fittings. When eccentric fitting is used, install with level side up.
- G. Trap each cooling coil and drain pans with trap seal of sufficient depth to prevent conditioned air from moving through piping. Extend drain piping to approved drain location. Construct trap with plugged tee for cleanout purposes. Pitch pipe down at 1/4" per one foot for proper drainage.

2.3 PIPE JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Braze Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Install di-electric fittings where dissimilar metals are joined together.

END OF SECTION 23 21 13

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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.
- B. Section 01 91 00 – General Commissioning Requirements.
- C. Section Includes:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Single-wall round and flat-oval ducts and fittings.
 - 3. Outdoor, pre-insulated duct system
 - 4. Sheet metal materials.
 - 5. Duct liner.
 - 6. Sealants and gaskets.
 - 7. Hangers and supports.
- D. Related Sections:
 - 1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
 - 2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Duct hangers and supports shall withstand the effects of gravity within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".
- B. Comply with all requirements of the International Mechanical Code, latest adopted version.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of the following products:
 - 1. Liners and adhesives.
 - 2. Sealants and gaskets.
- B. Shop Drawings:
 - 1. Electronic drawing files shall be generated by the Contractor.
 - 2. Drawings shall be submitted in both hard copy and electronic (AutoCAD or Revit version as required by the Owner) version or AutoCAD Version 2010 if not specified.
 - 3. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - 4. Factory- and shop-fabricated ducts and fittings, and sheet metal shop standards. Edited to specification and job specific requirements. Sheet metal shop standards shall be submitted for review prior to the submission of sheet metal shop drawings. Any sheet metal shop drawings submitted prior to the submission and review of the sheet metal shop standards shall be returned "not reviewed."
 - 5. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
 - 6. Shop drawings shall be submitted in 3/8" scale.
 - 7. Elevation of top and bottom of ducts.
 - 8. Dimensions of main duct runs from building grid lines.
 - 9. Fittings and fitting construction edited to specification and job specific requirements.
 - 10. Reinforcement and spacing.
 - 11. Seam and joint construction.
 - 12. Penetrations through fire-rated and other partitions.

13. Equipment installation based on equipment being used on Project.
14. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
15. Hangers and supports, including methods for duct and building attachment and vibration isolation.
16. Schedule indicating ductwork material, service, location (interior, exterior), and sealing method.
17. Submittals with multiple manufacturers listed for a single product will not be reviewed shall be returned "not reviewed."

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.
 3. Structural members to which duct will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Penetrations of smoke barriers and fire-rated construction.
 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.
- B. Welding certificates.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports, AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 STANDARDS

- A. SMACNA "HVAC Duct Construction Standards - Metal and Flexible" Latest Edition.
- B. Minimum duct gauge shall be 24 for all rigid ductwork.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Refer to specification sections below and the details on the drawings for more information regarding acceptable elbows, transitions, offsets, branch connections, and other duct construction.
- E. Sheet metal shop duct identification labels/tags shall not be installed on the inside surface of ductwork or fittings.

2.3 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

- A. Round and flat oval ductwork shall be pre-fabricated spiral seam round or spiral flat oval by a listed manufacturer in indicated below.
- B. Where round and flat oval ductwork is exposed, ductwork manufacturer shall thoroughly clean exterior surfaces of all products and provide packaging to protect exterior finish of ductwork.
- C. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
- D. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).
- E. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 48 Inches in Diameter: Flanged.
- F. Spiral Seams: Spiral lockseam (smooth) according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2" Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." RL-2, 3, 4, 5, and snaplock seam types RL-6A, 6B, 7, 8 are not acceptable. SMACNA form M Metallic duct (semi rigid) is not acceptable.
- G. Tees and Laterals: Fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5,"90 Degree Tees and Laterals," 45 degree lateral taps and tees, (the use of 90 degree taps and fittings are not acceptable) for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- H. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Refer to specification sections below and the details on the drawings for more information regarding acceptable elbows, transitions, offsets, branch connections, and other duct construction.
- I. Sheet metal shop duct identification labels/tags shall not be installed on the inside surface of ductwork or fittings.

2.4 OUTDOOR, PRE-INSULATED DUCT SYSTEM

- A. Alternate: In lieu of galvanized steel ductwork with insulation and weather jacketing, outdoor ductwork may be a premanufactured, pre-insulated and jacked system as described below.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Thermaduct.
 - b. QDuct.
 - c. Koolduct.
- B. Exterior Ductwork shall be a double layered duct system using closed cell or phenolic insulated panels pre-fabricated and assembled into inter-locking sections.
- C. The panels used in the fabrication of the ductwork system shall have minimum R-value of R-8.
- D. Rigid insulation panels shall comprise CFC/HCFC-free rigid insulation core, autohesively bonded on both sides: aluminum internal liner and an aluminum or vinyl external liner.
- E. Exterior weatherproof cladding shall be a zero permeability vapor barrier, puncture resistant, and tear resistant.

2.5 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: G60
- C. Galvannealed or Mill Phosphatized: Comply with ASTM A 653/A 653M.
 - 1. Finished for surfaces indicated to be field painted: galvannealed or mill phosphatized.
 - 2. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 4 as indicated in the "Duct Schedule" Article.
- E. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; galvanized.
 - 1. Where galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- G. Tie Rods: Tie rod material shall match the duct material. 3/8-inch minimum diameter.

2.6 DUCT LINER

- A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, NFPA 90B, ASTM 1104 < 5%, and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Owens-Corning Fiberglass Company - Quiet R Rotary Duct Liner
 - b. CertainTeed – ToughGard T Textile Duct Liner
 - c. Knauf – Sonic XP Duct Liner with ECOSE Technology
 - d. Material shall be a Glass fiber coated with a black pigmented fire resistant coating fascia. Material shall be 1", 1.5" or 2" thick as called out on the drawings and have a 1.5 lbs/ft³ density minimum. Material shall meet or exceed applicable testing requirements set forth herein and shall meet or exceed the requirements of NFPA 90. When tested according to ASTM E84, product shall have a Flame Spread Rating of no more than 25 and Smoke Developed Rating

of no more than 50. Product shall be UL 723 Class 1 product. Material shall be secured to substrate with adhesive and mechanical fasteners.

- B.** Absorptive material shall be adhered by 100% covering of a fire retardant adhesive. In addition, use non-ferrous mechanical fasteners such as welded pins and speed clips, 12" on center maximum. Attach the pins to substrate with adhesive and screws. The pins shall be cut off flush, washers shall be used and installation made so that no gaps or loose edges occur in the material. Apply a brushcoat of adhesive to washers, extending onto material surface a minimum of 2". Fasteners shall comply with SMACNA HVAC Duct Construction Standards Article S2.11
- C.** Absorptive fiberglass material shall have the following minimum sound absorption coefficients when tested in accordance with ASTM C423 procedures utilizing ASTM E795 mounting type "A":

	Octave	Band	Center Frequency, Hz.					
	125	250	500	1000	2000	4000	NRC	
1.5" thick	0.16	0.36	0.61	0.83	0.90	0.92	0.70	
2.0" thick	0.20	0.53	0.79	0.94	0.95	0.97	0.80	

- D.** Thermal Performance: Type I, Flexible:
- 1.5" thick 0.27 Btu x in./h x ft² x °F at 75 deg F mean temperature, R=6.0
 2.0" thick 0.26 Btu x in./h x ft² x °F at 75 deg F mean temperature, R=8.0
- E.** Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
- F.** Adhesives:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - a. 15-141 from King Co.
St. Louis, MO
314-772-9953
 - b. Tuffbond from Goodloe E. Moore, Inc.
Danville, IL
800-331-1164
 - c. INC C-700 from Industrial Noise Control Inc.
Addison, IL
312-620-1998
 2. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - a. Insulation Pins and Washers:
 3. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) AGM Industries, Inc.; CH-10.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.
 4. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
 5. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 6. Apply adhesive to transverse edges of liner facing downstream that do not receive metal nosing.
 7. Butt transverse joints without gaps, provide metal nosing and coat joint with adhesive.
 8. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.

9. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
10. Apply adhesive coating on longitudinal seams in ducts.
11. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
12. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceded by unlined duct.
 - c. Upstream edges of all transverse joints and edges of all upstream transverse joints between butted edges of lining.
13. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.7 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 2. Tape Width: 6 inches.
 3. Sealant: Modified styrene acrylic.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 7. Service: Indoor and outdoor.
 8. Service Temperature: Minus 40 to plus 200 deg F.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. VOC: Maximum 75 g/L (less water).
 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 8. Service: Indoor or outdoor.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Flanged Joint Sealant: Comply with ASTM C 920.
 1. General: Single-component, acid-curing, silicone, elastomeric.
 2. Type: S.

3. Grade: NS.
 4. Class: 25.
 5. Use: O.
 6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
1. Seal shall provide maximum 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.8 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Electrogalvanized steel rods, washers and nuts.
- B. Hanger Rods for Corrosive/Moist Environments: Hot dipped galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct." Minimum threaded rod shall be 3/8".
- D. Wire, steel cables and cable clutches are not acceptable for hanging ductwork.
- E. Duct Attachments: Sheet metal screws or self-tapping metal screws; compatible with duct materials and of appropriate length.
- F. Trapeze and Riser Supports:
1. Supports for Galvanized-Steel Ducts: Electrogalvanized-steel shapes and plates.
 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.
- G. All hanger rod and channel ends; exposed and 12' or less above finished floor; shall be provided with plastic caps and plastic channel safety end caps. Color shall be same throughout the project; yellow, orange or red.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and indicated on the Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round and flat-oval ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated, smoke rated interior partitions and exterior walls, install fire dampers or smoke dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines." using "Advance Level" protection requirements.

3.2 INSTALLATION OF ALL (NON-EXTERNALLY INSULATED) EXPOSED DUCTWORK/FITTINGS

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. For acoustically lined ductwork, trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.
- F. Wire, steel cables and cable clutches are not acceptable for hanging ductwork.
- G. Spiral seams shall align when round spiral seam ductwork sections are joined.
- H. Sheet metal shop duct identification labels/tags shall be removed. Sheet metal shop duct identification labels/tags shall not be installed on the inside surface of ductwork or fittings.

3.3 Provide flush seam ductwork for all ductwork where un-insulated and exposed in finished spaces or where required to maintain clearances.

- A. Non-acoustically lined ductwork shall be internally sealed.

3.4 DUCT SEALING

- A. Seal all duct seams and joints to comply with ASHRAE 90.1-2010 6.4.4.2.1 (unless otherwise noted) which is more stringent than SMACNA requirements. All duct types shall be sealed at a minimum seal class per the table below:

Duct location	Duct Type			
	Supply		Exhaust	Return
	≤2 in.wc	>2" in.wc		
Outdoors	A	A	A	A
Unconditioned Space	A	A	A	A
Conditioned Space (includes return air plenums)	A	A	A	A

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports." Refer to specification sections and drawings for all acceptable hanging and support methods.
- B. Building Attachments: Stud wedge type expansion, female wedge type expansion or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 1. Where practical, install concrete inserts before placing concrete.
 2. Do not use powder-actuated concrete fasteners for ductwork hangers.

3. Pin/nail anchors, spikes, expansion shields, expansion anchors, dropin anchors, wedge bolts, self tapping screw anchors, and friction clamps are not acceptable.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 12inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Wire, steel cables and cable clutches are not acceptable for hanging ductwork.
- F. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- G. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- H. All hanger rod and channel ends; exposed and < 12' above finished floor; shall be provided with plastic caps and plastic channel safety end caps. Color shall be same throughout the project; yellow, orange or red.

