

# ITEM OPPORTUNITY SYNOPSIS

**Name of the item to be scouted:** BABA compliant split air conditioning units

**State item to be used in:** Vermont

## **Describe the Item:**

**Please describe the item application/the end use of item.** 1. Heat pump Condenser unit: Equivalent to DAIKIN REYQ72PBTJ 2. Air Conditioning Units: Equivalent to DAIKIN FXZQ07TAVJU, DAIKIN FXZQ05TAVJU, DAIKIN FXZQ12TAVJU 3. Electrical disconnect (similar to attached image Z32C0\_fo5oz.jpg)

## **Supplier Information:**

**Type of Supplier being sought (select from list below)**

**Manufacturer**

Contract Manufacturer

Distributor

Other (please specify)

**Reason for scouting submission (select from list below)**

2<sup>nd</sup> Supplier

Price

Re-Shore

Past supplier no longer available

New Product Startup

**BABA**

Other (please specify)

## **Summary of Technical Specifications and Performance Requirements:**

**Describe the manufacturing processes (elaborate to provide as much detail as possible).** molding, fabrication, assembly

**Provide dimensions / size / tolerances / performance specifications of the item.** See attached documents.

**List required materials needed to make the product, including materials of product components, if applicable.** steel, plastic, various a/c components

**Are there applicable certification requirements?**

Yes

No

**Please Explain:**

**Are there any applicable regulations that apply to the production of this item?**

Yes

No

**Please Explain:** Needs to be BABA Compliant

**Are there any other standards, requirements?**

Yes

No

**Please Explain:**

**Additional Comments:**

**Additional technical comments:** From the Vermont National Guard We put a project out to bid last year and were told the following products were not BABAA compliant. The project was pulled back because of these issues. I would like to share them with you so that can be posted through VMEC, and we can see what other products that are out there that may be compliant.

**Volume and Pricing:**

**Estimated Potential Business Volume (i.e. #Units per day, month, year):** 5

**Estimated Target Price / Unit Cost Information:** Accepting bids on BABA compliant units.

**Delivery Requirements:**

**When is it needed by? (Immediate, 30 days, 6 months, etc)** 3 Months

**Describe packaging requirements (i.e., individually/ group packaging).** Individual, see attached documents.

**Where will this item be shipped?** Vermont

**Additional Comments:**

**Is there other information you would like to include?** See attached project documents, and example pictures





# VT ARNG - RRTC AC EQUIP. REPLACEMENT

147 GENERAL CRAM DRIVE  
NORTHFIELD, VT 05663

D&W PROJECT # 19-0790.07



## OWNER

VERMONT ARMY NATIONAL GUARD

## OWNER'S REPRESENTATIVE:

THOMAS MOORE, MILITARY PROJECT MANAGER  
BUILDING #5, CAMP JOHNSON  
789 NATIONAL GUARD ROAD  
COLCHESTER, VT 05446-3009  
P: 802.338.3322  
F: 802.338.3305

## ARCHITECT

DORE & WHITTIER ARCHITECTS, INC.  
212 BATTERY STREET  
BURLINGTON, VT 05401  
P: 802.863.1428  
F: 802.863.6955

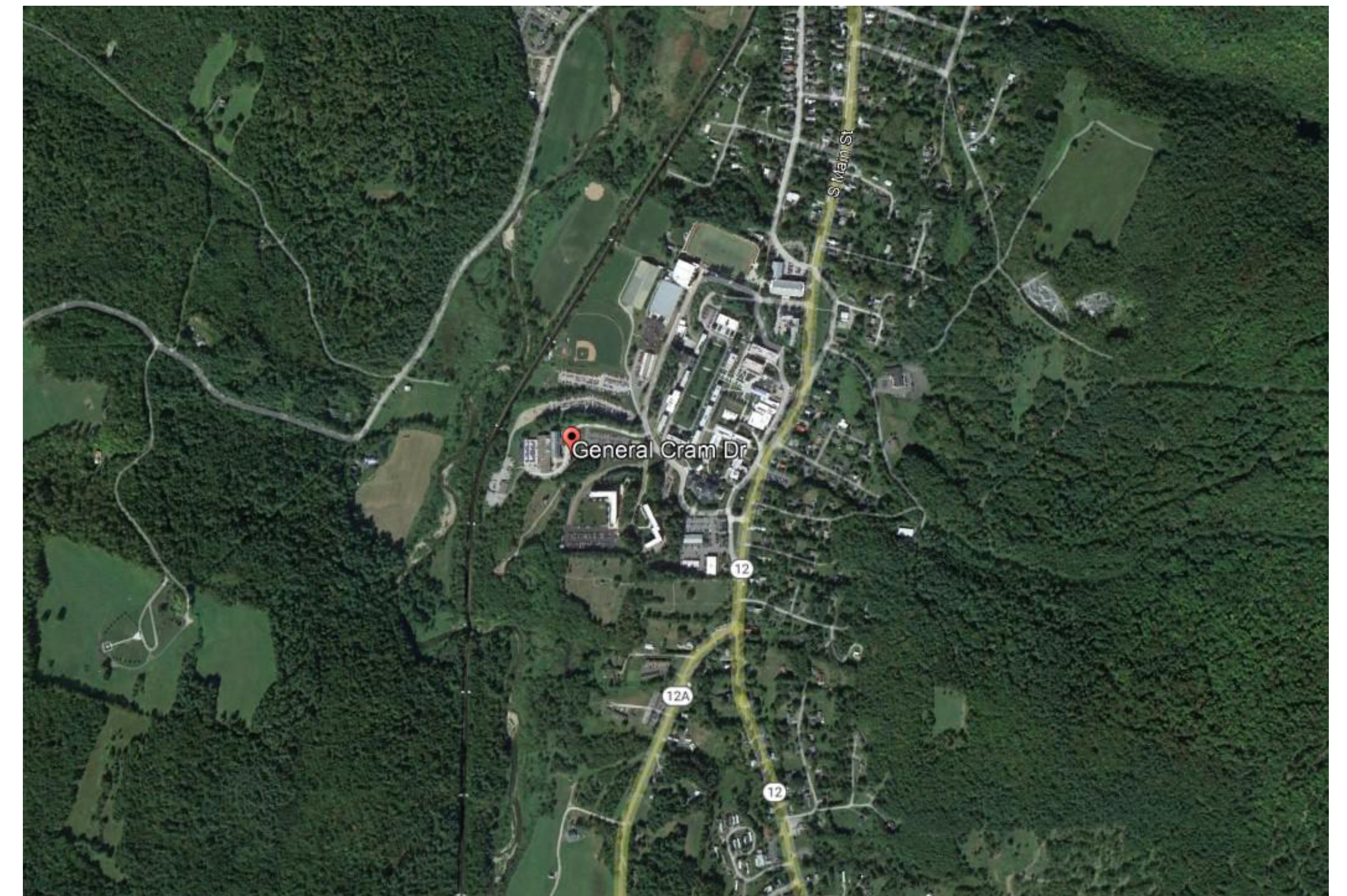
260 MERRIMAC STREET  
BUILDING 7, 2nd FLOOR  
NEWBURYPORT, MA 01950  
P: 978.499.2999  
F: 978.499.2944

## MEP CONSULTANT

PEARSON AND ASSOCIATES  
A DIVISION OF DUBOIS AND KING  
75 NORTH MAIN STREET, PO BOX 119  
WATERBURY, VT 05676  
P: 802.882.8789

## DRAWING INDEX

SHEET NUMBER	SHEET NAME
GENERAL G0.00	COVER
ARCHITECTURAL A1.0	LEVEL 2 REFLECTED CEILING PLAN
MECHANICAL ME0.1 ME1.1 ME2.1 ME2.2 ME3.1	MECHANICAL LEGEND SECOND FLOOR MECH DEMO PLANS PROPOSED SECOND FLOOR MECH PLAN MECHANICAL ROOF PLANS MECHANICAL SCHEDULES



## PROJECT LOCATION MAP

147 GENERAL CRAM DRIVE  
NORTHFIELD, VT 05663

BID DOCUMENTS

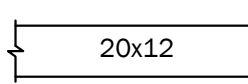
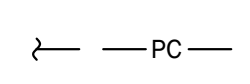
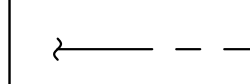
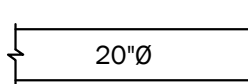
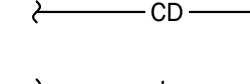

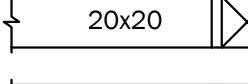
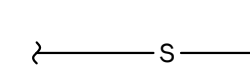

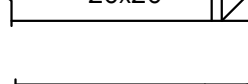
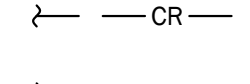

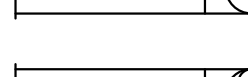
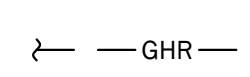

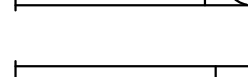
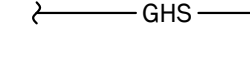


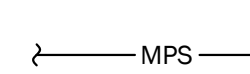

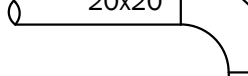
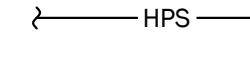


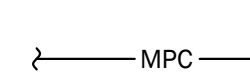
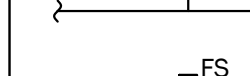
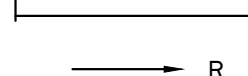
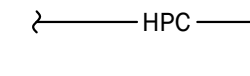
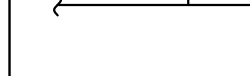
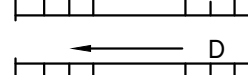
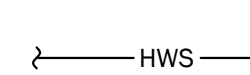


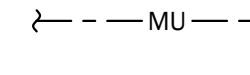
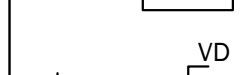

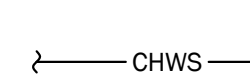
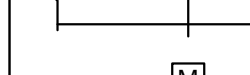
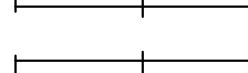
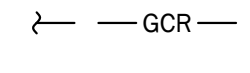
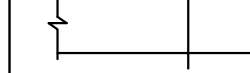
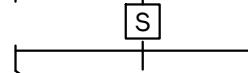
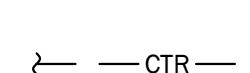
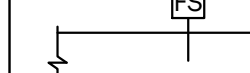

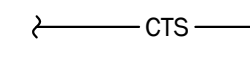

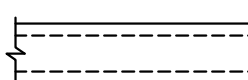
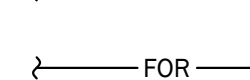

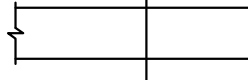


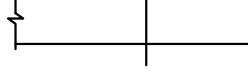

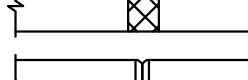
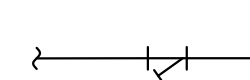
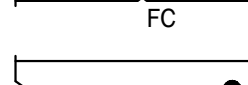
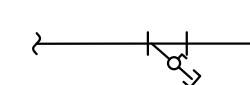

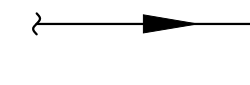
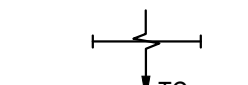

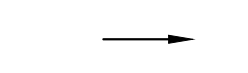



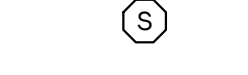

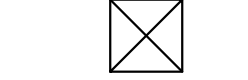
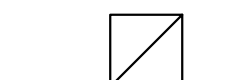


6/30/2022





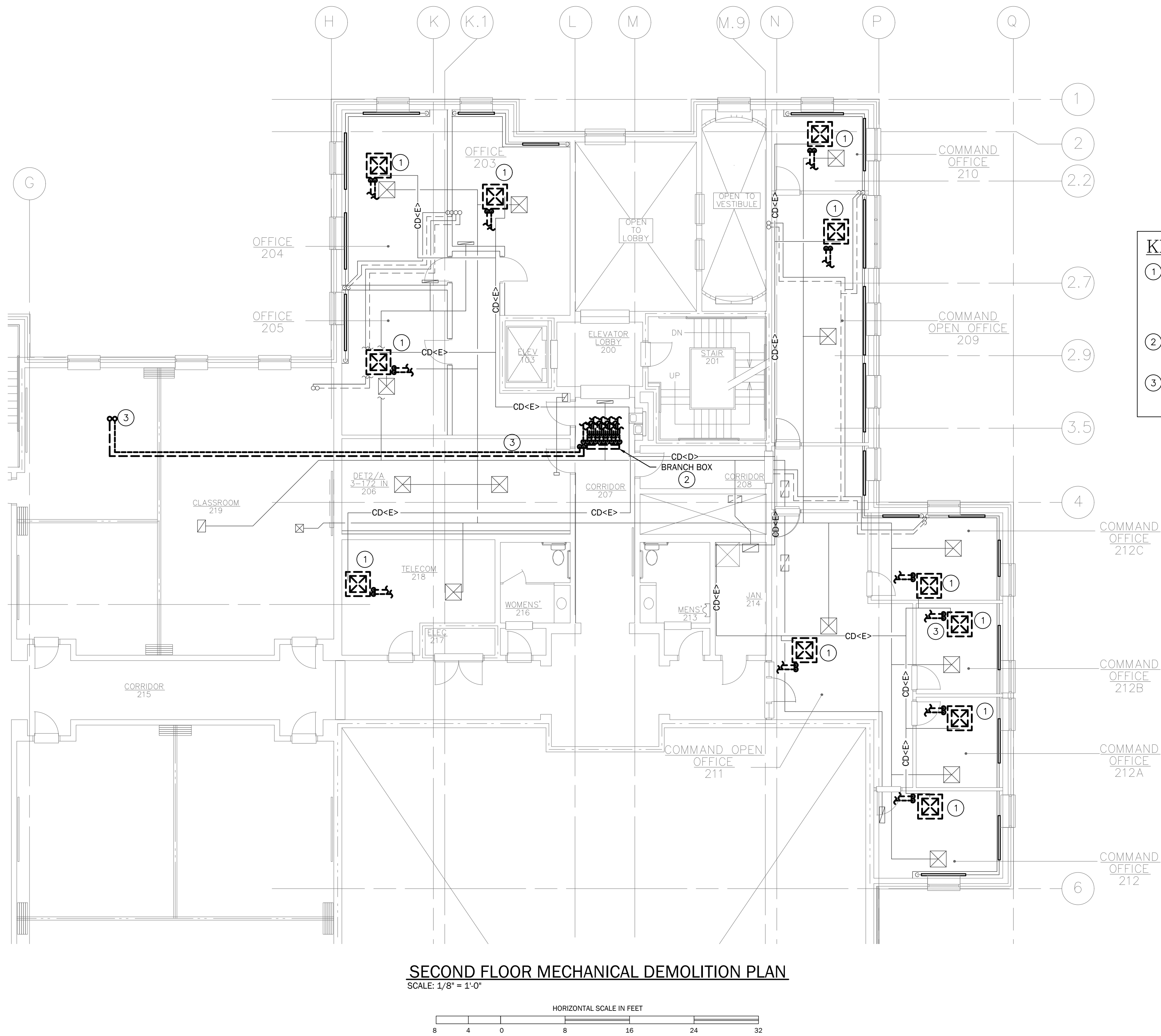
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NOTE: NOT ALL SYMBOLS/ABBREVIATIONS SHOWN IN THE LEGEND ARE USED IN THIS DRAWING SET. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY CONTENT SHOWN ON DRAWINGS.

DUCTWORK		PIPING SYSTEMS		CONTROLS & BALANCING		ABBREVIATIONS					
	RECTANGULAR DUCT, FIRST NUMBER IS DIMENSION IN VIEW OF DRAWING		PUMPED STEAM CONDENSATE		CONTROLS WIRING	Ø	DIAMETER	FVNR	FULL VOLTAGE ON-REVERSING	TYP	TYPICAL
	ROUND RIGID DUCT		CONDENSATE DRAIN		WALL MOUNTED THERMOSTAT, SUBSCRIPTS: HEATING & COOLING, ARROW POINTS TO DEVICE CONTROLLED	A	AMPS/AMPERAGE	GAL	GALLON(S)	UD	UNDERCUT DOOR
	DUCT ELBOW UP		REFRIGERANT LIQUID		UNIT MOUNTED THERMOSTAT	AA	ALL AROUND	GC	GENERAL CONTRACTOR	VB	VACUUM BREAKER
	DUCT ELBOW DOWN		REFRIGERANT SUCTION		THERMOSTAT, LINE VOLTAGE	ABV	AUTOMATIC BALANCE VALVE	GPM	GALLONS PER MINUTE	VFD	VARIABLE FREQUENCY DRIVE
	ROUND DUCT, ELBOW UP		CONDENSER WATER RETURN		FAN SPEED CONTROL	AD	ACCESS DOOR	HOA	HAND-OFF-AUTOMATIC	VIF	VERIFY IN FIELD
	ROUND DUCT, ELBOW DOWN		CONDENSER WATER SUPPLY		HUMIDISTAT	AFF	ABOVE FINISH FLOOR	HP	HORSEPOWER	WB	WET BULB TEMPERATURE
	RECTANGULAR DUCT 90° MITERED ELBOW WITH TURNING VANES		GLYCOL HEATING RETURN		THERMAL SENSOR	AI	ANALOG INPUT	Hz	HERTZ	WC	WATER COLUMN
	TYPICAL LONG RADIUS ELBOW, RECTANGULAR/ROUND DUCT		GLYCOL HEATING SUPPLY		AQUASTAT	AO	ANALOG OUTPUT	ID	INSIDE DIAMETER	WG	WATER GAUGE
	TYPICAL BRANCH DUCT 45° TAKE-OFF W/VOLUME DAMPER		LOW PRESSURE STEAM		PRESSURE TRANSMITTER	APD	AIR PRESSURE DROP	in	INCH(ES)	WPD	WATER PRESSURE DROP
	DUCT RISE		MEDIUM PRESSURE STEAM		FLOW SWITCH	ARCH	ARCHITECT(URAL)	kW	KILOWATT(S)		
	DUCT SET DOWN		HIGH PRESSURE STEAM		BALANCING VALVE	ATC	AUTOMATIC TEMPERATURE CONTROL	LAT	LEAVING AIR TEMPERATURE		
	FLEXIBLE DUCT		LOW PRESSURE CONDENSATE		DIFFERENTIAL PRESSURE SWITCH	AWT	AVERAGE WATER TEMPERATURE	LDB	LEAVING DRY BULB		
	FIRE DAMPER		MEDIUM PRESSURE CONDENSATE		MANUAL VOLUME DAMPER	BAS	BUILDING AUTOMATION SYSTEM	LF	LINEAR FEET		
	SMOKE DAMPER		HIGH PRESSURE CONDENSATE		MOTOR OPERATED DAMPER	BF	BOILER FEEDWATER	LRA	LOCKED ROTOR AMPS		
	FIRE & SMOKE DAMPER		MAKE-UP WATER		AIR FLOW SWITCH	BHP	BRAKE HORSEPOWER	LWB	LEAVING WET BULB		
	DUCT SMOKE DETECTOR		CHILLED WATER RETURN		CARBON MONOXIDE GAS SENSOR	BOD	BOTTOM OF DUCTWORK (ELEVATION)	LWT	LEAVING WATER TEMPERATURE		
	DUCT SOUND ATTENUATION LINING		CHILLED WATER SUPPLY		CARBON DIOXIDE GAS SENSOR	BTU/H	BRITISH THERMAL UNITS PER HOUR	MAX	MAXIMUM		
	BACKDRAFT DAMPER		CHILLED GLYCOL RETURN		CONTROL PANEL	C	COMMON	MBH	1,000 BRITISH THERMAL UNITS PER HOUR		
	BAROMETRIC RELIEF DAMPER		CHILLED GLYCOL SUPPLY			CAP	CAPACITY	MC	MECHANICAL CONTRACTOR		
	FLEXIBLE DUCT CONNECTOR		COOLING TOWER RETURN			CFM	CUBIC FEET PER MINUTE	MCA	MINIMUM CIRCUIT AMPACITY		
	EQUIPMENT FLEX CONNECTOR		COOLING TOWER SUPPLY			CKT	CIRCUIT	MCC	MOTOR CONTROL CENTER		
	ELEVATION OF TOP OF DUCT (TOD) AFF		FUEL OIL SUPPLY			CM	CONSTRUCTION MANAGER	MEP	MECHANICAL, ELECTRICAL, PLUMBING		
	ELEVATION OF BOTTOM OF DUCT (BOD) AFF		FUEL OIL RETURN			CONN.	CONNECTION	MIN	MINIMUM		
	TRANSFER GRILLE					COP	COEFFICIENT OF PERFORMANCE	MMBH	MILLIONS OF BTU/H		
	DIRECTION OF SUPPLY AIR FLOW					CP	CONTROL PANEL	MOC	MAXIMUM OVERCURRENT PROTECTION		
	DIRECTION OF RETURN OR EXHAUST AIR FLOW					db	DRY BULB TEMPERATURE	MOD	MOTOR OPERATED DAMPER		
	SUPPLY FAN ROOF MOUNTED					DCW	DOMESTIC COLD WATER	MRE	MECHANICAL ROOM EQUIPMENT		
	EXHAUST FAN ROOF MOUNTED					DDC	DIRECT DIGITAL CONTROL	MTD	MOUNTED		
	SMOKE DETECTOR					DI	DIGITAL INPUT	NC	NORMALLY CLOSED		
	FAN (SCHEMATIC)					DIA.	DIAMETER	NIC	NOT IN CONTRACTOR		
	SUPPLY AIR DIFFUSER, REGISTER, OR GRILLE					DN	DOWN	NO	NORMALLY OPEN		
	RETURN AIR REGISTER OR GRILLE					DO	DIGITAL OUTPUT	NO.	NUMBER		
	EXHAUST AIR REGISTER OR GRILLE					DR	DRAIN	NTS	NOT TO SCALE		
						DWG	DRAWING	O/A	OUTDOOR AIR		
						DWV	DRAIN, WASTE, VENT	OAT	OUTSIDE AIR TEMPERATURE		
						DX	DIRECT EXPANSION	OD	OUTSIDE DIAMETER		
						<E>	EXISTING	OED	OPEN ENDED DUCT		
						E/A	EXHAUST AIR	OIT	OPERATOR INTERFACE TERMINAL		
						EAT	ENTERING AIR TEMPERATURE	P	PUMP		
						EC	ELECTRICAL CONTRACTOR	PC	PLUMBING CONTRACTOR		
						ECON	ECONOMIZER	PD	PRESSURE DROP		
						EDB	ENTERING DRY BULB	PH	ELECTRICAL PHASE		
						EER	ENERGY EFFICIENCY RATIO	PSI	POUNDS PER SQUARE INCH		
						EFF	EFFICIENCY	R/A	RETURN AIR		
						ESP	EXTERNAL STATIC PRESSURE	RH	RELATIVE HUMIDITY		
								RLA	RATED LOAD AMPS		
								RPM	REVOLUTIONS PER MINUTE		
								S/A	SUPPLY AIR		
								SAT	SUPPLY AIR TEMPERATURE		
								SF	SQUARE FEET		
								SP	STATIC PRESSURE		
								SS	STAINLESS STEEL		
								TEMP	DEGREES FAHRENHEIT (°F) UNLESS OTHERWISE NOTED		
								TSP	TOTAL STATIC PRESSURE		
				</							

SHEET 1 OF 5

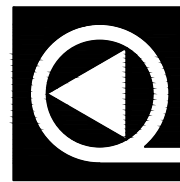




SECOND FLOOR MECHANICAL DEMOLITION PLAN  
SCALE: 1/8" = 1'-0"



**Pearson & Associates**  
MECHANICAL & ELECTRICAL ENGINEERS  
A SUBSIDIARY OF DUBOIS & KING INC.  
P.O. BOX 119, WATERBURY, VERMONT 05676  
TEL (802) 882-9789  
www.pearsonandassociates.com



DATE	REVISION	BY

PROJECT NAME: <b>VTARNG HOUSE DOCTOR</b> NORTHFIELD, VT	SHEET TITLE: <b>SECOND FLOOR DEMOLITION PLAN</b> I:\727515_VTARNG House Doctor\Drawings\Mechanical\727515_VTARNG House Doctor Mechanical.dwg
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SCALE: AS NOTED	
JOB NO: 727447	
DRAWN BY:	
APPROVED BY:	
DWG. NO.	

