

Rooftop – Albany 8 Office
(8 Computer Drive West, Albany, NY)





NYS UNIFORM BUILDING CODE DATA			
ALL WORK MUST COMPLY WITH THE UNIFORM FIRE PROTECTION CODE OF NYS STATE OR THE "UNIFORM CODE". THE PUBLICATION INCORPORATED BY REFERENCE INCLUDE THE 2020 BUILDING CODE OF NEW YORK STATE, THE 2020 PLUMBING CODE OF NEW YORK STATE, THE 2020 MECHANICAL CODE OF NEW YORK STATE, THE 2020 FUEL GAS CODE, OF NEW YORK STATE, THE 2020 FIRE CODE OF NEW YORK STATE, THE 2020 PROPERTY MAINTENANCE CODE OF NEW YORK STATE.			
BUILDING INFORMATION		INTERIOR ENVIRONMENT	
OCCUPANCY GROUP USE	B OFFICE AND DATA CENTER	LIGHT VENTILATION	"N/A" "N/A"
CONSTRUCTION TYPE	I & B "N/A"	ENERGY CONSERVATION	
MIXED OCCUPANCIES	"N/A"	CLIMATE ZONE	"N/A"
INCIDENTAL USE AREAS	"N/A"	ROOF	"N/A"
CONTROL AREAS	"N/A"	WALLS	"N/A"
EXISTING BUILDING CODE		BELOW SLAB INSULATION	"N/A"
		WINDOWS	"N/A"
		DOORS	"N/A"
COMPLIANCE METHOD	WORK AREA	MECHANICAL SYSTEM DESIGN CRITERIA	"N/A"
CLASSIFICATION	ALTERATION LEVELS 1 AND 2	MECHANICAL SYSTEM TYPE	"N/A"
ALL ITEMS BELOW INDICATED WITH "N/A" ARE NOT REQUIRED TO BE MODIFIED OR UPGRADED TO MEET BOEN'S 2020 CRITERIA PER THE WORK AREA COMPLIANCE METHOD, CHAPTERS 7 AND 8.		WATER HEATING SYSTEM TYPE	"N/A"
HEIGHT AND AREA		ECONOMIZER	"N/A"
		CONTROLS	"N/A"
		FAN MOTORS	"N/A"
		DUCT SEALING	"N/A"
		DUCT AND PIPE INSULATION	"N/A"
		LIGHTING FUTURE SCHEDULE	"N/A"
		LIGHTING WATTAGE / CONTROL NARRATIVE	"N/A"
		DAYLIGHT ZONES	"N/A"
FIRE AND SMOKE RESISTANT CONSTRUCTION		EXCEPTION TAKEN:	
PROTECTED EXTERIOR WALLS	"N/A"	OSI 3, EXCEPTION 3 - EXISTING CEILING, WALL, OR FLOOR CAVITIES EXPOSED DURING CONSTRUCTION, PROVIDING THAT THESE CAVITIES ARE FILLED WITH INSULATING MATERIAL.	
PROTECT EXISTING WALL OPENINGS	"N/A"		
WALL WITH WALL OPENING AREA	"N/A"	ROOF ASSEMBLY	
FIRE WALLS	NOT REQUIRED	CLASSIFICATION	CLASS C
FIRE BARRIERS	NOT REQUIRED		
FIRE PARTITIONS	NOT REQUIRED		
SMOKE BARRIERS	NOT REQUIRED		
INTERIOR FINISHES		ELECTRICAL	
WALLS AND CEILINGS: EXITS	"N/A"	EMERGENCY AND STANDBY POWER	NOT REQUIRED
WALLS AND CEILINGS: EXT ACCESS	"N/A"	EXT SENS	NOT REQUIRED
FLOORS	CLASS C	MEANS OF EGRESS ILLUMINATION	REQUIRED
	CLASS II	MECHANICAL	
FIRE PROTECTION SYSTEMS		DUCTS AND AIR TRANSFER OPENINGS	
FIRE EXTINGUISHING SYSTEM	NOT REQUIRED PER EBCOYS SECTION 803.2.2.2	COMBUSTION AIR	"N/A"
PORTABLE FIRE EXTINGUISHERS	1 DURING CONSTRUCTION REQUIRED	CHIMNEYS, FLUES, AND GAS VENTS	"N/A"
FIRE ALARM SYSTEM	REQUIRED	PLUMBING	
EMERGENCY VOICES	REQUIRED	FUTURE COUNT	"N/A"
SMOKE DETECTION SYSTEM	REQUIRED	AVAILABLE STREET WATER PRESSURE	"N/A"
SMOKE CONTROL	NOT REQUIRED		
SMOKEPROOF ENCLOSURE	NOT REQUIRED		
ACCESSIBILITY		ELEVATOR	
ROUTE TO PRIMARY FUNCTION AREAS ARE NOT REQUIRED TO BE UPGRADED TO BE ACCESSIBLE PER EBCOYS SECTION 305.7, EXCEPTION 3. NO OTHER ALTERATIONS OR WORK IMPACT ITEMS RELATED TO ACCESSIBILITY.		EMERGENCY OPERATION	
		"N/A"	
COMPLY WITH THE FOLLOWING REGULATORY REQUIREMENTS FOR CONSTRUCTION, INCLUDING, BUT NOT LIMITED TO: • OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION) • 2020 BUILDING CODE OF NEW YORK STATE, CHAPTER 33, SAFEGUARDS DURING CONSTRUCTION • 2020 EXISTING BUILDING CODE, CHAPTER 15, CONSTRUCTION SAFEGUARDS • 2020 FIRE CODE OF NEW YORK STATE, CHAPTER 33, FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION			

GENERAL CONSTRUCTION NOTES

- [illegible]

GENERAL REMOVAL NOTES

1. IF DEMOLITION IS PERFORMED IN EXCESS OF THAT INDICATED, RESTORE AFFECTED AREAS AT NO ADDITIONAL COST.
2. OBJECTS SHOWN ON THE REMOVALS PLAN WITH A DASHED LINE ARE TO BE REMOVED IN THEIR ENTIRETY. REFER TO REMOVAL NOTES FOR FURTHER DETAIL.
3. NOTIFY OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THE DRAWINGS AND ACTUAL CONDITIONS RELATED TO REMOVALS, INCLUDING BUT NOT LIMITED TO LOAD BEARING STRUCTURAL ELEMENTS.

PAINTING NOTES:

PAINTING: INTERIOR ACRYLIC PAINT, COLOR AND SHEEN TO MATCH EXISTING.

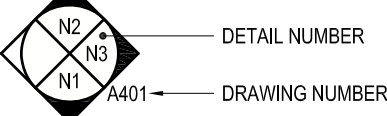
1. PAINT NEW SUBSTRATES WITH ONE COAT OF PRIMER AND TWO FINISH COATS.
2. PAINT EXISTING SUBSTRATES WITH TWO FINISH COATS.

SYMBOLS:

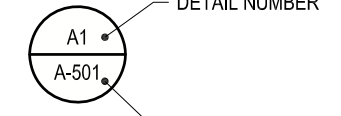
DRAWING/DETAIL LABEL:

DETAIL No.	DETAIL TITLE
DWG REFERENCE	SCALE

INTERIOR ELEVATION INDICATOR:



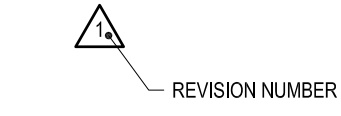
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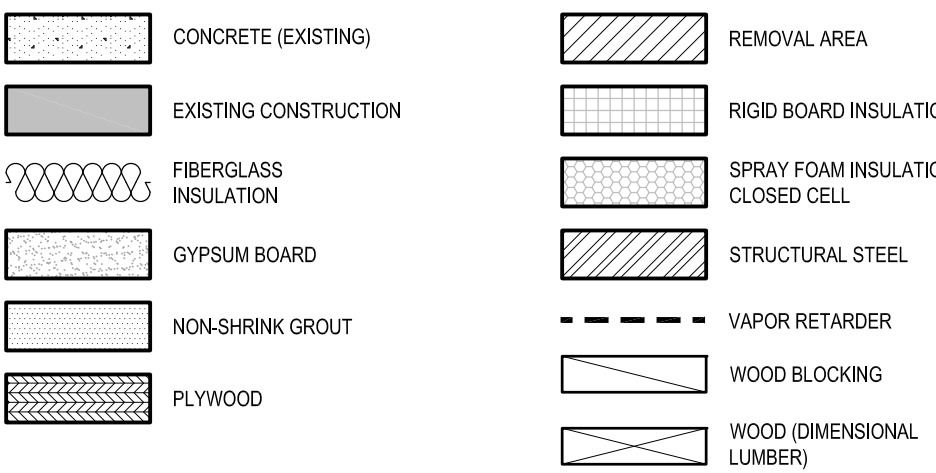
SECTION INDICATOR:



REVISION NUMBER IDENTIFIER:



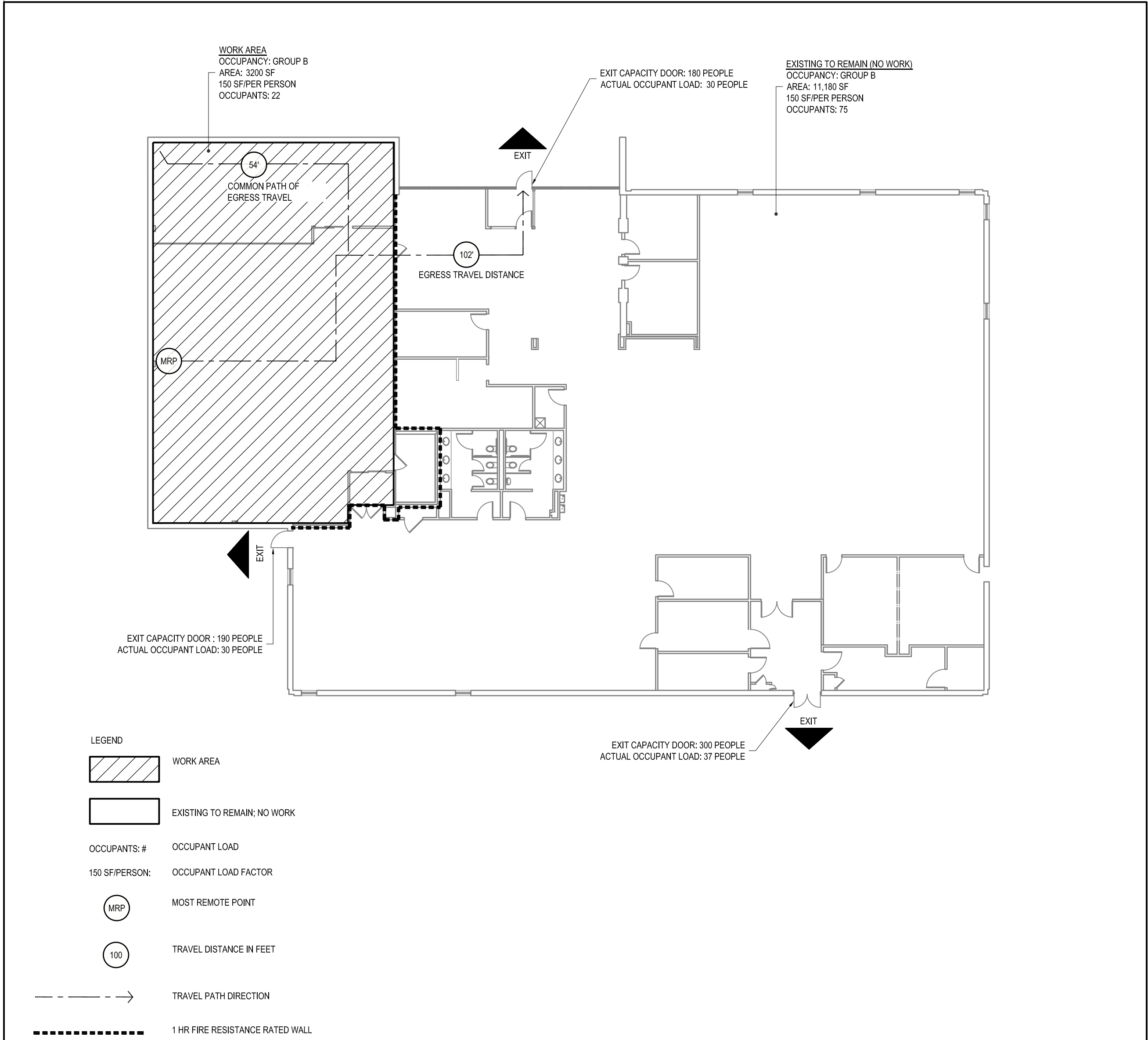
MATERIAL INDICATORS:



ABBREVIATIONS:

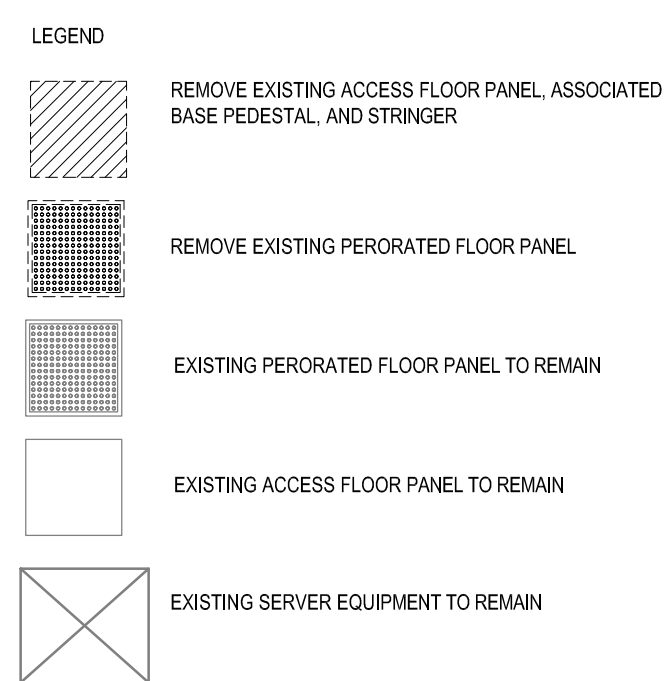
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THIS LIST IS ONLY TO BE USED TO LOOK UP ABBREVIATIONS CONTAINED IN THE CONTRACT DRAWINGS. IT IS NOT AN INDICATION THAT ANY SPECIFIC MATERIAL, PROCESS, ETC., IS NOT INCLUDED IN THIS WORK OF CONTRACT. NOT ALL ABBREVIATIONS LISTED ABOVE ARE USED IN THE DRAWINGS OF THE CONTRACT.

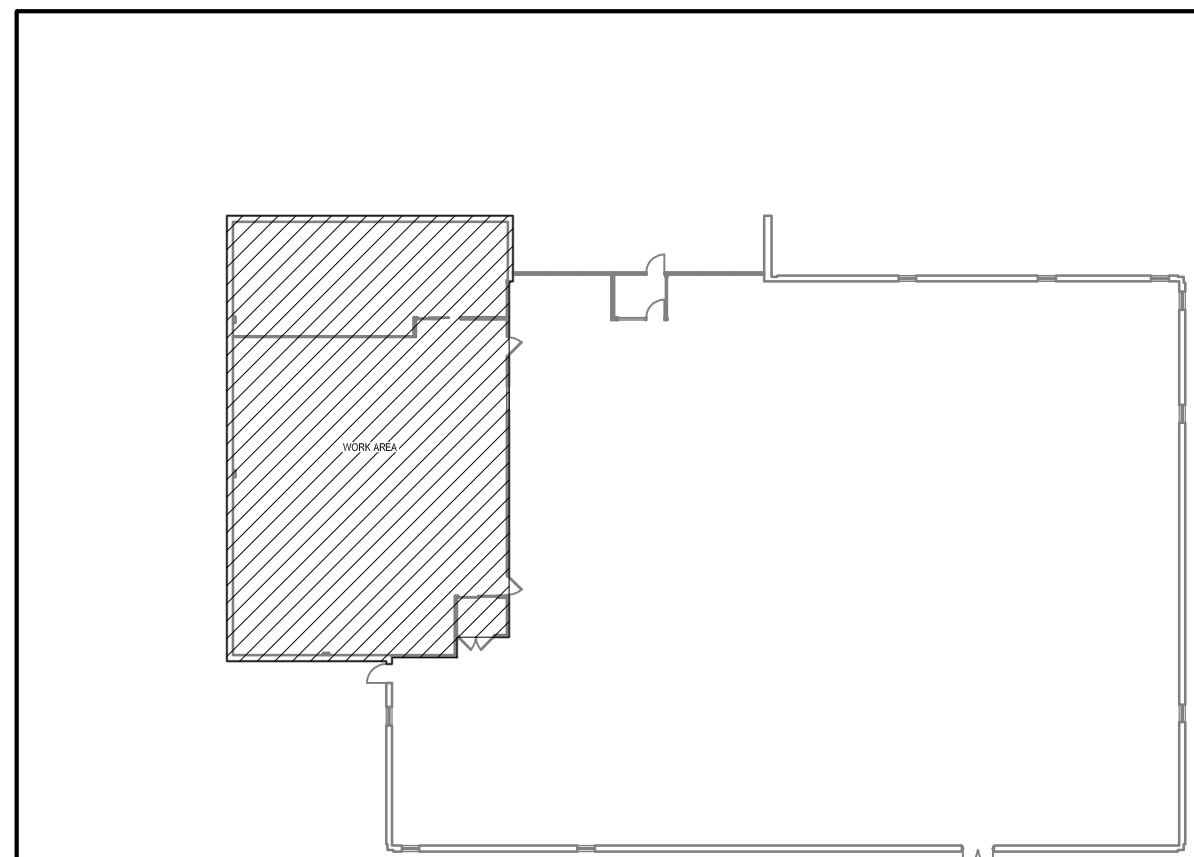


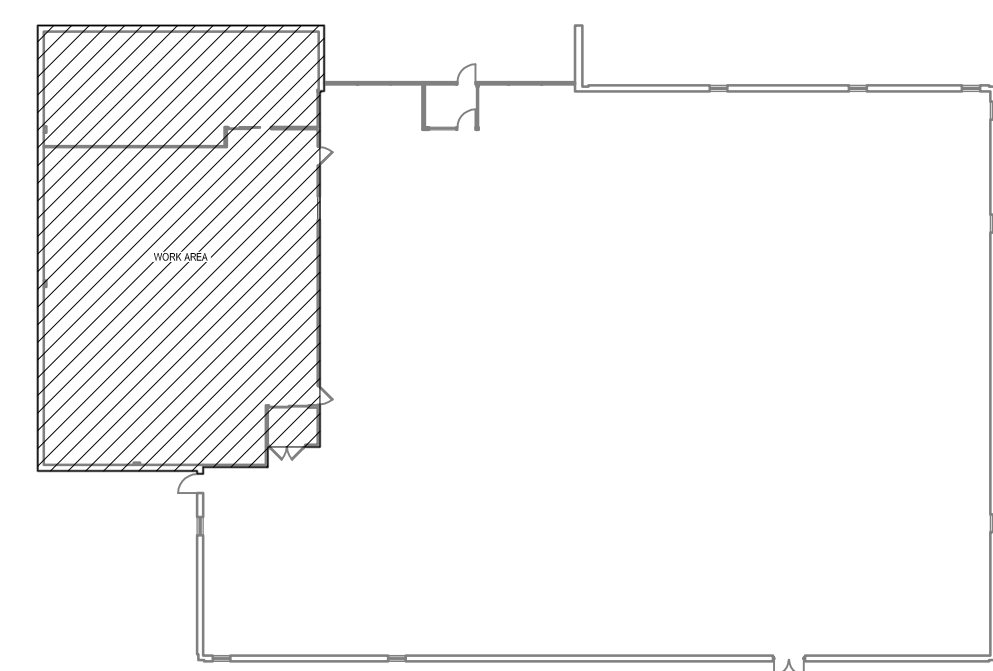
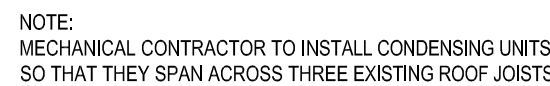
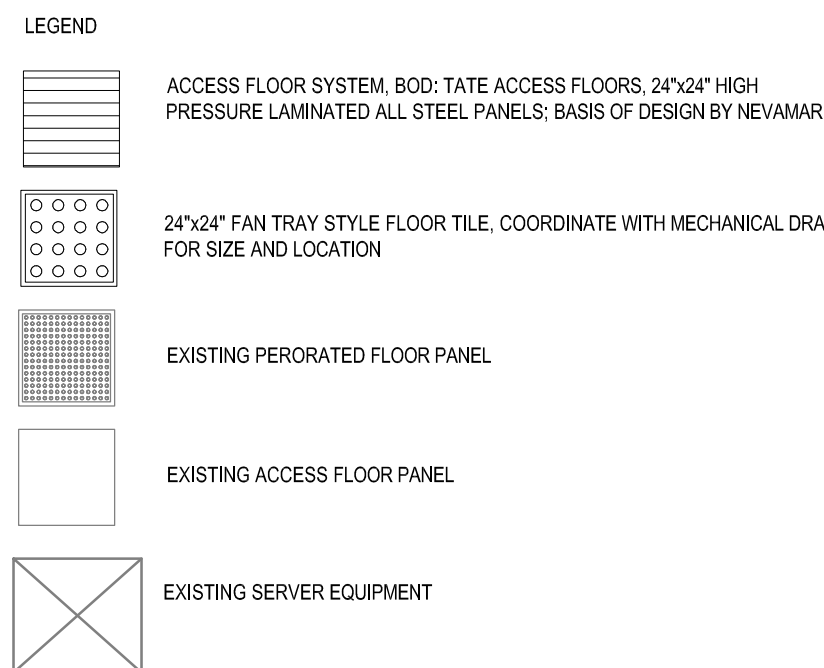
1	CODE PLAN	←
REF:	SCALE: 1/16"= 1'-0"	PLAN NORTH

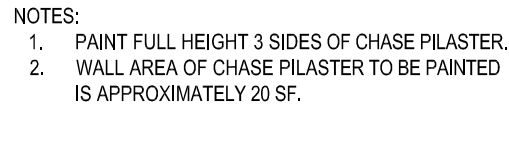
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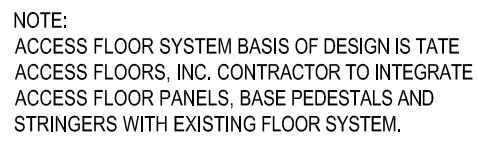
- NOTES:
1. UNLESS OTHERWISE NOTED, EXISTING BASE PEDESTALS AND STRINGERS THAT SUPPORT THE RAISED FLOOR TO REMAIN.
 2. REMOVE ONLY ONE EXISTING CRAC UNIT AT A TIME SO THAT TWO EXISTING CRAC UNITS ARE FUNCTIONAL AT ALL TIMES IN THE SERVER ROOM. SEE MECHANICAL DRAWINGS FOR REMOVAL AND INSTALLATION OF CRAC UNITS.
 3. FOLLOW THIS SEQUENCE FOR THE REMOVAL AND INSTALLATION OF CRAC UNITS:
 - 3.1. REMOVE EXISTING CRAC UNIT A AND INSTALL CRAC UNIT 1. EXISTING CRAC UNIT 1 AND EXISTING CRAC UNIT C ARE TO REMAIN IN OPERATION UNTIL CRAC UNIT 1 IS FULLY FUNCTIONAL.
 - 3.2. REMOVE EXISTING CRAC UNIT B AND INSTALL CRAC UNIT 2. EXISTING CRAC UNIT C IS TO REMAIN IN OPERATION UNTIL CRAC UNIT 2 IS FULLY FUNCTIONAL.
 - 3.3. REMOVE EXISTING CRAC UNIT C AND INSTALL CRAC UNIT 3.