3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 PAINTING

- A. Paint interior of metal ducts and plenums that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 1. Test the following systems in accordance with the methods outlined in SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - a. Ducts with a Pressure Class Higher Than 2-Inch wg: Test representative duct sections totaling no less than 90 percent of total installed duct area for each designated pressure class.
 - b. Ducts with a Pressure Class of 2-Inch wg and less: Test representative duct sections totaling no less than 90 percent of total installed duct area for each designated pressure class.
 2. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 3. Test for leaks before applying external insulation.
 4. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 5. Give seven days' advance notice for testing.
- C. Duct System Cleanliness Tests:
 1. Following duct cleaning indicated in the sections below Under "DUCT CLEANING":
 - a. Visually inspect duct system to ensure that no visible contaminants are present.
 - b. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - 1) Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

- D. Duct system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.9 DUCT CLEANING

- A. Clean new and existing duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal and external surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.
 - 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:
 - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 - 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
 - 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
 - 5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
 - 6. Provide drainage and cleanup for wash-down procedures.
 - 7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.10 START UP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.11 DUCT SCHEDULE

- A.** Fabricate ducts with G90 galvanized sheet steel except as otherwise indicated on the Duct Material Schedule on the drawings.
- B.** Static Pressure Classes:
1. Refer to Duct Pressure Class schedule on drawings for duct pressure and leakage class requirements.
 2. Liner:
 - a. Install acoustical liner as indicated on drawings, as noted, or specified elsewhere.
 - b. Minimum of 15' upstream and downstream of all fans, except those serving labs, kitchens, showers, outside air plenums, outside air ducts and dishwasher exhaust ducts.
 - c. Minimum 10' downstream of all VAV boxes.
 - d. In all transfer ducts.
 3. Intermediate Reinforcement:
 - a. Galvanized-Steel Ducts: Galvanized steel.
 - b. Aluminum Ducts: Aluminum.
- C.** Elbow Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows" and the requirements indicated in specification section 233300 Air Duct Accessories. Single wall vanes are not acceptable. RE 2 is only acceptable where space does not permit the use of radius type RE 1 elbows.
 - c. Elbow types RE 4, 6, 7, 8, 9, and 10 are not acceptable.
 2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam or welded.
 - d. Adjustable elbows are not acceptable.
 - e. Elbows for exposed ductwork, elbows shall be segmented for all sizes to match the appearance of the spiral ductwork.
- D.** Branch Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch:
 - 1) 45-degree entry with clinch lock.
 - 2) Self-adhesive duct takeoffs are not acceptable.
 - b. Rectangular Main to Round Branch:
 - 1) Bellmouth and conical.
 - 2) Self-adhesive/"high efficiency" duct takeoffs are not acceptable.
 - 3) Rectangular 45-degree entry with clinch lock with transition to round attached.
 - 4) Transitioning rectangular to round tap with and without integral volume dampers and gasket are not acceptable.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing ducts only.
 - a. 45-degree lateral fitting.
 - b. 90 degree taps and fittings are not acceptable.
- E. Offset, Transition and Obstruction Configuration:
 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-7, "Offsets and Transitions and Figure 4-8 "Obstructions"
 - a. Offsets type 1 is not acceptable.
 - b. All offsets shall be use radius elbows; mitered elbow offsets are not acceptable.
 - c. Concentric transitions shall be limited to 40°. Angle may need to be greater based on job conditions. Each instance shall be reviewed.
 - d. Eccentric transitions shall be limited to 20°. Angle may need to be greater based on job conditions. Each instance shall be reviewed.
 - e. Obstruction Figure D is not acceptable; Figure B shall be utilized as space allows. If space does not allow radius elbow offsets, each instance shall be reviewed.

END OF SECTION 23 31 13

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. Backdraft and pressure relief dampers.
 2. Barometric relief dampers.
 3. Manual volume dampers.
 4. Control dampers.
 5. Flange connectors.
 6. Turning vanes.
 7. Remote damper operators.
 8. Duct-mounted access doors.
 9. Flexible connectors.
 10. Flexible ducts.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.
- B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control-damper installations.
 - d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
 - e. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.
- B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and 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.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" latest edition for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- C. Comply with International Mechanical Code.

2.2 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" latest edition for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 1. Galvanized Coating Designation: G90.
 2. Finishes for Surfaces Exposed to View: G60
 3. Finished for surfaces indicated to be field painted: galvanized.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and No. 4 finish for exposed ducts.
- D. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Material shall match components, minimum 3/8-inch.

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Greenheck Fan Corporation.
 2. Nailor Industries Inc.
 3. Pottorff.
 4. Ruskin Company.
- B. Description: Gravity balanced.
- C. Maximum Air Velocity: 1000 fpm.
- D. Maximum System Pressure: 2-inch wg.
- E. Frame: Hat-shaped, 0.063-inch- thick extruded aluminum, with welded corners or mechanically attached and mounting flange.
- F. Blades: Multiple single-piece blades, maximum 6-inch width, 0.050-inch- thick aluminum sheet with sealed edges.
- G. Blade Action: Parallel.

- H. Blade Seals: Neoprene, mechanically locked.
- I. Blade Axles:
 - 1. Material: Aluminum.
 - 2. Diameter: 0.20 inch.
- J. Tie Bars and Brackets: Aluminum.
- K. Return Spring: Adjustable tension.
- L. Bearings: Steel ball or synthetic pivot bushings.
- M. Accessories:
 - 1. Adjustment device to permit setting for varying differential static pressure.
 - 2. Counterweights and spring-assist kits for vertical airflow installations.
 - 3. Electric actuators.
 - 4. Chain pulls.
 - 5. Screen Mounting: Front mounted in sleeve.
 - a. Sleeve Thickness: 20 gage minimum.
 - b. Sleeve Length: 6 inches minimum.
 - 6. Screen Material: Aluminum.
 - 7. Screen Type: Insect.
 - 8. 90-degree stops.

2.4 **BAROMETRIC RELIEF DAMPERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Greenheck Fan Corporation.
 - 2. Nailor Industries Inc.
 - 3. Pottorff.
 - 4. Ruskin Company.
- B. Suitable for horizontal or vertical mounting.
- C. Maximum Air Velocity: 2000 fpm.
- D. Maximum System Pressure: 2-inch wg.
- E. Frame: Hat-shaped, 0.063-inch- thick extruded aluminum, with welded corners or mechanically attached and mounting flange.
- F. Blades:
 - 1. Multiple, 0.050-inch- thick aluminum sheet.
 - 2. Maximum Width: 6 inches.
 - 3. Action: Parallel.
 - 4. Balance: Gravity.
- G. Blade Seals: Neoprene.
- H. Blade Axles: Nonferrous metal.
- I. Tie Bars and Brackets:
 - 1. Material: Aluminum .
 - 2. Rattle free with 90-degree stop.
- J. Return Spring: Adjustable tension.
- K. Bearings: Synthetic, Stainless steel or Bronze.
- L. Accessories:
 - 1. Flange on intake.
 - 2. Adjustment device to permit setting for varying differential static pressures.

- M. Screen Mounting: Front mounted in sleeve.
- N. Sleeve Thickness: 20 gage minimum.
- O. Sleeve Length: 6 inches minimum.
- P. Screen Material: Aluminum.
- Q. Screen Type: Insect.

2.5 MANUAL VOLUME DAMPERS

- A. Single Blade Dampers. Maximum width of single blade shall be 14", use opposed blade damper for height exceeding 14". Pre-manufactured dampers shall be part of an assembly complete with damper, frame, axle and bearings. The damper frame shall be installed internal to the duct and fastened with the appropriate hardware. The installation shall not interfere with the operation of the damper blade(s).
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Rectangular	Air Balance	AC-111
Greenheck	MBD-10	
Ruskin	MD25	
Round	Air Balance	AC-112
	Greenheck	MBDR50
Ruskin	MDRS25	
- C. Multiple Blade Dampers. Opposed blade damper shall be used where duct height exceeds 14". Approved products for pre-manufactured devices are as follows:

Opposed Blade	Air Balance	AC-2
Greenheck	MBD-15	
Ruskin	MD35OB	
- D. Steel, Manual Volume Dampers: Except for outdoor air
- E. Linkage outside airstream.
- F. Suitable for horizontal or vertical applications.
- G. Frames:
 - 1. Hat shaped.
 - 2. Galvanized-steel channels, 0.064 inch thick.
 - 3. Mitered and welded corners.
 - 4. Flanges for attaching to walls and flangeless frames for installing in ducts.
- H. Blades:
 - 1. Parallel- or opposed-blade design.
 - 2. Stiffen damper blades for stability.
 - 3. Galvanized, roll-formed steel, 0.064 inch thick.
 - 4. Blade Axles: Galvanized steel.
- I. Bearings:
 - 1. Zero leak bearings at both ends of operating shaft and positive locking quadrants.
 - 2. Dampers in ducts shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 3. Jamb Seals: Cambered aluminum.
 - 4. Tie Bars and Brackets: Aluminum.
- J. Accessories:
 - 1. Include locking device to hold single-blade dampers in a fixed position without vibration.
 - a. Locking quadrants shall be similar to Rossi Everlock or Elgen for single blade dampers.

2. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
3. Include standoffs for insulated ductwork.
- K.** Aluminum, Manual Volume Dampers: For outdoor air
- L.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. McGill AirFlow LLC.
 2. Pottorff; a division of PCI Industries, Inc.
 3. Ruskin Company.
- M.** Linkage outside airstream.
- N.** Suitable for horizontal or vertical applications.
- O.** Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
- P.** Blades:
 1. Parallel- or opposed-blade design.
 2. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
 3. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
 4. Blade Axles: Galvanized steel.
- Q.** Bearings:
 1. Zero leak bearings at both ends of operating shaft and positive locking quadrants.
 2. Dampers in ducts shall have axles full length of damper blades and bearings at both ends of operating shaft.
- R.** Jamb Seals: Cambered aluminum.
- S.** Tie Bars and Brackets: Aluminum.
- T.** Accessories:
 1. Include locking device to hold single-blade dampers in a fixed position without vibration.
 - a. Locking quadrants shall be similar to Rossi Everlock or Elgen for single blade dampers.
 2. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
 3. Include standoffs for insulated ductwork.
- U.** Jackshaft:
 1. Size: 1-inch diameter.
 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- V.** Damper Hardware:
 1. Include center hole to suit damper operating-rod size.
 2. All dampers shall be furnished with an elevated platform/standoff for insulated duct mounting.
 3. Provide dampers in all branch ducts and duct splits whether indicated or not on the drawings.

2.6 FLANGE CONNECTORS

- A.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Ductmate Industries, Inc.
 2. Nexus PDQ; Division of Shilco Holdings Inc.
 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B.** Description: roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

- C. Material: Galvanized steel.
- D. Gage and Shape: Match connecting ductwork.

2.7 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Manufacturers Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vanes and Vane Runners," and 2-4, "Vane Support in Elbows" unless otherwise noted.
- D. Vane Construction: Turning vanes shall be double wall construction of minimum 24 gauge galvanized metal for 4 1/2" radius vanes and minimum 26 gauge galvanized metal for 2" radius vanes. Each vane shall be securely riveted or welded to minimum 22 gauge runner or directly to duct.
- E. Turning vanes shall have 2" inside radius spaced 2-1/8" apart through 24" wide duct. Vanes in elbows larger than 24" shall have a 4 1/2" radius and be spaced 3 1/4" apart.
- F. Vanes shall be installed in sections to reduce unsupported length for duct depths exceeding 60".

2.8 REMOTE DAMPER OPERATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Metropolitan Air
 - 2. Young Regulator
 - 3. DuroDyne
- B. Description: Cable system designed for remote manual damper adjustment.
- C. Tubing: Brass.
- D. Cable: Stainless steel.
- E. Cable operated dampers (COD) shall be provided where indicated on plans, and/or where required due to damper location above/behind finished construction, where access to damper would require access door in finished construction.
- F. Provide cable operated dampers in branch duct serving diffusers in inaccessible ceiling locations whether indicated or not on the drawings.
- G. Cable shall terminate within the face of each diffuser/register/grille. Damper shall be adjustable through the face of the diffuser/register/grille with standard Philips head tool.
- H. Furnish all required duct penetration seal plates, gaskets, bearings, retainers, and cable to duct mounting clamps.
- I. Cable lengths shall be coordinated to allow damper to be placed at the branch duct take-off immediately off the main. Dampers shall be located as far as possible from the terminal outlet/diffuser.
- J. Wall-Box Mounting: Recessed.
- K. Wall-Box Cover-Plate Material: Steel.