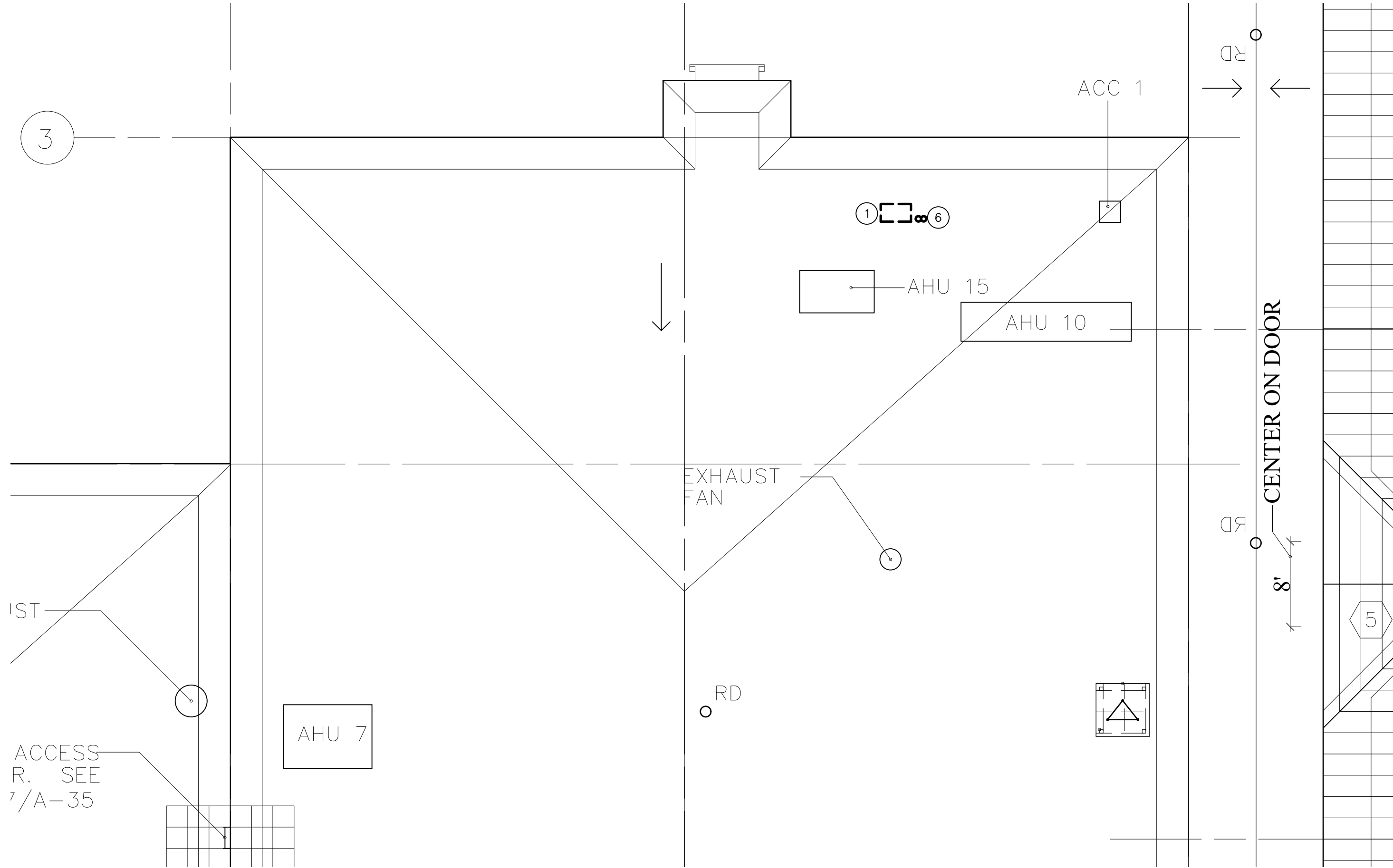
ISSUED FOR  
CONSTRUCTION

6/30/22

**ME1.1**

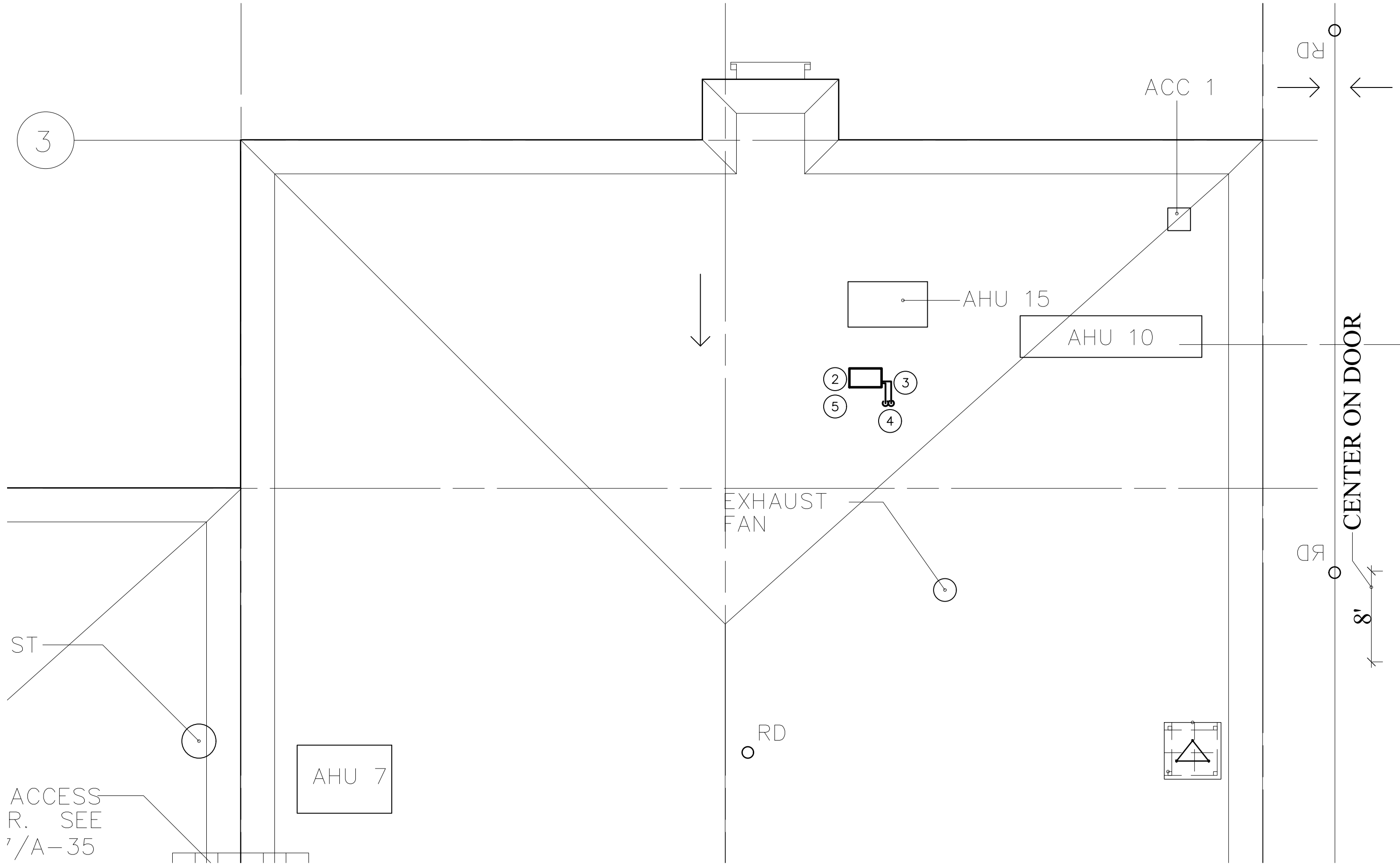
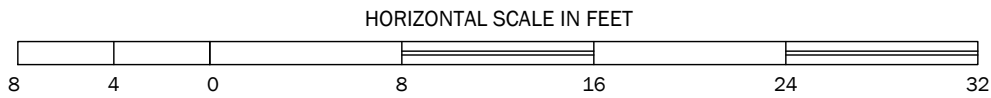






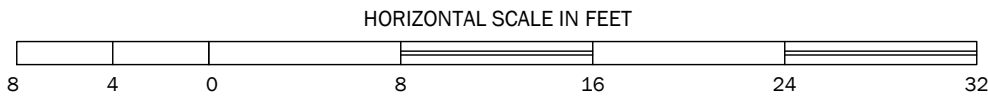
ROOF DEMOLITION PLAN

SCALE: 1/8" = 1'-0"



PROPOSED ROOF PLAN

SCALE: 1/8" = 1'-0"

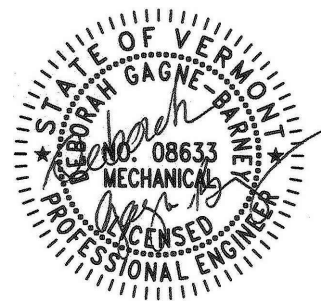
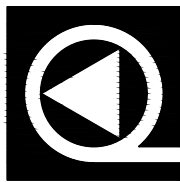


KEYED NOTES:

- 1 REMOVE EXISTING OUTDOOR HEAT PUMP UNIT. REFRIGERATION PIPING TO BE REMOVED FROM UNIT TO BRANCH BOX INDOORS. REMOVE EXISTING LIGHTNING PROTECTION FROM UNIT AND SALVAGE FOR REUSE ON NEW UNIT. DISCONNECT POWER FOR UNIT REMOVAL. SALVAGE EXISTING CIRCUIT FOR REPLACEMENT UNIT. COORDINATE WITH ROOFER TO HAVE ROOF PATCHED WHERE NEEDED.
- 2 INSTALL NEW OUTDOOR HEAT PUMP UNIT. UNIT TO BE INSTALLED ON DURABLOCK EQUIPMENT SUPPORTS OR EQUIVALENT. PROVIDE NEW ROOF PENETRATION FOR ELECTRICAL AND REFRIGERATION PIPING. PROVIDE REFRIGERATION PIPING FROM UNIT TO BRANCH BOX INDOORS. PROVIDE POWER FROM EXISTING CIRCUIT FROM OLD HEAT PUMP TO NEW OUTDOOR HEAT PUMP LOCATION. EXTEND EXISTING WIRING AS REQUIRED. PROVIDE NEW NEMA 3R, FUSED, HEAVY DUTY 60 AMP DISCONNECT WITH 45 AMP FUSES AT OUTDOOR HEAT PUMP.
- 3 NEW REFRIGERATION PIPING SUPPORTED BY DURABLOCK PIPE SUPPORT OR EQUIVALENT. PIPING TO HAVE K-FLEX CLAD ALL CLOSED CELL FLEXIBLE ELECTROMETRIC FOAM INSULATION WITH FACTORY APPLIED ALUMINUM JACKET WITH DOUBLESEAL CLOSURE SYSTEM.
- 4 PROVIDE NEW PATE CURB AND CAP OR EQUIVALENT FOR REFRIGERATION LINES, ELECTRICAL AND CONTROL CONDUIT. COORDINATE WITH ROOFER TO HAVE NEW PITCH POCKET FLASHED INTO EXISTING ROOF. PATE MODEL PCC-1, CURB AND 4 PIPE CAP AND BOOT PACKAGE.
- 5 INSTALL SALVAGED LIGHTNING PROTECTION ON NEW UNIT AND CONNECT TO EXISTING LIGHTNING PROTECTION LOOP, EXTEND EXISTING WIRING AS REQUIRED.
- 6 ROOFER TO PATCH EXISTING PITCH POCKET USED FOR REMOVED REFRIGERANT AND ELECTRICAL FEED TO OUTDOOR HEAT PUMP BEING REMOVED.



**Pearson & Associates**  
MECHANICAL & ELECTRICAL ENGINEERS  
A SUBSIDIARY OF DUBOIS & KING INC.  
P.O. BOX 119, WATERBURY, VERMONT 05676  
TEL (802) 862-9789  
www.pearsonandassociates.com



NUMBER	DATE	REVISION	BY

PROJECT NAME:  
**VTARNG HOUSE DOCTOR**  
NORTHFIELD, VT

SHEET TITLE:  
**DEMO AND PROPOSED ROOF PLAN**

I:\72727515 VTARNG House Doctor\Drawings\Mechanical\727515 VTARNG House Doctor Mechanical.dwg

DATE:	12/10/21
SCALE:	AS NOTED
JOB NO:	727447
DRAWN BY:	
APPROVED BY:	
DWG. NO.	

ISSUED FOR  
CONSTRUCTION

6/30/22

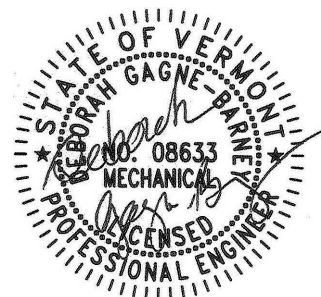
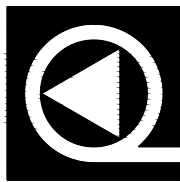
**ME2.2**

HEAT PUMP CONDENSER UNIT SCHEDULE																	
TAG	MATCHED UNIT TAG	LOCATION	MANUFACTURER & MODEL NO.	NOMICAL CAPACITY COLING (TONS)	HEATING CAPACITY (MBH)	LIQUID CONN.	GAS CONN.	H/L PRESSURE CONN.	CONDENSER				MCA	MOCP	EFFICIENCY		REMARKS
						(IN.)	(IN.)	(IN.)	FANS	VOLTS	PH	HZ			IEER	COP	
CU-1	AC-1 TO AC-11	ROOF	DAIKIN REYQ72PBTJ	6	77	3/8	3/4	5/8	2	208	3	60	36	-	25.1	4.2	1,2,3,4,5

1. UNITS TO BE LOW AMBIENT, CAPABLE OF HEATING DOWN TO -13°F, PROVIDE A FACTORY AUTHORIZED MANUFACTURER'S STARTUP OF EQUIPMENT, REFRIGERANT R-410A, PIPE PER MANUFACTURERS INSTALLATION REQUIREMENTS.
2. UNIT TO BE SUPPORTED ON DURABLOCK OF EQUIVALENT ROOFTOP EQUIPMENT SUPPORT.
3. UNIT TO BE CONNECTED TO EXISTING LIGHTING ROD SYSTEM. ON ROOF. SEE ELECTRICAL NOTES
4. UNIT TO BE INTEGRATED INTO EXISTING BUILDING MANAGEMENT SYSTEM (AUTOMATED LOGIC).
5. PROVIDE FACTORY START-UP AND START-UP REPORT.

TAG	SERVES	MANUFACTURER & MODEL NO.	TYPE	FAN PERFORMANCE	REFRIG. TYPE	LIQUID LINE (in)	GAS LINE (IN)	CONDENSATE LINE (IN)	COOLING PERFORMANCE MBH	HEATING PERFORMANCE MBH (° -13F)	ELECTRICAL					REMARKS
				CFM							VOLTS	PH	HZ	MCA	MOCP	
AC-1	OFFICE 204	DAIKIN FXZQ07TAVJU	CASSETTE	307	R-410A	¾	½	1"	7.5	8.5	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-2	OFFICE 205	DAIKIN FXZQ05TAVJU	CASSETTE	300	R-410A	¾	½	1"	5.8	4.7	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-3	OFFICE 206	DAIKIN FXZQ05TAVJU	CASSETTE	300	R-410A	¾	½	1"	5.8	4.7	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-4	OFFICE 210	DAIKIN FXZQ05TAVJU	CASSETTE	300	R-410A	¾	½	1"	5.8	4.7	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-5	OFFICE 209	DAIKIN FXZQ09TAVJU	CASSETTE	300	R-410A	¾	½	1"	9.5	6.6	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-6	OFFICE 212C	DAIKIN FXZQ05TAVJU	CASSETTE	300	R-410A	¾	½	1"	5.8	4.7	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-7	OFFICE 212B	DAIKIN FXZQ05TAVJU	CASSETTE	300	R-410A	¾	½	1"	5.8	4.7	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-8	OFFICE 212A	DAIKIN FXZQ05TAVJU	CASSETTE	300	R-410A	¾	½	1"	5.8	4.7	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-9	OFFICE 212	DAIKIN FXZQ05TAVJU	CASSETTE	300	R-410A	¾	½	1"	5.8	4.7	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-10	RECEPTION 211	DAIKIN FXZQ05TAVJU	CASSETTE	300	R-410A	¾	½	1"	5.8	4.7	230	1	60	0.3	15	1,2,3,4,5,6,7
AC-11	IT ROOM (218)	DAIKIN FXZQ12TAVJU	CASSETTE	353	R-410A	¾	½	1"	12.0	7.8	230	1	60	0.4	15	1,2,3,4,5,6,7

1. PROVIDE WITH WALL MOUNTING KIT.
2. UNIT CONTROLLED BY WALL MOUNTED BUILDING MANAGEMENT THERMOSTAT (EXISTING AUTOMATED LOGIC THERMOSTAT).
3. CAPACITY WILL VARY DEPENDING ON UNIT CONFIGURATION WITH REMOTE HEAT PUMP UNIT
4. SEE PLANS FOR REMOTE CONDENSING UNIT. COORDINATE LOCATION WITH OWNERS REPRESENTATIVE BEFORE INSTALLING.
5. SEE SHEET M2.1 AIR CONDITIONING UNIT LAYOUTS. COORDINATE LOCATION WITH OWNERS REPRESENTATIVE BEFORE INSTALLING.
6. CONDENSATE LINES TO BE GRAVITY DRAINED PER MANUFACTURERS' INSTALLATION INSTRUCTIONS. INSULATE DRAIN HOSE AND CONNECTION AT UNIT WITH 1/2" ARMAFLEX PER MANUFACTURER REQUIREMENTS.
7. PROVIDE WITH FACTORY START UP AND START UP REPORT.

[illegible]

**SHEET TITLE:**  
**SCHEDULES**

DATE:	12/10/21
SCALE:	AS NOTED
JOB NO:	727447
DRAWN BY:	
APPROVED BY:	
DWG. NO.	

# ME3.1

SHEET 5 OF 5

ISSUED FOR  
CONSTRUCTION

6/30/22



# PROJECT MANUAL



## Vermont Army National Guard - RRTC AC Equipment Replacement

147 General Cram Drive, Northfield, VT 05663

## **BID DOCUMENTS - June 30, 2022**

Dore & Whittier Architects Inc. Project Number 19-0790.07

### **AWARDING AUTHORITY / OWNER:**

Vermont Army National Guard

### **ARCHITECT:**

Dore & Whittier Architects, Inc.

### **M-E-P CONSULTANT:**

Pearson and Associates, a Division of Dubois and King



PROJECT LOCATION MAP







**SECTION 00 01 07**  
**SEALS PAGE**



Dore & Whittier Architects Inc.  
260 Merrimac Street, Building #7  
Newburyport, MA 01950  
(978) 499 - 2999

212 Battery Street  
Burlington, VT 05401  
(802) 863 - 1428

**Project Name:** VT ARNG Norwich RRTC AC Equipment Replacement  
**Vermont Army National Guard Project Number:** NA  
**Dore & Whittier Architects Inc. Project Number:** 19-079.07

This document bears the seal and signature of the licensed professional who is responsible for its content. It may not be altered without the knowledge and consent of that professional. Be advised it is a violation of the law of the State of Vermont for any person - unless he or she is acting under the direction of the undersigned Architect or Engineer - to alter these documents in any way.

---

Donald M. Walter

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Date

**END OF SECTION**





## **SECTION 00 01 10 TABLE OF CONTENTS**

### **PROCUREMENT AND CONTRACTING REQUIREMENTS**

#### **DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS**

- 00 01 01 - Project Title Page.
- 00 01 07 - Seals Page.
- 00 01 15 - List of Drawing Sheets.

### **SPECIFICATIONS**

#### **DIVISION 01 – GENERAL REQUIREMENTS**

- 01 10 00 - Summary.
- 01 30 00 - Administrative Requirements.
- 01 30 01 - Request for Information Form.
- 01 30 02 - Submittal Data Sheet.
- 01 31 14 - Coordination.
- 01 31 15.02 - Terms of Use of Digital Drawings and Electronic Data.
- 01 32 16 - Construction Progress Schedule.
- 01 40 00 - Quality Requirements.
- 01 41 00 - Regulatory Requirements.
- 01 50 00 - Temporary Facilities and Controls.
- 01 52 13 - Field Offices and Sheds.
- 01 60 00 - Product Requirements.
- 01 70 00 - Execution and Closeout Requirements.
- 01 78 00 - Closeout Submittals.
- 01 79 00 - Demonstration and Training.

#### **DIVISION 02 – EXISTING CONDITIONS**

- 02 41 00 - Demolition.

#### **DIVISION 03 – CONCRETE (NOT USED)**

#### **DIVISION 04 – MASONRY (NOT USED)**

#### **DIVISION 05 – METALS (NOT USED)**

#### **DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES (NOT USED)**

#### **DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

- 07 53 00 - Elastomeric Membrane Roofing.
- 07 84 00 - Firestopping.

#### **DIVISION 08 – OPENINGS (NOT USED)**

#### **DIVISION 09 – FINISHES**

- 09 51 00 - Acoustical Ceilings.

**DIVISION 10 – SPECIALTIES (NOT USED)**

**DIVISION 11 – EQUIPMENT (NOT USED)**

**DIVISION 12 – FURNISHINGS (NOT USED)**

**DIVISION 13 – SPECIAL CONSTRUCTION (NOT USED)**

**DIVISION 14 – CONVEYING EQUIPMENT (NOT USED)**

**DIVISION 21 – FIRE SUPPRESSION (NOT USED)**

**DIVISION 22 – PLUMBING (NOT USED)**

**DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)**

23 00 00 - Basic Mechanical Requirements.

23 05 00 - Basic Mechanical Materials and Methods.

23 05 29 - Pipe Hangers and Supports.

23 07 00 - Mechanical Insulation.

23 21 13 - Pipe and Pipe Fittings.

23 21 16 - Piping Specialties.

**DIVISION 24 – RESERVED (NOT USED)**

**DIVISION 25 – INTEGRATED AUTOMATION (NOT USED)**

**DIVISION 26 – ELECTRICAL (NOT USED)**

**END OF SECTION**

## **SECTION 00 01 15 LIST OF DRAWING SHEETS**

### **GENERAL DRAWINGS**

G0.00 COVER

### **ARCHITECTURAL DRAWINGS**

A1.0 LEVEL 2 REFLECTED CEILING PLAN

### **MECHANICAL DRAWINGS**

ME0.1 MECHANICAL LEGEND  
ME1.1 SECOND FLOOR MECH DEMO PLANS  
ME2.1 PROPOSED SECOND FLOOR MECH PLAN  
ME2.2 MECHANICAL ROOF PLANS  
ME3.1 MECHANICAL SCHEDULES

**END OF SECTION**





## SECTION 01 10 00 SUMMARY

### **PART 1 GENERAL**

#### **1.01 PROJECT**

- A. Project Name: VT ARNG Norwich RRTC AC Equipment Replacement
- B. Owner's Name: Vermont Army National Guard.
- C. Architect's Name: Dore & Whittier Architects Inc.
- D. The Project consists of:
  - 1. Replacement of indoor cassette-style AC units, associated piping, branch box, and roof-top heat pump condenser.
  - 2. Ancillary ceiling replacement and roof repairs, and penetrations necessary to accomodate HVAC work.

#### **1.02 CONTRACT DESCRIPTION**

- A. Contract type: As indicated in the Sample Contract.

#### **1.03 PRODUCT/ ASSEMBLY/ SYSTEM SUBSTITUTIONS**

- A. Where the Bid Documents stipulate particular acceptable products, the Contractor is encouraged to utilize one of the products listed. Products of other manufacturers not listed in the Specifications shall be submitted as substitutions with accompanying comparison to specified product, and will be evaluated by the Awarding Authority for equality to the specified product. The submitting contractor shall prepare sufficient data to enable review and comparison of submitted products for conformance to Specification requirements, and comparison to listed products in terms of construction, quality, strength, performance, durability, and/or appearance. Allow for 30 days review time for Substitution Requests. The Awarding Authority shall make final determination of acceptance.
- B. Where the Bid Documents stipulate a particular product with a designation as a "Proprietary Product" the Awarding Authority has undertaken an evaluation of the specified product and competing products, and determined that use of the specified product is of specific benefit and in the best interest of the project, and has been voted as proprietary by the Awarding Authority. This indicates the strongest possible preference for the Contractor or subcontractors to utilize the specified product, however the Awarding Authority will evaluate products of other manufacturers for equality to the specified product. The submitting contractor shall prepare sufficient data to enable review and comparison of submitted products for conformance to Specification requirements, and comparison to listed products in terms of construction, quality, performance, strength, durability, and/or appearance. The Awarding Authority shall make final determination of acceptance.

#### **1.04 OSHA REQUIREMENTS**

- A. Pursuant to M.G.L. C. 30, SEC. 39S (A)(2), all employees to be employed on the project site shall have successfully completed a course in construction safety and health approved by OSHA and of at least 10 hours in duration.

#### **1.05 OWNER OCCUPANCY**

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the work to accommodate Owner occupancy.

#### **1.06 CONTRACTOR USE OF SITE AND PREMISES**

- A. Construction Operations: Limited to areas noted on Drawings.
- B. Arrange use of site and premises to allow:
  - 1. Owner occupancy of subject building during the construction period.
- C. Existing building spaces may be used for storage. Coordinate locations with the Owner.
- D. Time Restrictions:
  - 1. Limit conduct of especially noisy exterior work to the hours of 7 AM to 4:30 PM, Monday through Friday only.
- E. Utility Outages and Shutdown:

1. Limit disruption of utility services to hours the building is unoccupied.
  - a. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
- F. Available utilities: Contractor will be permitted to use available on-site water and power with the cost of such utilities paid for by the Owner.