REF: 6/A-501	SCALE: 3"= 1'-0"
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REF: 1/A-101	SCALE: 3"= 1'-0"
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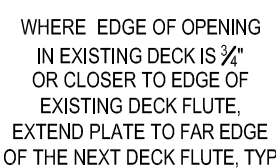
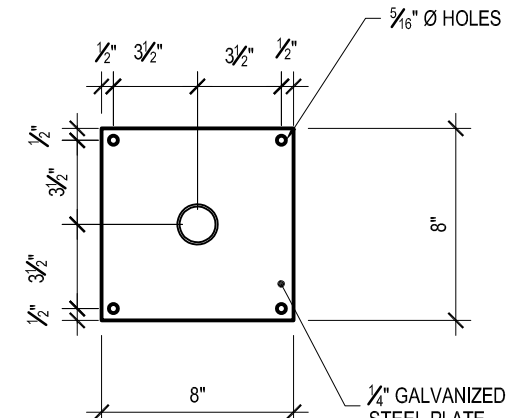


Diagram illustrating the elevation view of a steel deck assembly. The assembly consists of an existing steel deck to remain, which is extended by a 18 GA PLATE. The extension is secured with No. 10 LOW PROFILE HEAD SELF-DRILLING SCREWS AT 6" MAX OC, TYP. The total length of the extended plate is labeled as EXTEND PLATE FROM OUT TO OUT OF UPPER DECK FLUTES, TYP. The existing openings are indicated as EXISTING OPENINGS 6" +/- V.F.

Diagram illustrating the cross-section of a roof assembly, showing the following components and materials:

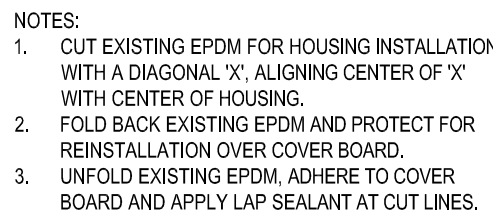
- EXISTING EPDM MEMBRANE
- EXISTING RIGID INSULATION
- 6" MIN
- SUBSTRATE BOARD
- 60 MIL EPDM SELF-ADHERED MEMBRANE BOU-SURE-SEAL SAT
- RIGID INSULATION MATCH THICKNESS OF EXISTING INSULATION TYP
- COVER BOARD, TYP BOU-DECK ROOF BOARD BY GEORCA PACIFIC; MATCH EXISTING THICKNESS 6" MIN
- EXISTING ROOF ASSEMBLY
- 40 MIL SELF-ADHERING VAPOR RETARDER WITH MIN 32 MIL SELF-ADHERING RUBBERIZED ASPHALT LAMINATED TO 8 MIL POLYESTER FABRIC OR 5 MIL BND-RESISTANT POLYETHYLENE FILM TYP LAP MIN 6" ONTO EXISTING VAPOR RETARDER
- EXISTING OPENINGS 4" x 4" MIN
- EPDM PRIMER, TYP

REF: 2/A-101	SCALE: 1 1/2" = 1'-0"
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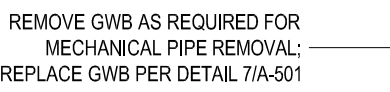


A SECTION

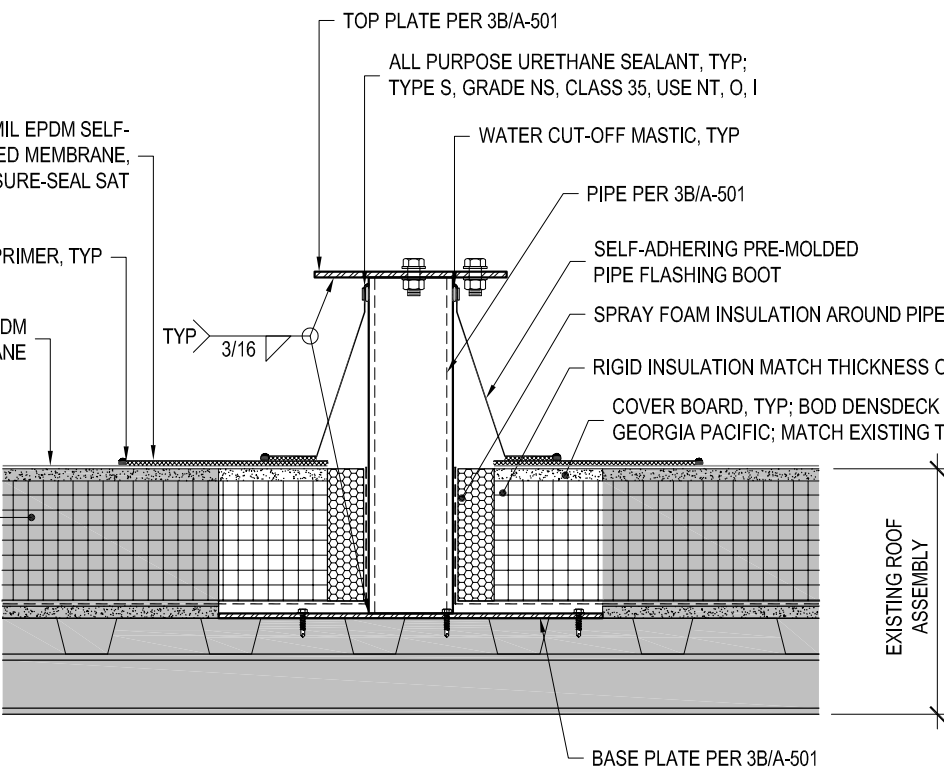
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SECTION _____

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TAG	CONFIGURATION	CFM	ESP	TOTAL FAN KW	EAT (°F)	COOLING CAPACITY		HUMIDIFIER			REHEAT		FILTER		ELECTRICAL DATA			FLOOR STAND HEIGHT	RETURN PLENUM HEIGHT	DIMENSIONS LxWxH	BASIS OF DESIGN	OPTIONS
						TOTAL MBH (KW)	SENS MBH (KW)	#/HR	KW	PAN	KW	STAGES	DEPTH	EFF	MCA	MCCP	VOLTS				LIEBERT DS	
CRAC-1	DOWNFLOW	5,200	0.2	1.9	72°/50%	121,916 (35.7)	100,060 (29.3)	11.0	-	-	NONE	NONE	2"	MERV 13	68.3	80A	208/3φ	18"	N/A	73"x35"x76"	DS035AD	1
CRAC-2	DOWNFLOW	5,200	0.2	1.9	72°/50%	121,916 (35.7)	100,060 (29.3)	11.0	-	-	NONE	NONE	2"	MERV 13	68.3	80A	208/3φ	18"	N/A	73"x35"x76"	DS035AD	1
CRAC-3	DOWNFLOW	5,200	0.2	1.9	72°/50%	121,916 (35.7)	100,060 (29.3)	11.0	-	-	NONE	NONE	2"	MERV 13	68.3	80A	208/3φ	18"	N/A	73"x35"x76"	DS035AD	1
OPTIONS:																						
1. REFER TO SPECIFICATION SECTION 238124 - COMPUTER ROOM AIR-CONITIONERS - FLOOR MOUNTED																						
NOTES:																						
1. CONTRACTOR TO FIELD INSTALL TOP PLENUM SECTION.																						
2. CONTRACTOR TO FIELD INSTALL EC FAN HOUSING BELOW RAISED ACCESS FLOOR.																						
3. CONTRACTOR TO FIELD INSTALL LEAK DETECTORS																						

3. FAN SPEED CONTROL TO -20°F

1. INSTALL NEW CRAC-3/ACC-3. POWER EQUIPMENT WITH TEMPORARY FEEDS.
2. COMMISSION AND START-UP NEW CRAC-3/ACC-3. EXISTING CRAC-3/ACC-3 TO REMAIN OPERATIONAL AT THIS POINT.
3. DECOMMISSION AND REMOVE EXISTING CRAC-1/ACC-1.
4. INSTALL NEW CRAC-1/ACC-1.
5. COMMISSION AND START-UP NEW CRAC-1/ACC-1.
6. DECOMMISSION AND REMOVE EXISTING CRAC-2/ACC-2.
7. INSTALL NEW CRAC-2/ACC-2.
8. COMMISSION AND START-UP NEW CRAC-2/ACC-2.
9. DECOMMISSION AND REMOVE EXISTING CRAC-3/ACC-3.
10. PROVIDE PERMANENT POWER TO NEW CRAC-3/ACC-3.

ENERGY CODE STATEMENT:

SECTION 230523 – GENERAL–DUTY VALVES FOR HVAC PIPING

PART 1 GENERAL

1.01 ABBREVIATIONS AND ACRONYMS

A.CWP: COLD WORKING PRESSURE.

B. EPM: ETHYLENE POLYPROPYLENE COPOLYMER RUBBER.

C. NBR: ACRYLONITRILE–BUTADIENE, BUNA–N, OR NITRILE RUBBER.

D. NRS: NOIRISING STEM.

E. OS&Y: OUTSIDE SCREW AND YOE.

F. PTFE: POLYTETRAFLUOROETHYLENE.

G. RS: RISING STEM.

H. TFE: TETRAFLUORETHYLENE.

I. WOG: WATER, OIL, AND GAS.

1.02 REFERENCE STANDARDS

A. ASME B1.20.1 – PIPE THREADS, GENERAL PURPOSE (NCH) 2013 (REAFFIRMED 2018).

B. ASME B16.18 – CAST COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS 2018.

C. ASME B31.9 – BUILDING SERVICES PIPING 2020.

D. MSS SP–45 – BYPASS AND DRAIN CONNECTIONS 2003 (REAFFIRMED 2008).

E. MSS SP–110 – BALL VALVES THREADED, SOCKET–WELDING, SOLDER JOINT, GROOVED AND FLARED ENDS 2010.

1.03 SUBMITTALS

A. PRODUCT DATA: PROVIDE DATA ON VALVES INCLUDING MANUFACTURERS CATALOG INFORMATION. SUBMIT PERFORMANCE RATINGS, ROUGH–IN DETAILS, WEIGHTS, SUPPORT REQUIREMENTS, AND PIPING CONNECTIONS.

B. WARRANTY: SUBMIT MANUFACTURER WARRANTY AND ENSURE THAT FORMS HAVE BEEN COMPLETED IN OWNER'S NAME AND REGISTERED WITH MANUFACTURER.

C. OPERATION AND MAINTENANCE DATA: INCLUDE MANUFACTURER'S DESCRIPTIVE LITERATURE, OPERATING INSTRUCTIONS, MAINTENANCE AND REPAIR DATA, AND PARTS LISTINGS.

1.04 QUALITY ASSURANCE

A. MANUFACTURER:

1. OBTAIN VALVES FOR EACH VALVE TYPE FROM SINGLE MANUFACTURER.

2. COMPANY MUST SPECIALIZE IN MANUFACTURING PRODUCTS SPECIFIED IN THIS SECTION, WITH NOT LESS THAN THREE YEARS OF DOCUMENTED EXPERIENCE.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. LISTED PIPE SIZES SHOWN USING NOMINAL PIPE SIZES (NPS) AND NOMINAL DIAMETER (DN).

B. PROVIDE THE FOLLOWING VALVES FOR THE APPLICATIONS IF NOT INDICATED ON DRAWINGS:

1. THROTTLING (HYDRONIC): BALL AND GLOBE.

2. ISOLATION (SHUTOFF): BALL.

C. SUBSTITUTIONS OF VALVES WITH HIGHER CWP CLASSES OR WSP RATINGS FOR SAME VALVE TYPES ARE PERMITTED WHEN SPECIFIED CWP RATINGS OR WSP CLASSES ARE NOT AVAILABLE.

D. REQUIRED VALVE END CONNECTIONS FOR NON–WAFER TYPES:

1. COPPER TUBE:

a. SIZE 2 INCH AND SMALLER: THREADED ENDS, EXCEPT SOLDER–JOINT VALVE–ENDS.

b. SIZE 2–1/2 INCH AND LARGER: GROOVED ENDS.