2.9 DUCT AND PLENUM MOUNTED ACCESS DOORS (0.5-2.0 in w.g.)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acudor
 - 2. Buckley
 - 3. Ruskin
 - 4. Ventfabrics Incorporated

- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct" unless otherwise noted.
- C. Door:
 - 1. Double wall, rectangular.
 - 2. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
- D. Hinges: Continuous piano hinge.
- E. Latches: similar to Ventfabrics, Inc. No. 100 for small doors and No. 310 where physical access is possible. Window latch/sash type hardware is specifically prohibited. Use multiple latches (minimum 4) where the door swing for a hinged door is restricted by the hung ceiling or some other obstruction.
- F. Fabricate doors airtight and suitable for duct pressure class.
- G. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
- H. Number of Hinges and Locks:
 - 1. Access Doors Less up to 12 Inches: Two hinges and one latch.
 - 2. Access Doors up to 20 Inches: Two hinges and two latches.
 - 3. Access Doors up to 24 Inches: Three hinges and two latches with outside and inside handles.
 - 4. Access Doors Larger than 24 Inches: Three hinges and two latches with outside and inside handles.
 - 5. Access doors shall be rated to maintain the fire/smoke rating of the equipment/duct in which they are installed.
- I. Pressure Relief Access Door:
 - 1. Door and Frame Material: Galvanized sheet steel.
 - 2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
 - 3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
 - 4. Factory set at 3.0- to 8.0-inch wg.
 - 5. Doors close when pressures are within set-point range.
 - 6. Hinge: Continuous piano.
 - 7. Latches: Cam.
 - 8. Seal: Neoprene or foam rubber.
 - 9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.10 DUCT AND PLENUM MOUNTED ACCESS DOORS (3.0 in w.g.)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acudor
 - 2. Buckley
 - 3. Ruskin
 - 4. Ventfabrics Incorporated
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct" unless otherwise noted.
- C. Door:
 - 1. Double wall, rectangular.
 - 2. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
- D. Hinges: Continuous piano hinge.
- E. Latches: similar to Ventfabrics, Inc. No. 100 for small doors and No. 310 where physical access is possible. Window latch/sash type hardware is specifically prohibited. Use multiple latches (minimum 4) where the door swing for a hinged door is restricted by the hung ceiling or some other obstruction.
- F. Fabricate doors airtight and suitable for duct pressure class.

- G.** Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
- H.** Number of Hinges and Locks:
 - 1. Access Doors Less up to 12 Inches: Two hinges and one latch.
 - 2. Access Doors up to 20 Inches: Two hinges and three latches.
 - 3. Access Doors up to 24 Inches: Three hinges and four latches with outside and inside handles.
- I.** Access Doors Larger than 24 Inches: Three hinges and four latches with outside and inside handles.
 - 1. Access doors shall be rated to maintain the fire/smoke rating of the equipment/duct in which they are installed.

2.11 DUCT AND PLENUM MOUNTED ACCESS DOORS (4.0-10 in w.g.)

- A.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Nailor
 - 2. Arrow
 - 3. Air Balance
- B.** Duct and Plenum Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct" unless otherwise noted.
- C.** Door:
 - 1. Double wall, rectangular.
 - 2. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
- D.** Hinges: Continuous piano hinge.
 - 1. Latches: similar to Ventfabrics, Inc. No. 100 for small doors and No. 310 where physical access is possible. Window latch/sash type hardware is specifically prohibited. Use multiple latches (minimum 4) where the door swing for a hinged door is restricted by the hung ceiling or some other obstruction.
- E.** Fabricate doors airtight and suitable for duct pressure class.
- F.** Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
- G.** Number of Hinges and Locks:
 - 1. Access Doors Less up to 12 Inches: Two hinges and three latches.
- H.** Access Doors up to 20 Inches: Three hinges and four latches.
- I.** Access Doors up to 24 Inches: Three hinges and six latches with outside and inside handles.
- J.** Access Doors Larger than 24 Inches: Four hinges and six latches with outside and inside handles.
 - 1. Access doors shall be rated to maintain the fire/smoke rating of the equipment/duct in which they are installed.
- K.** Pressure Relief Access Door:
 - 1. Door and Frame Material: Galvanized sheet steel.
 - 2. Door: Double wall with insulation fill with metal thickness applicable for duct pressure class.
 - 3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
 - 4. Factory set at 3.0- to 8.0-inch wg.
 - 5. Doors close when pressures are within set-point range.
 - 6. Hinge: Continuous piano.
 - 7. Latches: Cam.
 - 8. Seal: Neoprene or foam rubber.
 - 9. Insulation Fill: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.12 FLEXIBLE CONNECTORS

- A.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
 2. Duro Dyne Inc.
 3. Ventfabrics, Inc.
- B.** Materials: Flame-retardant or noncombustible fabrics.
- C.** Coatings and Adhesives: Comply with UL 181, Class 1.
- D.** Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to 2 strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
- E.** Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
- F.** Minimum Weight: 26 oz./sq. yd..
- G.** Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
- H.** Service Temperature: Minus 40 to plus 200 deg F.
- I.** Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
- J.** Minimum Weight: 24 oz./sq. yd..
- K.** Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
- L.** Service Temperature: Minus 50 to plus 250 deg F.
- M.** High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.
- N.** Minimum Weight: 16 oz./sq. yd..
- O.** Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
- P.** Service Temperature: Minus 67 to plus 500 deg F.

2.13 FLEXIBLE DUCTS

- A.** Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Flexmaster U.S.A., Inc. Type 3M
 2. McGill AirFlow LLC.
 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
 4. Buckley Type 3M
- B.** Insulated, Flexible Duct: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
1. Pressure Rating: 10-inch wg positive and 5.0-inch wg negative.
 2. Maximum Air Velocity: 4000 fpm.
 3. Temperature Range: Minus 20 to plus 210 deg F.
 4. Flame/Smoke Spread: 25/50.
- C.** Flexible Duct Connectors:
1. Clamps: Stainless steel strap in sizes 3 through 18 inches, to suit duct size.

2.14 DUCT ACCESSORY HARDWARE

- A.** Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B.** Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A.** Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.

- B.** Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C.** Install motorized dampers at the discharge of exhaust fans or exhaust ducts as close as possible to the exhaust outlet unless otherwise indicated.
- D.** Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts whether indicated or not. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel. Install damper in acoustically lined ducts in such a manner to avoid damage to liner and to avoid erosion of duct liner.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E.** Set dampers to fully open position before testing, adjusting, and balancing.
- F.** Provide volume dampers in each branch duct serving all inlets and outlets whether indicated or not.
- G.** Install volume damper as close to main as possible, maximum 2 duct widths from branch takeoff.
- H.** Install ribbon tag tied on to air control device for the purpose of visibly identifying control device locations.
- I.** Install test holes at fan inlets and outlets and elsewhere as indicated and as required.
- J.** Install fire, fire /smoke and smoke dampers according to UL listing.
- K.** Connect ducts to duct silencers rigidly.
- L.** Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 - 7. At each change in direction and at maximum 50-foot spacing.
 - 8. Upstream and downstream from turning vanes.
 - 9. Upstream or downstream from duct silencers.
 - 10. Control devices requiring inspection.
 - 11. Elsewhere as indicated.
- M.** Install access doors with swing against duct static pressure.
- N.** Access Door Sizes:
 - 1. One-Hand or Inspection Access: 12 by 12 inches.
 - 2. Two-Hand Access: 12 by 12 inches.
 - 3. Head and Hand Access: 20 by 16 inches.
 - 4. Head and Shoulders Access: 24 by 24 inches.
 - 5. Body Access: 24 by 24 inches.
 - 6. Body plus Ladder Access: 24 by 24 inches.
- O.** Label access doors according to Section 23 05 53 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.
- P.** Locate all duct balancing dampers above accessible ceilings, or provide cable operated dampers.
- Q.** Install flexible connectors to connect ducts to equipment.

- R. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- S. Install duct test holes where required for testing and balancing purposes.

3.2 FLEXIBLE DUCT

- A. Flexible duct sections shall not exceed 4'-0" fully extended.
- B. Flexible ductwork shall not be used for offsets or elbows.
- C. Joints shall be made with a minimum 2" overlap lined with mastic and sealed with metal clamps.
 - 1. Products: 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. 3M Scotch Seal EC800 mastic
 - b. Ductmate – 5511M Sealant
 - c. RCD - #7 Mastic
- D. Flexible ductwork shall only be used for branch duct to diffuser connections when indicated as an acceptable connector on the mechanical drawing details.
- E. Connections from branch duct to diffuser necks shall be rigid sheet metal unless otherwise noted on the drawing details.
- F. Flexible ductwork shall be supported in accordance with SMACNA Figure 3-10 and 3-11 "Flexible Duct Supports". A minimum of two (2) 1" wide metal straps shall be used. Wire hanging is not acceptable.

3.3 TEST CONNECTIONS

- A. On the discharge duct from each air handling unit downstream at least 5'-0" from unit if duct is accessible, or closer to unit if necessary, install a #699 Ventlock instrument test hold device for balancing and testing of system.

3.4 ACCESS DOORS IN WALLS AND CEILINGS

- A. Furnish access doors complying with the specified requirements in Access Doors and Panels.
- B. At each control and balancing damper in ductwork, at each fire damper and volume box, when located above ceiling or inside the wall not accessible by removal of grille or from the airshafts, furnish an access door for installation by the general contractor. Access doors shall be 18" x 18" (minimum) unless otherwise indicated on plans. In plenum ceilings, provide felt between the door and frame to make an air tight seal.
- C. All access panel locations shall be shown on the Coordination Drawings.
- D. Access doors shall be rated to maintain the fire/smoke rating of the wall/ceiling/construction in which they are installed.

3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.
 - 5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 23 33 00

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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. Utility set fans.
 - 2. Centrifugal roof ventilators.
 - 3. Axial roof ventilators.
 - 4. Upblast propeller roof exhaust fans.
 - 5. Centrifugal wall ventilators.
 - 6. Ceiling-mounted ventilators.
 - 7. In-line centrifugal fans.
 - 8. Propeller fans.

1.3 PERFORMANCE REQUIREMENTS

- A.** Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

- A.** Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material thickness and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
 - 6. Roof curbs.
 - 7. Fan speed controllers.
- B.** Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A.** Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Roof framing and support members relative to duct penetrations.
 - 2. Ceiling suspension assembly members.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- B.** Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.
- C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.8 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided.
- C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acme Engineering & Manufacturing Corporation.
 - 2. Greenheck Fan Corporation.
 - 3. Loren Cook Company.
- B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
 - 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.
 - 2. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Accessories:
 - 1. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
 - 3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
 - 4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 - 5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
- E. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch-thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
 - 1. Configuration: Built-in cant and mounting flange.
 - 2. Overall Height: 12 inches.
 - 3. Metal Liner: Galvanized steel.
 - 4. Mounting Pedestal: Galvanized steel with removable access panel.
 - 5. Vented Curb: Unlined with louvered vents in vertical sides.
- F. Capacities and Characteristics:
 - 1. Refer to plans & schedules.

2.2 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 23 05 13 "Common Motor Requirements for HVAC Equipment."
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- B. Enclosure Type: Totally enclosed, fan cooled.

2.3 SOURCE QUALITY CONTROL

- A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Support units using elastomeric mounts. Vibration control devices are specified in Section 23 05 48 "Vibration and Seismic Controls for HVAC Piping and Equipment."
- C. Secure roof-mounted fans to roof curbs with cadmium-plated hardware. See Section 07 72 00 "Roof Accessories" for installation of roof curbs.
- D. Install units with clearances for service and maintenance.
- E. Label units according to requirements specified in Section 23 05 53 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

- A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 23 33 00 "Air Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to manufacturer installation requirements.
- D. Connect wiring according to manufacturer installation requirements.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 5. Adjust belt tension.
 - 6. Adjust damper linkages for proper damper operation.