**1.07 SPECIFICATION SECTIONS AND FORMS APPLICABLE TO ALL SUBCONTRACTORS**

- A. The sections listed below contain provisions that apply to all subcontractors. Specific items of work listed under individual contract descriptions constitute exceptions.
  1. Section 01 30 00 - Administrative Requirements.
  2. Section 01 30 01 - Request for Information Form .
  3. Form 01 30 02 - Submittal Data Sheet.
  4. Section 01 31 15.02 - Terms of Use of Digital Drawings and Electronic Data.
  5. Section 01 32 16 - Construction Progress Schedule.
  6. Section 01 40 00 - Quality Requirements.
  7. Section 01 41 00 - Regulatory Requirements.
  8. Section 01 50 00 - Temporary Facilities and Controls.
  9. Section 01 52 13 - Field Offices and Sheds.
  10. Section 01 60 00 - Product Requirements.
  11. Section 01 70 00 - Execution and Closeout Requirements.
  12. Section 01 78 00 - Closeout Submittals.
  13. Section 01 79 00 - Demonstration and Training.
  14. All other Division 01 sections.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



## SECTION 01 30 00 ADMINISTRATIVE REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Progress meetings.
- C. Coordination drawings.
- D. Submittals for review, information, and project closeout.
- E. Number of copies of submittals.
- F. Requests for Information (RFI) procedures.
- G. Submittal procedures.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

#### 3.01 PRECONSTRUCTION MEETING

- A. The Owner's project manager will schedule a meeting to take place within 15 days after Notice to Proceed.
- B. Attendance Required:
  - 1. Owner.
  - 2. Owner's Project Manager.
  - 3. Architect.
  - 4. Architect's consultants as invited by Architect.
  - 5. General Contractor's project manager and superintendent.
  - 6. Subcontractors performing work at the site and major suppliers.
- C. Suggested Agenda:
  - 1. Introductions.
  - 2. Architect's overview of project and key aspects of the construction.
  - 3. Owner's statements.
  - 4. Distribution and discussion of:
    - a. List of major subcontractors and suppliers, including contact information for each.
    - b. Projected Construction Schedules.
    - c. Submittals Schedule Checklist.
  - 5. Project Phasing:
    - a. Owner requirements for continuing occupancy and operations.
      - 1) Access, Egress, Utilities.
      - 2) Temporary facilities for continuing Owner occupancy and operations.
      - 3) Separation and protection of building occupants from dust, fumes, noise, and other construction disturbances and hazards.
  - 6. Critical work sequencing.
  - 7. Major equipment deliveries and priorities.
  - 8. Project coordination:
    - a. Designation of responsible personnel.
  - 9. Designation of personnel representing the parties to Contract.
  - 10. Procedures and processing of:
    - a. Applications for Payment.
    - b. RFIs.

- c. Proposal requests.
- d. Submittals.
- e. Change Order proposals.
- f. Change Orders.
- g. Construction Change Directives.
- 11. Procedures for maintaining Record Documents.
- 12. Use of premises:
  - a. Office, work and storage areas.
  - b. Owner's requirements.
- 13. Construction facilities, controls and construction aids:
  - a. Temporary facilities related to project phases.
- 14. Temporary utilities:
  - a. Temporary utilities related to project phases.
- 15. Safety and first aid procedures.
- 16. Security procedures.
- 17. Housekeeping procedures.
- 18. Owner's documentation requirements prior to final acceptance/ Beneficial Occupancy.
- D. The General Contractor shall record meeting minutes and distribute copies within three days after meeting to participants, Architect, Owner, and those affected by decisions made.

**3.02      PROGRESS MEETINGS**

- A. Schedule and chair project meetings throughout progress of the work at maximum two week intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner's project manager, Architect, as relevant to agenda topics for each meeting.
- D. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of Owner concerns related to ongoing occupancy and operations.
  - 3. Review of work progress.
  - 4. Field observations, problems, and decisions.
  - 5. Identification of problems that impede, or will impede, planned progress.
  - 6. Review of submittals schedule and status of submittals including Sustainability Submittals.
  - 7. Review of off-site fabrication and delivery schedules.
  - 8. Maintenance of progress schedule.
  - 9. Corrective measures to regain projected schedules.
  - 10. Planned progress during succeeding work period.
  - 11. Coordination of projected progress.
  - 12. Maintenance of quality and work standards.
  - 13. Effect of proposed changes on progress schedule and coordination.
  - 14. Other business relating to work.
- E. The General Contractor shall record minutes and distribute copies within three days after meeting to Architect, Owner, participants, and those affected by decisions made.
- F. The General Contractor's meeting minutes shall serve as the project record.

**3.03      REQUESTS FOR INFORMATION (RFI)**

- A. Format for RFI Submittals:

1. RFIs are to be submitted exclusively by the Contractor, on the form included in this project manual or reasonable facsimile, indicating at a minimum the following:
  - a. RFIs must include sufficient clear information to determine the specific location(s), trade(s), material(s), or assembly(ies) in question. RFIs that are not clear will be returned unanswered.
  - b. All RFI's submitted MUST include a proposed solution, including a statement of any potential impact on project schedule or cost.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Allow sufficient time so the information will not delay installation as a result of the time required for processing. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  1. Prepare a separate RFI for each specific item.
  2. RFIs are to be submitted exclusively by the Contractor, on the form included in this project manual or reasonable facsimile.
- C. The Owner reserves the right to backcharge the General Contractor for time spent or fees incurred reviewing and responding to frivolous RFIs, those where no solution is proposed by the contractor, or those where the solution is readily interpreted or apparent in the construction documents. Charges billed to the Owner by the Architect or other subcontractors and consultants as additional services will be deducted from the General Contractor's final requisition.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response. Indicate at a minimum the following:
  1. The title "Request For Information"
  2. Official Project name and number.
  3. Origin of RFI (General Contractor, subcontractor, vendor).
  4. Discrete and consecutive RFI sequence number.
  5. Critical dates:
    - a. Date of request.
    - b. Date of response (leave blank).
  6. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent Drawing and detail number and/or Specification Section number, title, and paragraph(s).
  7. RFIs must include sufficient clear information to determine the specific location(s), trade(s), material(s), or assembly(ies) in question. RFIs that are not clear will be returned unanswered.
- E. Review Time: Architect will respond and return RFIs to General Contractor within 15 working days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 2 PM will be considered as having been received on the following regular working day.
  1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

### **3.04 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  1. Product data.
  2. Shop drawings.
  3. Samples for selection.
  4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.



**3.05 SUBMITTALS FOR INFORMATION**

A. When the following are specified in individual sections, submit them for information:

1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

**3.06 SUBMITTALS FOR PROJECT CLOSEOUT**

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:

1. Project record documents.
2. Operation and maintenance data, including Testing and Balancing Reports.
3. Warranties.
4. Bonds.
5. General Contractor's Release of Liens.
6. General Contractor's Insurance Certificates for the General Warranty period.
7. General Contractor's Asbestos-Free Certification.
8. Receipt of delivery and acceptance of attic stock or surplus materials by Owner.
9. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

**3.07 NUMBER OF COPIES OF SUBMITTALS**

A. Documents for Review or Information: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

**3.08 SUBMITTAL PROCEDURES**

A. General Requirements:

1. Transmit each submittal using approved form.
2. Electronic submittals are required in PDF format. Reviewed submittals will also be returned electronically.
3. Identify submittals with the section number and by sequentially numbering each transmittal in the order submitted. As an example, submittal 08 44 13-001 would indicate the first submittal filed under Section 08 44 13 - Glazed Aluminum Curtain Walls
  - a. Revisions to submittals shall be submitted under the original submittal number, which shall be appended with the suffix "R1" for the first resubmittal, "R2" for the second resubmittal, and so on. For example 08 44 13-001-R2 would indicate the second resubmittal of the Aluminum Curtainwalls submittal noted above.
  - b. DO NOT resubmit submittals previously returned for resubmittal with different sequential numbers without indicating which submittal the new item supersedes.
  - c. DO NOT group products specified in different Specification sections under one submittal and data sheet.
  - d. Submittals prepared and transmitted with Data Sheets that indicate incorrect Specification references, or which contain items from multiple Specification sections will be returned without review.
  - e. Grouping of multiple items within one Specification section into one submittal is not recommended, as the Designer's Action Stamp will govern ALL content within the submittal.

4. Identify: Project; General Contractor; subcontractor or supplier; pertinent drawing and detail number; and Specification section number and article/paragraph, on each copy.
  5. The General Contractor shall provide the Owner's Project Manager with one hard copy of all final submittals and shop drawings, to be filed at the OPM's site office and turned over to the Owner at Project Closeout.
  6. Apply General Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    - a. Any submittals forwarded without a completed and signed Submittal Data Sheet will be returned to the General Contractor without review.
    - b. No claims for delay or expense related to the Contractor's failure to provide proper submittal data sheets will be considered.
  7. Subcontractors' submittals shall be submitted electronically to the General Contractor.
  8. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 15 working days for Architect, 15 working days for consultant, excluding delivery time to and from the General Contractor.
      - 1) Review time for submittals posted to the electronic document submittal service begins when submittals are posted and notification to the Architect is provided by the website or Contractor. Review time for submittals posted after 2 PM on weekdays, or on weekend days or holidays will begin on the next business day.
      - 2) Review time for samples shipped to the Architect's business address begins upon receipt in the Architect's office; days in transit are not counted in review time.
  9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  10. Provide space for General Contractor and Architect review stamps.
  11. When revised for resubmission, identify all changes made since previous submission.
  12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
  13. The Architect will review the first submittal and the first resubmittal for each item submitted without prejudice. Should subsequent resubmittals become necessary due to the Contractor's failure to prepare adequate submittals, for reasons such as (but not limited to) failure to acknowledge previous review comments, field conditions, or perform required coordination with other trades, the Architect and consultants reserve the right to invoice the Owner for time spent reviewing such resubmittals. The Owner may elect to back-charge the General Contractor for these charges.
  14. The Architect reserves the right to refuse submittals that were not requested.
- B. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

### **3.09 ARCHITECT'S ACTION ON SUBMITTALS**

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, 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, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. Final Unrestricted Release: Where submittals are marked "Reviewed (No Comment)," that part of the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
  2. Final-But-Restricted Release: When submittals are marked "Reviewed (See Comments)," that part of the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
  3. Returned for Resubmittal: When submittal is marked "Reviewed (Resubmit)," do not proceed with that part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
    - a. Do not permit submittals marked "Reviewed (Resubmit)" to be used at the Project site, or elsewhere where work is in progress.
  4. Not Reviewed: When submittals are marked "Not Reviewed" the submitted content was not required by these project Specifications, and the Architect takes no position on the accuracy, validity, or appropriateness of the content.
- C. The Action Stamp applied to each submittal governs ALL content of that submittal, and as such the inclusion of multiple items under one submittal may subject otherwise acceptable content to be returned for resubmittal (when other content is not acceptable.) Submittals will not be "segregated" during review and returned with different actions applicable to portions of the content. The Contractor shall use good common sense judgement regarding grouping of items when preparing submittals.

**END OF SECTION**

**SECTION 01 30 01**

**REQUEST FOR INFORMATION FORM**

**VT ARNG NORWICH RRTC AC EQUIPMENT REPLACEMENT - #19-079.07**

<b>TO:</b> Dore & Whittier Architects Inc. 212 Battery St. Burlington, VT 05401	<b>FROM:</b> [Name of Contractor] [Street Address] [City, State, ZIP]	<b>RFI #:</b>
<b>Attn:</b> Dave S. Mentzer	<b>Reply Requested by:</b>	<b>Issue Date:</b>
<b>RFI DESCRIPTION</b> (indicate origin of RFI, and summarize the question or type of information required):          		
<b>REFERENCES</b> (List relevant Drawings or Specification sections and paragraphs):          		
<b>SENDER'S RECOMMENDATION</b> (All RFIs must include a contractor's recommended solution to each condition, including a statement of cost or schedule of impact if applicable. The contractor may be back-charged by the Owner for designer's review time for any RFI submitted without a sender's recommended solution or where response is evident in Drawings.)          		
<b>DESIGNER'S RESPONSE:</b>          		
<b>BY:</b>	<b>DATE:</b>	<b>COPIES TO:</b>

**END OF SECTION**





**SECTION 01 30 02**  
**SUBMITTAL DATA SHEET**

<b>SPEC DIVISION</b>	<b>NO.</b>	<b>REV.</b>

NAME OF GENERAL CONTRACTOR:	
DATE SUBMITTED:	
ITEM SUBMITTED:	
SPECIFICATION PARAGRAPH REF.:	
IS THIS ITEM A SUBSTITUTION?	
RETURN REQUESTED BY:	(Allow 15 working days for Architect, and 15 working days for consultant reviews.)

**GENERAL CONTRACTOR'S CERTIFICATION:**

The General Contractor hereby certifies that the General Contractor has reviewed the submitted item / system for compliance with the contract documents, verified all required field dimensions, and coordinated this item / system with related items / systems and with the overall work prior to making this submittals.

**SIGNED:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**END OF SECTION**



## SECTION 01 31 14 COORDINATION

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. General Coordination Requirements.
- B. Coordination of Submittals.
- C. Coordination of elements of the work.
- D. Coordination of Utilities, mechanical and electrical.
- E. Coordination of Cutting and Patching.
- F. Project Administration.
- G. Coordination of Contract Closeout.
- H. Coordination documents.

#### **1.02 SUBMITTALS**

- A. Schedules:
  - 1. Submit schedules prior to submitting shop drawings, product data, and samples.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION**

#### **3.01 COORDINATION REQUIRED**

- A. The General Contractor shall coordinate scheduling, submittals, and work of the various sections of Specifications and subcontractors to ensure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.
- B. Coordinate progress schedules, including dates for submittals and for delivery of products.
- C. Coordinate sequence of work to accommodate Owner occupancy as specified.
- D. Conduct meetings among subcontractors and others concerned, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.
- E. Conduct pre-installation conferences with personnel and subcontractors to assure coordination of work.
- F. Participate in progress meetings. Report on progress of work to be adjusted under coordination requirements, and any required changes in schedules. Transmit minutes of meetings and reports to concerned parties.

#### **3.02 PROJECT ADMINISTRATION**

- A. Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.
  - 1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
  - 2. Conduct conferences among subcontractors and others concerned with the work, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.
  - 3. Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:
    - a. Preparation of schedules.
    - b. Delivery and processing of submittals.
    - c. Progress meetings.
    - d. Project Closeout activities.

#### **3.03 COORDINATION OF SUBMITTALS**

- A. The General Contractor shall schedule and coordinate submittals.
- B. Review shop drawings, product data, and samples for compliance with Contract Documents and for coordination with related work. Transmit copies of reviewed documents to Architect.
- C. Check field dimensions and clearances and relationship to available space and anchors.

- D. Check compatibility with equipment and work of other sections, electrical characteristics, and operational control requirements.
- E. Coordinate requests for substitutions to assure compatibility of specifications, of operating elements, and effect on space requirements and work of other sections.
- F. Check motor voltages and control characteristics.
- G. Coordinate controls, interlocks, wiring of switches, and relays.
- H. Coordinate wiring and control diagrams.
- I. When changes in the work are made, review their effect on other work.
- J. Verify information and coordinate maintenance of record documents.

**3.04 COORDINATION OF SUBSTITUTIONS AND MODIFICATIONS**

- A. Review proposals and requests for substitution prior to submission to Architect.
- B. Verify compliance with Contract Documents and for compatibility with work of other sections.
- C. Submit with recommendation for action.

**3.05 COORDINATION OF ELEMENTS OF THE WORK**

- A. Before commencing any work, the General Contractor shall prepare and submit a sequence of operations for all work under this Contract for approval by the Architect.
- B. If, in the judgment of the Architect, continued work under the submitted sequence of operations may interfere with the progress of the work, the Architect may advise the Owner to direct the General Contractor to accelerate, interrupt, or cease work at particular points. The General Contractor shall make reasonable changes in the sequence of operations to accommodate these directions at no additional cost to the Owner.
- C. The General Contractor shall be responsible for the proper fitting of all work and the coordination of the operations of all trades, subcontractors, materials and equipment engaged upon the work. GC shall guarantee each of GC's subcontractors the dimensions which they may require for the fitting of their work to all surrounding work and shall do or cause the subcontractors to do all cutting, fitting, adjusting and patching necessary to make the several parts of the work come together properly and to fit the work to receive or be received by that of other contractors.
- D. The General Contractor shall have a competent superintendent and assistants on the work at all times during the progress of the work to assure the proper coordination and expediting of the work.
- E. The General Contractor shall be in charge of the entire work and shall be responsible for the prompt coordination of all trades, including GC's own forces and GC's subcontractors, as well as the Owner's separate contractors if they are on the job during the General Contractor's operations, and become fully familiar with all work required under the Contract.
- F. Care shall be given to the proper scheduling, delivery, and installation of items to be built into rough construction which will affect the latter portions of the work, such as anchors, pipe sleeves, inserts, conduit, pipes, lugs, clips, brackets, braces, hangers, bolts, miscellaneous metal, wood blocking and similar items. These items are not necessarily specified under the trade section under which they are to be installed. The General Contractor shall ascertain that all are properly installed in their correct locations at the proper time so as to prevent cutting and patching of finished work.
- G. The General Contractor shall be fully responsible for coordination of general construction work with that of subcontractors. General Contractor shall investigate, together with the subcontractors involved, the routing of pipes, ductwork, and conduit with particular attention to interference of structural members, other pipes, ducts, and conduit cuts, head room conditions, door and window openings and swings, pipe chases, and any associated maintenance or repair access clearances, and similar features of the building which may affect installation and proper functioning of such items.
- H. Changes in design locations, which may be necessary in the routing of pipes and ducts, or in the location of any mechanical, electrical or other equipment, shall be anticipated and made prior to installation. Additional compensation will not be allowed for costs incurred as a result of the General Contractor's failure to anticipate the necessity for such changes.



- I. There shall be no change or variation in ceiling height, wall layout, shaft, chase, soffit, furring or other dimensions shown on Drawings, without the specific written approval of the Architect.
- J. The General Contractor's responsibility for the coordination of all work under the Contract shall be complete, and shall extend to all modifications in the work, whether or not such modifications entail a change in the Contract Price.  
Where the Contract Documents allow an optional material or method of performing a portion of the work, or where the General Contractor is ultimately allowed or directed to perform a part of the work using a substitute material or method, the General Contractor shall provide all other coordination and additional work that such change necessitates, without any additional cost to the Owner.

**3.06 COORDINATION OF CUTTING AND PATCHING**

- A. Cutting and patching coordination: The General Contractor is responsible for coordination of all cutting and patching necessary for the completion of this Contract and for the quality and appearance of all patch work in expose-to-view finished materials.

**3.07 OBSERVATION OF WORK**

- A. Observe work for compliance with Contract Documents.
- B. Maintain a list of observed deficiencies and defects; promptly submit.

**3.08 COORDINATION OF CONTRACT CLOSEOUT**

- A. The General Contractor shall coordinate the completion and cleaning of the work of separate subcontractors in preparation for the Substantial Completion of portions of the work designated for partial Owner occupancy.
- B. After the Owner occupancy of premises, coordinate access to the site by various subcontractors for correction of defective or unfinished work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- C. Assemble and coordinate closeout submittals specified in Section 01 78 00 - Closeout Submittals.

**3.09 EQUIPMENT START-UP**

- A. Verify utilities, connections, and controls are complete and equipment is in operable condition as indicated in Section 01 70 00 - Execution and Closeout Requirements.
- B. Observe start-up and adjustments, test run, record time and date of start-up, and results.
- C. Observe equipment demonstrations made to Owner; record times and additional information required for operation and maintenance manuals.

**3.10 INSPECTION AND ACCEPTANCE OF EQUIPMENT**

- A. Prior to inspection, verify that equipment is tested, operational, clean, and ready for operation.
- B. Assist Owner's project manager and Architect with review. Prepare list of items to be completed and corrected.

**END OF SECTION**



## SECTION 01 31 15.02 TERMS OF USE OF DIGITAL DRAWINGS AND ELECTRONIC DATA

WHEREAS, DORE & WHITTIER ARCHITECTS INC. (HEREAFTER REFERRED TO AS ARCHITECT) AGREES TO FURNISH \_\_\_\_\_ (HEREAFTER REFERRED TO AS "USER") ELECTRONIC FILES AND DATA RELATING TO THE VT ARNG NORWICH RRTC AC EQUIPMENT REPLACEMENT PROJECT (HEREAFTER REFERRED TO AS "THE PROJECT") AT THE USER'S REQUEST, PROVIDING THAT THE USER AGREES TO THE FOLLOWING CONDITIONS: IN ACCEPTING AND UTILIZING ANY EXPORTED DATA FROM BUILDING INFORMATION MODELS, DRAWINGS OR OTHER DATA ON ANY FORM OF ELECTRONIC MEDIA GENERATED AND PROVIDED BY THE ARCHITECT, THE CONTRACTOR COVENANTS AND AGREES THAT ALL SUCH DRAWINGS AND DATA ARE INSTRUMENTS OF SERVICE OF THE ARCHITECT, WHO SHALL BE DEEMED THE AUTHOR OF SAID DRAWINGS AND DATA, AND SHALL RETAIN ALL COMMON LAW, STATUTORY LAW AND OTHER RIGHTS, INCLUDING COPYRIGHTS. BY PROVIDING THE EXPORTED DATA FROM THE BUILDING INFORMATION MODEL, DRAWINGS, AND OTHER ELECTRONIC DATA TO THE USER, DORE & WHITTIER ARCHITECTS INC. GRANTS THE USER A NON-EXCLUSIVE, NON-TRANSFERABLE ROYALTY-FREE LICENSE TO USE SAID DRAWINGS AND DATA FOR INFORMATIONAL PURPOSES ONLY IN CONNECTION WITH THE PROJECT IN STRICT ACCORDANCE WITH THESE TERMS OF USE, THE BIM EXECUTION PLAN, AND AIA DOCUMENT E202 THAT APPLY TO THE PROJECT

THE USER FURTHER AGREES NOT TO USE THE EXPORTED DATA FROM THE BUILDING INFORMATION MODEL, DRAWINGS, OR OTHER DATA IN WHOLE OR IN PART, FOR ANY PURPOSE OR PROJECT OTHER THAN THE PROJECT WHICH IS THE SUBJECT OF THIS AGREEMENT. THE USER AGREES TO WAIVE ALL CLAIMS AGAINST THE ARCHITECT RESULTING IN ANY WAY FROM ANY UNAUTHORIZED CHANGES OR REUSE OF SAID DRAWINGS AND DATA FOR ANY OTHER PROJECT OR BY ANYONE OTHER THAN THE ARCHITECT.

UNDER NO CIRCUMSTANCES SHALL TRANSFER OF THE EXPORTED DATA FROM THE BUILDING INFORMATION MODEL, DRAWINGS AND OTHER DATA AND OTHER INSTRUMENTS OF SERVICE ON ELECTRONIC MEDIA FOR USE BY THE USER BE DEEMED A SALE BY THE ARCHITECT, AND DORE & WHITTIER ARCHITECTS INC. MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY AND FITNESS FOR ANY OTHER PARTICULAR PURPOSE.

THE EXPORTED DATA FROM BUILDING INFORMATION MODELS, DRAWINGS, AND OTHER ELECTRONIC DATA FILES ARE MADE AVAILABLE TO THE USER SOLELY FOR HIS CONVENIENCE AND INFORMATIONAL PURPOSES ONLY AND ARE NOT INSTRUMENTS OF SERVICE, AND DO NOT CONSTITUTE THE CONSTRUCTION DOCUMENTS. DIFFERENCES MAY EXIST BETWEEN SAID ELECTRONIC FILES AND CORRESPONDING HARD-COPY CONSTRUCTION DOCUMENTS. DORE & WHITTIER ARCHITECTS INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, REGARDING THE ACCURACY OR COMPLETENESS OF THE ELECTRONIC FILES PROVIDED TO THE USER. IN THE EVENT THAT A CONFLICT ARISES BETWEEN THE SIGNED OR SEALED HARD-COPY CONSTRUCTION DOCUMENTS PREPARED BY DORE & WHITTIER ARCHITECTS INC. AND THE ELECTRONIC FILES, THE SIGNED OR SEALED HARD-COPY CONSTRUCTION DOCUMENTS SHALL GOVERN. THE USER IS RESPONSIBLE FOR DETERMINING IF ANY CONFLICT EXISTS.

BY RECEIPT AND USE OF THE EXPORTED DATA FROM THE BUILDING INFORMATION MODELS, DRAWINGS, AND OTHER ELECTRONIC DATA FILES, THE USER IS NOT RELIEVED OF THEIR CONTRACTUAL OBLIGATION TO FULLY COMPLY WITH THE CONTRACT DOCUMENTS, INCLUDING, AND WITHOUT LIMITATION, THE NEED TO CHECK, CONFIRM AND COORDINATE ALL DIMENSIONS AND DETAILS, TAKE FIELD MEASUREMENTS, VERIFY FIELD CONDITIONS AND COORDINATE THE WORK WITH THAT OF OTHER CONTRACTORS AND TRADES FOR THE PROJECT. THE USER IS NOT TO RELY SOLELY UPON THE EXPORTED DATA FROM THE BUILDING INFORMATION MODEL OR THE DATA AND/OR INFORMATION CONTAINED THEREIN IN PREPARING ANY OF THE COORDINATION DOCUMENTS FOR THE PROJECT.

BY OPENING THE FILES PROVIDED, THE USER AGREES THAT THESE TERMS APPLY TO THE ALL ELECTRONIC FILES PROVIDED BY THE ARCHITECT, INCLUDING EXPORTED DATA FROM THE BUILDING INFORMATION MODEL, DRAWINGS, AND OTHER COMPUTER DATA IN THEIR ENTIRETY, TOGETHER WITH ALL OF ITS COMPONENT PARTS AND DATA. THE USER ACKNOWLEDGES THAT THE REQUIREMENTS OF THESE TERMS OF USE APPLY TO ALL OF USER'S PRINCIPALS, EMPLOYEES AND AGENTS.

BECAUSE INFORMATION PRESENTED ON THE ELECTRONIC FILES CAN BE MODIFIED, UNINTENTIONALLY OR OTHERWISE, DORE & WHITTIER ARCHITECTS INC. RESERVES THE RIGHT TO REMOVE ALL INDICIA OF OWNERSHIP AND/OR INVOLVEMENT FROM EACH ELECTRONIC DISPLAY.