2.02 GENERAL REQUIREMENTS

A. VALVE PRESSURE AND TEMPERATURE RATINGS: NO LESS THAN RATING INDICATED; AS REQUIRED FOR SYSTEM PRESSURES AND TEMPERATURES.

B. VALVE SIZES: MATCH UPSTREAM PIPING UNLESS OTHERWISE INDICATED.

C. VALVE ACTUATOR TYPES:

1. HAND LEVER: QUARTER–TURN VALVES 6 INCH AND SMALLER.

D. VALVES IN INSULATED PIPING: PROVIDE 2 INCH STEM EXTENSIONS AND THE FOLLOWING FEATURES:

1. BALL VALVES: EXTENDED OPERATING HANDLE OF NON–THERMAL–CONDUCTIVE MATERIAL, AND PROTECTIVE SLEEVE THAT ALLOWS OPERATION OF VALVE WITHOUT BREAKING THE VAPOR SEAL OR DISTURBING INSULATION.

E. VALVE–END CONNECTIONS:

1. THREADED END VALVES: ASME B1.20.1.

2. SOLDER JOINT CONNECTIONS: ASME B16.18.

F. GENERAL ASME COMPLIANCE:

1. BUILDING SERVICES PIPING VALVES: ASME B31.9.

G. BRONZE VALVES:

1. FABRICATE FROM DEZINCIFICATION RESISTANT MATERIAL.

2. COPPER ALLOYS CONTAINING MORE THAN 15 PERCENT ZINC ARE NOT PERMITTED.

H. VALVE BYPASS AND DRAIN CONNECTIONS: MSS SP–45.

I. SOURCE LIMITATIONS: OBTAIN EACH VALVE TYPE FROM A SINGLE MANUFACTURER.

2.03 BRONZE, BALL VALVES

A. GENERAL:

1. FABRICATE FROM DEZINCIFICATION RESISTANT MATERIAL.

2. COPPER ALLOYS CONTAINING MORE THAN 15 PERCENT ZINC ARE NOT PERMITTED.

B. THREE PIECE, FULL PORT WITH STAINLESS STEEL TRIM:

1. COMPLY WITH MSS SP–110.

2. WSP RATING: 150 PSI.

3. CWP RATING: 600 PSI.

4. END CONNECTIONS: PIPE THREAD.

5. SEATS: PTFE.

6. STEM: STAINLESS STEEL.

7. BALL: STAINLESS STEEL, VENTED.

8. MANUFACTURERS:

a. APOLLO VALVES: WWW.APOLLOVALVES.COM/#\$LE.

b. VEGA LL2: WWW.VEGA.US/#\$LE.

PART 3 EXECUTION

3.01 EXAMINATION

A. DISCARD ALL PACKING MATERIALS AND VERIFY THAT VALVE INTERIOR, INCLUDING THREADS AND FLANGES, ARE COMPLETELY CLEAN WITHOUT SIGNS OF DAMAGE OR CORROSION THAT COULD RESULT IN LEAKAGE.

B. VERIFY VALVE PARTS TO BE FULLY OPERATIONAL IN ALL POSITIONS FROM CLOSED TO FULLY OPEN.

C. CONFIRM GASKET MATERIAL TO BE SUITABLE FOR THE SERVICE, TO BE OF CORRECT SIZE, AND WITHOUT DEFECTS THAT COULD COMPROMISE EFFECTIVENESS.

D. SHOULD VALVE IS DETERMINED TO BE DEFECTIVE, REPLACE WITH NEW VALVE.

3.02 INSTALLATION

A. PROVIDE UNIONS OR FLANGES WITH VALVES TO FACILITATE EQUIPMENT REMOVAL AND MAINTENANCE WHILE MAINTAINING SYSTEM OPERATION AND FULL ACCESSIBILITY FOR SERVICING.

B. PROVIDE SEPARATE VALVE SUPPORT AS REQUIRED AND LOCATE VALVE WITH STEM AT OR ABOVE CENTER OF PIPING, MAINTAINING UNIMPEDED STEM MOVEMENT.

END OF SECTION

SECTION 230529 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. SECTION 033000 – CAST–IN–PLACE CONCRETE: CONCRETE EQUIPMENT PADS.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M – STANDARD SPECIFICATION FOR ZINC (HOT–DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS 2017.

B. ASTM A153/A153M – STANDARD SPECIFICATION FOR ZINC COATING (HOT–DIP) ON IRON AND STEEL HARDWARE 2016A.

C. ASTM A36/A36M – STANDARD SPECIFICATION FOR CARBON STRUCTURAL STEEL 2019.

D. ASTM A47/A47M – STANDARD SPECIFICATION FOR FERRITIC MALLEABLE IRON CASTINGS 1999, WITH EDITORIAL REVISION (2018).

E. ASTM B633 – STANDARD SPECIFICATION FOR ELECTRODEPOSITED COATINGS OF ZINC ON IRON AND STEEL 2019.

F. ASTM E84 – STANDARD TEST METHOD FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS 2021A.

G. ASTM E96/E96M – STANDARD TEST METHODS FOR WATER VAPOR TRANSMISSION OF MATERIALS 2016.

H. MFMA–4 – METAL FRAMING STANDARDS PUBLICATION 2004.

I. MSS SP–58 – PIPE HANGERS AND SUPPORTS: DESIGN, MANUFACTURE, SELECTION, APPLICATION, AND INSTALLATION 2018.

J. UL 723 – STANDARD TEST FOR SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS CURRENT EDITION, INCLUDING ALL REVISIONS.

1.03 ADMINISTRATIVE REQUIREMENTS

A. COORDINATION:

1. COORDINATE SIZES AND ARRANGEMENT OF SUPPORTS AND BASES WITH THE ACTUAL EQUIPMENT AND COMPONENTS TO BE INSTALLED.

2. COORDINATE THE WORKING FRAMING AND MATERIALS REQUIRED FOR INSTALLATION.

3. COORDINATE COMPATIBILITY OF SUPPORT AND ATTACHMENT COMPONENTS WITH MOUNTING SURFACES AT THE INSTALLED LOCATIONS.

4. COORDINATE THE ARRANGEMENT OF SUPPORTS WITH DUCTWORK, PIPING, EQUIPMENT AND OTHER POTENTIAL CONFLICTS INSTALLED UNDER OTHER SECTIONS OR BY OTHERS.

5. NOTIFY ARCHITECT OF ANY CONFLICTS WITH OR DEVIATIONS FROM CONTRACT DOCUMENTS. OBTAIN DIRECTION BEFORE PROCEEDING WITH WORK.

B. SEQUENCING:

1. DO NOT INSTALL PRODUCTS ON OR PROVIDE ATTACHMENT TO CONCRETE SURFACES UNTIL CONCRETE HAS FULLY CURED IN ACCORDANCE WITH SECTION 033000.

1.04 SUBMITTALS

A. SEE SECTION 013000 – ADMINISTRATIVE REQUIREMENTS, FOR SUBMITTAL PROCEDURES.

B. PRODUCT DATA: PROVIDE MANUFACTURER'S STANDARD CATALOG PAGES AND DATA SHEETS FOR CHANNEL (STRUT) FRAMING SYSTEMS, NONPENETRATING ROOFTOP SUPPORTS, POST–INSTALLED CONCRETE AND MASONRY ANCHORS, AND THERMAL INSULATED PIPE SUPPORTS.

C. INSTALLER'S QUALIFICATIONS: INCLUDE EVIDENCE OF COMPLIANCE WITH SPECIFIED REQUIREMENTS.

D. MANUFACTURER'S INSTRUCTIONS: INDICATE APPLICATION CONDITIONS AND LIMITATIONS OF USE STIPULATED BY PRODUCT TESTING AGENCY. INCLUDE INSTRUCTIONS FOR STORAGE, HANDLING, PROTECTION, EXAMINATION, PREPARATION, AND INSTALLATION OF PRODUCT.

1.05 QUALITY ASSURANCE

A. COMPLY WITH APPLICABLE BUILDING CODE.

B. PRODUCT LISTING ORGANIZATION QUALIFICATIONS: AN ORGANIZATION RECOGNIZED BY OSHA AS A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) AND ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.

1.06 DELIVERY, STORAGE, AND HANDLING

A. RECEIVE, INSPECT, HANDLE, AND STORE PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. GENERAL REQUIREMENTS:

1. PROVIDE ALL REQUIRED HANGERS, SUPPORTS, ANCHORS, FASTENERS, FITTINGS, ACCESSORIES, AND HARDWARE AS NECESSARY FOR THE COMPLETE INSTALLATION OF PLUMBING WORK.

2. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED, WHERE APPLICABLE.

3. WHERE SUPPORT AND ATTACHMENT COMPONENT TYPES AND SIZES ARE NOT INDICATED, SELECT IN ACCORDANCE WITH MANUFACTURER'S APPLICATION CRITERIA AS REQUIRED FOR THE LOAD TO BE SUPPORTED WITH A MINIMUM SAFETY FACTOR OF 5. INCLUDE CONSIDERATION FOR VIBRATION, EQUIPMENT OPERATION, AND SHOCK LOADS WHERE APPLICABLE.

4. DO NOT USE WIRE, CHAIN, PERFORATED PIPE STRAP, OR WOOD FOR PERMANENT SUPPORTS UNLESS SPECIFICALLY INDICATED OR PERMITTED.

5. STEEL COMPONENTS: USE CORROSION RESISTANT MATERIALS SUITABLE FOR THE ENVIRONMENT WHERE INSTALLED.

a. INDOOR DRY LOCATIONS: USE ZINC–PLATED STEEL OR APPROVED EQUIVALENT UNLESS OTHERWISE INDICATED.

b. OUTDOOR AND DAMP OR WET INDOOR LOCATIONS: USE STAINLESS STEEL UNLESS OTHERWISE INDICATED.

c. ZINC–PLATED STEEL: ELECTROPLATED IN ACCORDANCE WITH ASTM B633.

d. GALVANIZED STEEL: HOT–DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123/A123M OR ASTM A153/A153M.

B. METAL CHANNEL (STRUT) FRAMING SYSTEMS: FACTORY–FABRICATED CONTINUOUS–SLOT METAL CHANNEL (STRUT) AND ASSOCIATED FITTINGS, ACCESSORIES, AND HARDWARE REQUIRED FOR FIELD–ASSEMBLY OF SUPPORTS.

1. MANUFACTURERS:

a. COOPER B–LINE, A DIVISION OF EATON CORPORATION: WWW.COOPERINDUSTRIES.COM/#\$LE.

b. FERGUSON ENTERPRISES INC: WWW.FNW.COM/#\$LE.

c. THOMAS & BETTS CORPORATION: WWW.TNB.COM/#\$LE.

d. UNISTRUT, A BRANCH OF ATKINS INTERNATIONAL INC: WWW.UNISTRUT.COM/#\$LE.

e. SOURCE LIMITATIONS: FURNISH CHANNELS (STRUTS) AND ASSOCIATED FITTINGS, ACCESSORIES, AND HARDWARE PRODUCED BY A SINGLE MANUFACTURER.

2. COMPLY WITH MFMA–4.

PART 3 EXECUTION

3.01 PREPARATION

A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.

3.02 INSTALLATION

A. INSTALL NAMEPLATES WITH CORROSIVE–RESISTANT MECHANICAL FASTENERS, OR ADHESIVE. APPLY WITH SUFFICIENT ADHESIVE TO ENSURE PERMANENT ADHESION AND SEAL WITH CLEAR LACQUER.

B. INSTALL PLASTIC PIPE MARKERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

C. INSTALL PLASTIC TAPE PIPE MARKERS COMPLETE AROUND PIPE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

D. USE TAGS ON PIPING 3/4 INCH DIAMETER AND SMALLER.

E. LOCATE CEILING TAGS TO LOCATE VALVES OR DAMPERS ABOVE LAY–IN PANEL CEILINGS. LOCATE IN CORNER OF PANEL CLOSEST TO EQUIPMENT.

END OF SECTION

PART 3 EXECUTION

3.01 PREPARATION

A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.