7. Verify lubrication for bearings and other moving parts.
 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 10. Shut unit down and reconnect automatic temperature-control operators.
 11. Remove and replace malfunctioning units and retest as specified above.
- C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - D. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Comply with requirements in Section 23 05 93 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor pulleys as required to achieve design airflow.
- E. Lubricate bearings.

END OF SECTION 23 34 23

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. Bypass, single-duct air terminal units.
 2. Dual-duct air terminal units.
 3. Fan-powered air terminal units.
 4. Shutoff, single-duct air terminal units.
 5. Diffuser-type air terminal units.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and.
1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
 2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
 3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

1.4 SUBMITTALS

- A. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.
1. Air terminal units.
 2. Liners and adhesives.
 3. Sealants and gaskets.
 4. Seismic-restraint devices.
- B. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.
1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 2. Wiring Diagrams: For power, signal, and control wiring.
 3. Hangers and supports, including methods for duct and building attachment and vibration isolation.
- C. 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 assembly members.
 2. Size and location of initial access modules for acoustic tile.
 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- D. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
1. Instructions for resetting minimum and maximum air volumes.
 2. Instructions for adjusting software set points.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of air terminal units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: minimum 18 months from substantial completion.

PART 2 - PRODUCTS

2.1 SHUTOFF, SINGLE-DUCT AIR TERMINAL UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Environmental Technologies, Inc.
 - 2. Nailor Industries Inc.
 - 3. Price Industries.
 - 4. Titus.
- B. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.
- C. Casing: 0.034-inch steel, single wall.
 - 1. Casing Lining: Adhesive attached, 3/4-inch- thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
 - 3. Air Outlet: S-slip and drive connections.
 - 4. Access Doors: Provide removable panels for access with latches upstream and downstream of coil and to parts requiring service, adjustment, or maintenance; with airtight gasket.
 - 5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
 - 1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.
 - 2. Damper Position: Normally open.
- E. Electronic Controls: Bidirectional damper operator and microprocessor-based thermostat with integral airflow transducer and room sensor. Control devices shall be compatible with temperature controls specified in Section 230900 "Instrumentation and Control for HVAC" and shall have the following features:
 - 1. Damper Actuator: 24 V, powered closed, powered open.
 - 2. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to 4-inch wg; and shall have a multipoint velocity sensor. Locate velocity sensors in cold-deck air inlets and air outlets.
- F. HANGERS AND SUPPORTS
- G. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- H. Hanger Rods for Corrosive Environments: Hot dipped galvanized, all-thread rods and nuts.
- I. Steel cables and cable clutches are not acceptable for hanging Terminal Air Units.
- J. Air Terminal Unit Attachments: Sheet metal screws or self-tapping metal screws; compatible with duct materials.

- K. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

2.2 SOURCE QUALITY CONTROL

- A. Factory Tests: Test assembled air terminal units according to ARI 880.
 - 1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
- B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.
- C. Install wall-mounted thermostats.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Do not use powder-actuated fasteners for terminal units or seismic restraints.
- C. Hangers Exposed to View: Threaded rod and angle or channel supports.
- D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- E. Steel cables and cable clutches are not acceptable for hanging Terminal Air Units.

3.3 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- B. Install cables so they do not bend across edges of adjacent equipment or building structure.
- C. Install cable restraints on air terminal units that are suspended with vibration isolators.
- D. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction.
- E. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
- F. Drilling for and Setting Anchors:
 - 1. Identify position of reinforcing steel and other embedded items before drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Install heavy-duty sleeve anchors with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Set anchors to manufacturer's recommended torque, using a torque wrench.

5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.4 CONNECTIONS

- A. Connect ducts to air terminal units according to Section 233113 "Metal Ducts."
- B. Make connections to air terminal units with rigid ductwork.
- C. Connect air terminal unit to main supply duct with a duct matching the inlet size of the terminal box unless otherwise indicated.

3.5 IDENTIFICATION

- A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
 1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Air terminal unit will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

3.7 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.
 2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
 3. Verify that controls and control enclosure are accessible.
 4. Verify that control connections are complete.
 5. Verify that nameplate and identification tag are visible.
 6. Verify that controls respond to inputs as specified.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION 23 36 00

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. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:
 1. Direct-expansion cooling.
 2. Hot-gas reheat.
 3. Gas furnace.
 4. Economizer outdoor- and return-air damper section.
 5. Integral, space temperature controls.
 6. Roof curbs.

1.3 DEFINITIONS

- A. DDC: Direct-digital controls.
- B. ECM: Electrically commutated motor.
- C. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.
- D. Outdoor-Air Refrigerant-Coil Fan: The outdoor-air refrigerant-coil fan in RTUs. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.
- E. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central-station air-handling units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.
- F. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.
- G. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.
- H. VVT: Variable-air volume and temperature.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design RTU supports to comply with wind requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Wind-Restraint Performance:
 1. Basic Wind Speed: 100 MPH.
 2. Building Classification: Type 3B: .
 3. Minimum 10 lb/sq. ft multiplied by the maximum area of the mechanical component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

1.5 ACTION SUBMITTALS

- A. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Delegated-Design Submittal: For RTU supports 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. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
 - 2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
 - 3. Wind-Restraint Details: Detail fabrication and attachment of wind restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Structural members to which RTUs will be attached.
 - 2. Roof openings
 - 3. Roof curbs and flashing.
- B. Manufacturer Wind Loading Qualification Certification: Submit certification that specified equipment will withstand wind forces identified in "Performance Requirements" Article.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of wind force and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control test reports.
- D. Warranty: Special warranty specified in this Section.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For RTUs to include in emergency, operation, and maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fan Belts: One set for each belt-driven fan.
 - 2. Filters: One set of filters for each unit.

1.9 QUALITY ASSURANCE

- A. ARI Compliance:
 - 1. Comply with ARI 203/110 and ARI 303/110 for testing and rating energy efficiencies for RTUs.
 - 2. Comply with ARI 270 for testing and rating sound performance for RTUs.
- B. ASHRAE Compliance:
 - 1. Comply with ASHRAE 15 for refrigeration system safety.
 - 2. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
 - 3. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

- C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
- D. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.
- E. UL Compliance: Comply with UL 1995.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.
 1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
 2. Warranty Period for Gas Furnace Heat Exchangers: Manufacturer's standard, but not less than 10 years from date of Substantial Completion.
 3. Warranty Period for Solid-State Ignition Modules: Manufacturer's standard, but not less than three years from date of Substantial Completion.
 4. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 1. AAON
 2. Daikin.
 3. Trane; American Standard Companies, Inc.

2.2 CASING

- A. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.
- B. Exterior Casing Material: Galvanized steel with factory-painted finish, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.
 1. Exterior Casing Thickness: 0.0626 inch thick.
- C. Inner Casing Fabrication Requirements:
 1. Inside Casing: Galvanized steel, 0.034 inch thick, perforated 40 percent free area.
- D. Casing Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
 1. Materials: ASTM C 1071, Type I.
 2. Thickness: 1 inch.
 3. Liner materials shall have air-stream surface coated with an erosion- and temperature-resistant coating or foil face.
 4. Liner Adhesive: Comply with ASTM C 916, Type I.
- E. Condensate Drain Pans: Formed sections of stainless-steel sheet, a minimum of 2 inches deep, and complying with ASHRAE 62.1.
 1. Double-Wall Construction: Fill space between walls with foam insulation and seal moisture tight.
 2. Drain Connections: Threaded nipple.

2.3 FANS

- A. Direct-Driven Supply-Air Fans: Double width, backward inclined, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.
- B. Belt-Driven Supply-Air Fans: Double width, backward inclined, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the casing. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.
- C. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.
- D. Relief-Air Fan: Backward inclined, shaft mounted on permanently lubricated motor.
- E. Fan Motor: Comply with requirements in Section 23 05 13 "Common Motor Requirements for HVAC Equipment."

2.4 COILS

- A. Supply-Air Refrigerant Coil:
 - 1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.
 - 2. Coil Split: Interlaced.
 - 3. Baked phenolic coating.
 - 4. Condensate Drain Pan: Stainless steel formed with pitch and drain connections complying with ASHRAE 62.1.
- B. Hot-Gas Reheat Refrigerant Coil:
 - 1. Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.
 - 2. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
 - 3. Baked phenolic coating.

2.5 REFRIGERANT CIRCUIT COMPONENTS

- A. Compressor: Hermetic, scroll, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater.
- B. Refrigeration Specialties:
 - 1. Refrigerant: R-407C or R-410A.
 - 2. Expansion valve with replaceable thermostatic element.
 - 3. Refrigerant filter/dryer.
 - 4. Manual-reset high-pressure safety switch.
 - 5. Automatic-reset low-pressure safety switch.
 - 6. Minimum off-time relay.
 - 7. Automatic-reset compressor motor thermal overload.
 - 8. Brass service valves installed in compressor suction and liquid lines.
 - 9. Low-ambient kit high-pressure sensor.
 - 10. Hot-gas reheat solenoid valve with a replaceable magnetic coil.
 - 11. Hot-gas bypass solenoid valve with a replaceable magnetic coil.
 - 12. Four-way reversing valve with a replaceable magnetic coil, thermostatic expansion valves with bypass check valves, and a suction line accumulator.

2.6 AIR FILTRATION

- A. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - 1. Glass Fiber: Minimum 80 percent arrestance, and MERV 8.
 - 2. Pleated: Minimum 90 percent arrestance, and MERV 12.

2.7 GAS FURNACE

- A. Description: Factory assembled, piped, and wired; complying with ANSI Z21.47 and NFPA 54.
 - 1. CSA Approval: Designed and certified by and bearing label of CSA.
- B. Burners: Stainless steel.
 - 1. Fuel: Natural gas.
 - 2. Ignition: Electronically controlled electric spark or hot-surface igniter with flame sensor.
 - 3. High-Altitude Model: For Project elevations more than 2000 feet above sea level.
- C. Heat-Exchanger and Drain Pan: Stainless steel.
- D. Venting: Gravity vented with vertical extension.
- E. Safety Controls:
 - 1. Gas Control Valve: Modulating.
 - 2. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.

2.8 DAMPERS

- A. Outdoor-Air Damper: Linked damper blades, for 0 to 25 percent outdoor air, with motorized damper.
- B. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
 - 1. Damper Motor: Modulating with adjustable minimum position.
 - 2. Relief-Air Damper: Gravity actuated or motorized, as required by ASHRAE/IESNA 90.1, with bird screen and hood.

2.9 ELECTRICAL POWER CONNECTION

- A. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit and control-circuit transformer with built-in overcurrent protection.

2.10 CONTROLS

- A. Basic Unit Controls:
 - 1. Control-voltage transformer.
 - 2. Furnish and install Daikin System Manager (Basis of Design) or equivalent. Controller shall be capable of controlling local terminal boxes. Refer to specification 230993 for additional requirements. Final location of controller shall be coordinated with end user.
 - 3. Remote Wall-Mounted Annunciator Panel for Each Unit:
 - a. Lights to indicate power on, cooling, heating, fan running, filter dirty, and unit alarm or failure.
 - b. DDC controller or programmable timer.
 - c. Digital display of outdoor-air temperature, supply-air temperature, return-air temperature, economizer damper position, indoor-air quality, and control parameters.
- B. Electronic Controller:
 - 1. Controller shall have volatile-memory backup.
 - 2. Safety Control Operation:
 - a. Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
 - b. Firestats: Stop fan and close outdoor-air damper if air greater than 130 deg F enters unit. Provide additional contacts for alarm interface to fire alarm control panel.
 - c. Fire Alarm Control Panel Interface.
 - d. Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply air temperature is less than 40 deg F.

3. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
4. Unoccupied Period:
 - a. Heating Setback: 10 deg F.
 - b. Cooling Setback: System off.
 - c. Override Operation: Two hours.
5. Supply Fan Operation:
 - a. Occupied Periods: Run fan continuously.
 - b. Unoccupied Periods: Cycle fan to maintain setback temperature.
6. Refrigerant Circuit Operation:
 - a. Occupied Periods: Cycle or stage compressors, and operate hot-gas bypass to match compressor output to cooling load to maintain room temperature and humidity. Cycle condenser fans to maintain maximum hot-gas pressure. Operate low-ambient control kit to maintain minimum hot-gas pressure.
 - b. Unoccupied Periods: Cycle compressors and condenser fans for heating to maintain setback temperature.
 - c. Switch reversing valve for heating or cooling mode on air-to-air heat pump.
7. Hot-Gas Reheat-Coil Operation:
 - a. Occupied Periods: Humidistat opens hot-gas valve to provide hot-gas reheat, and cycles compressor.
 - b. Unoccupied Periods: Reheat not required.
8. Gas Furnace Operation:
 - a. Occupied Periods: Modulate burner to maintain room temperature.
 - b. Unoccupied Periods: Cycle burner to maintain setback temperature.
9. Economizer Outdoor-Air Damper Operation:
 - a. Occupied Periods: Open to 25 percent fixed minimum intake, and maximum 100 percent of the fan capacity to comply with ASHRAE Cycle II. Controller shall permit air-side economizer operation when outdoor air is less than 60 deg F. Use outdoor-air enthalpy to adjust mixing dampers. Start relief-air fan with end switch on outdoor-air damper. During economizer cycle operation, lock out cooling.
 - b. Unoccupied Periods: Close outdoor-air damper and open return-air damper.
10. Carbon Dioxide Sensor Operation:
 - a. Occupied Periods: Reset minimum outdoor-air ratio down to minimum 10 percent to maintain maximum 1000-ppm concentration.
 - b. Unoccupied Periods: Close outdoor-air damper and open return-air damper.

2.11 ACCESSORIES

- A. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required. Outlet shall be energized even if the unit main disconnect is open.
- B. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.
- C. Coil guards of painted, galvanized-steel wire.
- D. Hail guards of galvanized steel, painted to match casing.
- E. Concentric diffuser with white louvers and polished aluminum return grilles, insulated diffuser box with mounting flanges, and interior transition.

2.12 ROOF CURBS

- A. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.

1. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
 - a. Materials: ASTM C 1071, Type I or II.
 - b. Thickness: 2 inches.
2. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.
 - a. Liner Adhesive: Comply with ASTM C 916, Type I.
 - b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
 - c. Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service air velocity.
 - d. Liner Adhesive: Comply with ASTM C 916, Type I.
- B. Curb Height: 18 inches.
- C. Wind and Seismic Restraints: Metal brackets compatible with the curb and casing, painted to match RTU, used to anchor unit to the curb, and designed for loads at Project site.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of RTUs.
- B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.
- C. Examine roofs for suitable conditions where RTUs will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Roof Curb: Install on roof structure or concrete base, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction specified in Section 07 72 00 "Roof Accessories." Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.
- B. Unit Support: Install unit level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to structural support with anchor bolts.

3.3 CONNECTIONS

- A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
- B. Install piping adjacent to RTUs to allow service and maintenance.
 1. Gas Piping: Comply with applicable requirements in Section 22 11 25 "Natural-Gas Piping." Connect gas piping to burner, full size of gas train inlet, and connect with union and shutoff valve with sufficient clearance for burner removal and service.
- C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
 1. Install ducts to termination at top of roof curb.
 2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
 3. Connect supply ducts to RTUs with flexible duct connectors specified in Section 23 33 00 "Air Duct Accessories."
 4. Install return-air duct continuously through roof structure.

5. Install normal-weight, 3000-psi, compressive strength (28-day) concrete mix inside roof curb, 4 inches thick. Concrete, formwork, and reinforcement are specified with concrete.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Report results in writing.
- C. Tests and Inspections:
 1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
 1. Inspect for visible damage to unit casing.
 2. Inspect for visible damage to furnace combustion chamber.
 3. Inspect for visible damage to compressor, coils, and fans.
 4. Inspect internal insulation.
 5. Verify that labels are clearly visible.
 6. Verify that clearances have been provided for servicing.
 7. Verify that controls are connected and operable.
 8. Verify that filters are installed.
 9. Clean condenser coil and inspect for construction debris.
 10. Clean furnace flue and inspect for construction debris.
 11. Connect and purge gas line.
 12. Inspect operation of barometric relief dampers.
 13. Verify lubrication on fan and motor bearings.
 14. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 15. Adjust fan belts to proper alignment and tension.
 16. Start unit according to manufacturer's written instructions.
 - a. Start refrigeration system.
 - b. Do not operate below recommended low-ambient temperature.
 - c. Complete startup sheets and attach copy with Contractor's startup report.
 17. Inspect and record performance of interlocks and protective devices; verify sequences.
 18. Operate unit for an initial period as recommended or required by manufacturer.
 19. Perform the following operations for both minimum and maximum firing. Adjust burner for peak efficiency.

- a. Measure gas pressure on manifold.
 - b. Inspect operation of power vents.
 - c. Measure combustion-air temperature at inlet to combustion chamber.
 - d. Measure flue-gas temperature at furnace discharge.
 - e. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
 - f. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
20. Calibrate thermostats.
21. Adjust and inspect high-temperature limits.
22. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
23. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F above return-air temperature:
- a. Coil leaving-air, dry- and wet-bulb temperatures.
 - b. Coil entering-air, dry- and wet-bulb temperatures.
 - c. Outdoor-air, dry-bulb temperature.
 - d. Outdoor-air-coil, discharge-air, dry-bulb temperature.
24. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
25. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
- a. Supply-air volume.
 - b. Return-air volume.
 - c. Relief-air volume.
 - d. Outdoor-air intake volume.
26. Simulate maximum cooling demand and inspect the following:
- a. Compressor refrigerant suction and hot-gas pressures.
 - b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.
27. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
- a. High-temperature limit on gas-fired heat exchanger.
 - b. Low-temperature safety operation.
 - c. Filter high-pressure differential alarm.
 - d. Economizer to minimum outdoor-air changeover.
 - e. Relief-air fan operation.
 - f. Smoke and firestat alarms.
28. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.
- B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs. Refer to Section 01 79 00 "Demonstration and Training."

END OF SECTION 23 74 13

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 split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and 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.
 - 1. Filters: One set(s) for each air-handling unit.

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and Section 7 - "Construction and System Start-up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Section 03 30 00 "Cast-in-Place Concrete."
- B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
1. Warranty Period:
 - a. For Compressor: Five year(s) from date of Substantial Completion.
 - b. For Parts: Five year(s) from date of Substantial Completion.
 - c. For Labor: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following].
1. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
 2. SANYO North America Corporation; SANYO Fisher Company.
 3. Trane; a business of American Standard companies.

2.2 INDOOR UNITS (5 TONS OR LESS)

- A. Concealed Evaporator-Fan Components:
1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
 2. Insulation: Faced, glass-fiber duct liner.
 3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
 4. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch; leak tested to 300 psig underwater; with a two-position control valve.
 5. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
 6. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
 7. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 23 05 13 "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - c. Wiring Terminations: Connect motor to chassis wiring with plug connection.
 8. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 9. Filters: Permanent, cleanable.
 10. Condensate Drain Pans:
 - a. Fabricated with [one] [two] percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - 1) Length: Extend drain pan downstream from leaving face [to comply with ASHRAE 62.1] <Insert distance>.
 - 2) Depth: A minimum of [2 inches] <Insert depth> deep.
 - b. Single-wall, [galvanized] [stainless]-steel sheet.

- c. Double-wall, **[galvanized] [stainless]**-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
 - d. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on **[one end] [both ends]** of pan.
 - 1) Minimum Connection Size: **[NPS 1] [NPS 2] <Insert size>**.
 - e. Pan-Top Surface Coating: Asphaltic waterproofing compound.
 - f. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.
- B. Floor-Mounted, Evaporator-Fan Components:**
- 1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect.
 - a. Discharge Grille: **[Steel with surface-mounted frame] [Welded steel bars forming a linear grille and welded into supporting panel]**.
 - b. Insulation: Faced, glass-fiber duct liner.
 - c. Drain Pans: Galvanized steel, with connection for drain; insulated.
 - 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
 - 3. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch; leak tested to 300 psig underwater; with a two-position control valve.
 - 4. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
 - 5. Fan: Direct drive, centrifugal **[, with power-induced outside air]**.
 - 6. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 23 05 13 "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - 7. Air Filtration Section:
 - a. General Requirements for Air Filtration Section:
 - 1) Comply with NFPA 90A.
 - 2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
 - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
 - b. Disposable Panel Filters:
 - 1) Factory-fabricated, viscous-coated, flat-panel type.
 - 2) Thickness: **[1 inch] [2 inches]**.
 - 3) Dust-Holding Capacity: **<Insert lb>**.
 - 4) Initial Resistance: **<Insert inches wg>**.
 - 5) Recommended Final Resistance: **<Insert inches wg>**.
 - 6) Arrestance according to ASHRAE 52.1: **[80] <Insert value>**.
 - 7) Merv according to ASHRAE 52.2: **[5] <Insert value>**.
 - 8) Media: Interlaced glass fibers sprayed with nonflammable adhesive **[and antimicrobial agent]**.
 - 9) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.
 - c. Extended-Surface, Disposable Panel Filters:
 - 1) Factory-fabricated, dry, extended-surface type.

- 2) Thickness: [1 inch] [2 inches] [4 inches].
 - 3) Dust-Holding Capacity: <Insert lb>.
 - 4) Initial Resistance: <Insert inches wg>.
 - 5) Recommended Final Resistance: <Insert inches wg>.
 - 6) Arrestance according to ASHRAE 52.1: [90] <Insert value>.
 - 7) Merv according to ASHRAE 52.2: [7] <Insert value>.
 - 8) Media: Fibrous material formed into deep-V-shaped pleats [with antimicrobial agent] and held by self-supporting wire grid.
 - 9) Media-Grid Frame: [Nonflammable cardboard] [Galvanized steel] [Fire-retardant, 3/4-inch particleboard with gaskets].
 - 10) Mounting Frames: Welded, galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- C. Wall-Mounted, Evaporator-Fan Components:
1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 210/240.
 3. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
 4. Fan: Direct drive, centrifugal.
 5. Fan Motors:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 23 05 13 "Common Motor Requirements for HVAC Equipment."
 - b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 - c. Enclosure Type: Totally enclosed, fan cooled.
 - d. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
 - e. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
 - f. Mount unit-mounted disconnect switches on [exterior] [interior] of unit.
 - g. <Insert unique motor characteristics>.
 6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 7. Condensate Drain Pans:
 - a. Fabricated with [one] [two] percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 - 1) Length: Extend drain pan downstream from leaving face [to comply with ASHRAE 62.1] <Insert distance>.
 - 2) Depth: A minimum of [1 inch] <Insert depth> deep.
 - b. Single-wall, [galvanized] [stainless]-steel sheet.
 - c. Double-wall, [galvanized] [stainless]-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
 - d. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on [one end] [both ends] of pan.
 - 1) Minimum Connection Size: [NPS 1] [NPS 2] <Insert size>.
 - e. Pan-Top Surface Coating: Asphaltic waterproofing compound.

8. Air Filtration Section:
 - a. General Requirements for Air Filtration Section:
 - 1) Comply with NFPA 90A.
 - 2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
 - 3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.
 - b. Disposable Panel Filters:
 - 1) Factory-fabricated, viscous-coated, flat-panel type.
 - 2) Thickness: [1 inch] [2 inches].
 - 3) Dust-Holding Capacity: <Insert lb>.
 - 4) Initial Resistance: <Insert inches wg>.
 - 5) Recommended Final Resistance: <Insert inches wg>.
 - 6) Arrestance according to ASHRAE 52.1: [80] <Insert value>.
 - 7) Merv according to ASHRAE 52.2: [5] <Insert value>.
 - 8) Media: Interlaced glass fibers sprayed with nonflammable adhesive[and antimicrobial agent].
 - 9) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.
 - c. Extended-Surface, Disposable Panel Filters:
 - 1) Factory-fabricated, dry, extended-surface type.
 - 2) Thickness: [1 inch] [2 inches] [4 inches].
 - 3) Dust-Holding Capacity: <Insert lb>.
 - 4) Initial Resistance: <Insert inches wg>.
 - 5) Recommended Final Resistance: <Insert inches wg>.
 - 6) Arrestance according to ASHRAE 52.1: [90] <Insert value>.
 - 7) Merv according to ASHRAE 52.2: [7] <Insert value>.
 - 8) Media: Fibrous material formed into deep-V-shaped pleats[with antimicrobial agent] and held by self-supporting wire grid.
 - 9) Media-Grid Frame: [Nonflammable cardboard] [Galvanized steel] [Fire-retardant, 3/4-inch particleboard with gaskets].
 - 10) Mounting Frames: Welded, galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

- A. Air-Cooled, Compressor-Condenser Components:
 1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
 2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant Charge: R-407C or R-410A.
 - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 210/240.
 3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.