UPON COMPLETION OF THE USER'S INVOLVEMENT WITH THE PROJECT OR AT ANY TIME UPON WRITTEN REQUEST OF THE DORE & WHITTIER ARCHITECTS INC., THE USER SHALL PROMPTLY DELIVER TO THE ARCHITECT ALL ELECTRONIC STORAGE MEDIA CONTAINING THE EXPORTED DATA FROM THE BUILDING INFORMATION MODEL ANY OTHER MATERIAL CONTAINING OR REFLECTING ANY INFORMATION OR DATA IN THE COMPUTER MODEL, DRAWINGS, AND OTHER DATA (WHETHER PREPARED BY THE ARCHITECT, THE USER OR OTHERWISE) AND WILL NOT RETAIN COPIES, EXTRACTS OR OTHER REPRODUCTIONS, TANGIBLE OR INTANGIBLE, IN WHOLE OR IN PART OF SAID DATA OR DRAWINGS. THE USER'S NON-DISCLOSURE AND NON-USE OBLIGATIONS SET FORTH HEREIN SHALL SURVIVE THE RETURN, DESTRUCTION OR DELETION OF SAID DRAWINGS, AND DATA. IF THE USER BECOMES LEGALLY COMPELLED, BY SUBPOENA OR COURT ORDER, TO DISCLOSE THE MODEL, OR ANY INFORMATION CONTAINED THEREIN, THE USER SHALL PROVIDE THE ARCHITECT WITH PROMPT NOTICE SO THAT A PROTECTIVE ORDER OR OTHER APPROPRIATE REMEDY MAY BE SOUGHT BY AND AT THE EXPENSE OF THE ARCHITECT AND/OR COMPLIANCE WITH THE PROVISIONS OF THIS PARAGRAPH OF THE TERMS OF USE MAY BE WAIVED.

THE USER AGREES THAT IN THE EVENT THE USER, ITS OFFICERS, DIRECTORS, SHAREHOLDERS, PARTNERS, AGENTS, EMPLOYEES, CONSULTANTS INDEPENDENT CONTRACTORS, SUCCESSORS OR ASSIGNS USE THE EXPORTED DATA FROM THE BUILDING INFORMATION MODEL, DRAWINGS, AND OTHER ELECTRONIC DATA ARE SOLELY AT THE USER'S RISK AND IT SHALL, TO THE FULLEST EXTENT PERMITTED BY LAW, DEFEND, INDEMNIFY AND HOLD THE ARCHITECT AND ITS OFFICERS, DIRECTORS, SHAREHOLDERS, PARTNERS, PRINCIPALS, CONSULTANTS, AGENTS AND EMPLOYEES HARMLESS FROM AND AGAINST ANY AND ALL ACTIONS, DAMAGES, DEMANDS, CLAIMS, SUITS, LOSSES, LIABILITY, JUDGMENTS, RECOVERIES, COSTS AND EXPENSES, INCLUDING, BUT NOT LIMITED TO, REASONABLE ATTORNEY'S FEES WHICH ANY OF THEM MAY INCUR IN CONNECTION WITH, ARISING FROM, RESULTING FROM OR RELATED TO ANY USE OF THE EXPORTED DATA FROM THE BUILDING INFORMATION MODEL, DRAWINGS, OR OTHER ELECTRONIC DATA AND/OR THE INFORMATION CONTAINED THEREIN BY THE USER OR ANY THIRD PARTY WHO RECEIVES SAID DRAWINGS AND DATA FROM THE USER. SUCH CLAIMS INCLUDE, WITHOUT LIMITATION, ANY CLAIM WHICH MAY ARISE DUE TO DELETIONS, OMISSIONS OR VARIATIONS OF DATA DUE TO MECHANICAL OR TECHNICAL FAILURE IN CONNECTION WITH THE TRANSMISSION OF THE DRAWINGS AND DATA.

THE USER HEREBY AGREES, TO THE FULLEST EXTENT PERMITTED BY LAW, THAT IN NO EVENT SHALL THE ARCHITECT BE LIABLE TO USER FOR ANY DAMAGES OR LOSSES OF ANY KIND INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR DEATH OR BODILY INJURY TO PERSONS, INJURY TO PROPERTY, AND DIRECT, INDIRECT, CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES, RESULTING FROM ANY ERROR, OMISSION, INACCURACY, DEFICIENCY OR DEFECT IN OR PROBLEM WITH, THE DATA EXPORTED FROM THE BUILDING INFORMATION MODEL, DRAWINGS, OR THE DATA AND/OR INFORMATION CONTAINED THEREIN. WITHOUT LIMITING THE FOREGOING, THE USER ACKNOWLEDGES THAT SAID DATA AND/OR INFORMATION CONTAINED THEREIN MAY BE INACCURATE AND/OR INCOMPLETE AND THAT THE ARCHITECT WILL HAVE NO OBLIGATION TO UPDATE OR MODIFY THE DATA EXPORTED FROM THE BUILDING INFORMATION MODEL, DRAWINGS, OR OTHER ELECTRONIC DATA, AND/OR INFORMATION CONTAINED IN IT BECAUSE SAID DRAWINGS AND DATA WERE PREPARED SOLELY FOR INFORMATIONAL PURPOSES AND ARE NOT PART OF THE CONSTRUCTION OR CONTRACT DOCUMENTS FOR THE PROJECT.

THE USER ACKNOWLEDGES REVIEWING OTHER SECTIONS OF THE PROJECT MANUAL RELATED TO THIS SECTION, INCLUDING BUT NOT LIMITED TO:

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS.

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS.

SECTION 01 78 00 - CLOSEOUT SUBMITTALS.

THE USER ACKNOWLEDGES AND AGREES THAT THESE TERMS OF USE DO NOT CONVEY A CONTRACT WITH DORE & WHITTIER ARCHITECTS INC. WITH RESPECT TO ANY CLAIMS OR CAUSES OF ACTION RELATED TO OR ARISING OUT OF THE PROJECT. THE USER FURTHER AGREES TO OBLIGATE ANY CONTRACTOR, CONSULTANT OR OTHER PARTY WHO USES THE DATA EXPORTED FROM THE BUILDING INFORMATION MODEL, DRAWINGS, OR OTHER ELECTRONIC DATA TO BE BOUND BY THE TERMS AND CONDITIONS CONTAINED HEREIN. ANY USER'S USE OF SAID DRAWINGS AND DATA, AND THE INFORMATION CONTAINED THEREIN CONSTITUTES SUCH USER'S ACCEPTANCE OF ALL THE TERMS HERE SPECIFIED.

AGREED AND ACCEPTED BY:

DATE:	
NAME:	WITNESS:
(PLEASE PRINT NAME)	(PLEASE PRINT NAME)
SIGNATURE:	SIGNATURE:
PRINT NAME:	PRINT NAME:
_____	_____
TITLE:	

**END OF SECTION**





## SECTION 01 32 16 CONSTRUCTION PROGRESS SCHEDULE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Preliminary schedule.
- B. Submittals Schedule.

#### 1.02 REFERENCE STANDARDS

- A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
  - 1. M-H (CPM); McGraw-Hill Higher Education, Critical Path Method;  
<http://www.cpmconstructionmanagement.com>.
  - a. M-H (CPM) - CPM in Construction Management - Project Management with CPM.

#### 1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Preliminary Schedule
  - 1. Within 10 days after date of Agreement, submit project schedule with a general outline for remainder of work.
    - a. Schedule shall be in bar chart form.
- C. Within 15 days of Notice to Proceed, provide a Submittals Schedule for Shop Drawings, Product Data and Samples. This shall coincide and align with Project Schedule and critical path items and dates as noted.

#### 1.04 SUBMITTAL SCHEDULE

- A. Required Submittals and Delivery Activities
  - 1. Submittal List: Submittals Schedule for Shop Drawings, Product Data and Samples: Prepare the schedule in chronological order; include all submittals required during construction. The General Contractor shall submit a list in tabular format of all submittals required by the Contract Documents in both electronic and hard copy format.
  - 2. Submit revised schedules with each application for payment and/or as otherwise required by this Section.

#### 1.05 PROGRESS REVISIONS

- A. Indicate progress of each activity to date of submission.
- B. Show changes occurring since previous submission of schedule:
  - 1. Major changes in scope.
  - 2. Activities modified since previous submission of schedule
  - 3. Revised projections of progress and completion
  - 4. Other identifiable changes.

#### 1.06 DISTRIBUTION

- A. Distribute copies of the schedules to:
  - 1. Architect.
  - 2. Owner's representative (project manager).
  - 3. Owner.
  - 4. Subcontractors.
  - 5. Other parties required to comply with scheduled dates.
  - 6. Post copies in the Project meeting room and temporary field office. Delete parties from distribution when they have completed their assigned portion of the work and are no longer involved in construction activities.
- B. Instruct recipients to report promptly to the General Contractor, in writing, any problems anticipated by the projections shown in the schedules.
- C. Electronic copies shall be provided if requested by Owner/Architect.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

## **SECTION 01 40 00 QUALITY REQUIREMENTS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Submittals.
- B. References and standards.
- C. Control of installation.
- D. Tolerances.
- E. Manufacturers' field services.
- F. Defect assessment.

#### **1.02 REFERENCE STANDARDS**

- A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
  - 1. NIST. National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).

#### **1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Construction Submittals
  - 1. Design Data
    - a. Submit for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
  - 2. Certificates: When specified in individual Specification sections, submit certification by the manufacturer and General Contractor to Architect, in quantities specified for Product Data.
    - a. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications.
    - b. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
  - 3. Manufacturer's Instructions: When specified in individual Specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

#### **1.04 REFERENCES AND STANDARDS**

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product Specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

**3.02 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

**3.03 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual Specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect 30 days in advance of required observations.
  - 1. Observer subject to approval of Architect.
  - 2. Observer subject to approval of Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

**3.04 DEFECT ASSESSMENT**

- A. Replace work or portions of the work not complying with specified requirements.

**END OF SECTION**

## **SECTION 01 41 00 REGULATORY REQUIREMENTS**

### **PART 1 GENERAL**

#### **1.01 SUMMARY OF REFERENCE STANDARDS**

- A. Regulatory requirements applicable to this project are the following:
1. 29 CFR 1910 - Occupational Safety and Health Standards.
  2. Vermont State Rules:
    - a. 2015 Vermont Fire and Building Safety Code.
    - b. Vermont Electrical Safety Rules, current edition.
    - c. Vermont Plumbing Rules, current edition.
    - d. Vermont Access Rules (ADA); current edition.
  3. State Adopted Codes:
    - a. NFPA 1 Fire Code; 2015 edition.
    - b. NFPA 101 Life Safety Code; 2015 edition.
    - c. The International Building Code, IBC, 2015 edition.
    - d. NFPA 70 Electrical Code; 2017 edition.
    - e. ICC International Plumbing Code; 2015 edition.
    - f. The National Board Inspection Code, National Board of Boiler & Pressure Vessel Inspectors, 2015.
  4. Commercial Building Energy Standards (CBES); current edition.
  5. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION - NOT USED**

**END OF SECTION**





## SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Temporary Sanitary Facilities.
- B. Temporary Controls: Barriers, Enclosures, and Fencing.
- C. Temporary Hoisting Equipment and Machinery
- D. Staging and Scaffolding
- E. Temporary Stairs, Ladders, Ramps and Platforms.
- F. Temporary Exits, Corridors, and Related Facilities for Normal Operations and Owner occupancy during phased construction.
- G. Waste removal facilities and services.
- H. Dust Control.

#### **1.02 TEMPORARY SANITARY FACILITIES**

- A. The General Contractor shall make all arrangements for and provide sanitary facilities for the use of all workers. Facilities shall meet all requirements of the local authorities having jurisdiction. Refer to General Conditions for additional requirements.
- B. Provide and maintain required facilities and enclosures. Provide at time of Project mobilization.
  - 1. Facilities shall be adequately screened to be inaccessible to flies.
- C. Maintain daily in clean and sanitary condition.
- D. Completely remove the facilities upon completion of the contract.

#### **1.03 TEMPORARY BARRIERS, ENCLOSURES, AND FENCING**

- A. The General Contractor shall be fully responsible for security of the work areas of the site and for patrolling and protecting the work under construction and his and the Owner's materials stored or otherwise located on the site.
- B. The General Contractor shall provide temporary fencing, barricading, and overhead protection of substantial nature to protect workers, other personnel, and the public against various hazards and attendant nuisances that come about as the work progresses such as, but not necessarily limited to, falling materials, dangerous projections or obstructions, stored or stockpiled materials. Comply fully with governing laws and codes.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect vehicular traffic, stored materials, site, and structures from damage.

#### **1.04 TEMPORARY HOISTING EQUIPMENT AND MACHINERY**

- A. The general contractor shall provide and maintain in safe conditions any hoisting equipment or machinery required for the execution of the work. At the Contractor's discretion, they may require specific sub-contractors to provide their own hoisting equipment and machinery as part of their respective sub-contract.
- B. All hoisting equipment and machinery and operation shall comply in all respects to the governing laws and codes.

#### **1.05 STAGING AND SCAFFOLDING**

- A. Staging and scaffolding shall be of engineered design adequate and suitable for the intended purpose and loading and in compliance with all applicable federal, State, and local laws and regulations, shall have all accident prevention devices and other features required by federal, State and local laws and regulations, and shall be erected and removed by experienced stage builders.
- B. The general contractor shall erect and maintain all staging and scaffolding required for the execution of the work. At the Contractor's discretion, they may require specific sub-contractors to provide their own staging or scaffolding as part of their respective sub-contract.

#### **1.06 TEMPORARY STAIRS, LADDERS, RAMPS AND PLATFORMS**

- A. The General Contractor shall provide and maintain all necessary temporary stairs, ladders, ramps, platforms, and other temporary construction required for the proper execution of the work, all of which shall comply with requirements

of the governing laws and codes.

**1.07 TEMPORARY EXITS, CORRIDORS, AND RELATED FACILITIES FOR NORMAL OPERATIONS AND OWNER OCCUPANCY DURING PHASED CONSTRUCTION**

- A. The General Contractor shall allow for continued normal, safe operations on the site, including serving utilities, deliveries, safe pedestrian and vehicle access and parking. The Owner will vacate the parts of the building and grounds during the construction period as indicated in the Phasing Schedule and Plans.
1. The General Contractor shall maintain controlled and fenced demolition, construction and staging areas.
  2. The General Contractor shall provide and maintain safe, protected exits from the occupied parts of the building to the public way. Every phase or sub-phase of the Project shall include, as part of the cost of the General Contractor's work without additional payment, the proper number and arrangement of exits from the occupied parts of the building. Where existing exits that serve occupied areas are removed or blocked by construction, and the remaining exits are not sufficient in quantity or arrangements, then temporary exits shall be provided in order to maintain code-required egress from the occupied building areas.
  3. During Owner-scheduled use of the facility throughout the duration of the Project, the General Contractor shall provide and maintain temporary parking equal in number of spaces to parking displaced by construction activities and shall provide signs, barricades and notifications to assist the Owner (staff and public) in utilizing such parking.
  4. The General Contractor shall provide exhaust scrubbers on all diesel equipment operating in the vicinity of the occupied building.
  5. Utility interruptions shall be limited to momentary disconnect-connect switch-over scheduled in advance and approved in advance by the Owner.

**1.08 SECURITY**

- A. Provide security and facilities to protect work, and Owner's operations from unauthorized entry, vandalism, or theft.
- B. Coordinate with Owner's security program.

**1.09 VEHICULAR ACCESS AND PARKING**

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. The General Contractor shall provide and maintain temporary parking in quantity required for the construction personnel, Project Manager, and visitors (e.g. Owner, Architect, Town authorities, and inspectors).

**1.10 WASTE REMOVAL / DUMPSTER**

- A. Provide waste removal facilities and services in appropriate quantity and frequency to maintain the site in clean and orderly condition.
- B. Provide a staging area for separation of staging waste.
- C. The General Contractor shall provide and pay all costs for temporary dumpster type trash containers outside the building for use by all subcontract and non subcontract trades, and shall have the containers replaced, hauled away, and the contents legally disposed of at sufficient intervals to maintain them at all times in sufficiently empty condition that they are continuously ready to receive trash and debris.
1. Excluded from these temporary trash containers shall be (1); all removed existing materials, trash, and debris resulting from demolition operations and (2); all removed materials resulting from site work, including all excavated site materials, whether the work of these categories is by the General Contractor, subcontractors, or by other subcontractors.
- D. Waste materials and rubbish which might otherwise raise dust shall be sprinkled during handling and loading to minimize this effect. Debris shall be carried out of the structure in containers or dropped in fully enclosed chutes and shall not be passed through, or thrown from, windows or other wall openings, and in no case shall be permitted to

drop freely therefrom.

E. All waste materials and rubbish shall be disposed of legally, off the site.

1. The General Contractor shall maintain record copies of land-fill receipts and shall submit copies of these to the Owner's Project Manager on a weekly basis.

F. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

**1.11 DUST CONTROL**

A. The General Contractor shall be responsible for minimizing and keeping dust down on the site and within the occupied building subject to dust from construction activity at all times, seven days a week.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



## SECTION 01 52 13 FIELD OFFICES AND SHEDS

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Temporary field offices and storage sheds for use of the General Contractor.
- B. Maintenance, relocation if necessary, and removal of field offices and sheds for General Contractor.

#### **1.02 USE OF EXISTING PERMANENT FACILITIES**

- A. Consult with OPM and Architect regarding feasibility of use of permanent facilities for field offices.
- B. Coordinate use and occupy same only with advance written approval by Owner (through OPM).
- C. Comply with all Owner requirements for General Contractor use of permanent building spaces, including insurance and other requirements.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS, EQUIPMENT, FURNISHINGS**

- A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

#### **2.02 CONSTRUCTION**

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. Construction: Structurally sound, secure, weather-tight enclosures for office. Maintain during progress of work; remove at completion of work.
- C. General Contractor shall procure permits required for field offices and sheds.
- D. Fire Extinguishers: Appropriate type fire extinguisher at each office.

#### **2.03 ENVIRONMENTAL CONTROL**

- A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

#### **2.04 GENERAL CONTRACTOR OFFICE AND FACILITIES**

- A. Provide office facilities in size required to accommodate General Contractor's general use and to provide space for project meetings. Provide heat, ventilation, power and light per building code requirements and acceptable to the AHJ. Provide and maintain throughout duration of project, local telephone service for the legitimate use of those connected with work. Pay all permits and charges related to temporary telephone service. Maintain a complete set of current project drawings and specifications at this office at all times. Maintain a file with all shop drawings, permits and other data pertinent to the work.
- B. Furnishings in Meeting Area: Conference table and chairs to seat at least six persons; racks and files for Contract Documents, submittals, and project record documents.
- C. Provide adequate electrical outlets within the meeting area: minimum of two free quad outlets per side of the meeting table, in addition to outlets dedicated to appliances and equipment.
- D. Other Furnishings: General Contractor's option.
- E. Equipment:
  - 1. Six adjustable band protective hard hats for visitors' use.
  - 2. Other equipment, as determined by General Contractor.

#### **2.05 GENERAL CONTRACTOR STORAGE SHEDS**

- A. The General Contractor shall provide such storage sheds, temporary buildings, or trailers to facilitate the performance of the Contract. Storage of construction materials in the work area shall be permitted, depending on the type of materials and the duration of expected storage, as determined by the Architect and Owner.
  - 1. Materials shall be handled, stored, and protected in accordance with best industry practice, and except where otherwise specified in the Contract Documents, in accordance with manufacturer's specifications and directions. Protect all construction materials from damage due to moisture, wind, cold, vandalism, or any other source in

accordance with requirements of applicable sections of the Contract Documents. Any damage to construction materials will be at the expense of the General Contractor.

- B. All temporary structures shall be removed at Substantial Completion.

**PART 3 EXECUTION**

**3.01 LOCATION AND ACCESS**

- A. Prior to installation of offices and sheds, consult with Architect and Owner on location, access and related facilities.

**3.02 INSTALLATION**

- A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.
- B. Install office furnishings and equipment ready for use.

**3.03 MAINTENANCE AND CLEANING**

- A. Weekly janitorial services for offices; periodic cleaning and maintenance for offices.
- B. Maintain approach walks, steps, and driveways free of mud, water, and snow.

**3.04 REMOVAL**

- A. At completion of work remove buildings, foundations, utility services, furnishings and equipment, and debris. Restore areas.

**END OF SECTION**



## **SECTION 01 60 00 PRODUCT REQUIREMENTS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Transportation, handling, storage and protection.
- B. Product option requirements.
- C. Maintenance materials, including extra materials, spare parts, tools, and software.

#### **1.02 SUBMITTALS**

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

### **PART 2 PRODUCTS**

#### **2.01 LOCAL MATERIALS**

- A. To the greatest extent practical, products and materials manufactured, fabricated, or mined in Vermont shall be given highest selection priority, and materials manufactured, fabricated, or mined in the United States shall be given second selection priority.
- B. All VTARNG contracts are subject to the Buy American Act. US, NAFTA, and EEC (European Economic Community) products are exempted.

#### **2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.
- C. Use of products having any of the following characteristics is not permitted:
  - 1. Made using or containing CFC's or HCFC's.
- D. Asbestos Prohibition:
  - 1. There shall be no asbestos (i.e., Zero content) in any product or material supplied, delivered to, or built into the project, and it is expressly intended that the materials in these specifications and indicated on the drawings contain no asbestos.
  - 2. As a condition of Substantial Completion, the General Contractor shall submit a signed certificate which states that there is no asbestos in any product or material supplied to or built into the project.

#### **2.03 PRODUCT OPTIONS**

- A. Product selection and use of alternative products shall comply with the following:
  - 1. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
  - 2. Products Specified by Naming One or More Manufacturers: Contractors are encouraged to use a product of one of the manufacturers named and meeting specification requirements. Products of other manufacturers not listed will be considered substitutions, and the submitting contractor shall prepare sufficient data to enable review and comparison of submitted products for conformance to specification requirements, and comparison to listed products in terms of construction, quality, strength, performance, durability, and/or appearance, and submit said comparison using the Product Substitution Form provided following this Section. Allow for 30 days review time for Substitution Requests. The Awarding Authority shall make final determination of acceptance.

**2.04 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain and submit Owner's signed receipts of delivery prior to final payment.

**PART 3 EXECUTION**

**3.01 SUBSTITUTION LIMITATIONS**

- A. See Section 01 25 00 - Substitution Procedures.

**3.02 PACKAGING WASTE MANAGEMENT**

- A. When ordering materials and products, request to each manufacturer, fabricator, supplier, and shipper that they provide least amount of packaging that adequately and properly protects, supports and contains the items shipped, and is reusable, returnable, or recyclable.

**3.03 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

**3.04 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
  - 1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**

## SECTION 01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Closeout procedures, including General Contractor's Correction Punch List, except payment procedures.

#### 1.02 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Construction Submittals
  - 1. Cutting and patching:
    - a. Submit written request in advance of cutting or alteration that affects:
      - 1) Structural integrity of any element of Project.
      - 2) Integrity of weather-exposed or moisture-resistant element.
      - 3) Efficiency, maintenance, or safety of any operational element.
      - 4) Visual qualities of sight-exposed elements.
      - 5) Work of Owner or separate contractor.

#### 1.03 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

### PART 2 PRODUCTS

#### 2.01 PATCHING MATERIALS

- 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.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

#### 3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.

- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

**3.03 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect five days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.

**3.04 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

**3.05 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and to the extent needed to accomplish new work.
  - 1. Remove items indicated on Drawings.
  - 2. Relocate items indicated on Drawings.
  - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces in a manner suitable to receive new finish; remove existing finish if necessary for successful application of new finish.
  - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Services: Remove, relocate, and extend existing systems to accommodate new construction.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment.
  - 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections required to maintain existing systems in service.
  - 4. Verify that abandoned services serve only abandoned facilities.
  - 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- D. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Refinish existing surfaces as indicated.
- H. Clean existing systems and equipment.
- I. Do not begin new construction in alterations areas before demolition is complete.
- J. Comply with all other applicable requirements of this Section.

**3.06 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Cutting, coring, and patching shall be performed by the Fire Protection, Plumbing, HVAC, and Electrical subcontractor requiring the cutting, coring, and/or patching, except as indicated in respective subcontractor sections. Where any of those subcontractor sections indicate that cutting, coring, and/or patching shall be performed by other sections, the cost of such cutting, coring, and/or patching shall be borne by the subcontractor requiring the cutting, coring, and/or patching. All cutting, coring, and patching shall be coordinated through and by the General Contractor. Any and all cutting of structural members shall require approval of the Project's structural engineer; refer to Structural Drawings for penetrations typically allowed and for required provisions related to such penetrations.
- C. Perform whatever cutting and patching is necessary to:
  1. Complete the work.
  2. Fit products together to integrate with other work.
  3. Provide openings for penetration of mechanical, electrical, and other services.
  4. Match work that has been cut to adjacent work.
  5. Repair areas adjacent to cuts to required condition.
  6. Repair new work damaged by subsequent work.
  7. Remove samples of installed work for testing when requested.
  8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.
- J. Patching:
  1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  2. Match color, texture, and appearance.
  3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

**3.07 ROOFING REMOVAL, PROTECTION, CUTTING AND PATCHING**

- A. In areas of roof related alterations, the Roofing subcontractor shall be responsible for removal of existing roofing, flashing, insulation materials, roof accessories, and blocking down to the existing roof deck (including fascia blocking) to the extent necessary to accommodate new work, except where scheduled to remain.

1. The Roofing subcontractor shall be responsible for protecting exposed decking from damage, inclement weather, and moisture.

**3.08 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

**3.09 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

**3.10 SYSTEM STARTUP**

- A. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- B. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- C. Verify that wiring and support components for equipment are complete and tested.
- D. Execute start-up under supervision of applicable General Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- E. When specified in individual specification sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

**3.11 GENERAL CONTRACTOR'S CORRECTION PUNCH LIST**

- A. The General Contractor shall inspect the project and prepare a list of corrective or incomplete work to be completed. This punch list shall be completed and submitted to the Architect prior to Substantial Completion and before request for the Architect to conduct a punch list inspection.
- B. The Architect will provide one punch list inspection and one reinspection "back-punch" of each building or site area without prejudice to the project. Costs related to additional punch list inspections will be charged as an additional service to the Owner and will be back-charged against the project retainage.