3.02 INSTALLATION

A. INSTALL NAMEPLATES WITH CORROSIVE–RESISTANT MECHANICAL FASTENERS, OR ADHESIVE. APPLY WITH SUFFICIENT ADHESIVE TO ENSURE PERMANENT ADHESION AND SEAL WITH CLEAR LACQUER.

B. INSTALL PLASTIC PIPE MARKERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

C. INSTALL PLASTIC TAPE PIPE MARKERS COMPLETE AROUND PIPE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

D. USE TAGS ON PIPING 3/4 INCH DIAMETER AND SMALLER.

E. LOCATE CEILING TAGS TO LOCATE VALVES OR DAMPERS ABOVE LAY–IN PANEL CEILINGS. LOCATE IN CORNER OF PANEL CLOSEST TO EQUIPMENT.

END OF SECTION

PART 3 EXECUTION

3.01 PREPARATION

A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.

3.02 INSTALLATION

A. INSTALL NAMEPLATES WITH CORROSIVE–RESISTANT MECHANICAL FASTENERS, OR ADHESIVE. APPLY WITH SUFFICIENT ADHESIVE TO ENSURE PERMANENT ADHESION AND SEAL WITH CLEAR LACQUER.

B. INSTALL PLASTIC PIPE MARKERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

C. INSTALL PLASTIC TAPE PIPE MARKERS COMPLETE AROUND PIPE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

D. USE TAGS ON PIPING 3/4 INCH DIAMETER AND SMALLER.

E. LOCATE CEILING TAGS TO LOCATE VALVES OR DAMPERS ABOVE LAY–IN PANEL CEILINGS. LOCATE IN CORNER OF PANEL CLOSEST TO EQUIPMENT.

END OF SECTION

PART 3 EXECUTION

3.01 PREPARATION

A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.

3.02 INSTALLATION

A. INSTALL NAMEPLATES WITH CORROSIVE–RESISTANT MECHANICAL FASTENERS, OR ADHESIVE. APPLY WITH SUFFICIENT ADHESIVE TO ENSURE PERMANENT ADHESION AND SEAL WITH CLEAR LACQUER.

B. INSTALL PLASTIC PIPE MARKERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

C. INSTALL PLASTIC TAPE PIPE MARKERS COMPLETE AROUND PIPE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

D. USE TAGS ON PIPING 3/4 INCH DIAMETER AND SMALLER.

E. LOCATE CEILING TAGS TO LOCATE VALVES OR DAMPERS ABOVE LAY–IN PANEL CEILINGS. LOCATE IN CORNER OF PANEL CLOSEST TO EQUIPMENT.

END OF SECTION

SECTION 230529 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT (CONT.)

C. HANGER RODS: THREADED ZINC–PLATED STEEL UNLESS OTHERWISE INDICATED.

1. MINIMUM SIZE, UNLESS OTHERWISE INDICATED OR REQUIRED:

a. PIPING UP TO 1 INCH (27 MM) NOMINAL: 1/4 INCH DIAMETER.

b. PIPING LARGER THAN 1 INCH (27 MM) NOMINAL: 3/8 INCH DIAMETER.

c. TRAPEZE SUPPORT FOR MULTIPLE PIPES: 3/8 INCH DIAMETER.

D. THERMAL INSULATED PIPE SUPPORTS:

1. MANUFACTURERS:

a. BUCKAROOS, INC: WWW.BUCKAROOS.COM/#\$LE.

b. KB ENTERPRISES: WWW.SNAPPITZ.COM/#\$LE.

2. GENERAL CONSTRUCTION AND REQUIREMENTS:

a. INSULATED PIPE SUPPORTS TO BE PROVIDED AT HANGER, SUPPORT, AND GUIDE LOCATIONS ON PIPE REQUIRING INSULATION OR ADDITIONAL SUPPORT.

b. SURFACE BURNING CHARACTERISTICS: FLAME SPREAD INDEX/SMOKE DEVELOPED INDEX OF 5/30, MAXIMUM, WHEN TESTED IN ACCORDANCE WITH ASTM E84 OR UL 723.

c. PIPE SUPPORTS TO BE PROVIDED FOR NOMINALLY SIZED, 1/2 INCH TO 30 INCH IRON PIPES.

d. INSULATION INSERTS TO CONSIST OF RIGID POLYISOCYANURATE (URETHANE) INSULATION SURROUNDED BY A 360 DEGREE, PVC JACKETING.

3. PVC JACKET:

a. PIPE INSULATION PROTECTION SHIELDS TO BE PROVIDED WITH A BALL BEARING HINGE AND LOCKING SEAM.

b. MOISTURE VAPOR TRANSMISSION: 0.0071 PERM INCH, WHEN TESTED IN ACCORDANCE WITH ASTM E96/E96M.

c. THICKNESS: 60 MIL.

E. PIPE SUPPORTS:

1. LIQUID TEMPERATURES UP TO 122 DEGREES F:

a. OVERHEAD SUPPORT: MSS SP–58 TYPES 1, 3 THROUGH 12.

b. SUPPORT FROM BELOW: MSS SP–58 TYPES 35 THROUGH 38.

2. OPERATING TEMPERATURES FROM 122 TO 446 DEGREES F:

a. OVERHEAD SUPPORT: MSS SP–58 TYPE 1 OR 3 THROUGH 12, WITH APPROPRIATE SADDLE OF MSS SP–58 TYPE 40 FOR INSULATED PIPE.

F. RISER CLAMPS:

1. PROVIDE COPPER PLATED CLAMPS FOR COPPER TUBING SUPPORT.

2. FOR INSULATED PIPE RUNS, PROVIDE TWO BOLT–TYPE CLAMPS DESIGNED FOR INSTALLATION UNDER INSULATION.

G. STRUT CLAMPS: TWO–PIECE PIPE CLAMP.

H. INSULATION CLAMPS: TWO BOLT–TYPE CLAMPS DESIGNED FOR INSTALLATION UNDER INSULATION.

I. PIPE HANGERS: FOR A GIVEN PIPE RUN, USE HANGERS OF THE SAME TYPE AND MATERIAL.

1. MATERIAL: MALLEABLE IRON, ASTM A47/A47M, OR CARBON STEEL, ASTM A36/A36M.

2. PROVIDE COATED OR PLATED HANGERS TO ISOLATE STEEL HANGERS FROM DISSIMILAR METAL TUBE OR PIPE.

J. DIELECTRIC BARRIERS: PROVIDE BETWEEN METALLIC SUPPORTS AND METALLIC PIPING AND ASSOCIATED ITEMS OF DISSIMILAR TYPE; ACCEPTABLE DIELECTRIC BARRIERS INCLUDE RUBBER OR PLASTIC SHEETS OR COATINGS ATTACHED SECURELY TO PIPE OR ITEM.

K. ANCHORS AND FASTENERS:

1. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED, USE THE ANCHOR AND FASTENER TYPES INDICATED FOR THE SPECIFIED APPLICATIONS.

PART 3 EXECUTION

3.01 EXAMINATION

A. VERIFY THAT FIELD MEASUREMENTS ARE AS INDICATED.

B. VERIFY THAT MOUNTING SURFACES ARE READY TO RECEIVE SUPPORT AND ATTACHMENT COMPONENTS.

C. VERIFY THAT CONDITIONS ARE SATISFACTORY FOR INSTALLATION PRIOR TO STARTING WORK.

3.02 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. INSTALL ANCHORS AND FASTENERS IN ACCORDANCE WITH ICC EVALUATION SERVICES, LLC (CC–ES) EVALUATION REPORT CONDITIONS OF USE WHERE APPLICABLE.

C. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, CONDUIT, OR OTHER SYSTEMS.

D. UNLESS SPECIFICALLY INDICATED OR APPROVED BY ARCHITECT, DO NOT PROVIDE SUPPORT FROM SUSPENDED CEILING SUPPORT SYSTEM OR CEILING GRID.

E. UNLESS SPECIFICALLY INDICATED OR APPROVED BY ARCHITECT, DO NOT PROVIDE SUPPORT FROM ROOF DECK.

F. DO NOT PENETRATE OR OTHERWISE NOTCH OR CUT STRUCTURAL MEMBERS WITHOUT APPROVAL OF STRUCTURAL ENGINEER.

G. PROVIDE THERMAL INSULATED PIPE SUPPORTS COMPLETE WITH HANGERS AND ACCESSORIES. INSTALL THERMAL INSULATED PIPE SUPPORTS DURING THE INSTALLATION OF THE PIPING SYSTEM.

H. EQUIPMENT SUPPORT AND ATTACHMENT:

1. USE METAL FABRICATED SUPPORTS OR SUPPORTS ASSEMBLED FROM METAL CHANNEL (STRUT) TO SUPPORT EQUIPMENT AS REQUIRED.

2. USE METAL CHANNEL (STRUT) SECURED TO STUDS TO SUPPORT EQUIPMENT SURFACE MOUNTED ON HOLLOW STUD WALLS WHEN WALL STRENGTH IS NOT SUFFICIENT TO RESIST PULL–OUT.

3. USE METAL CHANNEL (STRUT) TO SUPPORT SURFACE–MOUNTED EQUIPMENT IN WET OR DAMP LOCATIONS TO PROVIDE SPACE BETWEEN EQUIPMENT AND MOUNTING SURFACE.

4. SECURELY FASTEN FLOOR–MOUNTED EQUIPMENT. DO NOT INSTALL EQUIPMENT SUCH THAT IT RELIES ON ITS OWN WEIGHT FOR SUPPORT.

I. SECURE FASTENERS ACCORDING TO MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.

J. REMOVE TEMPORARY SUPPORTS.

3.03 FIELD QUALITY CONTROL

A. INSPECT SUPPORT AND ATTACHMENT COMPONENTS FOR DAMAGE AND DEFECTS.

B. REPAIR CUTS AND ABRASIONS IN GALVANIZED FINISHES USING ZINC–RICH PAINT RECOMMENDED BY MANUFACTURER. REPLACE COMPONENTS THAT EXHIBIT SIGNS OF CORROSION.

C. CORRECT DEFICIENCIES AND REPLACE DAMAGED OR DEFECTIVE SUPPORT AND ATTACHMENT COMPONENTS.

END OF SECTION

SECTION 230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM D709 – STANDARD SPECIFICATION FOR LAMINATED THERMOSETTING MATERIALS 2017.

1.02 SUBMITTALS

A. LIST: SUBMIT LIST OF WORDING, SYMBOLS, LETTER SIZE, AND COLOR CODING FOR MECHANICAL IDENTIFICATION.

B. CHART AND SCHEDULE: SUBMIT VALVE CHART AND SCHEDULE, INCLUDING VALVE TAG NUMBER, LOCATION, FUNCTION, AND VALVE MANUFACTURER'S NAME AND MODEL NUMBER.

C. PRODUCT DATA: PROVIDE MANUFACTURERS CATALOG LITERATURE FOR EACH PRODUCT REQUIRED.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. CRA TYPES: NAMEPLATES.

B. PIPING: PIPE MARKERS.

2.02 NAMEPLATES

A. MANUFACTURERS:

1. ADVANCED GRAPHIC ENGRAVING, LLO: WWW.ADVANCEDGRAPHICENGRAVING.COM/#\$LE.

2. BRIMAR INDUSTRIES, INC: WWW.PIPEMARKER.COM/#\$LE.

3. CRAFTMARK PIPE MARKERS: WWW.CRAFTMARKID.COM/#\$LE.

4. KOLBI PIPE MARKER CO: WWW.KOLBIPIPEMARKERS.COM/#\$LE.

5. SETON IDENTIFICATION PRODUCTS, A TRICOR DIRECT COMPANY: WWW.SETON.COM/#\$LE.

B. LETTER COLOR: WHITE.

C. LETTER HEIGHT: 1/4 INCH.

D. BACKGROUND COLOR: BLACK.

E. PLASTIC: COMPLY WITH ASTM D709.

2.03 TAGS

A. MANUFACTURERS:

1. ADVANCED GRAPHIC ENGRAVING: WWW.ADVANCEDGRAPHICENGRAVING.COM/#\$LE.

2. BRADY CORPORATION: WWW.BRADYCORP.COM/#\$LE.

3. BRIMAR INDUSTRIES, INC: WWW.PIPEMARKER.COM/#\$LE.

4. CRAFTMARK PIPE MARKERS: WWW.CRAFTMARKID.COM/#\$LE.

5. KOLBI PIPE MARKER CO: WWW.KOLBIPIPEMARKERS.COM/#\$LE.

B. PLASTIC TAGS: LAMINATED THREE–LAYER PLASTIC WITH ENGRAVED BLACK LETTERS ON LIGHT CONTRASTING BACKGROUND COLOR. TAG SIZE MINIMUM 1–1/2 INCH DIAMETER.