4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F.
7. Mounting Base: Polyethylene.

2.4 ACCESSORIES

- A. Thermostat: 7-Day programmable, low voltage with subbase to control compressor and evaporator fan.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
- D. Drain Hose: For condensate.

2.5 CAPACITIES AND CHARACTERISTICS

- A. Refer to floor plans for requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install roof-mounted, compressor-condenser components on equipment supports specified in Section 07 72 00 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.
- D. Install seismic restraints.
- E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 23 81 26

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PART 1 - PRODUCTS

1.1 GENERAL REQUIREMENTS

- A. Work of this Division shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install all work of this Division as shown on the drawings, as specified herein, and/or as required by job conditions.
- B. This Section 26 01 00 governs general procedures, materials and workmanship as applicable to the electrical work specified in the other Division 26 sections. Refer to Division 1 sections for additional general requirements.
- C. Perform the work in accordance with the requirements and provisions of all applicable codes and laws.
- D. Equipment, materials, and installation shall conform to applicable standards and requirements of the following organizations and documents:
 - ANSI American National Standards Institute
 - ASTM American Society for Testing and Materials
 - AWS American Welding Society
 - CBM Certified Ballast Manufacturers Association
 - ETL ETL Testing Laboratories
 - FCC Federal Communications Commission
 - FM Factory Mutual
 - FS Federal Specifications
 - ICEA Insulated Cable Engineers Association
 - IEEE Institute of Electrical and Electronic Engineers
 - IESNA Illuminating Engineering Society of North America
 - NEC National Electrical Code
 - NECA National Electrical Contractors Association
 - NEMA National Electrical Manufacturers Association
 - NESC National Electric Safety Code
 - NETA International Electrical Testing Association
 - NFPA National Fire Protection Association
 - OSHA Occupational Safety and Health Administration
 - UL Underwriters Laboratories, Inc.

1.2 INTENT

- A. It is the intention of the specifications and drawings to obtain finished work, clean, tested, and ready for operation.
- B. Items and services not shown on drawings, but mentioned in specifications, or vice versa, or items and services necessary to render the work complete and ready for operation, even if not specified, shall be provided without additional cost.
- C. Where conflicts occur between drawings and specifications, or within either document, the Contractor shall ask for and obtain a written clarification from the Architect prior to submitting his bid. Otherwise, the items or arrangements of superior quality, greater quantity or higher cost shall prevail and be included in the contract price.

1.3 WORK INCLUDED

- A. The work under this Division shall include all labor, material, equipment, services and administrative tasks required to complete and make operable the electrical work shown on the drawings and specified herein, and including, but not limited to, the following:
 - 1. Preparation and submission of shop drawings, diagrams and illustrations.
 - 2. Procuring all necessary permits and approvals, and paying all required fees and charges in connection with the work of this Division.
 - 3. Coordinating with, and complying with requirements of, the local electric utility, telephone company, and other franchised utility and service companies as applicable to the scope of this work.
 - 4. Record drawings.
 - 5. Operating and maintenance instructions and manuals.
 - 6. Identification labels, tags, charts and diagrams.
 - 7. Final connections to all electrical equipment and devices.
 - 8. All cutting, drilling, and patching required for the work of this Division.
 - 9. Temporary light and power for construction purposes.
 - 10. Testing and adjustment of all systems and equipment furnished, installed, and/or connected under this Division.

1.4 APPROVALS

- A. See General Conditions and Division 1 sections, in addition to the following requirements.
- B. Submit for approval a list of manufacturers of equipment proposed for the work. Contractor's intent to use exact make specified does not relieve him of responsibility for submitting such a list.
- C. Where any specific material, process or method of construction, or manufactured article is specified by name or by reference to catalog number of a manufacturer, or other standards, the intent is not to take precedence over the basic duty and performance specified, noted on drawings, or as required for intended results. In all cases, the Contractor shall verify the duty specified with the specific characteristics of the equipment offered for approval.
- D. If material or equipment is installed before it is approved, the Contractor shall be liable for its removal and replacement with no additional cost.

1.5 SUBMITTALS

- A. See Division 26 equipment sections for specific submittals required. Unless otherwise indicated, submittals are required for all electrical devices, equipment, and systems including basic construction materials such as conduit, 600 volt building wire, and standard fittings and boxes.
- B. Manufacturers' Data
 - 1. If catalog cuts of standard manufactured items show different types, options, finishes, performance requirements, or other variations, those features that the Contractor proposes to furnish shall be clearly identified. If any variations from the catalog description are proposed or required, such variations must be clearly noted on the cut.
- C. Shop Drawings
 - 1. Shop drawings shall clearly indicate all details, sectional views, arrangements, working and erection dimensions, kinds and quality of materials and their finishes, and other information necessary for proper checking and for fabrication and installation of the items, and shall include all information required for making connections to other work.
 - 2. Shop drawings shall be numbered consecutively, and drawings related to various units comprising a proposed assembly shall be submitted simultaneously so that such units may be checked both individually and as an assembly.
 - 3. Contractor shall keep on the site, in good order, a complete up-to-date set of approved shop drawings. Shop drawings shall be made available for inspection by the Architect.

4. The approval of shop drawings will be for general conformance to drawings and specifications, and shall not be construed as permitting any departure from the contract requirements. If the shop drawings show any variations from contract requirements because of standard shop practices or other reasons, such variations shall be clearly identified on the drawings or specifically noted in the letter of transmittal, in order that, if acceptable, suitable action may be taken for proper adjustment in other work affected thereby. If the Contractor fails to so identify such variations, he will not be relieved of responsibility for executing the work in accordance with the contract, even though such shop drawings have been approved and the work installed. Approval shall not relieve the Contractor of responsibility for any error in details, dimensions, etc. that may exist on shop drawings, nor for the furnishing of materials or work required by the contract and not indicated on the shop drawings. Approval shall not be construed as approved departure from details or instructions previously furnished by the Architect.
 5. No work for which shop drawings are required shall be executed until the Architect's approval is obtained.
- D. Shop Drawing Schedule**
1. The Contractor shall submit, within 30 days of the award of his contract, a schedule of all proposed shop drawing submissions.
 2. The schedule shall include the following information.
 - a. Item to be submitted
 - b. Date of submission
 - c. Latest date for review
 - d. Manufacturers of the specified item.
 3. Items not specifically listed as "approved equal" should be listed for consideration at this time.
 4. Shop drawings require a minimum of 10 business days from the date they have been received by the Consulting Engineer's office to adequately review the submittal. If there is any submittal which requires to be expedited sooner than the 10 business days, the Engineer shall be informed in writing at the beginning of construction with a list of those submittals.
- E. Operating and Maintenance Instructions**
1. Furnish manufacturer's operating and maintenance instructions, parts lists, and sources of supply for replacements.

1.6 RECORD DRAWINGS

- A.** Provide record drawings in accordance with contract requirements, indicating in a neat and accurate manner a complete record of all revisions to the original design of the work. Include all changes and an accurate record, on reproductions of the contract drawings or appropriate shop drawings, of all deviations between the work shown and the work installed.
- B.** The contractor shall provide a complete set of as-built drawings. Drawings shall be submitted in both hard copy and electronic (AutoCAD and Revit version as required by the Owner) version or AutoCAD Version 2014 if not specified. Number of copies of each as requested by the Owner.
- C.** The as-built drawings shall reflect as installed conditions including all addenda, and miscellaneous revisions. The contractor shall make necessary modifications to the as-built drawings based upon the review submission comments. The final product shall include a copy of all electronic files of all as-built drawings of size and format consistent with the project standards.

1.7 GUARANTEES AND SERVICES

- A.** All workmanship, installation materials, and equipment shall be guaranteed as specified in the General Conditions and Division 1.
- B.** Contractor shall leave entire system installed under this Contract in proper working order, and shall replace any work or material which develops defects within the guarantee period, including all other work damaged as a result of such defects, without additional cost.

1.8 PERMITS AND CERTIFICATES

- A. Prior to proceeding with any installation, the Contractor shall prepare and submit to the proper authorities for their approval all working drawings required by them, and shall give all necessary notices, obtain all permits, and pay all local, state and federal taxes, fees and other costs in connection with this work.

1.9 EQUIPMENT MANUALS AND OPERATING INSTRUCTIONS

- A. Provide the following:
 - 1. Three complete sets of final and correct shop drawings, maintenance and replacement parts manuals, and operating instructions for the equipment supplied. Bind each set within a common binder. Index, number, and organize with a table of contents to permit quick and convenient reference.
 - 2. Three days of instruction in operation and maintenance of equipment to Owner's maintenance force during a 2-week period. Designate a 2-week period, convenient to the Owner, during which qualified personnel, including manufacturers' technicians and engineers, will be available for Owner's instructions.

PART 2 - PRODUCTS

2.1 MATERIALS, EQUIPMENT AND SYSTEMS

- A. Materials and equipment and systems shall be new, bear manufacturer's name and trademark, and comply with applicable standards specified.
- B. The UL label shall be borne on each piece of applicable material or equipment.
- C. Equipment shall be provided with all required hardware for proper installation, assembly, and operation.
- D. The descriptions cover basic equipment and operation but not all the details of design and construction. The use of singular in descriptions does not limit the quantities of items to be furnished to provide the operation specified. Furnish all equipment required to produce specified performance under installed conditions. Provide all trim, enclosures and accessories required to make a complete installation.
- E. Follow manufacturers' directions in delivery, storage, protection and installation of equipment and materials. Notify Architect promptly, in writing, of any conflict between requirements of the contract documents and manufacturers' directions, and obtain Architect's written instructions before proceeding with work. Bear all costs to correct deficiencies arising from failure to comply with the manufacturers' directions and instructions.
- F. Deliver equipment and materials to the site and store in original containers, suitably sheltered from the elements. Store items subject to moisture damage in dry, heated spaces. Tightly cover and protect equipment against dirt, water, chemical, and mechanical injury, and against theft.
- G. Equipment and materials of the same general type shall be of the same manufacturer, make and model throughout the work to provide uniform appearance, operation and maintenance.
- H. Where new products or components are indicated to be installed or connected to existing systems or equipment, verify compatibility and performance with the manufacturer of the existing systems or equipment prior to purchase and installation.
- I. Where devices and/or equipment are indicated to be relocated, conductors and raceway shall be extended to the new location and reconnected to provide a complete working system. If there are associated devices with the relocated equipment they shall be relocated as well, unless otherwise noted, and connected into the system.

2.2 EQUIPMENT DEVIATIONS

- A. Where Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, and which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical or electrical layouts, such redesign and new drawings required thereby, with approval of the Architect, shall be prepared by the Contractor without additional cost.

- B. Where such approved deviation requires a different quantity or arrangement of equipment from that specified or indicated on the drawings, the Contractor shall provide any structural supports, controllers, motors, starters, wiring, conduit, and any other additional equipment required by the deviation, at no additional cost.
- C. It is the intent of these specifications that wherever a manufacturer of a product or a catalog number is specified, and terms "or equal" or "or approved equal" are used, a substituted item must conform in all essential respects to the specified item. Consideration will not be given to claims that a substituted item meets performance requirements with lesser construction. Performance as indicated in schedules and in specifications shall be interpreted as minimum acceptable performance.