**3.12 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
- B. Use cleaning materials that are non-hazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Replace filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- J. Clean Owner-occupied areas of work.

**3.13 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Architect and Owner.
- B. Submit initial draft copy of operations and maintenance / closeout documentation prior to requesting Substantial Completion.
- C. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the General Contractor's Correction Punch List for General Contractor's Notice of Substantial Completion.
- D. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- E. Submit written certification containing General Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and General Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- H. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

**END OF SECTION**





## **SECTION 01 78 00 CLOSEOUT SUBMITTALS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

#### **1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Closeout Submittals
  - 1. Submit in accordance with this Section and Section 01 70 00 - Execution and Closeout Requirements.
    - a. Project Record Documents: Submit documents to Architect and Owner to review.
    - b. Operation and Maintenance Data:
      - 1) Submit preliminary manuals electronically, in accordance with submittal procedures. Architect will review drafts and provide comments.
      - 2) For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
      - 3) Submit completed documents not less than three weeks prior to Substantial Completion. A copy will be returned with Architect comments. Revise content of all document sets prior to final submission.
      - 4) Submit one printed copy and one PDF copy of revised final documents in final form not less than one week prior to Substantial Completion.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION**

#### **3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Proposal Requests (PRs).
  - 5. Requests for Information (RFIs).
  - 6. Architect's Supplemental Instructions (ASIs).
  - 7. Reviewed shop drawings, product data, and samples.
  - 8. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.

#### **3.02 OPERATION AND MAINTENANCE DATA**

- A. Source Data: For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: Provide to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

**3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
  - 1. Product data, with catalog number, size, composition, and color and texture designations.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.
- D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

**3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, General Contractor and subcontractors, with names of responsible parties.
- H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, General Contractor, subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.

- b. Certificates.
- c. Photocopies of warranties and bonds.
- N. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- O. Provide one printed copy and one PDF copy.

**3.05 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include all warranties with Operation and Maintenance Manuals.

**3.06 ASBESTOS FREE CERTIFICATION:**

- A. As a condition of Substantial Completion in accordance with Section 01 60 00 - Product Requirements, the General Contractor shall submit a signed certificate which states that there is no asbestos in any product or material supplied to or built into the project.

**END OF SECTION**



## SECTION 01 79 00 DEMONSTRATION AND TRAINING

### **PART 1 GENERAL**

#### **1.01 SUMMARY**

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
  - 1. HVAC systems and equipment.

#### **1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
  - 1. Include applicable portion of Operations and Maintenance manuals.
  - 2. Include copies of all hand-outs, slides, overheads and video presentations that are not included in Operations and Maintenance manuals.
  - 3. Provide two extra copies of each training manual to be included with operation and maintenance data.

#### **1.03 QUALITY ASSURANCE**

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
  - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
  - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION**

#### **3.01 DEMONSTRATION - GENERAL**

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this Section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
  - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
  - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
  - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

#### **3.02 TRAINING - GENERAL**

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide training room and seating at no cost to General Contractor.
- C. Training schedule will be subject to availability of Owner's personnel to be trained; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge General Contractor for personnel "show-up" time.
- D. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  - 1. The location of the Operations and Maintenance manuals and procedures for use and preservation; backup copies.
  - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.

3. Typical uses of the Operations and Maintenance manuals.
- E. Product- and System-Specific Training:
1. Review the applicable Operations and Maintenance manuals.
  2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  4. Provide hands-on training on all operational modes possible and preventive maintenance.
  5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  6. Discuss common troubleshooting problems and solutions.
  7. Discuss any peculiarities of equipment installation or operation.
  8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  10. Review spare parts and tools required to be furnished by General Contractor.
  11. Review spare parts suppliers and sources and procurement procedures.
- F. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

**END OF SECTION**

## SECTION 02 41 00 DEMOLITION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. The work required under this Section shall include, but is not limited to the following:
  - 1. Selective demolition of building elements for alteration purposes.
  - 2. Abandonment and removal of existing utilities and utility structures.
- B. The Plumbing, HVAC, and Electrical subcontractors shall be responsible for cutting, capping, and making safe of their respective building systems and subsystems to allow for demolition by the General Contractor and his selected non-sub-bid subcontractors in areas of general building demolition (i.e., complete removal of buildings, structures, and building wings as scheduled).

#### 1.02 REFERENCE STANDARDS

- A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
  - 1. OSHA. U.S. Occupational Safety and Health Administration; [www.osha.gov](http://www.osha.gov).
  - 2. Vermont Hazardous Waste Management Regulations (VHWMR): <https://dec.vermont.gov/waste-management/hazardous/regulations>
  - 3. NFPA. National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
    - a. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

#### 1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination per Section 01 31 14 - Coordination, and as follows:
  - 1. Coordinate schedules of operations with Owner prior to starting work.
    - a. Schedule demolition and dismantling to cause no interference with the use of the existing buildings.
    - b. Cooperate with the Owner to reduce to a minimum all interference with normal use of the building.
- B. Preconstruction Meeting required per Section 01 70 00 - Execution and Closeout Requirements.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Construction Submittals
  - 1. Submit for record a copy of all necessary permits, certificates, and notices required by local authorities for demolition work and transport and disposal of debris.
- C. Closeout Submittals
  - 1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
  - 2. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

#### 1.05 FIELD CONDITIONS - SELECTIVE DEMOLITION

- A. Conditions at the time of inspection for bidding purposes will be maintained by Owner in so far as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work.
- B. Protection: Erect barriers, fences, guardrails, enclosures, chutes, and shoring to protect public and personnel, structures and utilities remaining intact. Provide temporary closures to fully separate construction areas from areas occupied by Owner.
- C. Maintaining Traffic: Ensure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities. Coordinate parking and any lane blockages with Owner.



- D. Ensure safe passage of persons around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.
- E. Cease operations and notify the Owner immediately, if safety of subject property and/or adjacent properties or occupants appear to be endangered. Take precautions to properly support structure. Do not resume operations until safety is restored.
- F. Use of explosives will not be permitted.

**1.06 QUALITY ASSURANCE**

- A. Demolition Firm Qualifications: Company specializing in the type of work required.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION**

**3.01 SCOPE**

- A. Remove that portion of the existing as designated on the Drawings, and as follows:
  - 1. Remove mechanical equipment and associated piping and equipment as indicated in Mechanical drawings.
  - 2. Remove portions of ceiling systems to the extent necessary to perform HVAC and Electrical work.

**3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with other requirements specified in Section 01 70 00 - Execution and Closeout Requirements.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Comply with applicable requirements of NFPA 241.
  - 3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
- C. Do not begin removal until receipt of notification to proceed from Owner.
- D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. Perform demolition in a manner that maximizes salvage and recycling of materials.
  - 1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal, including waste management plan, alternative landfills proposal, recycling requirements, waste disposal reports, records of donations, and records of sales.
  - 2. Dismantle existing construction and separate materials.
  - 3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

**3.03 DEBRIS AND WASTE REMOVAL**

- A. Cleaning: remove debris and trash from site and building daily. Burning of materials from demolished structures will not be permitted on site.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal, including waste management plan, alternative landfills proposal, recycling requirements, waste disposal reports, records of donations, and records of sales
- C. Transport materials removed from demolished structures and legally dispose off site.
- D. Leave site in clean condition, ready for subsequent work.
- E. Clean up spillage and wind-blown debris from public and private lands.

**3.04 PROTECTION OF EXISTING BUILDING**

- A. Use all means and precautions necessary to insure the safety of the occupants of the building and the good condition of materials, finishes, and systems scheduled to remain.
  - 1. Contractor shall maintain the required exits, where indicated or required for code compliance, from all occupied portions of the building.
  - 2. Refer to Section 01 51 00 - Temporary Utilities for requirements for temporary exits.

**END OF SECTION**

## SECTION 07 53 00 ELASTOMERIC MEMBRANE ROOFING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Fabricating, furnishing, delivering, erecting, and installing the following elastomeric membrane roofing system work:
  - 1. Elastomeric roofing membrane, ballasted conventional application: Patching of existing abandoned roof penetrations at mechanical equipment to be removed, and flashing/sealing of new penetrations at new roof top mechanical equipment.
  - 2. Flexible flashings and accessories.
  - 3. Sealers and adhesives
- B. Temporary flashing protection of phased roofing construction.
  - 1. Provide protection from the elements when cutting involves exterior walls or roof. The Roofing and Flashing subcontractor shall provide temporary protection of roofing removal areas and roofing cutting and patching areas.

#### 1.02 REFERENCE STANDARDS

- A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced::
  - 1. ASTM. ASTM International; [www.astm.org](http://www.astm.org).
    - a. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
    - b. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.
    - c. ASTM D570 - Standard Test Method for Water Absorption of Plastics.
    - d. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
    - e. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
    - f. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness.
    - g. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane.
    - h. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.
    - i. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
    - j. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
  - 2. CDPH. California Department of Public Health; [www.cdph.ca.gov](http://www.cdph.ca.gov).
  - 3. FM. Factory Mutual.
    - a. FM 4470 - 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.
  - 4. NRCA. National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
    - a. NRCA (RM) - The NRCA Roofing Manual.
    - b. NRCA (WM) - The NRCA Waterproofing Manual.
  - 5. UL. Underwriters Laboratories; [www.ul.com](http://www.ul.com).

#### 1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Construction Submittals
  - 1. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, fasteners, and cover board, fire resistant deck sheathing.
  - a. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, mechanical fastener layout, and paver layout.
    - 1) Proposed 20 year system MFR's details
      - (a) Indicate where variations occur particular to this project

- (b) Indicate each non-standard detail meeting 20 year warranty requirements verified by system manufacturer
  - 2) Profile details of flashing methods for penetrations
- 2. Specimen Warranty: For approval.
- 3. Certifications:
  - a. Applicator: Submit certification that the roofing system installed meets each identified code and insurance requirement specified.
- 4. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- 5. Warranty: Submit manufacturer sample warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- C. Closeout Submittals
  - 1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
  - 2. Operation and Maintenance Data: Operating, cleaning and maintenance recommendations.
    - a. Basic Owner requirements to maintain warranty
    - b. Recommended maintenance guidelines and maintenance schedule.
  - 3. Warranty Documentation:
    - a. Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
    - b. Submit roofer's workmanship warranty.

#### **1.04 QUALITY ASSURANCE**

- A. Regulatory Agency Approvals:
  - 1. Exterior Fire-Test Exposure: Details compatible with Class A per ASTM E108, for application and roof slopes indicated.
  - 2. Fire-Resistance Ratings of Roof Assemblies: ASTM E119.
- B. Applicator Qualifications: Company with a minimum of three years experience that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product, and that is eligible to receive manufacturer's warranty.
  - 1. Applicator shall certify to roof system manufacturer that all work has been done in strict accordance with the contract specifications and manufacturer's requirements.
- C. Source Limitations: Obtain each component for membrane roofing system from roofing membrane manufacturer or its designated distributor.
- D. Perform work in accordance with NRCA (RM) and NRCA (WM) and manufacturer's instructions.
- E. Building envelope commissioning will be provided for this project by Owner. This subcontractor shall cooperate fully with the building commissioning agent to provide access for testing of installed materials, and to repair or remediate conditions identified by the building commissioning agent in order to obtain his acceptance of installed work. Testing of completed roofing systems will be performed by the Owner's testing agent and/or the building commissioning agent.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 - Product Requirements

#### **1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Prepare and submit a written warranty covering materials and labor signed by manufacturer that all repairs and new penetrations comply with the requirements necessary to maintain the existing roofing system warranty.
- C. Roofer's Workmanship Warranty:
  - 1. Roofer shall provide a separate 3-year warranty of the Thermoplastic Membrane Roof System.

- a. Special Requirements: The Applicator shall supply the Owner with a three-year warranty separate from the manufacturer warranty. In the event any work related to roofing, flashing, or metal is found to be defective, installed improperly, or otherwise not in accordance with the Contract Documents within this warranty term, the Contractor(s) shall repair that defect at no cost to the Owner. This warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer and Architect.
2. Warranty obligation shall run directly to the Owner, and a copy shall be sent to the manufacturer and Architect.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. EPDM Membrane Materials: Subject to compliance with these Specifications, provide products from one of the following:
  1. Basis of Design: Carlisle SynTec; Sure-Tough EPDM: [www.carlisle-syntec.com](http://www.carlisle-syntec.com).
  2. Firestone Building Products, LLC: [www.firestonebpco.com](http://www.firestonebpco.com).
  3. Johns Manville: [www.jm.com](http://www.jm.com).
  4. Versico Roofing Systems; VersiGard EPDM: [www.versico.com](http://www.versico.com).
  5. Other manufacturer's products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions.

### **2.02 ROOFING MEMBRANE AND ASSOCIATED MATERIALS**

- A. Membrane: Ethylene-propylene-diene-monomer (EPDM); externally reinforced with fabric; complying with minimum properties of ASTM D4637/D4637M.
  1. Membrane Thickness: Min 60 mil (0.06 inch or .2mm).
  2. Solar Reflectance: 0.75, minimum, initial, and 0.64, minimum, 3-year, certified by Cool Roof Rating Council.
  3. Thermal Emittance: 0.84, minimum, initial, and 0.87, minimum, 3-year, certified by Cool Roof Rating Council.
  4. Color: Gray.
  5. Tensile Strength value in accordance with ASTM D412.
  6. Ultimate Elongation value in accordance with ASTM D412.
  7. Hardness value in accordance with ASTM D2240.
  8. Tear Strength: 150 lbf/inch, measured in accordance with ASTM D624.
  9. Water absorption value measured as percent increase in weight, maximum, measured in accordance with ASTM D570.
  10. Water Vapor Permeability value in accordance with ASTM E96/E96M.
  11. Brittleness Temperature value in accordance with ASTM D746.
- B. Seaming Materials: As recommended by membrane manufacturer for specified Warranty.
- C. Membrane Fasteners: As recommended by and approved by membrane manufacturer.

### **2.03 FLASHING**

- A. Flexible Sheet Flashing: Manufacturer's standard unreinforced EPDM sheet flashing, 60 mil (1.5 mm) thick, minimum, of same color as sheet membrane approved for use with Adhered Roofing Systems.
  1. Types:
    - a. EPDM T-Joint Cover.
    - b. EPDM Walkway Pads.
    - c. Pre- Molded Pipe Flashings.
    - d. Split Pipe Seals.
    - e. Corners.
    - f. EPDM Curb Wrap Corners.
    - g. Molded Sealant Pockets.

2. Acceptable Manufacturers / Products: Selections subject to compliance with requirements from one of the following products:
  - a. Firestone EPDM Roofing System Accessories; <http://www.firestonebpco.com>.
  - b. Carlisle Sure-White EPDM System Accessories; <http://www.carlisle-syntec.com>.
  - c. Versico VersiGard Accessories; <http://www.versico.com>.
3. Other manufacturer's products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions.

#### **2.04 COVER BOARDS**

- A. Cover Boards: Glass-mat faced gypsum panels complying with ASTM C1177/C1177M.
  1. Thickness: 1/2 inch, fire resistant.
  2. Manufacturers:
    - a. Certainteed; GlassRoc; [www.certainteed.com/sheathing/products/glasroc-sheathing](http://www.certainteed.com/sheathing/products/glasroc-sheathing).
    - b. Georgia-Pacific; DensDeck Prime with EONIC Technology: [www.densdeck.com/#sle](http://www.densdeck.com/#sle).
    - c. USG Corporation; Securock Ultralight Glass-Mat Roof Board: [www.usg.com](http://www.usg.com).
    - d. Other manufacturer's products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions.

#### **2.05 INSULATION**

- A. Polyisocyanurate board insulation acceptable to roofing manufacturer as part of roofing system and covered under roofing system warranty. Installed by this Section.
  1. Insulation shall meet all identified code / insurance requirements
  2. Insulation shall be approved in writing by insulation manufacturer for intended use, and for use with membrane materials
  3. Insulation shall be compatible with roof membrane
  4. Provide insulation in minimum two layers to achieve thickness matching existing conditions, or thickness otherwise necessary to satisfy manufacturer warranty requirements.

#### **2.06 ACCESSORIES**

- A. Insulation Fasteners: Appropriate for purpose intended.
- B. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- C. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
- D. Sealants: As recommended by membrane manufacturer.
- E. Exposed Fasteners: Type 304 stainless factory-coated steel fasteners and plastic plates meeting corrosion-resistance provisions in FM 4470 or ASCE 7, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- F. Ballast stone: clear existing stone from area to receive new mechanical equipment. Salvage and reinstall in location of removed mechanical equipment.
- G. Spray-foam insulation sealant: spray foam insulation compatible with roofing system for sealing around penetrations and sealing to roof air & vapor barrier.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements, and as follows:
  1. Weather Conditions: No rain, snow or frost, and none in the immediate forecast.
- B. Work Conditions:
  1. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care shall be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrane system.

2. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The building and its contents shall be protected against all risks. Avoid over-use of non-vented direct-fired heaters during winter months. Avoid application of cover board during rains, heavy fogs and other conditions that may deposit moisture on the surface.
3. All surfaces to receive new insulation, membrane, metal roof deck, roofing material of any type, or flashings shall be dry. Should surface moisture occur the Roofing and Flashing subcontractor shall provide the necessary equipment to dry the surface prior to application.
4. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
5. Prior to and during application, all dirt, debris and dust shall be removed from surfaces by vacuuming, sweeping, and similar non-air borne methods.
6. Prior to installation inspect substrate surfaces. Identify any unsuitable substrate surfaces or conditions to the General Contractor prior to commencing with work of this Section. Submit written acceptance of substrate surfaces and conditions prior to commencing with work of this Section.
7. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's acceptance.
8. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.
9. Roofing and Flashing subcontractor shall follow all safety regulations required by OSHA and other AHJ.

**3.02 MEMBRANE APPLICATION**

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- C. Around roof penetrations, seal flanges and flashings with flexible flashing.

**3.03 FLASHING**

- A. Flashing of parapets, curbs, expansion joints and other parts of the roof shall be performed using reinforced EPDM membrane. Non-reinforced EPDM membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded accessories is not feasible.
- B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

**3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Remove, repair and reinstall or restore-in-place damaged items.
  1. Replace damaged materials or items with new if repair is not acceptable to Architect.
  2. Wet insulation materials shall be replaced.

**3.05 CLEANING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal, and as follows:
- C. Clean roof area before beginning work and at the end of each workday. Prior to laying roofing membrane perform a close check to ensure no sharp objects are present on the substrate.
- D. Remove bituminous markings from finished surfaces.
- E. In areas where finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- F. Repair or replace defaced or damaged finishes caused by work of this Section.

**3.06 PROTECTION**

- A. Immediately after roofing is installed, remove all construction waste from roof surface, including (but not limited to) packaging, strapping, fasteners such as nails and screws, surplus metal flashing and trim and other sharp-edged

materials. Notify General Contractor immediately of unsatisfactory conditions caused by other trades due to accumulation of trash or debris accumulation on completed roofing. Remove materials deposited by others promptly when observed.

- B. Provide 30 rubber walk pads to the General Contractor to be used to protect installed roof membrane where foot traffic must continue over installed roofing. The General Contractor shall verify that roof pads are temporarily placed in areas where subcontractors are performing work at areas of installed roofing. At Substantial Completion, the walk pads shall be delivered to the Owner.
- C. The General Contractor shall temporarily protect areas where subcontractors are performing work at areas of installed roofing.
- D. Protect installed roofing and flashings from construction operations until date of final Completion, or Owner occupancy (whichever occurs first).

**END OF SECTION**

## SECTION 07 84 00 FIRESTOPPING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on Drawings or not, and other openings indicated.
- C. Details that require fire stopping include the following, but are not limited to:
  - 1. Penetrations through fire-resistance-rated floor and ceiling/roof construction requiring protected openings including both empty openings and openings that contain penetrations (including vertical shaft walls and partitions).
  - 2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings that contain penetrations.
  - 3. Membrane penetrations in fire-resistance-rated walls and partitions that penetrating items penetrate one side of the barrier.
  - 4. Sealant joints in fire-resistance-rated construction (floors, walls or roof)
  - 5. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
  - 6. Safing slot gaps between edge of floor slabs and curtain walls.
  - 7. Openings between structurally separate sections of wall or floors.
  - 8. Gaps between the top of walls and ceilings of roof assemblies.
  - 9. Openings and penetrations in walls containing fire doors.
  - 10. Openings around structural members penetrating floors or walls.

#### 1.02 REFERENCE STANDARDS

- A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
  - 1. ASTM. ASTM International; [www.astm.org](http://www.astm.org).
    - a. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
    - b. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
    - c. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
  - 2. CDPH. California Department of Health; [www.cdph.ca.gov](http://www.cdph.ca.gov).
  - 3. OTC. Ozone Transport Commission; [www.otcair.org](http://www.otcair.org).
  - 4. SCAQMD. South Coast Quality Management District; [www.aqmd.gov](http://www.aqmd.gov).
  - 5. UL. Underwriters Laboratories; [www.ul.com](http://www.ul.com).
    - a. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

#### 1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meetings: See Section 01 70 00 - Execution and Closeout Requirements.
- B. Sequencing and Scheduling per Section 01 32 16 - Construction Progress Schedule, and as follows:
  - 1. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements. Coordinate sequence of work with the work of other trades.
  - 2. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Construction Submittals
  - 1. Product Data: Provide data on product characteristics.



2. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
  3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
  4. Schedule of materials: Submit a schedule of materials indicating the firestop system to be utilized for each different firestopping application in tabular form and identify:
    - a. Include all of the individual materials required for each complete system.
    - b. Indicate manufacturer's product name and nomenclature for each material.
    - c. Type of penetration or opening type by design designation of qualified testing and inspecting agency with location of each.
    - d. Types of construction assembly penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
- C. Closeout Submittals
1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
  2. Operation and Maintenance Data:
    - a. Basic Owner requirements to maintain warranty
  3. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this Section and:
1. With minimum five years documented experience installing work of this type.
  2. Having received and passed all training, licensing and approvals required by the firestopping system manufacturer.
- B. Single Source Responsibility: To the greatest extent practical, obtain firestop materials from single manufacturer.
1. All trades required to provide firestopping and coordinate with each other to provide products from the same manufacturer.
  2. Materials of different firestop manufacturers shall not be intermixed in the same firestop system or opening - if not part of that firestop system.
  3. Tested and listed firestop systems are to be used before an engineering judgment (EJ) is requested, even if from another manufacturer.

#### **1.06 FIELD CONDITIONS**

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Firestopping Manufacturers:
1. 3M Fire Protection Products: [www.3m.com/firestop](http://www.3m.com/firestop).
  2. Hilti, Inc: [www.us.hilti.com](http://www.us.hilti.com).
  3. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  4. RectorSeal: [www.rectorseal.com](http://www.rectorseal.com).
  5. Specified Technologies Inc: [www.stifirestop.com](http://www.stifirestop.com).
  6. Thermafiber, Inc: [www.thermafiber.com](http://www.thermafiber.com).
  7. USG: [www.usg.com](http://www.usg.com).
  8. Other manufacturer's products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitution.

## 2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Performance Requirements - Provide and install firestopping systems that are produced to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases. Include the following:
  - 1. Firestop each penetration through rated construction to the approval of the Authority Having Jurisdiction (AHJ).
  - 2. Provide and install complete firestopping systems that are designed and approved for the specific construction to be firestopped.
  - 3. Provide and install firestop materials of thickness, width, and density required.
- B. F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop system with F (flame) ratings indicated, as determined per ASTM E814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
- C. T-Rated Through-Penetration Firestop Systems: Provide firestop systems with T (temperature) ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupied floor areas. T-rated assemblies are required where the following conditions exist where firestop systems protect:
  - 1. Penetrations located outside of wall cavities.
  - 2. Penetrations located outside fire-resistive shaft enclosures.
  - 3. Penetrations located in construction containing doors required to have a temperature-rise rating.
  - 4. Penetrating items larger than a 4 in. diameter nominal pipe of 16 sq. in. in overall cross-sectional area.
- D. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per UL 2079 and/or ASTM E119 and ASTM E1966, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
- E. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
  - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide through-penetration firestop systems with elastomeric qualities.
  - 2. For floor penetrations with annular spaces exceeding 4 in. or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
  - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

## 2.03 FIRESTOPPING SYSTEMS

- A. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant; conforming to the following:
  - 1. Durability and Longevity: Permanent.
- B. Foam Firestopping: Single component silicone foam compound; conforming to the following:
  - 1. Durability and Longevity: Permanent.
- C. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers; conforming to the following:
  - 1. Durability and Longevity: Permanent.
- D. Fiber Firestopping: Mineral fiber insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to the following:
  - 1. Durability and Longevity: Permanent.
- E. Firestop Devices - Wrap Type: Mechanical device with incombustible filler and sheet stainless steel jacket, intended to be installed after penetrating item has been installed; conforming to the following:
  - 1. Durability and Longevity: Permanent; suitable for pedestrian traffic.
- F. Intumescent Putty: Compound that expands on exposure to surface heat gain; conforming to the following:
  - 1. Durability and Longevity: Permanent.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify openings are ready to receive the work of this Section.

**3.02 PREPARATION**

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.
- D. Coordinate with fire protection, plumbing, mechanical, electrical and other trades to assure that all pipe, conduit, cable, and other items that penetrate fire rated construction have been permanently installed prior to installation of firestops and smoke seals.