C. METAL TAGS: BRASS WITH STAMPED LETTERS; TAG SIZE MINIMUM 1–1/2 INCH DIAMETER WITH SMOOTH EDGES.

D. VALVE TAG CHART: TYPEWRITTEN LETTER SIZE LIST IN ANODIZED ALUMINUM FRAME.

2.04 PIPE MARKERS

A. MANUFACTURERS:

1. BRADY CORPORATION: WWW.BRADYCORP.COM/#\$LE.

2. BRIMAR INDUSTRIES, INC: WWW.PIPEMARKER.COM/#\$LE.

3. CRAFTMARK PIPE MARKERS: WWW.CRAFTMARKID.COM/#\$LE.

4. KOLBI PIPE MARKER CO: WWW.KOLBIPIPEMARKERS.COM/#\$LE.

5. SETON IDENTIFICATION PRODUCTS, A TRICOR COMPANY: WWW.SETON.COM/#\$LE.

B. COLOR: COMPLY WITH ASME A13.1.

C. PLASTIC PIPE MARKERS: FACTORY FABRICATED, FLEXIBLE, SEMI– RIGID PLASTIC, PREFORMED TO FIT AROUND PIPE OR PIPE COVERING; MINIMUM THICKNESS 0.005 INCHES.

D. PLASTIC TAPE PIPE MARKERS: FLEXIBLE, VINYL FILM TAPE WITH PRESSURE SENSITIVE ADHESIVE BACKING AND PRINTED MARKINGS.

2.05 CILING TAGS

A. MANUFACTURERS:

1. CRAFTMARK PIPE MARKERS: WWW.CRAFTMARKID.COM/#\$LE.

B. DESCRIPTION: STEEL WITH 3/4 INCH DIAMETER COLOR CODED HEAD.

C. COLOR CODE AS FOLLOWS:

1. HEATING/COOLING VALVES: BLUE.

PART 3 EXECUTION

3.01 PREPARATION

A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.

3.02 INSTALLATION

A. INSTALL NAMEPLATES WITH CORROSIVE–RESISTANT MECHANICAL FASTENERS, OR ADHESIVE. APPLY WITH SUFFICIENT ADHESIVE TO ENSURE PERMANENT ADHESION AND SEAL WITH CLEAR LACQUER.

B. INSTALL PLASTIC PIPE MARKERS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

C. INSTALL PLASTIC TAPE PIPE MARKERS COMPLETE AROUND PIPE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

D. USE TAGS ON PIPING 3/4 INCH DIAMETER AND SMALLER.

E. LOCATE CEILING TAGS TO LOCATE VALVES OR DAMPERS ABOVE LAY–IN PANEL CEILINGS. LOCATE IN CORNER OF PANEL CLOSEST TO EQUIPMENT.

END OF SECTION

PART 3 EXECUTION

3.01 PREPARATION

A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.

3.02 INSTALLATION

A. INSTALL NAMEPLATES WITH CORROSIVE–RESISTANT MECHANICAL FASTENERS, OR ADHESIVE. APPLY WITH SUFFICIENT ADHESIVE TO ENSURE PERMANENT ADHESION AND SEAL WITH CLEAR LACQUER.

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END OF SECTION

PART 3 EXECUTION

3.01 PREPARATION

A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.

3.02 INSTALLATION

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END OF SECTION

PART 3 EXECUTION

3.01 PREPARATION

A. DEGREASE AND CLEAN SURFACES TO RECEIVE ADHESIVE FOR IDENTIFICATION MATERIALS.

3.02 INSTALLATION

A. INSTALL NAMEPLATES WITH CORROSIVE–RESISTANT MECHANICAL FASTENERS, OR ADHESIVE. APPLY WITH SUFFICIENT ADHESIVE TO ENSURE PERMANENT ADHESION AND SEAL WITH CLEAR LACQUER.

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D. USE TAGS ON PIPING 3/4 INCH DIAMETER AND SMALLER.

E. LOCATE CEILING TAGS TO LOCATE VALVES OR DAMPERS ABOVE LAY–IN PANEL CEILINGS. LOCATE IN CORNER OF PANEL CLOSEST TO EQUIPMENT.

END OF SECTION

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

1.02 REFERENCE STANDARDS

A. ASHRAE STD 111 – MEASUREMENT, TESTING, ADJUSTING, AND BALANCING OF BUILDING HVAC SYSTEMS 2008, WITH ERRATA (2019).

1.03 SUBMITTALS

A. TAB PLAN: SUBMIT A WRITTEN PLAN INDICATING THE TESTING, ADJUSTING, AND BALANCING STANDARD TO BE FOLLOWED AND THE SPECIFIC APPROACH FOR EACH SYSTEM AND COMPONENT.

1. INCLUDE AT LEAST THE FOLLOWING IN THE PLAN:

a. LIST OF ALL AIR FLOW, WATER FLOW, SOUND LEVEL, SYSTEM CAPACITY AND EFFICIENCY MEASUREMENTS TO BE PERFORMED AND A DESCRIPTION OF SPECIFIC TEST PROCEDURES, PARAMETERS, FORMULAS TO BE USED.

b. COPY OF FIELD CHECKOUT SHEETS AND LOGS TO BE USED, LISTING EACH PIECE OF EQUIPMENT TO BE TESTED, ADJUSTED AND BALANCED WITH THE DATA CELLS TO BE GATHERED FOR EACH.

c. DISCUSSION OF WHAT NOTATIONS AND MARKINGS WILL BE MADE ON THE DUCT AND PIPING DRAWINGS DURING THE PROCESS.

d. FINAL TEST REPORT FORMS TO BE USED.

e. PROCEDURES FOR FORMAL DEFICIENCY REPORTS, INCLUDING SCOPE, FREQUENCY AND DISTRIBUTION.

f. FINAL REPORT: INDICATE DEFICIENCIES IN SYSTEMS THAT WOULD PREVENT PROPER TESTING, ADJUSTING, AND BALANCING OF SYSTEMS AND EQUIPMENT TO ACHIEVE SPECIFIED PERFORMANCE.

2. REVISIT TAB PLAN TO REFLECT ACTUAL PROCEDURES AND SUBMIT AS PART OF FINAL REPORT.

3. SUBMIT DRAFT COPIES OF REPORT FOR REVIEW PRIOR TO FINAL ACCEPTANCE OF PROJECT. PROVIDE FINAL COPIES FOR ARCHITECT AND FOR INCLUSION IN OPERATING AND MAINTENANCE MANUALS.

3. INCLUDE ACTUAL INSTRUMENT LIST, WITH MANUFACTURER NAME, SERIAL NUMBER, AND DATE OF CALIBRATION.

4. FORM OF TEST REPORTS: WHERE THE TAB STANDARD BEING FOLLOWED RECOMMENDS A REPORT FORMAT USE THAT; OTHERWISE, FOLLOW ASHRAE STD 111.

5. UNITS OF MEASURE: REPORT DATA IN BOTH I–P (INCH–POUND) AND SI (METRIC) UNITS.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. PERFORM TOTAL SYSTEM BALANCE IN ACCORDANCE WITH ONE OF THE FOLLOWING:

B. BEGIN WORK AFTER COMPLETION OF SYSTEMS TO BE TESTED, ADJUSTED, OR BALANCED AND COMPLETE WORK PRIOR TO SUBSTANTIAL COMPLETION OF THE PROJECT.

C. TAB AGENCY QUALIFICATIONS:

1. COMPANY SPECIALIZING IN THE TESTING, ADJUSTING, AND BALANCING OF SYSTEMS SPECIFIED IN THIS SECTION.

2. HAVING MINIMUM OF THREE YEARS DOCUMENTED EXPERIENCE.

3.02 EXAMINATION

A. VERIFY THAT SYSTEMS ARE COMPLETE AND OPERABLE BEFORE COMMENCING WORK. ENSURE THE FOLLOWING CONDITIONS:

1. SYSTEMS ARE STARTED AND OPERATING IN A SAFE AND NORMAL CONDITION.

2. TEMPERATURE CONTROL SYSTEMS ARE INSTALLED COMPLETE AND OPERABLE.

3. FANS ARE ROTATING CORRECTLY.

3.03 AIR SYSTEM PROCEDURE

A. ADJUST AIR HANDLING AND DISTRIBUTION SYSTEMS TO PROVIDE REQUIRED OR DESIGN SUPPLY, RETURN, AND EXHAUST AIR QUANTITIES AT SITE ALTITUDE.

B. MEASURE AIR QUANTITIES AT AIR INLETS AND OUTLETS.

C. MEASURE STATIC AIR PRESSURE CONDITIONS ON AIR SUPPLY UNITS, INCLUDING FILTER AND COIL PRESSURE DROPS, AND TOTAL PRESSURE ACROSS THE FAN. MAKE ALLOWANCES FOR 50 PERCENT LOADING OF FILTERS.

3.04 SCOPE

A. TEST, ADJUST, AND BALANCE THE FOLLOWING:

1. COMPUTER ROOM AIR CONDITIONING UNITS.

3.05 MINIMUM DATA TO BE REPORTED

A. ELECTRIC MOTORS:

1. MANUFACTURER.

2. MODEL/FRAME.

3. HP/BHP.

4. PHASE, VOLTAGE, AMPERAGE, NAMEPLATE, ACTUAL, NO. LOAD.

5. RPM.

6. SERVICE FACTOR.

7. STARTER SIZE, RATING, HEATER ELEMENTS.

8. SHEAVE MAKE/SIZE/BORE.

B. V–BELT DRIVES:

1. IDENTIFICATION/LOCATION.

2. REQUIRED DRIVEN RPM.

3. DRIVEN SHEAVE, DIAMETER AND RPM.

4. BELT, SIZE AND QUANTITY.

5. MOTOR SHEAVE DIAMETER AND RPM.

6. CENTER TO CENTER DISTANCE, MAXIMUM, MINIMUM, AND ACTUAL.

C. AIR COOLED CONDENSERS:

1. IDENTIFICATION/NUMBER.

2. LOCATION.

3. MANUFACTURER.

4. MODEL NUMBER.

5. SERIAL NUMBER.

6. ENTERING DB AIR TEMPERATURE, DESIGN AND ACTUAL.

7. LEAVING DB AIR TEMPERATURE, DESIGN AND ACTUAL.

8. NUMBER OF COMPRESSORS.

D. AIR MOVING EQUIPMENT:

1. LOCATION.

2. MANUFACTURER.

3. MODEL NUMBER.

4. SERIAL NUMBER.

5. ARRANGEMENT/CLASS/DISCHARGE.

6. AIR FLOW, CAPACITY, OR DISCHARGE RATE.

7. RETURN AIR FLOW, SPECIFIED AND ACTUAL.

8. TOTAL STATIC PRESSURE (TOTAL EXTERNAL), SPECIFIED AND ACTUAL.

9. INLET PRESSURE.

10. DISCHARGE PRESSURE.

11. SHEAVE MAKE/SIZE/BORE.

12. NUMBER OF BELTS/MAKE/SIZE.

13. FAN RPM.

END OF SECTION

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. PERFORM TOTAL SYSTEM BALANCE IN ACCORDANCE WITH ONE OF THE FOLLOWING:

B. BEGIN WORK AFTER COMPLETION OF SYSTEMS TO BE TESTED, ADJUSTED, OR BALANCED AND COMPLETE WORK PRIOR TO SUBSTANTIAL COMPLETION OF THE PROJECT.