PART 3 - EXECUTION

3.1 SITE INVESTIGATION

- A. Examine drawings, specifications, and site, and be responsible for the nature and location of work and the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, availability of labor, electric power, roads, etc.

3.2 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of systems and work required. Do not scale the drawings. Consult the Mechanical and Architectural drawings and details for exact locations of equipment.
- B. Drawings shall be used in layout of work. Check reference drawings to verify spaces in which work will be installed, and maintain maximum headroom and space conditions. Where headroom, working clearances or space conditions appear inadequate, Architect shall be notified before proceeding with installation.
- C. If directed by the Architect, make minor modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

3.3 COORDINATION WITH OTHER TRADES

- A. Closely schedule the work so that the work will be installed at the proper time and without delaying the project's completion.
- B. Where the work of this Division is to be installed in close proximity to the work of other trades, or where there is evidence that the work will interfere with the work of other trades, assist in working out space conditions to make a satisfactory arrangement. If the work is installed before such coordination with other trades, make necessary changes in the work as directed by the Architect to correct any conflicts or interferences, without additional cost.

3.4 COORDINATION AND LAYOUT

- A. Study drawings and specifications to ensure completeness of work required. Include supplementary items normal to manufacturers' requirements or standard accepted trade practices as necessary to complete the work, even if not explicitly shown or specified.
- B. Verify measurements and conditions in field before starting work.
- C. Examine materials, surfaces, and structures to which work is to be applied and notify the Architect, in writing, of any conditions which are detrimental to proper and expeditious installation of work. Starting of work shall be construed as acceptance of conditions.
- D. Confer with other trades to install work to avoid interference with other trades. The necessary adjustments to conform to structural conditions and work of other trades, particularly ductwork and piping layouts, is included under this section. Assist other trades in the preparation of coordinated layout drawings.

3.5 CONNECTIONS TO EQUIPMENT FURNISHED UNDER OTHER DIVISIONS

- A. Provide electrical connections to equipment and fixtures requiring such connections which are supplied under other Divisions.
- B. Provide conduit, wire, fittings, accessories, and trim for final connection of each item of equipment as required for complete assembly and specified operation.
- C. Verify with approved project submittals that power conductor's meet both project as well as manufacturer requirements prior to conductor procurement and installation.
- D. Verify conductor material and specified size are compatible with equipment to be connected to.
- E. Notify architect and design team of identified issues prior to conductor procurement and installation.
- F. Proceed with procurement and installation only after unsatisfactory conditions have been corrected.

3.6 WORKMANSHIP

- A. Perform work in practical, neat, and workmanlike manner, with electricians skilled in the work they are performing, and using the best generally recognized trade practices.
- B. No work shall be covered or hidden from view until it has been inspected and approved by the required Building Department personnel and the Architect.
- C. Workmanship or materials not meeting with requirements of the specifications or drawings, or the satisfaction of the Architect, shall be rejected and shall be immediately replaced in an acceptable manner without additional cost.

3.7 TESTS

- A. Test all wiring, lighting fixtures, switches, controllers, starters, motors, etc., wired under this Division. Leave free from grounds, crosses, shorts, opens, etc., and leave materials and apparatus in proper and satisfactory working condition. Perform additional tests as listed in the other Division 26 specification sections.
- B. Furnish necessary meters, instruments, temporary wiring, and skilled labor to perform tests and adjustments. Measuring instruments shall be properly calibrated.
- C. Prior to energizing, test insulation resistance of all conductors and distribution equipment with a 500VDC megger, both phase-to-phase and phase-to-ground. Do not energize any circuits with a reading of less than 50 megohms. Circuits under megger insulation test shall be connected to respective final terminals but with switches and breakers in the "OFF" position.
- D. Prior to energizing, test for continuity and identification of each conductor. Identify both ends of each conductor.
- E. Perform additional tests required by Owner, Architect or any other authorities having jurisdiction.
- F. Correct or replace any circuit, material or equipment which is found to be defective by these tests. Correct defects, whether due to faulty workmanship or material furnished, in a manner acceptable to Engineer without additional cost.
- G. Test all three phase equipment and motors for proper phase connections and phase rotation. Correct as required.
- H. Notify Architect, in writing, at least one week prior to tests, of the proposed testing timetables. Perform tests with the approval of and in the presence of the Architect or his representative.

3.8 IDENTIFICATION

- A. Equipment
 - 1. Identify each item and the system or area it serves. Provide an engraved multilayer, multicolor, plastic nameplate in a visible location on each disconnect, switch, control and similar accessory. Provide stencils on all major equipment.
 - 2. All junction boxes, switches, controllers, etc., shall be identified as to systems, voltage, phases, etc., on their exteriors.

- B. Wiring**
 - 1. Provide fiber tags for feeders and branch circuits in pull boxes, cabinets, and outlets to identify each feeder and circuit.
 - 2. All cables and branch wiring shall be identified showing phasing, system designations, and items served. Identity is required in switchboards, panels, junction boxes, switches, controllers, cabinets, etc.
- C.** For all panelboards and switchboards part of scope of work, provide updated, complete, accurate, typewritten panelboard and switchboard directories mounted securely to panelboard doors and switchboard faces.

3.9 TEMPORARY LIGHT AND POWER

- A.** Contractor shall furnish, install and maintain a temporary light and power system to provide the buildings, field offices, and project site with temporary light to provide safe working conditions throughout, and to supply construction power as required on the job.
- B.** The system shall be furnished, installed, and operating at the earliest possible date.
- C.** All work for the system shall be in accordance with NEC Article 305, the requirements of the Utility Company, and as approved by the Owner and authorities having jurisdiction.
- D.** The work shall include generally, but not be limited to, the following:
 - 1. Make all arrangements with the utility company or the Owner to furnish and install the temporary light and power service.
 - 2. Review and coordinate the electrical needs of all trades on a continuing basis, until permanent power and light is available and the temporary system is removed and no longer needed.
 - 3. Furnish, install, and maintain all required temporary system equipment, devices, and wiring. Remove when no longer needed, or at the direction of the Owner. Modify, add, or relocate equipment, devices, and wiring as required to suit job conditions.

END OF SECTION 26 01 00

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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. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Procedure: Prepare and make the submissions listed below and in Division 1.
- B. Shop Drawings: Submit shop drawings of all items proposed to be furnished and installed under this Division.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways and cables will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- C. Upon installation of back boxes for devices but prior to installation of raceway to same the contractor shall notify the Owner, Architect and Engineer at least two weeks prior so that a site visit for review of back box locations may be performed. Contractor shall promptly be given marked up directions indicating which back boxes are to be relocated. Relocation of back boxes as a result of the site review shall be performed at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 3. Pressure Plates: Plastic. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways or cables penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- D. Cut sleeves to length for mounting flush with both surfaces of walls.
- E. Extend sleeves installed in floors 2 inches above finished floor level.
- F. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- G. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

- I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- J. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 26 05 00

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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. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Personnel with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. General Cable Corporation.
 - 2. Southwire Company.
 - 3. Allied Wire and Cable
- B. Copper Conductors: Comply with NEMA WC 70 THHN-THWN.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- D. Multiconductor Cable: Comply with NEMA WC70 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.

- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway and Metal-clad cable, Type MC. Homeruns shall be THHN-THWN, single conductors in raceway. Homerun shall be considered from the panelboard to the area served. Contractor shall provide a junction box in the area served to homerun from and transition to MC cable.
- B. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- C. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."
- G. Metal clad cables are permitted for lighting switching legs in dry walls and for whips not exceeding 6 feet in length from a junction box to light fixtures in ceiling.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor shall perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.
- C. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken and observations after remedial action.
- D. Test Reports: Prepare a written report to record the following:
 1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19

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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. This Section includes methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.

4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.
 7. Metal-clad cable runs.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

3.3 **INSTALLATION**

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

END OF SECTION 26 05 26

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. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Equipment supports.
- C. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS**2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS**

- A. Steel Slotted Support Systems:** Comply with MFMA-4, factory-fabricated components for field assembly.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit: a division of Atkore.
 - b. Cooper B-Line, Inc.; a division of Atkore
 - c. ERICO International Corporation.
 - d. GS Metals Corp.; a division of Eaton.
 - e. Thomas & Betts Corporation.
 - f. Unistrut A; a division of Atkore.
 - g. Wesanco, Inc.
 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports:** As described in NECA 1 and NECA 101. MC cable shall be supported by products UL listed for the purpose. Cable ties shall not be allowed for supporting MC cable but shall be allowed for bundling. Using miscellaneous wire wrapped around the MC cable and connected to structure as support shall not be allowed. MC cable shall be supported by MCS Series cable supports as manufactured by Caddy a Division of Erico, Inc. or equal. MC cable shall be supported parallel to studs with Colorado Jim supports as manufactured by Caddy a Division of Erico, Inc. or equal.
- C. Conduit and Cable Support Devices:** Hot dipped galvanized steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit:** Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints:** ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components:** Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Shall not be acceptable.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Eaton
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded hot dipped galvanized steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION**3.1 APPLICATION**

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

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

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A.** Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1.** Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B.** Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C.** Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

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. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. LFMC: Liquidtight flexible metal conduit.

1.4 SUBMITTALS

- A. Product Data: For raceways and fittings.
- B. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Structural members in the paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.
- C. Qualification Data: For professional engineer and testing agency.
- D. Source quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflec Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube Company.
- B. Aluminum Rigid Conduit: ANSI C80.5.
- C. EMT: ANSI C80.3.
- D. FMC: aluminum.
- E. LFMC: Flexible steel conduit with PVC jacket.

- F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Fittings for EMT: Steel, compression type.

2.2 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.
 - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 - 6. O-Z/Gedney; a unit of General Signal.
 - 7. RACO; a Hubbell Company.
 - 8. Robroy Industries, Inc.; Enclosure Division.
 - 9. Scott Fetzer Co.; Adalet Division.
 - 10. Spring City Electrical Manufacturing Company.
 - 11. Thomas & Betts Corporation.
 - 12. Walker Systems, Inc.; Wiremold Company (The).
 - 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- D. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.

2.3 Expansion/Deflection Coupling

- A. Manufacturer:
 - 1. Crouse-Hinds Model XD

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Aluminum.
 - 2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 3. Boxes and Enclosures, Aboveground: Where boxes are mounted to building facades provide NEMA 4X stainless steel.
- B. Comply with the following indoor applications, unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Do not install aluminum conduits in contact with concrete.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- G. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- J. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations.
 - 2. Where otherwise required by NFPA 70.
- K. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC in damp or wet locations not subject to severe physical damage.
- L. Expansion/Deflection couplings: Installed whenever crossing seismic, expansion or control joints. Arrange expansion fittings on concrete embedded raceways so that sliding action is not impeded. Refer to architectural/structural drawings for locations.

3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and boxes are without damage or deterioration at time of Substantial Completion.

END OF SECTION 26 05 33

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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. This Section includes the following:
 - 1. Identification for raceway and metal-clad cable.
 - 2. Identification for conductors.
 - 3. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.
- C. Samples: For each type of label to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 RACEWAY AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Color for Printed Legend:
 - 1. Power Circuits: Black letters on an orange field.
 - 2. Legend: Indicate system or service and voltage, if applicable.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label. Labels shall be plenum rated when located in plenums.
- D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action. Labels shall be plenum rated when located in plenums.

- E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action. Labels shall be plenum rated when located in plenums.
- F. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- C. Aluminum Wraparound Marker Labels: Cut from 0.014-inch-thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors. Labels shall be plenum rated when located in plenums.
- D. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking nylon tie fastener.
- E. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable. Shall not be used in plenum spaces.
 - 1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength: 50 lb, minimum.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black, except where used for color-coding.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Branch Circuits More Than 30 A: Identify with orange self-adhesive vinyl label for raceways and self-adhesive vinyl tape applied in bands for metal clad cable.
- B. Power-Circuit Conductor Identification: For conductors No. 1/0 AWG and larger in pull and junction boxes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.
- C. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape and write-on tags.
- D. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source and circuit number.