**3.03 CLEANING**

- A. Clean adjacent surfaces of firestopping materials.

**3.04 PROTECTION**

- A. Protect adjacent surfaces from damage by material installation.

**END OF SECTION**

## SECTION 09 51 00 ACOUSTICAL CEILINGS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Furnishing, delivering, erecting and installing the following work:
  - 1. Acoustical units.
  - 2. Trim, perimeter pockets, and other accessories required for a complete installation.

#### 1.02 REFERENCE STANDARDS

- A. Editions of listed standards as referenced by applicable codes, or most current edition if not referenced:
  - 1. ASCE. American Society of Civil Engineers; [www.asce.org](http://www.asce.org).
    - a. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
  - 2. ASTM. ASTM International; [www.astm.org](http://www.astm.org).
    - a. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
    - b. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
    - c. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
    - d. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.
  - 3. CDPH. California Department of Public Health; [www.cdph.ca.gov](http://www.cdph.ca.gov).
  - 4. UL. Underwriters Laboratories; [www.ul.com](http://www.ul.com).
    - a. UL (FRD) - Fire Resistance Directory.

#### 1.03 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling per Section 01 32 16 - Construction Progress Schedule, and as follows:
  - 1. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
  - 2. Do not install acoustical units until after interior wet work is dry.

#### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Construction Submittals
  - 1. Product Data: Submit manufacturer's printed product literature including products standards, acoustical tile materials, suspension system components, finishes, installation instructions, use limitations, and recommendations.
- C. Closeout Submittals
  - 1. Submit in accordance with Section 01 70 00 - Execution and Closeout Requirements and Section 01 78 00 - Closeout Submittals.
  - 2. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    - a. See Section 01 60 00 - Product Requirements, for additional provisions.
    - b. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

#### 1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company with a minimum of three years experience specializing in work of the type required by this Section.
- B. Single Source Responsibility: Furnish system materials from one manufacturer for entire Project, unless otherwise acceptable to Architect.

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements and submittal instructions and the following:
1. Materials and Workmanship Warranties: Provide 10 year panel / 15 year system, and 10 year / lifetime system warranty (depending on tile specified) warranties, issued by the manufacturer upon completion of the work and beginning on the date of Substantial Completion.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Acoustic Tiles/Panels: Subject to compliance with requirements of these Specifications, provide equivalent product from one of the following manufacturers, except where otherwise noted for specific ceiling types below:
1. Armstrong World Industries, Inc: [www.armstrongceilings.com](http://www.armstrongceilings.com).
  2. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  3. USG Corporation: [www.usg.com/ceilings](http://www.usg.com/ceilings).

**2.02 MATERIALS - ACOUSTICAL UNITS**

- A. Acoustical Tile Type ACP1: Painted mineral fiber, to matc, ASTM E1264 Type III, with the following characteristics:
1. Size: 24 by 24 inches .
  2. Thickness: 1 inches.
  3. Composition: Water felted.
  4. Light Reflectance: .85 percent, determined in accordance with ASTM E1264.
  5. NRC: .85, determined in accordance with ASTM E1264.
  6. Ceiling Attenuation Class (CAC): .35, determined in accordance with ASTM E1264.
  7. Edge: Square lay-in.
  8. Surface Color: White.
  9. Surface Pattern: Fine textured.
  10. Basis-of Design Product: Calla by Armstrong.
- B. Acoustical Tile Type ACP1A: Painted mineral fiber, ASTM E1264 Type III, with to the following characteristics:
- C. Acoustical Tile Type ACP1B: Painted mineral fiber, ASTM E1264 Type III, with to the following characteristics:

**2.03 SUSPENSION SYSTEM(S)**

- A. Manufacturers:
1. Same as for acoustical units.
  2. Other manufacturer's products accepted by the Awarding Authority as equal to the specified products in terms of construction, quality, durability, performance, and or appearance. Submit as substitutions.
- B. Suspension Systems - General: ASTM C635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as necessitated by the work.
- C. Exposed Suspension System: Formed steel, commercial quality cold rolled.
1. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
  2. Profile: Tee; 15/16 inch face width.
  3. Finish: Baked enamel.
  4. Color: White.
  5. Basis of Design Product: Prelude tee suspension system, by Armstrong

**2.04 ACCESSORIES**

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

- B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.
- C. Perimeter Moldings: Same metal and finish as grid.
  - 1. At Exposed Grid: Angle molding: L-shaped, for mounting at same elevation as face of grid.
- D. Touch-up Paint: Type and color to match acoustical and grid units.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examination and Acceptance of Conditions per Section 01 40 00 - Quality Requirements, and as follows:
  - 1. Carefully examine installation areas with Installer present, for compliance with requirements affecting work performance.
    - a. Verify that field measurements, substrates, structural support, utility connections, tolerances, levelness, plumbness, humidity, moisture content level, cleanliness and other conditions are ready to receive work.
    - b. Verify that layout of hangers will not interfere with other work.
  - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.02 INSTALLATION - SUSPENSION SYSTEM**

- A. General: Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions, ASCE 7, Drawings and as follows:
  - 1. Install acoustical materials and suspension systems in accordance with UL (FRD) Design Number for roof/ceiling assembly indicated on Drawings.
  - 2. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
    - a. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
      - 1) Use longest practical lengths.
      - 2) Overlap and rivet corners.
  - 3. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
  - 4. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
  - 5. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
  - 6. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
  - 7. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
  - 8. Do not eccentrically load system or induce rotation of runners.

#### **3.03 INSTALLATION - ACOUSTICAL UNITS**

- A. General: Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions, ASCE 7, Drawings and as follows:
  - 1. Install acoustical materials and suspension systems in accordance with UL (FRD) Design Number for roof/ceiling assembly indicated on Drawings.
  - 2. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
  - 3. Fit border trim neatly against abutting surfaces.
  - 4. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
  - 5. Cutting Acoustical Units:
    - a. Cut to fit irregular grid and perimeter edge trim.
    - b. Make field cut edges of same profile as factory edges.
    - c. Double cut and field paint exposed reveal edges.

**3.04 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Remove, repair and reinstall or restore in place damaged items prior to inspection for Substantial Completion.
  - 1. Replace damaged materials and components with new if repair not acceptable to Architect.

**3.05 CLEANING**

- A. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
- B. Following installation, clean dirty discolored surfaces of acoustical units and leave them free of defects.

**3.06 PROTECTION**

- A. Protect installed work from subsequent construction operations until date of Substantial Completion or Owner occupancy, whichever occurs first.

**END OF SECTION**

## SECTION 23 00 00 BASIC MECHANICAL REQUIREMENTS

### PART 1 – GENERAL

#### 1.01 DESCRIPTION

- A. Provide all labor, materials, equipment and transportation as required to completely install the HVAC systems as shown on the Drawings and as specified in this Division
- B. Drawings:
  - 1. Contract drawings are, in part, diagrammatic and are intended to convey the scope of the work and indicate in general arrangement of the equipment and do not indicate every required offset, fitting, valve, etc. Follow these drawings in laying out the work. Consult all Drawings to become familiar with all conditions affecting the work and to verify spaces in which the work will be installed.
  - 2. Reasonable changes required by job conditions (including offsetting of piping and ductwork, etc.) shall be made at no additional cost to the owner.
- C. Definitions:
  - 1. "Provide" shall have the same meaning as "furnish and install." All material so implied either on the drawings or in these specifications shall be furnished and installed unless specifically noted otherwise.
  - 2. Contractor Abbreviations:
    - a. MC Mechanical Contractor
    - b. EC Electrical Contractor
    - c. PC Plumbing Contractor
    - d. GC General Contractor
- D. Contractor shall be responsible to insure a complete system and compliance with all applicable codes. In the absence of a clarification by the Engineer, the contractor must install his work in accordance with the more stringent application. Contractor assumes full responsibility for any and all items furnished and installed without the written approval by the Architect and/or Engineer. Under no circumstances will a change order be approved for work installed that was not approved by the Architect and/or Engineer.
- E. Related work specified elsewhere includes:
  - 1. Instructions to Bidders
  - 2. General Requirements Division 01
  - 3. Sitework Division 31
  - 4. Concrete Division 03
  - 5. Finishes Division 09
  - 6. Electrical Division 25
  - 7. Automatic control valves, separable wells for immersion elements, louvers and dampers furnished by others shall be installed by the Mechanical Contractor.



## **1.02 ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT**

- A. The HVAC work shall include the installation of all motors, temperature controls, limit switches, etc., as herein specified. All 480, 240, 208, and 120 volt "power" wiring and connections, not specified in this Section, will be provided under Division 16 - Electrical.
- B. All wiring, motor starters and auxiliary devices required for the specified systems, equipment and operations indicated in this Section shall be provided under this Section, unless specifically indicated on the Drawings related to Division 16 - Electrical. This shall include, but is not necessarily limited to, all wiring for automatic temperature control and all wiring for automatic timing controls.
- C. The materials and methods for all electrical work provided under this Section shall comply with the requirements specified under Division 16 - Electrical. Coordinate equipment ratings, starter sizes, protective device sizes, wire and conduit sizes, holding coil voltages and control voltages with Division 16.

## **1.03 SUBMITTAL DATA AND SHOP DRAWINGS**

- A. Submit seven copies of all submittal data and/or complete shop drawings as specified in each section for review.
- B. See Division 1, for Administrative Provisions.
- C. Mechanical/Plumbing contractor shall provide a list of Submittals for Engineers review prior to submitting on submittals.
- D. Submittals shall be complete by specification article. All items specified under the same article as the major item shall be included in the submittals. No partial or incomplete submittal will be accepted or reviewed. Submittals for equipment requiring electrical service shall include wiring diagrams.
- E. Provide copies of all required permits.
- F. Provide air and water balance reports.
- G. Provide as-built mechanical drawings.
- H. Provide Operation and Maintenance Manuals for all equipment.
- I. Submittals and/or shop drawings are to be edited to show specific data for the mechanical equipment that the contractor intends to provide.
- J. Submittals and/or shop drawings are to be identified with numbers and letters identical to those listed on the drawings and/or specifications.

## **1.04 RECORD DRAWINGS**

- A. During progress of the work, the contractor shall maintain an accurate record of all changes made in the mechanical system installation from the layout and materials shown. These shall be kept on a separate set of plans. At the completion of the project, transfer all information to the architect/engineer

## **1.05 OPERATIONS AND MAINTENANCE MANUAL**

- A. Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Architect/Engineer three copies of a manual describing the system. Prepare manuals in durable plastic binders approximately 8½ by 11 inches in size with at least the following:
1. Identification on, or readable through, the front cover stating general nature of the manual.
  2. Neatly typewritten index near the front of the manual, furnishing immediate information as to location in the manual of all data regarding the installation.
  3. A copy of all reviewed submittals and shop drawings.
  4. A simplified description of the operation of all systems including the function of each piece of equipment within each system. These descriptions shall be supported with a schematic flow diagram.
  5. Valve tag charts, where applicable.
  6. An explanation of the control sequence of each system along with the following instructions wherever applicable.
    - a. Emergency procedures for fire or failure of major equipment.
    - b. Normal starting, operation and shutdown.
    - c. Summer or winter shutdown.
  7. An outline of a preventive maintenance program for each system which shall include a schedule of inspection and maintenance. It shall suggest the maintenance and inspection that should be done with outside service.
  8. Complete name and address of nearest vendor of replaceable parts.
  9. Copy of all guarantees and warranties issued.
  10. Where contents of manual include manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete, or otherwise clearly indicate, all manufacturer's data with which this installation is not concerned.
  11. Letter of Guarantee from Contractor.

## **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. The Contractor shall be responsible for the care and protection of all materials and mechanical work until the project is accepted by the Owner.
- B. Immediately remove from the construction site all materials damaged and/or destroyed and replace with new materials to the complete satisfaction of the Architect/Engineer without additional cost to the Owner.

## **1.07 SUBSTITUTION FOR SPECIFIED MATERIALS:**

- A. Where a specific trade name, manufacturer and model number is mentioned, it is intended to establish the quality, style and type of equipment necessary to fulfill design

criteria and shall not be construed as restricting or limiting competition among manufacturers.

- B. The specific name and model number scheduled on the drawings and/or the first name in the specification is the basis of the system design.
- C. Contractor may propose substitutes.
  - 1. Any material or equipment other than that designated as system design shall be considered a substitute whether referenced as an equal or not.
  - 2. All submittals for substitution shall be in the form of a fully coordinated proposal covering all changes in the work associated with making the substitution.
  - 3. The change shall include the mechanical and all other disciplines associated with the change.
  - 4. Refer to Division 1, General Requirements for procedures to propose substitutes.
  - 5. Contractors shall be held responsible for all physical changes resulting from such substitutions of equipment and shall bear any and all increased costs to himself as well as to other trades in making said substitutions. Approval by the Architect/Engineer of equipment other than the specified does not relieve the Contractor of this responsibility.
  - 6. In all instances, contractors shall assume full responsibility for proof of quality of the substitute to the equipment hereinafter specified. All data and information necessary for proof of equality, function and space requirements shall be prepared and accompany the submittal of the substitution to the Architect/Engineer.
- D. In the event the substitute material or equipment does not perform, fit or meet quality standards, the Contractor shall provide the specified material or equipment and bear all costs to replace the substituted item with the specified.

#### **1.08 QUALITY ASSURANCE**

- A. All work specified in Division 15 shall be performed by approved workmen qualified by satisfactory experience in the particular work.
- B. Mechanical equipment, piping, etc... shall be designed to ANSI, ASME, NEMA, OSHA, IEEE, AGMA and other applicable standards.

#### **1.09 LAWS, PERMITS, INSPECTION, TAP FEES**

- A. Comply with all Federal, State, Municipal, OSHA, NFPA, AGA, NEC, and Utility Companies' laws, ordinances and regulations that apply to the work.
- B. Obtain all required permits and inspections. Pay all fees and costs.
- C. Before requesting final payment, submit certificates of approval (or final inspection) from the concerned above authorities.

#### **1.10 GUARANTEE**

- A. The Contractor will guarantee all materials, workmanship and the successful operation of all equipment and apparatus installed for a period of one year from the date of final acceptance.
- B. The Contractor will guarantee to repair or replace at his own expense any work or material installed or furnished under this contract which develops defects, except for normal wear, within one year from the date of final acceptance of the entire work.

## **PART 2 – PRODUCTS**

### **2.01 GENERAL**

- A. Provide and install only new materials and equipment of the latest design of the respective manufacturers.
- B. All materials and equipment of the same classification shall be the product of the same manufacturer unless otherwise specified.
- C. Furnish to the proper trades, all manufacturer's wiring diagrams for installation of mechanical equipment.
- D. Provide tee fittings, elbows, reducers, and other required components to install equipment and control devices furnished by other trades.

### **2.02 PAINTING**

- A. In general, all of the finish painting will be provided by the contractor, except as specified below:
  - 1. Pumps, motors, expansion tanks, and other factory manufactured parts shall be factory coated with a traditional shop coat of paint, except where there are special finishes required.
  - 2. Any item that is scratched or damaged shall be repainted to match original.
- B. Paint steel brackets, stands, hangers, etc... as mentioned in this section with a black rust inhibitive paint, compatible with other paints.
- C. Brackets, hangers, etc.. that cannot be painted after installation shall be painted prior to installation.

### **2.03 ELECTRICAL EQUIPMENT**

- A. All electrical equipment shall conform to Division 16, Electrical Specifications and shall be suitable for operation on the voltage and phase available at the building site. These characteristics shall be verified by the Contractor prior to ordering equipment.
- B. Provide motors as required for proper operation of all equipment furnished under this Division. The minimum motor horsepower ratings are specified or scheduled on the drawings. Minimum requirements for all motors are as follows:
  - 1. Dustproof/leakproof bearing rings
  - 2. Factory balanced
  - 3. TEFC Industrial duty
  - 4. Thermal overload protection
  - 5. Minimum efficiencies shall not be less than values in NEMA MGI 12.54

6. Minimum efficiencies - 1-4HP, 78.5%; 5-9HP 89%; 10-19HP, 91%.
7. Furnish starters with thermal overload protection for all motors provided.
8. All starters for three-phase motors shall be magnetic complete with the following accessories:
  9. Three-leg overload protection
  10. Control transformers with fused primary and secondary
  11. 120 volt holding coils
  12. Integral hand-off-auto switch
  13. Auxiliary contacts required for system operation plus one spare
  14. Conform to NEC and NEMA requirements.
- C. All starters for single-phase motors shall be horsepower rated thermal overload switches, unless magnetic starters are required for automatic control. If magnetic starters are necessary, provide as per above.
- D. Furnish all necessary control devices such as speed controls, transformers, and relays as required for proper operation of all equipment furnished under this Division.
- E. Furnish all remote switches and/or pushbutton stations required for manually operated equipment complete with pilot lights of an approved type lighted by current from load side of starter.
- F. Motors, starters, and other electrical control equipment installed in moist areas or areas of special conditions, shall be designed and approved for installation in such areas.
- G. Furnish identification as to purpose for each switch and/or pushbutton station furnished herein. Identification may be either engraved plastic sign or permanent mounting to wall below switch, or stamping on switch cover proper. All such identification signs and/or switch covers in finished areas shall match other hardware in the immediate area.

## **PART 2 – EXECUTION**

### **3.01 INSTALLATION**

- A. Install all work with a neat and orderly appearance, as specified and as shown on the Drawings.
- B. Make all installations structurally sound throughout.
- C. Coordinate mechanical work with all other trades.
- D. Locate all installations to avoid interference with equipment, storage areas, work of other trades, and traffic areas.
- E. Perform all work incidental to the installation of the apparatus and materials including, but not limited to, cutting, patching, trenching, excavating, backfilling, trench covering, plastering and the constructing of chases, slots, furring, foundations, piers and pads, when applicable. All work shall be performed in accordance with the applicable Divisions of this Specification by qualified workmen regularly employed in the applicable trades.
- F. The Contractor for the work of general construction will provide all boxed openings, chases, recesses, lintels and bucks required for the admission of the work. Furnish him with all necessary information in ample time.
- G. If openings, chases, recesses, lintels or bucks are omitted or not correctly located, bear the cost of subsequent patching as required.

- H. Do not cut walls or floors that are waterproofed or pierce any structural member without written permission from the Architect.
- I. The Owner or Owner's Representative reserves the right to relocate terminal equipment (10) ten feet in any direction from locations indicated on plans, before roughing-in, with no change in contract price.
- J. All equipment shall be installed true, level and in the location shown on the drawings.
- K. Furnish and install all necessary guides, anchors, bolts and other accessories required with the installation of the equipment.
- L. All equipment shall be installed as to provide necessary access for maintenance and operation.
- M. Contractor is responsible for sizing, locating and design of all anchor pads, piers, thrust blocks, curb supports, structural steel supports and other structural support items.
- N. Provide all brackets and/or supports as required for mechanical installations in excess of building structure. Submit shop drawings of intended construction for review.

### **3.02 INSTRUCTIONS**

- A. On completion of the job, the Contractor shall provide a competent technician to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed 24 hours and be performed in a minimum of two intervals of 4 hours each. Time shall not be used all at one time. It shall be used in intervals as deemed necessary. The time and number of personnel for instruction shall be arranged with the Owner.

### **3.03 CUTTING AND PATCHING**

- A. Perform cutting and patching in accordance with Division 1 Section "Cutting and Patching".
- B. Perform cutting and patching of mechanical equipment and materials required to:
  - 1. Uncover work to allow installation of late work.
  - 2. Remove and replace defective work.
  - 3. Remove and replace work not conforming to the construction documents.
  - 4. Install equipment and materials in existing structures.
- C. During cutting and patching, protect adjacent area structure, furnishings and finishes.
- D. Provide and maintain temporary partitions or barriers to prevent the spread of dust and dirt to the adjacent areas.

### **3.04 CODE CONFORMANCE**

- A. Install all systems of Division 15 sections in conformance with all applicable State of Vermont codes and Town of Northfield, VT codes in addition to the standards listed in the Division 15 specifications.

- B. Codes include but are not limited to the following:
1. 2015 Vermont Fire & Building Safety Code
  2. 2015 The Uniform Fire Code, NFPA 1
  3. 2015 International Building Code
  4. 2018 International Mechanical Code
  5. 2018 Vermont Plumbing Rules
  6. 2020 Vermont Commercial Building Energy Standards
  7. 2015 Standard for the Installation of Air Conditioning and Ventilation Systems, NFPA 90A

### **3.05 INFORMATION FOR OTHER DIVISIONS**

- A. Provide all information concerning the equipment or work of Division 15 required by other Divisions in ample time to prevent delay in building progress.

### **3.06 EXCAVATING AND BACKFILLING**

- A. Provide all excavating and backfilling required in connection with the work under this Division.
- B. Include provisions for repairing of finished surfaces, all required shoring, bracing, pumping, and protection for safety of persons and property.
- C. Backfilling and compaction shall be in conformance with "Earthwork Division" of these specifications. Backfilling shall not be done until pipe lines are properly tested in the presence of the Architect/Engineer or plumbing inspector.

### **3.07 FINAL ACCEPTANCE**

- A. When all work, testing, balancing, initial start-up and operation instructions have been completed, the Contractor shall notify Architect and arrange for final acceptance.
- B. Contractor shall have all necessary test data complete in accordance with specifications and at hand during inspection.
- C. Items found not in accordance with Contract Documents or items functioning incorrectly will be itemized and submitted in writing to the Contractor for correction.

### **3.08 CLEANING**

- A. Do not allow refuse and surplus materials to accumulate and obstruct the construction site.
- B. Upon completion of the installation, remove refuse and surplus materials from the construction site and leave the building neat and clean.

- C. Repair any items that have been scratched or damaged during construction. Any item repaired or refinished shall be brought to the attention of the Architect/Engineer.

**3.09 GUARANTEE**

- A. Contractor by accepting the plans and specifications and signing the contract shall guarantee the following:
- B. All equipment, accessories and material furnished by him for a period of one year from final acceptance, against all defects in material and workmanship.
- C. If equipment fails, does not operate satisfactorily or shows undue wear, the Contractor will be notified and will be required to remedy the defect immediately at his own expense.
- D. That all equipment will produce the result specified or required.
- E. That all piping shall be drip-tight, properly installed and free of vibration, pounding or objectionable noise.
- F. Guarantee shall extend for one (1) year from date of acceptance by the Owner except where items of equipment, etc., are guaranteed by manufacturer for periods in excess of this time, manufacturer's guarantee shall take preference.

**END OF SECTION**



## **SECTION 00 00 ASIC MECHANICAL MATERIALS AND METHODS**

### **ART 1 GENERAL**

#### **1 01 DESCRIPTION**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

#### **1 0 SUMMARY**

- A. This Section specifies piping materials and installation methods common to more than one section of Division and includes joining materials, piping specialties, and basic piping installation instructions.

#### **1 0 SUBMITTALS**

- A. See Section .
- B. Product Data: Submit product data on the following items:
1. Escutcheons
  2. Mechanical Sleeve Seals
  3. Mechanical equipment nameplate data
  4. Wall and floor sleeves
  5. Selective Demolition including: Nondestructive removal of materials and equipment for reuse or salvage as indicated, dismantling mechanical materials and equipment made obsolete by these installations.
  6. Miscellaneous metals for support of mechanical materials and equipment.
  7. Miscellaneous lumber for support and anchorage of mechanical materials and equipment.
  8. Firestopping caulk
  9. Elastomeric joint sealers for sealing around mechanical materials and equipment.
  10. Access Panels

#### **1 0 QUALITY ASSURANCE**

- A. Use only thoroughly trained and experienced personnel who are completely familiar with the types of piping accessories required, the manufacturers' installation recommendations and the requirements of the Contract Documents.
- B. Welding procedure qualifications:
1. Contractor shall submit for review the Contractor's standard procedures. Procedure shall be submitted on PQR form as described in the ASME Boiler and Pressure Vessel Code.
- C. Welder's Qualifications:

1. All welders shall be certified to the PS as listed on the Contractor's PQR. Certifications are to be performed by an independent testing laboratory within twelve months prior to the commencement of work.
  2. Each welder is to stamp the pipe adjacent to each weld performed by them. During the submittal process, the Contractor is required to provide a list of each welder's name and the mark used by each welder.
- D. Tack welding: Tack welding may be performed by non certified welders. All tack welds, whether performed by certified or non certified welders, must be ground out and removed.
- E. No welding may take place until a satisfactory reviewed submittal is complete.

**1 0 DELIVER, STORE AND HANDLINE**

- A. Provide factory applied plastic end caps on each length of pipe and tube, except for hub and spigot pipe. Maintain end caps through shipping, storage and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.
- C. Protect flanges, fittings, and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

**1 0 PROTECT CONDITIONS**

- A. Conditions Affecting Selective Demolition: The following protect conditions apply:
1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
  2. Locate, identify, and protect mechanical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.
- B. Environmental Conditions: Apply joint sealers and firestopping under temperature and humidity conditions within the limits permitted by the manufacturer. Do not apply joint sealers and firestopping to wet substrates.

**1 07 SEQUENCE AND SCHEDULE**

- A. Coordinate the shut off and disconnection of utility services with the Owner and the utility company.
- B. Notify the Architect at least 5 days prior to commencing demolition operations.
- C. Perform demolition in phases as specified, indicated or required.

**ART 1 PRODUCTS**

**01 PIPE AND FITTINGS**

1.  $\square \text{eld } O \text{ Lets}, \square \text{Thread } O \text{ Lets}, \text{ or } \square \text{Sock } O \text{ Lets}$
2.  $\square \text{Trans } O \text{ Con}$

## 0 OININ MATERIALS

- A. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.
- B. Gaskets for Flanged Joints: Provide gasketed material for full faced cast iron flanges and raised face for steel flanges. Select materials to suit the service of the piping system in which installed and which conform to their respective ANSI Standard (A 1.11, B1 . . . , or B1 . . . 1). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried. Gasket type shall be spiral wound stainless steel/graphite type for raised faced joints. NBR gaskets shall be used for flat faced joints. Red rubber gaskets are not allowed.