C. TAB AGENCY QUALIFICATIONS:

1. COMPANY SPECIALIZING IN THE TESTING, ADJUSTING, AND BALANCING OF SYSTEMS SPECIFIED IN THIS SECTION.

2. HAVING MINIMUM OF THREE YEARS DOCUMENTED EXPERIENCE.

3.02 EXAMINATION

A. VERIFY THAT SYSTEMS ARE COMPLETE AND OPERABLE BEFORE COMMENCING WORK. ENSURE THE FOLLOWING CONDITIONS:

1. SYSTEMS ARE STARTED AND OPERATING IN A SAFE AND NORMAL CONDITION.

2. TEMPERATURE CONTROL SYSTEMS ARE INSTALLED COMPLETE AND OPERABLE.

3. FANS ARE ROTATING CORRECTLY.

3.03 AIR SYSTEM PROCEDURE

A. ADJUST AIR HANDLING AND DISTRIBUTION SYSTEMS TO PROVIDE REQUIRED OR DESIGN SUPPLY, RETURN, AND EXHAUST AIR QUANTITIES AT SITE ALTITUDE.

B. MEASURE AIR QUANTITIES AT AIR INLETS AND OUTLETS.

C. MEASURE STATIC AIR PRESSURE CONDITIONS ON AIR SUPPLY UNITS, INCLUDING FILTER AND COIL PRESSURE DROPS, AND TOTAL PRESSURE ACROSS THE FAN. MAKE ALLOWANCES FOR 50 PERCENT LOADING OF FILTERS.

3.04 SCOPE

A. TEST, ADJUST, AND BALANCE THE FOLLOWING:

1. COMPUTER ROOM AIR CONDITIONING UNITS.

3.05 MINIMUM DATA TO BE REPORTED

A. ELECTRIC MOTORS:

1. MANUFACTURER.

2. MODEL/FRAME.

3. HP/BHP.

4. PHASE, VOLTAGE, AMPERAGE, NAMEPLATE, ACTUAL, NO. LOAD.

5. RPM.

6. SERVICE FACTOR.

7. STARTER SIZE, RATING, HEATER ELEMENTS.

8. SHEAVE MAKE/SIZE/BORE.

B. V–BELT DRIVES:

1. IDENTIFICATION/LOCATION.

2. REQUIRED DRIVEN RPM.

3. DRIVEN SHEAVE, DIAMETER AND RPM.

4. BELT, SIZE AND QUANTITY.

5. MOTOR SHEAVE DIAMETER AND RPM.

6. CENTER TO CENTER DISTANCE, MAXIMUM, MINIMUM, AND ACTUAL.

C. AIR COOLED CONDENSERS:

1. IDENTIFICATION/NUMBER.

2. LOCATION.

3. MANUFACTURER.

4. MODEL NUMBER.

5. SERIAL NUMBER.

6. ENTERING DB AIR TEMPERATURE, DESIGN AND ACTUAL.

7. LEAVING DB AIR TEMPERATURE, DESIGN AND ACTUAL.

8. NUMBER OF COMPRESSORS.

D. AIR MOVING EQUIPMENT:

1. LOCATION.

2. MANUFACTURER.

3. MODEL NUMBER.

4. SERIAL NUMBER.

5. ARRANGEMENT/CLASS/DISCHARGE.

6. AIR FLOW, CAPACITY, OR DISCHARGE RATE.

7. RETURN AIR FLOW, SPECIFIED AND ACTUAL.

8. TOTAL STATIC PRESSURE (TOTAL EXTERNAL), SPECIFIED AND ACTUAL.

9. INLET PRESSURE.

10. DISCHARGE PRESSURE.

11. SHEAVE MAKE/SIZE/BORE.

12. NUMBER OF BELTS/MAKE/SIZE.

13. FAN RPM.

END OF SECTION

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. PERFORM TOTAL SYSTEM BALANCE IN ACCORDANCE WITH ONE OF THE FOLLOWING:

B. BEGIN WORK AFTER COMPLETION OF SYSTEMS TO BE TESTED, ADJUSTED, OR BALANCED AND COMPLETE WORK PRIOR TO SUBSTANTIAL COMPLETION OF THE PROJECT.

C. TAB AGENCY QUALIFICATIONS:

1. COMPANY SPECIALIZING IN THE TESTING, ADJUSTING, AND BALANCING OF SYSTEMS SPECIFIED IN THIS SECTION.

2. HAVING MINIMUM OF THREE YEARS DOCUMENTED EXPERIENCE.

3.02 EXAMINATION

A. VERIFY THAT SYSTEMS ARE COMPLETE AND OPERABLE BEFORE COMMENCING WORK. ENSURE THE FOLLOWING CONDITIONS:

1. SYSTEMS ARE STARTED AND OPERATING IN A SAFE AND NORMAL CONDITION.

2. TEMPERATURE CONTROL SYSTEMS ARE INSTALLED COMPLETE AND OPERABLE.

3. FANS ARE ROTATING CORRECTLY.

3.03 AIR SYSTEM PROCEDURE

A. ADJUST AIR HANDLING AND DISTRIBUTION SYSTEMS TO PROVIDE REQUIRED OR DESIGN SUPPLY, RETURN, AND EXHAUST AIR QUANTITIES AT SITE ALTITUDE.

B. MEASURE AIR QUANTITIES AT AIR INLETS AND OUTLETS.

C. MEASURE STATIC AIR PRESSURE CONDITIONS ON AIR SUPPLY UNITS, INCLUDING FILTER AND COIL PRESSURE DROPS, AND TOTAL PRESSURE ACROSS THE FAN. MAKE ALLOWANCES FOR 50 PERCENT LOADING OF FILTERS.

3.04 SCOPE

A. TEST, ADJUST, AND BALANCE THE FOLLOWING:

1. COMPUTER ROOM AIR CONDITIONING UNITS.

3.05 MINIMUM DATA TO BE REPORTED

A. ELECTRIC MOTORS:

1. MANUFACTURER.

2. MODEL/FRAME.

3. HP/BHP.

4. PHASE, VOLTAGE, AMPERAGE, NAMEPLATE, ACTUAL, NO. LOAD.

5. RPM.

6. SERVICE FACTOR.

7. STARTER SIZE, RATING, HEATER ELEMENTS.

8. SHEAVE MAKE/SIZE/BORE.

B. V–BELT DRIVES:

1. IDENTIFICATION/LOCATION.

2. REQUIRED DRIVEN RPM.

3. DRIVEN SHEAVE, DIAMETER AND RPM.

4. BELT, SIZE AND QUANTITY.

5. MOTOR SHEAVE DIAMETER AND RPM.

6. CENTER TO CENTER DISTANCE, MAXIMUM, MINIMUM, AND ACTUAL.

C. AIR COOLED CONDENSERS:

1. IDENTIFICATION/NUMBER.

2. LOCATION.

3. MANUFACTURER.

4. MODEL NUMBER.

5. SERIAL NUMBER.

6. ENTERING DB AIR TEMPERATURE, DESIGN AND ACTUAL.

7. LEAVING DB AIR TEMPERATURE, DESIGN AND ACTUAL.

8. NUMBER OF COMPRESSORS.

D. AIR MOVING EQUIPMENT:

1. LOCATION.

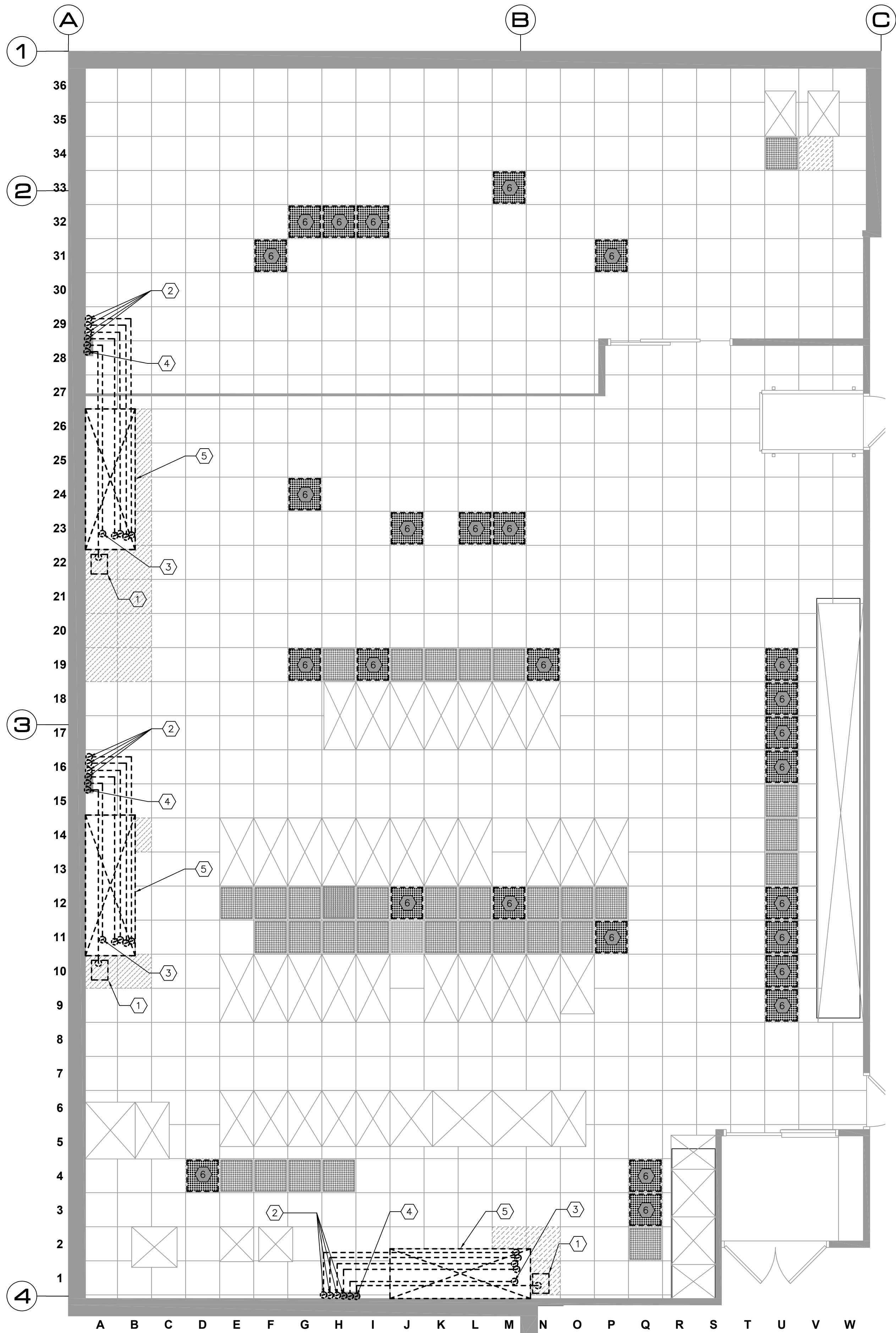
2. MANUFACTURER.