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate. When mounted on NEMA-4 or 4X cabinets or other equipment intended to prevent water intrusion, apply sealant/pad to back of label prior to fastening. Sealant shall be suitable

- for the label and cabinet materials as to not have adverse chemical reaction. Where manufacturer of equipment will void warranty for installation of fasteners in cabinet, provide stenciled legend on equipment in lieu of plastic engraved label.
- F.** System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G.** Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.
- 1.** Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
 - 2.** Colors for 208/120-V Circuits:
 - a.** Phase A: Black.
 - b.** Phase B: Red.
 - c.** Phase C: Blue.
 - d.** Neutral: White
 - 3.** Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- H.** Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

END OF SECTION 26 05 53

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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. Lighting and appliance branch-circuit panelboards.

1.3 SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- C. Qualification Data: For qualified testing agency.
- D. Field Quality-Control Reports:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- F. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. 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.
- E. Comply with NEMA PB 1.
- F. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and prepare panelboards for installation according to NECA 407, NEMA PB 1.

1.6 PROJECT CONDITIONS**A. Environmental Limitations:**

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
 - b. Altitude: Not exceeding 6600 feet.

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Architect, Construction Manager, and Owner no fewer than two days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Architect's, Construction Manager's, Owner's written permission.
3. Comply with NFPA 70E.

1.7 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace parts that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Keys: Two spares for each type of panelboard cabinet lock.
 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard.

PART 2 - PRODUCTS**2.1 GENERAL REQUIREMENTS FOR PANELBOARDS****A. Enclosures:** Flush- and surface-mounted cabinets.

1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
2. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
3. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.

- b. Back Boxes: Galvanized steel.
- 4. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
- B. Incoming Mains Location: As per project requirements.
- C. Phase, Neutral, and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- D. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Mechanical type.
 - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
- E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.
- F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- G. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on drawings as manufactured by General Electric Company; GE Consumer & Industrial – Electrical Distribution, or comparable product by one of the following manufacturers in the next paragraph:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. Siemens Energy & Automation, Inc.
 - 3. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: As per the contract drawings.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on drawings as manufactured by General Electric Company; GE Consumer & Industrial – Electrical Distribution, or comparable product by one of the following manufacturers in the next paragraph:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. Siemens Energy & Automation, Inc.
 - 3. Square D; a brand of Schneider Electric.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 100 A and larger.
 - 2. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 - 3. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
 - 4. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.

- b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
- c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
- d. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NECA 407, NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to NECA 407, NEMA PB 1.1.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- C. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- E. Install overcurrent protective devices and controllers not already factory installed.
- F. Install filler plates in unused spaces.
- G. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- H. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor shall perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
 1. Measure as directed during period of normal system loading.
 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

END OF SECTION 26 24 16

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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. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Snap switches.

1.3 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 GFCI RECEPTACLES

- A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

- B. Weather Resistant, Duplex GFCI Convenience Receptacles, 125 V, 20 A: Comply with UL WC-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; WRVGF20.
 - b. Hubbell; HBL5362WR.
 - c. Leviton; WR899.
 - d. Pass & Seymour; WR5362.
 - 2. To be provided where "WP" is indicated next to a receptacle.

2.3 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Pilot Light Switches, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 2221PL for 120 V and 277 V.
 - b. Hubbell; HPL1221PL for 120 V and 277 V.
 - c. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
 - d. Pass & Seymour; PS20AC1-CPL for 120 V, PS20AC1-CPL7 for 277V.
 - 2. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."

2.4 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."
- B. Wet-Location, Weatherproof "In-Use" Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable cover.

2.5 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.

2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted provided the outlet box is large enough.
- D. Device Installation:
1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
 6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 8. Tighten unused terminal screws on the device.
 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems."
1. Receptacles: Identify panelboard and circuit number from which served. Use press on label, black lettering on white background on face of plate and in easily readable location inside device backbox, and durable wire markers or tags on conductors inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
1. Test Instruments: Use instruments that comply with UL 1436.
 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 5. Using the test plug, verify that the device and its outlet box are securely mounted.

6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 26 27 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 SUMMARY

- A. Section Includes:
 - 1. Nonfusible switches.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.

1.4 SUBMITTALS

- A. Product Data: For each type of enclosed switch, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Include evidence of NRTL listing for series rating of installed devices.
- B. Shop Drawings: For enclosed switches. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Qualification Data: For qualified testing agency.
- D. Field quality-control reports.
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- E. Manufacturer's field service report.
- F. Operation and Maintenance Data: For enclosed switches to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain enclosed switches, components, and accessories, within same product category, from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. 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.
- E. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Architect, Construction Manager, and Owner no fewer than seven days in advance of proposed interruption of electric service.
 - 2. Indicate method of providing temporary electric service.
 - 3. Do not proceed with interruption of electric service without Architect's, Construction Manager's, Owner's written permission.
 - 4. Comply with NFPA 70E.

1.7 COORDINATION

- A. Coordinate layout and installation of switches, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace parts that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 NONFUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on drawings as manufactured by Square D; a brand of Schneider Electric or comparable product by one of the following manufacturers in the next paragraph:
- B. Manufacturers: Subject to compliance with performance and site condition requirements, one of the manufacturers listed below may be provided in lieu of the Basis of Design manufacturer:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
- C. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- D. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Lugs: Mechanical type, suitable for number, size, and conductor material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor shall perform tests and inspections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- D. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Enclosed switches will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports, including a certified report that identifies enclosed switches and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 26 28 16

PART 1 GENERAL

1.1 DESCRIPTION

- A. Section Includes: Supply and application of pavement-marking paint.

1.2 REFERENCES

- A. Reference Standards: Latest edition as of Specification date.
 - 1. Federal Specifications.
 - a. A-A-2886: Paint, Traffic, Solvent Base.
 - b. TT-P-115: Paint, Traffic, Highway, White and Yellow (cancelled)
 - c. TT-P-1952: Paint, Traffic and Airfield Marking, Waterborne.

1.3 SUBMITTALS

- A. Product Data: Pavement-marking-paint manufacturer's literature including written instructions for evaluating, preparing, and treating substrate; technical data including tested physical and performance properties; and application instructions. Include:
 - 1. VOC content of components.
 - 2. Include Safety Data Sheets for information only.
- B. Drawings of pavement markings, including parking stall striping, handicap stall markings, and crosshatching.

1.4 QUALITY ASSURANCE

- A. Mockup: Apply pavement-marking paint on 1 square foot of each substrate to demonstrate surface preparation and application method.
 - 1. After pavement-marking paint has cured, Architect/Engineer will scrape paint with pocket knife to verify adhesion.
 - 2. If Architect/Engineer determines mockup does not comply with requirements, construct new mockup until mockup is approved.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials according to manufacturer's recommendations and in such a manner as to prevent damage to materials or structure.
- B. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, lot number, and directions for storing and mixing with other components.
- C. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, and installation. Reject and remove from Site new materials which exhibit evidence of moisture during application, or have been exposed to moisture.
- D. Store materials in original, undamaged containers, and coatings, thinners, and cleaners in tightly-closed containers, in clean, dry, protected, well-ventilated location on raised platforms with weather-protective coverings, within temperature range required by pavement-marking-paint manufacturer. Protect stored materials from direct sunlight, sparks, and flame. Manufacturer's standard packaging and covering is not considered adequate weather protection.
- E. Limit stored materials on structures to safe loading capacity of structure at time materials are stored, and to avoid permanent deck deflection.
- F. Conspicuously mark damaged or opened containers or containers with contaminated materials, and remove from Site as soon as possible.

- G. Remove and replace materials that cannot be applied within stated shelf life.

1.6 PROJECT CONDITIONS

- A. Verify existing dimensions and details prior to start of pavement-marking Work. Notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor of changes.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.
- C. Environmental Limitations: Apply pavement-marking paint when existing and forecast weather conditions permit pavement-marking paint to be applied according to pavement-marking-paint manufacturer's written instructions and warranty requirements.
 - 1. Do not apply when substrate or ambient temperature is outside of range recommended by pavement-marking-paint manufacturer.
 - 2. Do not apply to damp or wet substrate.
- D. Handle and apply materials in strict accordance with safety requirements required by pavement-marking-paint manufacturer; Safety Data Sheets; and local, state, and federal rules and regulations. Maintain Safety Data Sheets with materials in storage area and available for ready reference on Site.
- E. Maintain adequate ventilation during preparation and application of paint materials.

1.7 CHANGES IN WORK

- A. During rehabilitation work, existing conditions may be encountered which are not known or are at a variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials that could jeopardize the integrity or performance of the Work.
 - 1. Notify Architect/Engineer of conditions that may interfere with the proper execution of the Work or jeopardize the performance of the Work prior to proceeding with the Work.

PART 2 PRODUCTS

2.1 PAVEMENT-MARKING PAINT

- A. General: Chlorinated-rubber pavement-marking paint conforming to requirements of TT-P-115; 20-minute-maximum no-pick-up time.
 - 1. Colors: White.

PART 3 EXECUTION

- A. Examine substrates and conditions with applicator for compliance with requirements and other conditions affecting application or performance of pavement-marking Work.
 - 1. Ensure that work done by other trades is complete and ready for pavement-marking Work.
 - 2. Verify that areas and conditions under which pavement-marking Work is to be performed permit proper and timely completion of Work.
 - 3. Notify Architect/Engineer in writing of conditions which may adversely affect application or performance of pavement-marking Work and recommend corrections.
 - 4. Do not proceed with pavement-marking Work until adverse conditions have been corrected and reviewed by Architect/Engineer.
 - 5. Commencing pavement-marking Work constitutes acceptance of Work surfaces and conditions.

3.2 PROTECTION

- A. Take precautions to ensure safety of people, including building users, passers-by, and workmen, and animals, and protection of property, including adjacent building elements, landscaping, and motor vehicles.

- B. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
- C. Limit access to Work areas.
- D. Mask adjoining surfaces not receiving pavement-marking paint to prevent spillage and overspray affecting other construction.
- E. Provide and maintain barricades for vehicular and pedestrian traffic at pavement-marking-paint areas during application and curing period.
- F. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

3.3 EQUIPMENT

- A. Application equipment recommended by pavement-marking-paint manufacturer.

3.4 SURFACE PREPARATION

- A. Clean and prepare substrate according to pavement-marking-paint manufacturer's written instructions. Provide clean, dust-free, and dry substrate.
 - 1. Verify that substrate is sound and is visibly dry and free of moisture.
 - 2. Remove grease, oil, asphalt solids, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from substrate.
 - 3. Thoroughly sweep substrate and clean with oil-free compressed air.
- B. Examine substrate with applicator to ensure that it is properly prepared and ready to receive pavement-marking paint.
 - 1. Notify Architect/Engineer in writing of conditions which may adversely affect application or performance of pavement-marking paint and recommend corrections.
 - 2. Do not proceed with pavement-marking-paint application until adverse conditions have been corrected and reviewed by Architect/Engineer.
 - 3. Commencing application constitutes acceptance of Work surfaces and conditions.

3.5 APPLICATION

- A. Apply pavement-marking paint according to pavement-marking-paint manufacturer's written recommendations.
 - 1. Apply two coats, each with minimum wet film thickness of 15 mils, to provide solid lines and markings with uniform, sharp, clean edges.
 - 2. Use masking and stencils.
 - 3. Touch-up lines and markings to provide clean, straight edges.
 - 4. Provide and maintain hand-held, all-purpose fire extinguisher near paint storage and mixing area.

3.6 CLEANING

- A. At the end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.
- B. After completing pavement-marking Work:
 - 1. Clean or block out overspray, splatter, spillage, soiling, and paint on unintended locations.
 - a. Use cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
 - b. Block out with opaque pavement-marking paint matching substrate color.
 - 2. Repair surfaces stained, marred, or otherwise damaged during pavement-marking Work.
 - 3. Clean up debris and surplus materials and remove from Site.
- C. Waste Management:
 - 1. Collect surplus materials that cannot be reused and deliver to recycling or disposal facility.

2. Treat materials that cannot be reused as hazardous waste and dispose of in an appropriate manner.

END OF SECTION

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. 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