0 ESCUTC EONS

- A. Steel Escutcheons: Chrome plated, stamped steel, hinged, split ring escutcheon, with set screw. Inside diameter shall closely fit pipe outside diameter, or outside of pipe insulation where pipe is insulated. Outside diameter shall completely cover the opening in floors, walls, or ceilings. here escutcheons are to be painted, furnish prime painted.
- B. Plastic style snap on type escutcheons: Provide chrome plated for e posed finish areas, plain finish for mechanical rooms and areas which will be painted.

## 0 MECHANICAL SLEEVE SEALS

- A. Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

0	MEC	ANICAL EQUI	MENT NAME	LATE DATA
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- A. Nameplate: For each piece of power operated mechanical equipment provide a permanent operational data nameplate indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location.

**0 ALL AND FLOOR SLEE ES**

- A. Sheet Metal Sleeves (light): gage galvanized sheet metal with Pittsburgh lock longitudinal joint.
- B. Sheet Metal Sleeves (heavy): 1 gage galvanized sheet metal with pipe or Pittsburgh lock longitudinal joint.
- C. Steel Sleeves: Schedule 1 , steel pipe, ASTM A5 , Grade A.

**07 MISCELLANEOUS METALS**

- A. Steel plates, shapes, bars, and grating: ASTM A .
- B. Cold Formed Steel Tubing: ASTM A 5 .
- C. Hot Rolled Steel Tubing: ASTM A 5 1.
- D. Non shrink, Non metallic Grout: Pre mixed, factory packaged, non staining, non corrosive, nongaseous grout, recommended for interior and exterior applications.
- E. Fasteners: zinc coated, type, grade, and class as required.

**0 MISCELLANEOUS LUM BER**

- A. Framing Materials: Standard Grade, light framing size lumber of any species. Number Common boards complying with CLIB or APA rules, or Number boards complying with SPIB rules. Lumber shall be preservative treated in accordance with A PB LP , and kiln dried to a moisture content of not more than 1 percent.
- B. Construction Panels: Plywood panels APA C D PLUGGED E T, with exterior glue thickness as indicated, or if not indicated, not less than / inches.

**0 FIRESTOP IN**

- A. General: Firestopping caulk and other related materials compatible with each other and with joint substrates under conditions of service and application. All products shall be installed in the manner determined by the manufacturer as tested by an independent testing laboratory.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. M Fire Protection Products
  - 2. Spec Seal (Specified Technologies Inc.)
  - 3. Rectorseal Corporation

**10 ELASTOMERIC JOINT SEALERS**

- A. General: joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.
- B. Colors: As selected by the Architect from manufacturer's standard colors.

- C. General Duty: One part, neutral core silicone sealant of formulation indicated that is recommended for exposed applications on exterior and interior joints in vertical and horizontal surfaces of concrete, masonry, glass, aluminum, and steel.
- D. Detail Locations: Provide manufacturer's standard one part, mildew resistant, paintable silicone sealant that is recommended for exposed locations on interior ceramic tile, masonry, and metals in bathroom and shower room locations.
- E. Manufacturers:
  - 1. Dow Corning
  - 2. General Electric
  - 3. Pecora Corp.
  - 4. Tremco, Inc.

## **ART    EXECUTION**

### **01    GENERAL**

- A. Inspection: Examine areas and conditions under which pipe and piping accessories are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the Installer.
- B. Coordination: It is the responsibility of the contractor to coordinate the work of his trade with all other trades prior to the commencement of construction. Any conflicts must be brought to the attention of the Engineer. Any work requiring removal and re installation due to the lack of coordination shall be the responsibility of the contractors with no additional cost to the owner.

### **0    PREPARATION**

- A. Ream ends of pipes and tubes, and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

### **0    PIPE AND FITTING INSTALLATIONS**

- A. General Locations and Arrangements: Drawings indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.
- B. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated otherwise
- C. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- D. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated on the Drawings.
- E. Install piping tight to slabs, beams, joists, columns, walls and other permanent elements of the building. Provide space to permit insulation applications, with 1" clearance outside

the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

- F. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- G. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, ☐ ball valve with hose connection, cap and chain. Install vents at high points. Pitch water piping upward in direction of flow and arrange fittings to permit air to be vented to system high points or to expansion tank, and to permit complete drainage to low points. Use eccentric fittings where necessary.
- H. Temporarily cover the open ends of all pipes not actively being installed and at the end of each work day to prohibit the inflow of foreign materials.
- I. Arrange piping to provide adequate provision for thermal expansion and contraction to prevent undue strains on piping or apparatus connected. Arrange branches to take up motion or strain.
- J. Use fittings for all changes in direction, at all branch connections, and for change in pipe size.
- K. Remake leaking joints using new materials.
- L. Reductions in pipe size made with eccentric reducers shall have the tops level for water piping and bottoms level for steam piping.
- M. Run all horizontal building drains at uniform pitch. Follow indicated lines generally, but make exact layout on the job to work actual fitting dimensions, align piping and avoid interferences. Unless otherwise specified or required by code, provide proper support to maintain uniform fall of 1/8" per foot for lines 2 inches and smaller and 1/4" per foot for lines larger than 2 inches.

## **0 I IN JOINT REARATION**

### **A. Steel Pipe joints:**

- 1. Pipe 1/2" and Smaller: Thread pipe with tapered pipe threads in accordance with ANSI B 1.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint sealant or Teflon tape suitable for the service for which the pipe is intended on the male threads at each joint and tighten joint to leave not more than three threads exposed.
- 2. Flanged joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

### **B. Non ferrous Pipe joints:**

- 1. Braided joints: For copper tube and fitting joints, braided joints in accordance with the ASME Soldering Manual, the contractor's tested Procedure Qualification Record, ANSI B 1.1 Standard Code for Pressure Piping, Power Piping, ANSI B 1.1 Standard Safety Code for Mechanical Refrigeration and the following:

- a. Fill and allow a trickle flow of an inert gas (ie., nitrogen) through the pipe and fittings during brazing to prevent formation of scale. Caution must be exercised not to allow the inert gas to deplete the oxygen, causing asphyxiation.
  - b. Heat joints using oxygen acetylene torch. Heat to proper and uniform brazing temperature.
  - c. After installation of piping, but prior to installation of outlet valves, blow lines clear with nitrogen.
2. Soldered joints: For copper tube and fitting joints, solder joints in accordance with the AWS "Soldering Manual" and "The Copper Handbook". Thoroughly clean tube surface and inside surface of the cup of the fittings, using very fine emery cloth, prior to making soldered joints. Pipe tube and fittings clean and apply flux. Flux shall not be used as the sole means for cleaning tube and fitting surfaces.
  3. Copper and Brass Threaded Joint Pipe 1/2" and Smaller: Thread pipe with tapered pipe threads in accordance with ANSI B 1.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint sealant or Teflon tape suitable for the service for which the pipe is intended on the male threads at each joint and tighten joint to leave not more than three threads exposed.
  4. Flanged joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.
- C. Joints for other piping materials are specified within the respective piping system sections.

## **0 INSTALLATION OF MECHANICAL SLEEVE SEALS**

- A. Mechanical Sleeve Seals: Install per manufacturer's recommended practices. The sleeve must be clean and dry prior to installation.

## **0 INSTALLATION OF SLEEVES**

- A. Provide sleeves and inserts for all duct and piping.
- B. Provide cutting and patching as required to install mechanical and duct piping.
- C. Make sleeves in floors and partitions of galvanized steel pipe.
- D. Make sleeves of extra heavy cast iron pipe or galvanized steel pipe in outside walls, foundations and footings.
- E. Sleeves for insulated pipe shall be of sufficient size to pass insulation and of sufficient diameter to permit free movement of pipe where expansion and contraction occur.
- F. Sleeves for bare pipe shall be two pipe sizes larger than the pipe passing through

- G. Terminate sleeves flush with walls, partitions and ceilings. Terminate sleeves ☐ above finished floors, except in rooms having floor drains, where sleeves shall be extended ☐ above floor.
- H. Fill space between sleeve and pipe in underground walls with oakum and caulk watertight on both sides of wall.
- I. Fill space between sleeves and pipe with fiberglass blanket insulation when sleeve does not occur in an underground wall.
- . Sleeves through fire rated walls, shafts, floor and partitions shall be packed full length with UL listed fill to maintain the rating of the separation.

#### **07 SELECTIVE DEMOLITION**

- A. General: Demolish, remove, and disconnect abandoned mechanical materials and equipment indicated to be removed and not indicated to be salvaged or saved.
- B. Materials and Equipment To Be Salvaged: Remove and disconnect existing mechanical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage by the Owner.
- C. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.

#### **08 ERECTION OF METAL SUPPORTS AND ANCHORAGE**

- A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field welding: Comply with AWS Structural Welding Code.

#### **09 ERECTION OF WOOD SUPPORTS AND ANCHORAGE**

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

#### **10 APPLICATIONS OF FIRESTOPPING IN CAULK**

- A. Installation of Fire Stopping Sealant: The Contractor must determine the penetration is of suitable size and is properly prepared for installation of the fire caulk. Install sealant, including forming, packing, and other accessory materials, to fill openings around mechanical services penetrating floors and walls, to provide fire stops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.



**11 A APPLICATION OF ELASTOMERIC JOINT SEALER**

- A. General: Comply with joint sealer manufacturers printed application instructions applicable to products and applications indicated, except where more stringent requirements apply. Comply with recommendations of ASTM C 11 for use of elastomeric joint sealants.
- B. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.
- C. Tooling: Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

**1 FIELD QUALITY CONTROL**

- A. Testing: Refer to individual piping system specification sections. Test all pipe prior to the installation of insulation.

**END OF SECTION**

## SECTION 0 PIPE HANGERS AND SUPPORTS

### ART 1 GENERAL

#### 1 01 DESCRIPTION

- A. Work covered by this Section includes the furnishing and installation of pipe hangers and supports for interior and exposed piping.
- B. This section includes the following:
  - 1. Horizontal piping hangers and supports.
  - 2. Vertical piping clamps.
  - 3. Hanger rod attachments.
  - 4. Building attachments.
  - 5. Saddles and shields.
  - 6. Stanchions and pipe rolls.
  - 7. Miscellaneous materials.
  - 8. Pipe alignment guides.
  - 9. Anchors.
  - 10. Equipment supports.
- C. Related work specified elsewhere includes:
 

Basic Materials and Methods	5
Pipe and Pipe Fittings	11
Plumbing	

#### 1 0 QUALITY ASSURANCE

- A. Use only thoroughly trained and experienced personnel who are completely familiar with the types of supports and hangers required, the manufacturers recommendations and the requirements of the Contract Documents.
- B. Acceptable Manufacturers Grinnell, Foss Manufacturing, Crawford, or approved equal.
- C. Unless unavailable, all components of the pipe suspension systems shall be products prefabricated by an acceptable manufacturer whose primary work is the fabrication of such devices.

#### 1 0 SUBMITTALS

- A. See Section .
- B. Provide catalog cuts showing the types of hangers, supports and attachments proposed for use.

#### 1 0 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle all components of the pipe suspension system to avoid rusting, twisting, the stripping of threads and from damage of any type.

**ART □ RODUCTS**

**01 GENERAL**

- A. Provide a sufficient quantity of hangers and supports to maintain the pipelines, apparatus, and equipment in proper position and alignment under all operating conditions with due allowance for expansion and contraction. Provide hangers and supports of standard design where possible and that are best suited for the service required. Where required, provide hangers and supports that are screw and stable after installation.
- B. Attach hangers and supports within buildings to walls, floors, ceilings, or beams, as appropriate.
- C. Minimize the in-ury hazard in all protruding supporting devices. Provide end caps on exposed ends of framing members.
- D. Include proper pipe protection saddles for pipes that are covered with insulation.
- E. Provide hot dipped galvanized (ASTM B ) when galvanizing is specified or required.
- F. Locate supports so that at least one support is provided per full pipe length.
- G. Pipe Supports Used with an EPDM membrane roof, in lieu of wood blocking.
  - 1. Carlisle's Pipe Support or equal.

**0 PIPE SUPPORT DEVICES**

- A. Saddles
  - 1. Use pipe saddles that are shaped to fit the pipe that they will support and that are capable of screw and stment.
  - 2. Use floor stands or wall brackets to support saddles.
- B. Stanchions
  - 1. Provide pipe stanchion saddles with yokes and nuts of similar construction to saddles.
  - 2. Use floor stands or wall brackets to support stanchions.
- C. Pipe Rolls
  - 1. Provide and stable pipe rolls.
  - 2. Use floor stands, wall brackets, or ceiling or beam supports to support pipe rolls.
- D. Overhead Hangers Support by threaded rods suspended from wall brackets or ceiling and beam supports.
- E. Saddles Insulated pipe where specified to be continuous through hanger shall be protected at points of support with thermal hanger shields as manufactured by Pipe

Shields, Inc. or equal of Insulshield or Uni Grip. Thermal hanger shields shall consist of a degree insert of high density, 1 psi, water proofed calcium silicate, encased in a degree sheet metal shield. Insert to be same thickness as ad oining pipe insulation. Shield length and minimum sheet metal gauges shown in chart below. If pipe hanger spacing exceeds 1 feet, utilize double layer shield on bearing surface.

<u>Pipe Size</u>	<u>Shield Length</u>	<u>Minimum Gauge</u>
1/ 1 1/		
1 1/		
1 1/		1

F. Anchors

1. Provide cast iron chair type anchors with steel straps, except where anchors form an integral part of pipe fittings or where an anchor of special design is required.
2. Fasten anchors rigidly to wall brackets or directly to the structure.

G. Non adjustable Supports

1. Where adjustable supporting devices are not required, pipelines inches in diameter or smaller may be supported using hooks, hook plates, rings, or ring plates made of cast iron, malleable iron, polyvinyl chloride, or steel.
2. Mount as required or as directed by the Engineer.

0 MOUNTING DEVICES

A. FLOOR SUPPORTS

1. Brick and Concrete Piers Shape the pier to conform accurately to the bottom one third to one half of the pipe.
2. Saddle Stands Use a length of pipe fitted at the base with a standard threaded flange and at the top with an adjustable saddle, pipe roll, or stanchion. Bolt the base of the flange to the floor, foundation, or concrete base.

B. WALL BRACKETS

1. Provide welded steel support brackets.
2. Design wall brackets for three maximum loads classified as follows:
 

Light	5 pounds
Medium	15 pounds
Heavy	pounds
3. Furnish and install back plates of adequate size and thickness to distribute the load against the wall when bolting brackets to walls. When the use of back plates is not practicable, fasten the brackets to the wall in such a manner that the safe bearing strength of the wall will not be exceeded.

C. Ceiling and Beam Supports

1. Attach rods to the ceiling or beams using suitable and stable concrete inserts, beam clamps, screws, bolts, or welding.
2. Concrete inserts Provide galvanized inserts for concrete, recessed near the upper flange to receive reinforcing rods. Design inserts to permit the rods to be adjusted horizontally in one plane and to lock the rod nut or head automatically to carry safely the maximum load that can be imposed by the rod that they engage and to be held in position during concrete pouring operations.

#### **0 TIE RODS AND CLAMPS**

- A. Furnish and install tie rods, clamps, couplings, and accessories to prevent the movement of branch valves, as indicated on the Drawings or as directed.

#### **0 OTHER MATERIALS**

- A. Provide any materials not specifically shown or described, but required for complete, adequate and proper pipe suspension systems. Select the materials and submit shop drawings to Engineer for acceptance.

### **ART 1 EXECUTION**

#### **01 SECTION COORDINATION PREPARATION**

- A. Coordinate the work of the Section with the work of other trades and be sure that built in items are properly and accurately installed. Also, coordinate with pipe installers to determine the final locations of piping and to ascertain the date by which components of the pipe suspension systems must be available so as not to delay the work of others.
- B. Carefully inspect the installed work of other trades and verify that such work is properly cured, braced and complete to the point where this work may properly commence.

#### **0 PERFORMANCE**

- A. Piping systems shall be provided with adequate anchorage, sway braces, guides, hangers and supports. Design the components to suit actual pipe installations under full operating conditions.
- B. Design all support equipment, except for springs, with a minimum factor of safety of 5, based upon the ultimate tensile strength of the material.
- C. Design hangers and supports, based upon the total weight of the pipe, fittings, valves, insulation, and appurtenances, and the weight of the liquid or gas to be transported or used in testing, whichever is greater. Hanger rods shall be subject to tensile loading only. Provide suitable linkage to permit swing when lateral or axial movement is anticipated.
- D. Anchors and guides shall be capable of withstanding all forces imposed upon them, including those from expansion and contraction.
- E. Design, fabricate and install supports so that they will not disengage as a result of movement in the supported pipe.

- F. Fit pipe hangers and supports with adequate adjusting nuts, of the locking type, threaded to a rod, which will allow adjustment after erection while still supporting the load.
- G. Carefully install the pipe suspension system so that pipes remain straight and at the required slopes and grades, free from sags, humps and unnecessary bends and twists. Follow the manufacturer's recommended installation instructions.
- H. All supporting devices shall be designed to minimize interference with access and movement.

#### **0 SUPPORTS ACROSS AND HORIZONTAL RODS**

- A. No Hub Cast Pipe Horizontally, at every joint vertically, every 10 ft.
- B. Valves At valves 12 inches and larger, install supports on each side of valve, spaced no further than 10 ft from valve except for plastic piping, then 5 ft from valve. Provide additional supports where required to prevent piping loads from placing damaging stresses on valves and equipment.
- C. Wall Penetrations Provide pipe supports on each side of wall where pipe passes through a wall sleeve, spaced no further than 10 ft from the wall.
- D. Pipe Couplings Provide additional supports on each side of pipe couplings, flexible connections, repair clamps and the like, spaced sufficiently close to prevent loads which may cause damage to or leakage from the device.
- E. Vertical Pipes Use base fitting or hanger immediately adjacent to base and provide riser clamps as required, but not more than 15 ft on centers.
- F. Other Materials and Conditions Where not included in the Specifications or shown on the Drawings, support piping materials in accordance with the manufacturer's design and installation instructions. Provide supports so as not to overstress the piping system, place stresses on equipment and machinery, cause leakage, or to adversely affect system performance.

#### **0 PAINT AND CLEAN**

- A. Adjust the pipe suspension systems as required.
- B. Thoroughly clean the piping support system and prepare exposed components for painting.

### **END OF SECTION**

## SECTION 0 TESTING, ADJUSTING, AND BALANCING

### ART 1 □ GENERAL

#### 1 01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. Related Sections:
  - 1. Other Division Sections specify balancing devices and their installation, and materials and installations of mechanical systems.

#### 1 0 SUMMARY

- A. This Section specifies the requirements and procedures for total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the hydronic and air quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
- B. Test, adjust, and balance the following mechanical systems as shown on the plans:
  - 1. All air systems.

#### 1 0 DEFINITIONS

- A. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:
  - 1. The balance of water and air distribution.
  - 2. Adjustment of total system to provide design quantities.
  - 3. Electrical measurement.
  - 4. Verification of performance of all equipment and automatic controls.
- B. Approved Equal: Material, equipment, or method approved by the engineer for use in the work as being acceptable as an equivalent in essential attributes to the material, equipment, or method specified in the contract documents.

#### 1 0 QUALITY ASSURANCE

- A. Contractor Qualifications:
  - 1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

2. The independent testing, adjusting, and balancing agency certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project.
  3. In lieu of satisfying the requirements of section 1. .A. , the contractor need not be certified, but rather, have a minimum of ten years experience with similar projects. The contractor shall provide suitable evidence of past performance, including references, justifying the firm's capabilities. This does not relieve the contractor from the provisions stipulated in section 1. .B
- B. Codes and Standards:
1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems"
  2. AABC: "National Standards For Total System Balance"
  3. ASHRAE: ASHRAE Handbook, 1995 HVAC Applications, Chapter 18, "Testing, Adjusting, and Balancing"

## 10 SU MITTALS

- A. Certified Reports: Submit testing, adjusting, and balancing reports bearing the signature of the test and balance lead technician. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards are an accurate representation of how the systems have been installed are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures and are an accurate record of all final quantities measured to establish normal operating values of the systems. Final reports shall be type written, organized and formatted as specified below.
- B. Report Format: Report forms shall be those included in the first submittal for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in a reinforced, vinyl binder. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
1. General Information and Summary
  2. Air Systems
  3. Hydronic Systems
  4. Special Systems
  5. Reports Contents: Provide the following minimum information, forms and data:
    - a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project including addresses, contact names, and telephone numbers. Provide a listing of the instruments used for the procedures along with the proof of calibration.
    - b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the AABC or NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.



## **1 0 PROJECT CONDITIONS**

- A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

## **1 07 SEQUENCING AND SCHEDULING**

- A. Test, adjust, and balance the air systems before water and refrigerant systems.

### **ART 1.1 PRODUCTS AND MATERIALS**

### **ART 1.2 EXECUTION**

## **01 REBALANCE PROCEDURES**

- A. General Procedures

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.

- B. Air System Procedures

1. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
2. Check filters for cleanliness.
3. Check lubrication of all motors and bearings.
4. Check fan belt tension.
5. Check fan rotation.

- C. Check lubrication of all motors and bearings.

## **02 MEASUREMENTS**

- A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.
- B. Provide instruments meeting the specifications of the referenced standards.
- C. Use only those instruments that have the maximum field measuring accuracy and are best suited to the function being measured.
- D. Apply instrument as recommended by the manufacturer.
- E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.
- F. When averaging values, take a sufficient quantity of readings that will result in a repeatability error of less than 1%. When measuring a single point, repeat readings until consecutive identical values are obtained.
- G. Take measurements in the system where best suited to the task.

## **0 GENERAL TESTING AND BALANCING REQUIREMENTS**

- A. Cut insulation, ductwork, and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
- B. Patch insulation, ductwork, and housings, using materials identical to those removed.
- C. Seal ducts and piping, and test for and repair leaks.
- D. Seal insulation to reestablish integrity of the vapor barrier.
- E. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
- F. As part of the scope of this specification section, the contractor shall make any changes in the pulleys, belts, or sheaves, as required, for correct balance at no additional cost to the owner.
- G. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.
- H. Retest, adjust, and balance systems a second time if required for comfort balance.

## **0 AIR SYSTEM BALANCING PROCEDURE**

- A. Prepare individual schematic drawings of each air system.
- B. Perform a system profile of all air systems indicating on the previously developed sketch the pressure drop of each air handler component, including the inlet and discharge plenums.
- C. Artificially load the air filters in air handling units to simulate the midpoint resistance. Balance the duct distribution system when in this mode.
- D. Determine best locations in main and branch ductwork for most accurate duct traverses. Establish overall fan flow at or above design point.
- E. Establish airflow at all terminal inlets and outlets at design point. If necessary, adjust main fan speed to deliver more air. Determine leakage based on difference between main system traverse and sum of terminal inlets and outlets.
- F. Verify fan and motor operating characteristics and compare to manufacturer's fan curve.
- G. Where air systems have a variable speed drive, set at design speed and adjust sheaves to deliver required air at this speed.
- H. Prepare schematic diagrams of system "as built" ductwork to facilitate reporting.

## **0 RECORD AND REPORT DATA**

- A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

- B. The Balancing Contractor shall identify any problem areas, if they exist. The Mechanical Contractor shall work with the Balancing Contractor to correct the issues until the system is successfully balanced and operable.

## **END OF SECTION**

## SECTION 07 00 MECHANICAL INSULATION

### ART 1 GENERAL

#### 1 01 DESCRIPTION

A. Work covered by this Section includes the furnishing and installation of insulation materials as follows:

B. 1. Insulate all refrigeration piping  
Abbreviations

- 1. BTU British Thermal Units
- . SF Square Feet
- . Hr. Hour
- . °F Degrees Fahrenheit

#### 1 0 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be familiar with the type of materials being installed and the material manufacturers' recommended methods of installation and who shall direct all work performed under this Section.
- B. Appearance shall be of equal importance with its mechanical correctness and efficiency.

#### 1 0 SUBMITTALS

- A. See Section .
- B. Product Data: Submit manufacturer's technical product data and installation methods for each type of mechanical insulation specified in the schedule. Submit manufacturer's product number, k value, thickness, and furnished accessories for each mechanical system requiring insulation.

#### 1 0 DELIVERY, STORAGE AND HANDLING

- A. Comply with manufacturers' recommendations.
- B. Deliver, store and handle materials in a manner such that damage is avoided and the insulating properties are not decreased.

### ART 2 PRODUCTS

#### 2 01 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
- 1. Johns Manville Products Corp.
  - . Owens Corning Fiberglas Corp.
  - . Pittsburgh Corning Corp.
  - . Certainteed Corp.

5. IMCOA

0 INSULATIN MATERIALS

Insulating material and methods of installation shall conform to the following:

- A. Type A: One piece of half sectional fiberglass insulation jacketed with Owens Corning Fiberglass, or equal, Fiberglass 5AS /SSL II all service vapor barrier jacket.
1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
  - . Operating temperatures: °F to 5 °F.
  - . Jacket water vapor permeance: not more than . perm./inch.
  - . Jacket and butt strips: factory applied, self sealing pressure sensitive adhesive or a conventional lap seal adhesive.
  5. Surface burning characteristic ratings as tested by ASTM E , UL , or NFPA 55 not exceeding:
    - a. Flame Spread 5
    - b. Smoke Developed 5
- B. Type B: Rigid phenolic foam insulation, Armstrong Accotherm or equal, jacketed with an all service vapor barrier jacket.
1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
  - . Operating temperatures: °F to 5°F.
  - . Jacket water vapor permeance: not more than . perm./inch.
  - . Seal vapor barrier jacket laps and butt joints with Accotherm lap seal tape, Armstrong 5 adhesive, or a conventional lap seal adhesive.
  5. Fitting covers: fabricated and installed in accordance with manufacturer's recommendations with all joints sealed with Armstrong 5 .
- C. Type C: Flexible, elastomeric thermal insulation, Armstrong Armaflex II or equal.
1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
  - . Operating temperatures: °F to °F.
  - . Water vapor permeance: not more than . perm./inch.
  - . Seal seams and butt joints with Armstrong 5 .
  5. Fitting covers: fabricate and install in accordance with manufacturer's recommendations.
  - . Type C insulation shall not be used in air plenums or where prohibited by code.
- D. Type D: Plain, semi rigid fiberglass board insulation, Owens Corning Fiberglass board or equal.
1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
  - . Operating temperatures: °F to 5 °F.
  - . Density: lb./cu. ft.
  - . Secure insulation in place with minimum 1 gauge steel wire on 1 centers.
  - . Butt all joints firmly together.
  5. Finish: embed reinforced fiberglass cloth into a coat of white Foster Lagtane cement apply second coat of cement to provide neat finished appearance.
  - . Cleanouts, nameplates, and manholes shall not be insulated neatly bevel insulation on surrounding surfaces at such openings.
- E. Type E: Foil reinforced kraft faced vapor barrier jacketed, rigid fiberglass board insulation, Owens Corning Fiberglass 5 FS board or equal.

1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
    - . Operating temperatures: °F to 5 °F.
    - . Jacket water vapor permeance: not more than . perm./inch.
    - . Density: lb./cu. ft.
  5. Bo around item to be insulated with insulating board filling all spaces and voids of bo with fiberglass blanket insulation.
    - . Seal all joints with FR vapor seal tape.
    - . Finish: embed reinforced fiberglass cloth into a coat of white Foster 5 apply second coat of 5 providing a complete vapor seal with a neat finished appearance.
    - . Construct insulation for items with sections that must be removed for maintenance, such as split casing pumps, in sections so that same may be removed to service item.
- F. Type F: All service vapor barrier jacketed, rigid fiberglass board insulation, Owens Corning Fiberglass 5 AS board or equal.
1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
    - . Operating temperatures: °F to 5 °F.
    - . Jacket water vapor permeance: not more than . perm./inch.
    - . Density: lb./cu. ft.
  5. Apply insulation with mechanical fasteners spaced not more than 1 on center.
    - . Seal all edges, punctures, and joints with AS pressure sensitive tape.
- G. Type G: Foil reinforced kraft faced vapor barrier jacketed, inorganic glass fiber blanket insulation, Owens Corning Fiberglass T 1 FS Faced Duct work Insulation, Commercial Grade, or equal.
1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
    - . Operating temperatures: °F to 5 °F.
    - . Jacket water vapor permeance: not more than . perm./inch.
    - . Lap insulation tightly on ductwork with all circumferential joints butted and longitudinal joints overlapped a minimum of ductwork over wide use mechanical fasteners spaced not more than 1 on center.
  5. Adhere insulation to sheet metal with Foster 5 1 bonding adhesive.
- H. Type H: Bonded mat of glass fiber insulation coated with a black pigmented fire resistant coating and EPA Registered anti microbial agent on the airstream side, Certain Teed Tough Guard or equal.
1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
    - . Operating temperature: to 5 °F.
    - . Airstream side coating shall prevent insulation erosion at velocities up to , fpm.
    - . Attach liner to duct with both mechanical fasteners and Foster 5 adhesive in conformance with SMACNA Duct Liner Application Standard, latest edition.
- I. Type I: Lightweight, semi rigid glass fibers, bonded with a high temperature binder, board like insulation, Owens Corning Fiberglass Insul Quick Insulation or equal.
1. : . BtuH in./°F sq. ft. at °F mean temperature.
    - . Operating temperatures: to 5 °F after product stabilization.
    - . Secure insulation and metal mesh with welded pins or studs maximum spacing of 1 on center.
    - . Finish: trowel coat of insulating cement to a smooth, hard finish apply coat of fire retardant lagging adhesive, Foster Lagton embedding a layer of open weave glass cloth or canvas, overlapping seams finish with second coat of

- . Type : Rigid hydrous calcium silicate insulation, Owens Corning Fiberglass ,aylo Asbestos Free insulation or equal.
  - 1. : . BtuH in./°F sq. ft. at °F mean temperature.
    - . Operating temperatures: to 1 °F.
    - . Insulation: fit the contour of surface using preformed pipe sections for pipe and beveled lag sections for circumferences.
    - . Butt insulation at oints and hold in place using 1 gauge steel wire bands spaced not more than 1 on centers.
- . Type : ADA compliant. Insulation with a white, fitted anti microbial pipe cover. Cover shall be designed to allow access to the stop valves. Provide the following manufacturer:
  - 1. Lav Guard Truebro, Inc.

Type L: One piece of half sectional fiberglass insulation acketed with Owens Corning Fiberglass, or equal, Fiberglass 5AS /SSL II all service vapor barrier acket. Provide with Polyguard Alumaguard insulation membrane cover.

- 1. : . BtuH in./°F sq. ft. at 5°F mean temperature.
  - . Operating temperatures: °F to 5 °F.
  - . acket water vapor permeance: not more than . perm./inch.
  - . acket and butt strips: factory applied, self sealing pressure sensitive adhesive or a conventional lap seal adhesive.
- 5. Surface burning characteristic ratings as tested by ASTM E , UL , or NFPA 55 not e ceeding:
  - a. *Flame spread* 25
  - b. *Smoke Developed* 50

#### Alumaguard Spec

- 1. ater vapor permeance: . perms
  - . Membrane thickness: mils
  - . Surface burning characteristic ratings as tested by ASTM E , UL , or NFPA 55 not e ceeding:
    - a. *Flame spread* 25
    - b. *Smoke Developed* 50

- L. itchen e haust ductwork firewrap, Thermal Ceramics Firemaster Fast rap L or equal.

- 1. Meets ASTM E
  - . ero Clearance to combustibles at any location.
  - . 1 1/ °thick, pcf density
  - . Operating temperatures: to °F.
- 5. Butt oints on inside layer.
  - . Fully foil encapsulated.
  - . To be applied in layers.

## 0 OT ER MATERIALS

- A. All other materials, not specifically described within but required for complete, adequate and proper insulating systems, shall be as selected by Contractor and sub ect to the acceptance of Engineer.

- B. The thickness of all alternate insulating materials used shall be such as to provide the same minimum insulating efficiency as the specified materials at the thickness scheduled.

## **ART    □ EXECUTION**

### **01    INS ECTION**

- A. Prior to work of this Section, carefully inspect the work of other trades and verify that such work is complete to the point where this work may properly commence.
- B.        erify that pipelines to be insulated have been tested and accepted.

### **0       RE ARATION**

- A. Remove all dirt, scale and rust from surfaces and thoroughly dry.
- B. Prepare surfaces as recommended by the manufacturer.

### **0       INSTALLATION**

- A. Install materials in accordance with the manufacturers recommended installation instructions.
- B. Install insulation with longitudinal seams toward walls or ceilings and with oints butted firmly together to eliminate voids.
- C. Install pipe covering protectors, at each pipe hanger or support, simultaneously with the insulation. Also, provide pipe covering protectors at locations where insulation is sub ect to damage from traffic. Refer to Section 15       for pipe saddle requirements.
- D. Install pre fabricated, mitered insulation on fittings, valve bodies, flanges, and unions to the same thickness and with the same material as ad acent piping insulation.
- E. Secure rigid insulation with stainless steel bands.       ater and heating pipe insulation shall be □pped or oints sealed with an adhesive. Use of wire is not permitted.
- F. Secure aluminum acketing with aluminum or stainless steel locking bands at each oint. Provide additional bands as required or use aluminum or stainless steel sheet metal screws. Rivets are not permitted.
- G. Pipe and duct insulation shall be continuous through walls and floor openings e cept where walls and floors are required to be fire stopped or required to have a fire resistance rating.       here this occurs, the open space remaining between the sleeve and pipe and/or duct shall be filled with fire stop insulation. Duct linings shall be interrupted at fire dampers and fire doors so as not to interfere with their operation.
- H. Insulation on all cold surfaces must be applied with a continuous, unbroken vapor seal. Supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.
- I. All e posed raw edges shall be finished with finishing cement.
- . Insulated cold pipes shall be insulated continuously through hangers. Rigid insulation inserts are to be provided at all pipe hangers and supports. Pipe insulation shall abut the rigid insulation insert. Apply a wet coat of vapor barrier lap cement on all butt oints and seal the oints with       wide vapor barrier tape or band.



**0 ADJUST AND CLEANING**

- A. Adjust the work as required to attain maximum insulating capabilities and to achieve a neat, clean appearance.
- B. Clean work to remove dirt, labels, and other materials.

**0 MECHANICAL INSULATION SCHEDULE**

- A. Letters for TYPE refer to paragraphs of article . of this Section. Use the following materials unless otherwise noted:

Service	Location	Type	Size	Thickness
<b>INSULATION</b>				
Refrigeration Piping	all	C	all	1"

**END OF SECTION**

## SECTION 11 PIPE AND PIPE FITTINGS

### ART 1 GENERAL

#### 101 DESCRIPTION

A. This Section includes the material requirements for pipe and pipe fittings for piping provided under this Division unless otherwise indicated.

B. Related work specified elsewhere includes:

Basic Mechanical Methods	
Basic Mechanical Materials and Methods	5
Piping Specialties	11
Pipe Hangers and Supports	5
Insulation	
Plumbing	

#### 10 QUALITY ASSURANCE

A. See Section .

#### 10 DELIVERY, STORAGE AND HANDLING

A. Each length of pipe delivered to the site shall be clearly marked with the name of the manufacturer, class of pipe and pipe diameter. Store in accordance with manufacturer's approved instructions.

B. Carefully handle all pipes and fittings when loading and unloading.

C. Comply with all other recommendations of the manufacturers.

D. All pipe and pipe fittings shall meet ruling codes and regulations and shall be used and installed according to the ruling codes and regulations.

### ART 2 PRODUCTS

01 Pipe and pipe fittings for each service shall conform to the following schedule:

#### 0 QUALITY OF MATERIALS

- A. Copper tube, Type L, hard temper: ANSI H 1.
- B. Copper tube, Type K, soft temper: ANSI H 1.
- C. Cast iron soil pipe, service weight: C.I.S.P.I. HS .
- D. Cast iron soil pipe, no hub: C.I.S.P.I., IAMPO.
- E. Galvanized steel pipe, Schedule 40: ANSI B 6.
- F. Black steel pipe, Schedule 40: ANSI B 6.

- G. P. .C. (Polyvinylchloride) ASTM D .
- H. Black steel pipe Schedule : Coated and rapped.
- I. Black steel pipe, Schedule : ANSI B . .
- . Brass pipe fittings.
- . Ductile iron pipe Class 5 5 .
- L. FRP Pressure Carrier Pipe chemically resistant resins reinforced with fiberglass filament. Rated 15 PSIG working pressure at 5 degrees F.
- M. Polypropylene: ASTM D 5 rated SE O in accord with UL .
- N. Hard drawn copper refrigeration tubing. Cleaned and sealed.
- O. Polyethylene: ASTM D1 , ASTM D , A A CTS C 1
- P. Pe tubing, high density cross linked polyethylene with oxygen barrier: ASTM F

**0 QUALITY OF FITTINGS AND ACCESSORIES**

- A. Copper water tube solder joint fittings: Cast brass ANSI B1 .1 .
- B. Copper water tube flared joint fittings. Listed for underground service.
- C. Cast iron soil fittings, service weight: C.I.S.P.I., IAMPO.
- D. Cast iron, no hub fittings, C.I.S.P.I., IAMPO.
- E. Galvanized malleable iron fittings, 15 psig: ANSI B1 . .
- F. Black malleable iron fittings, 15 psig: ANSI B1 . .
- G. Steel butt welding fittings, A 1 seamless carbon steel, Schedule : ANSI B1 .5 15 psig welding neck forged steel flanges.
- H. P. .C. (polyvinylchloride) ASTM D .
- I. Cast Brass Compression: 5 5 5 5.
- . Single rubber sealing type or mechanical joints A A specification C11 .
- . Bell Bell same material as that of the carrier pipe.
- L. Same material as pipe.
- M. Copper refrigeration tube solder joint fittings.
- N. Same material as pipe: ASTM F 1

**0 JOINTS**

- A. Braided joints
- Silver Braiding Alloy: Stay Silver 5 or approved equal.

Flu : Silver braiding flu as approved.  
Remove excess flu .  
Remake leaky joints with new pipe and fittings.

B. Threaded joints

Ream and/or file before installation to remove all burrs.  
Remove all metal chips and filings.  
Pipe joint compound shall be suitable for service.

C. Gasketed joints

Materials and methods shall be as recommended by the pipe and fittings Manufacturer and shall comply with C.I.S.P.I. HSN T.

D. No Hub joints

Materials and methods shall be as recommended by the pipe and fittings manufacturer and shall comply with C.I.S.P.I. and IAMPO.

E. Welded joints

F. Solvent weld joints

G. Soldered joints

5 5 Tin Antimony solder  
Flu : Paste form as approved  
Remove excess solder and flu

H. Mechanical joints

I. Fuseal joints As manufactured by R G Sloane.

. Compression crimp or cinch

**ART 1 EXECUTION**

**01 INSTALLATION**

A. Interior and exposed piping installations are specified in other Division 15 Sections

**0 FIELD QUALITY CONTROL**

- A. Inspect pipe for compliance with the applicable specifications.
- B. All piping shall be installed with appropriate provisions for movement and expansion. Provide adequate expansion joints, guides, and anchors.
- C. All piping shall be installed according to ruling codes.
- D. All pipe and equipment openings shall be protected with temporary plugs or caps.
- E. Connections to equipment or control valves shall include unions whether shown on drawings or not.

- F. Chrome Plated Brass: Use white lead on threaded joints. Do not mar pipe. (Marred chrome pipe, valves, fittings, etc., shall be replaced.) Avoid use of toothed pipe wrench.
- G. Install piping approximately as indicated, straight, plumb and as direct as possible.
- H. Do not install within 12 inches of floors, or across doors or windows. Keep all piping concealed in finished rooms unless otherwise indicated. Install exposed risers as close to wall as possible, without offsets unless otherwise noted. Center risers, pipe line, etc., on adjacent construction.
- I. Keep all piping as high as possible. Locate groups of pipes parallel to each other and space to permit applying insulation and installation of valves.
  - . Bent nipples are not permitted make offsets with fittings ream, file and remove all burrs and chips from pipe before installation.
  - . Use full length of pipe wherever possible.
- L. Provide drainage piping of sizes noted or directed for equipment requiring drains. Connect to drainage system or spill to floor drain. This shall include all relief valve discharges, control and equipment drains.
- M. Before starting installation of piping, survey the routes and check for interferences. Modify route as required with the permission of the Owner at no additional cost.

#### 0 ADAPTERS

- A. Copper to Cast Iron Soil Pipe: Use soil pipe adapters, set as for soil pipe joints.
- B. Copper to Cast Iron Drains: Same as for cast iron soil pipe.
- C. Steel to Cast Iron Soil Pipe: Use galvanized half coupling to end of steel to form spigot, caulk as for cast iron soil pipe.
- D. Steel Pipe to Copper Tube: Provide dielectric union.

#### 0 SCHEDULE

- A. Letters in the schedule refer to paragraphs of Articles 1, 2, 3, and 4 of this Section. The reference in parenthesis is an option select one. Use the following materials unless otherwise noted:

Service	Size	Location	Pipe	Fittings	Joints
A/C Condensate Drain Piping		All	A	A	G
Refrigeration Piping		All	N	M	A

**END OF SECTION**

## SECTION 11 PIPE SPECIALTIES

### ART 1 GENERAL

#### 1 01 DESCRIPTION

A. Work covered by this Section includes the furnishing and installation of piping specialties, including, but not limited to, unions, strainers, gauges, thermometers, manometers and other specialty items.

B. Related work specified in other Sections includes:

Basic Mechanical Requirements	
Basic Mechanical Materials and Methods	5
Pipe and Pipe Fittings	11
Pipe Hangers and Supports	5
Plumbing	

#### 1 0 QUALITY ASSURANCE

A. The items in this Section are specified in a general manner and for normal conditions. Where corrosive liquids or gases are involved, or where materials are encountered which require special construction, use materials adequate for the service intended.

#### 1 0 SUBMITTALS

A. See Section .

B. Product Data: Submit product data on the following items:

1. Unions
2. Pressure Gauges
3. Thermometers
4. Temperature/Pressure Test Plug
5. Circuit Setters
6. Flexible Pipe Connections
7. Valves
8. Valve tags

C. Catalog cuts, technical data, and installation, operation and maintenance instructions for each item to be provided.

### ART 2 PRODUCTS

#### 2 01 UNIONS

A. Use Required For pipes with threaded, soldered, solvent cemented, or welded joints, provide unions at piping connections to each piece of equipment, at intervals of not more than 5' in straight runs of pipe, at each valve or cock (except where valves and cocks

have union ends), and elsewhere as required to adequately service the piping system and equipment.

- B. For Steel and Iron Pipe Malleable iron, Class 15 , brass to brass or brass to iron seats, ground joint.
- C. For Copper Pipe Cast bronze, 1 5 wsp, solder joint, copper to copper unions.

## **0 DIELECTRIC UNIONS AND FLANGES**

- A. Use required Provide dielectric unions and flanges at the following locations:
  - 1. At the connection of dissimilar metal pipes.
  - 2. On steel pipe whenever it leaves the ground.
- B. Performance Requirements Capable of separating metals in a manner which will prevent the passage of more than 1 of the galvanic current which would exist with metal to metal contact.
- C. Construction Pressure and temperature rating shall be no lower than those of the piping system in which installed and shall be of the same material as the piping.
- D. Acceptable Manufacturers:
  - 1. Eclipse, Inc.
  - 2. Perfection Corp.
  - 3. Watts Regulator Co.

## **0 PRESSURE GAUGES**

- A. Use Required Here shown on the Drawings or specified and on the suction and discharge of pumps. For circulator pumps, one pressure gauge is required with isolation valves to monitor both suction and discharge.
- B. Gauges Dial type utilizing a phosphor bronze Bourdon bottom, complete with weatherproof black iron case, 1 2 dial, 1 2 NPT male threads, stainless steel rack and pinion movements with nylon faced segments, black pointers with micrometer zero adjustments and white plastic dials with black figures.
- C. Scales
  - 1. Pumps In psig with range about two times the maximum operating pressure, but not less than 1 above the shut off head, unless otherwise specified.
- D. Standard Gauge Accessories Provide each gauge with pressure sensing tubing, main pipeline pressure tap, a shut off cock, and an air bleed.
- E. Gauge Snubber Provide a snubber with each gauge which may be subjected to rapid pressure changes so that pointers do not vibrate during operation.
- F. Acceptable Manufacturers:
  - 1. U.S. Gauge Company
  - 2. Ashcroft

**0 THERMOMETERS**

- A. Use Required here shown on the Drawings or specified and on the entering and leaving side of heat generating equipment.
- B. Thermometers shall Ashcroft Series EI Bimetal Thermometers or approved equal. Dial shall be 5" diameter. Model shall be EveryAngle to allow thermometer to be rotated and angled 1" Case and stem shall be made of stainless steel. Glass window shall be heavy duty.
- C. Provide appropriate temperature well for installation of thermometer.
- D. Install so that thermometer may be read from floor level.

**0 TEMPERATURE PRESSURE TEST PLUG**

- A. Furnish and install as indicated on the Drawings, Petersen Plug.
- B. Temperature/pressure test plug to receive either a temperature or pressure probe 1/2" O.D. Solid brass fitting with valve core of Nordel color coded and marked cap with gasket rated at 1,000 psig.
- C. Provide test kit to the owner upon completion of testing consisting of the following:
  - 1. ( ) pressure gauges 0-100 psi, .5% accuracy with adapters.
  - 2. ( ) bimetal thermometers F to 300 F, .5% accuracy.
  - 3. Compartmentalized protective carrying case.
- D. Acceptable Manufacturers:
  - 1. Petersen Products Company

**0 CIRCUIT SETTERS**

- A. Bronze calibrated balance valve with provisions for connecting a portable differential pressure meter. Meter connections to have built in check valves. An integral pointer shall register degree of valve opening. Valve shall have internal seals. Constructed for 15 lb. wp at 500°F.
- B. All balancing cocks where shown on drawings are required to be of the flow measuring type. If non flow measuring type are installed, contractor will be required to remove non flow measuring balancing cocks and install flow measuring type prior to balancing.
- C. Acceptable Manufacturers:
  - 1. Tour and Anderson
  - 2. Taco
  - 3. Bell and Gossett
- D. Balancing valves for heat pumps shall be automatic flow control valves as manufactured by Griswold Controls.

**07 FLEXIBLE PIPE CONNECTIONS**

- A. Furnish and install where shown on the Drawings and where otherwise required to control pipe vibration (suction and discharge of piping of all reciprocating/rotating



mechanical equipment). Flexible metal hose shall be annular hose of stainless steel with stainless steel braid.

B. Connectors shall be rated for a minimum of 15 psig at 100°F.

C. Acceptable Manufacturers:

1. Hefle Model S SSPC
2. Mason Industries Model BSSRF 15

## 0 AL ES GENERAL T ES

A. 1 1/2 lb. SP, Crane, as listed below, or Fairbanks, Lunkenheimer, Jenkins, Kennedy, Hammond, Nibco, Stockham or Walworth.

1. Gates: 1/2" bronze wedge disc rising stem screwed. ( 1 )
2. Globe: 1/2" bronze comp. disc rising stem screwed. ( 1 )
3. Gates: 1/2" up IBBM wedge disc O S and Y flanged. ( 1/2 )
4. Globes: 1/2" up IBBM bevel disc O S and Y flanged. ( 1/2 )
5. Stopcocks: Brass square head screwed. ( 1/2 )
6. Petcocks: 1/2" brass tee screwed. ( 1 )
7. Checks: 1/2" 1" bronze 1/2" swing disc screwed. ( 1 )
8. Checks: 1/2" 1" 1 1/2 lb. SP Miller Fig. 1 or approved equal.
9. Ball valves Full Port Size
10. Drain valve 1/2" Bronze ball valve with dust cover and chain, Apollo 1 Series

B. Two Piece, Full Port, Brass Ball valves with Stainless Steel Trim:

1. Manufacturers: Subject to compliance with requirements,
  - a. Crane Co.
  - b. Hammond valves
  - c. ITC Corporation
  - d. Milwaukee Valve Company
  - e. Nibco
2. Description:
  - a. Sizes: up to 1/2"
  - b. Standard: MSS SP 11
  - c. S P Rating: 15 PSIG
  - d. S P Rating: 15 PSIG
  - e. Body Design: Two Piece
  - f. Body Material: Forged Brass
  - g. Ends: Threaded or socket
  - h. Seats: TFE
  - i. Stem: 1/2" Stainless Steel
  - j. Ball: 1/2" Stainless Steel
  - k. Port: Full

C. 1 1/2 lb. SP, Crane, as listed below, or Fairbanks, Lunkenheimer, Jenkins, Kennedy, Hammond, Nibco, Stockham or Walworth.

1. Stopcocks: Brass square head screwed. ( 1/2 )

2. Petcocks: ☐ brass tee screwed. ( )
3. Checks: ☐ 1 bronze ☐ swing disc screwed. ( )
4. Checks: 1 ☐ , 1 5 lb. SP Miller Fig. 1 or approved equal.

D. PSI Butterfly valves, grooved ends, carbon steel body ☐ inc plated with EPDM liner, ASTM A 5 , Grade 5 5 1 .

1. Manufacturer: ☐ ictaulic or approved equal
2. For chilled water mains

## 0 AL E T A S

A. The tag shall be made from a plastic laminate of heavy plastic with a brass eyelet in the corner. Typed information on the plate inside the laminate will show a valve number, the fluid in the pipe, and the direction of flow for the equipment involved. Seton SPT or equal.

## 10 OT ER MATERIALS

A. Provide any materials not specifically shown or described, but required for a complete and proper installation. Select the materials and submit shop drawings to Engineer for acceptance.

## ART ☐ EXECUTION

### 01 ENERAL INSTALLATION

B. Carefully install work in accordance with the manufacturers recommended installation instructions.

### 0 INSTALLATION OF DIELECTRIC UNIONS AND ATER A ☐ FITTIN S

- A. Install dielectric unions and fittings to connect piping materials of dissimilar metals in wet piping systems.
- B. Bronze bodied valves and devices installed in steel piping systems do not require dielectric fittings when both connections are made with steel piping. Iron bodied valves and devices installed in copper systems require dielectric fittings.

### 0 SC EMATIC FLO DIA RAM

- A. Prepare a schematic flow diagram showing all component parts including all main isolation valves. Relate all valve tag numbers to this diagram.
- B. The schematic flow diagram and the temperature control diagrams are to be wall mounted under glass in an accessible location in the main mechanical equipment room.

### 0 IDENTIFICATION

- A. All piping shall be identified as to the service of the pipe and the normal direction of flow. The letters shall be at least 1 high and the flow arrows shall be at least long.
- B. All equipment shall be identified by stenciling the title of the equipment in a position that is clearly visible.
- C. Piping shall be identified at all tees, at equipment locations and in each separate room.

- D. All color codes of piping shall comply with ANSI A 1 .1.

**END OF SECTION**