3. MODEL NUMBER.

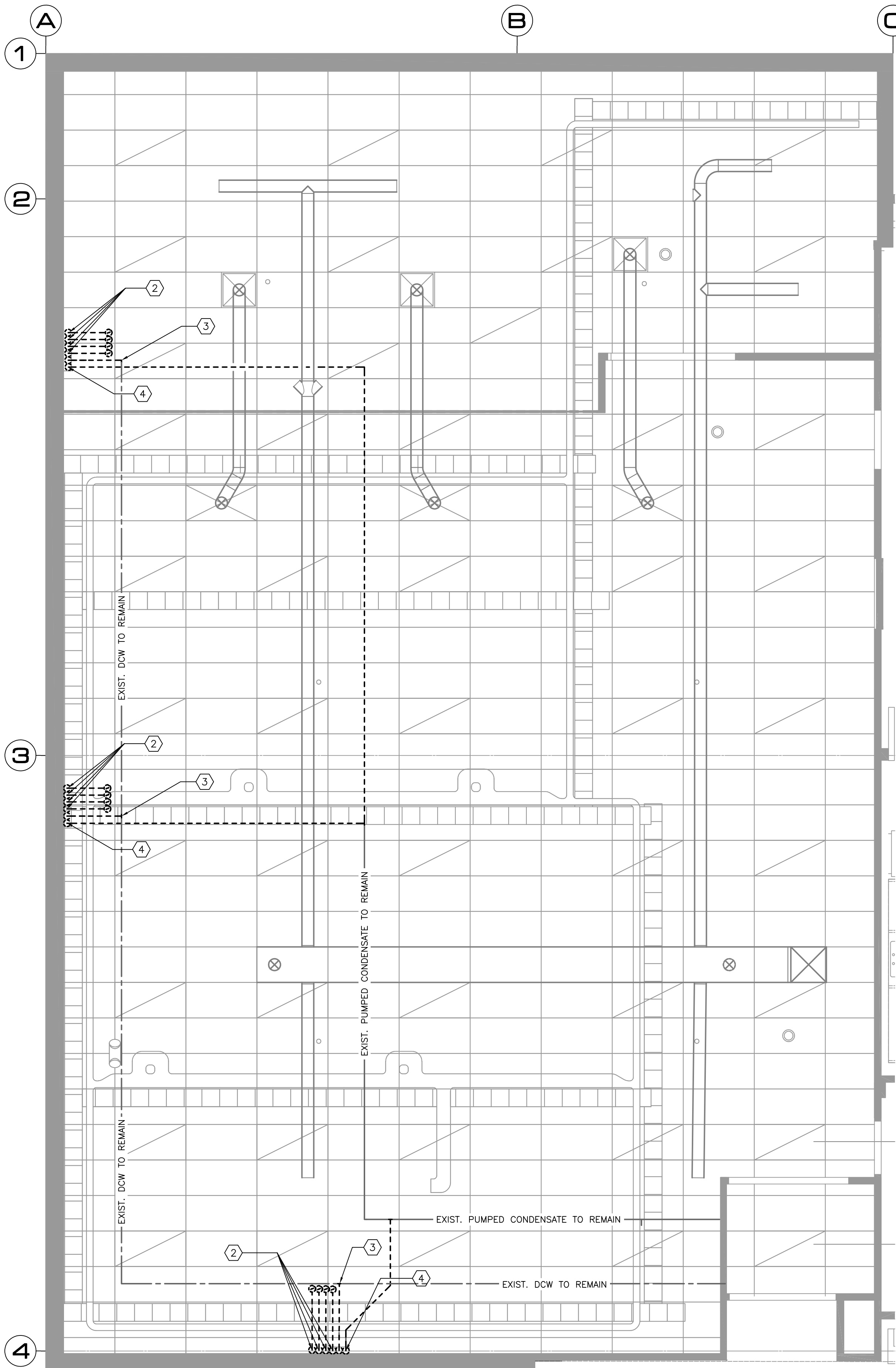
4. SERIAL NUMBER.

5. ARRANGEMENT/CLASS/DISCHARGE.

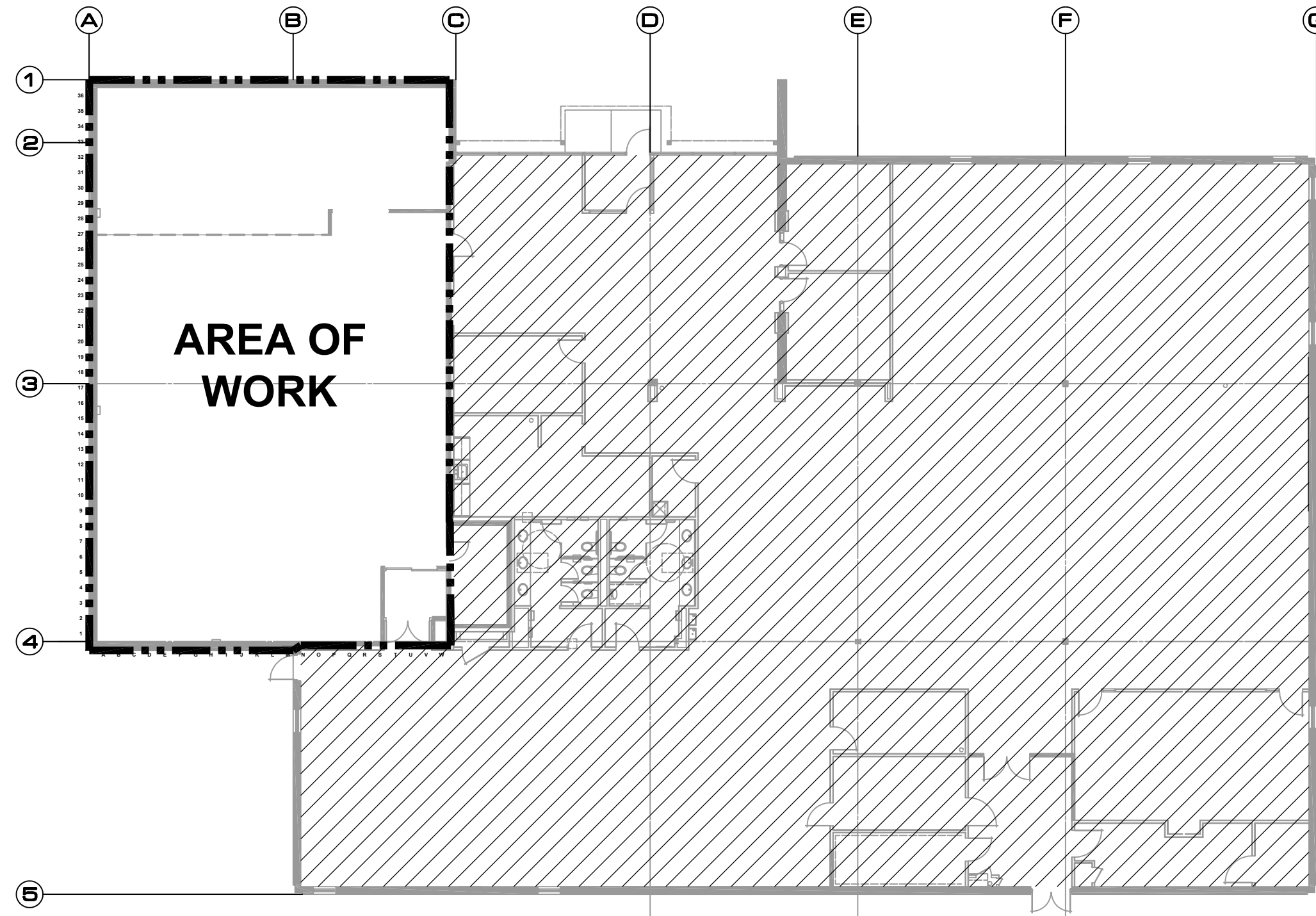
6.



2 MECHANICAL REMOVALS FLOOR PLAN
MD1.1 SCALE: 1/4" = 1'-0"



3 MECHANICAL REMOVALS REFLECTED CEILING PLAN
MD1.1 SCALE: 1/4" = 1'-0"



1 KEY PLAN
MD1.1 SCALE: 1/16" = 1'-0"

- CODED NOTES:**
- 1 EXISTING PUMPED CONDENSATE RESERVOIR TO BE REMOVED.
 - 2 EXISTING REFRIGERANT PIPING TO BE REMOVED AS SHOWN.
 - 3 EXISTING DCW PIPING TO BE REMOVED AS SHOWN.
 - 4 EXISTING PUMPED CONDENSATE PIPING TO BE REMOVED AS SHOWN.
 - 5 EXISTING CRAC UNIT TO BE REMOVED AS SHOWN.
 - 6 EXISTING PERFORATED FLOOR TILE TO BE REMOVED AS SHOWN. SEE NEW WORK PLAN FOR DETAILS ON REPLACEMENT (POWER FAN TRAY FLOOR TILE OR SOLID FLOOR TILE).

UNIFORM CODE STATEMENT:
TO THE BEST OF THE REGISTERED DESIGN PROFESSIONAL'S KNOWLEDGE, BELIEF, AND OPINION, THIS DOCUMENT COMPLIES WITH ALL CITY, STATE, AND FEDERAL REQUIREMENTS AND/OR SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 ENERGY CODE.

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NYSIF CRAC UNIT REPLACEMENT
8 COMPUTER DRIVE WEST
ALBANY, NY

MD1.1

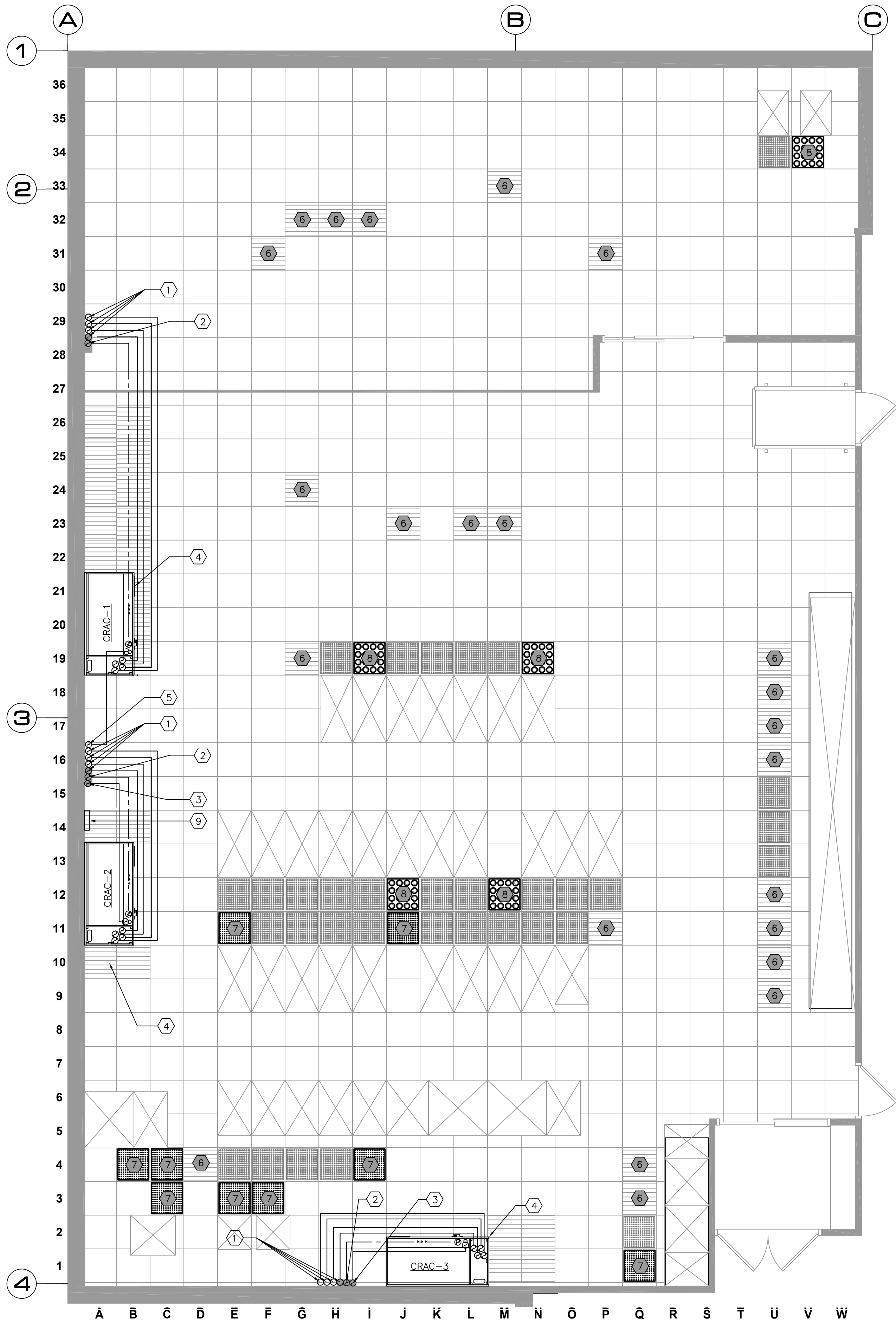
SCALE: AS NOTED

REVISION	REVISION DESCRIPTION	DATE

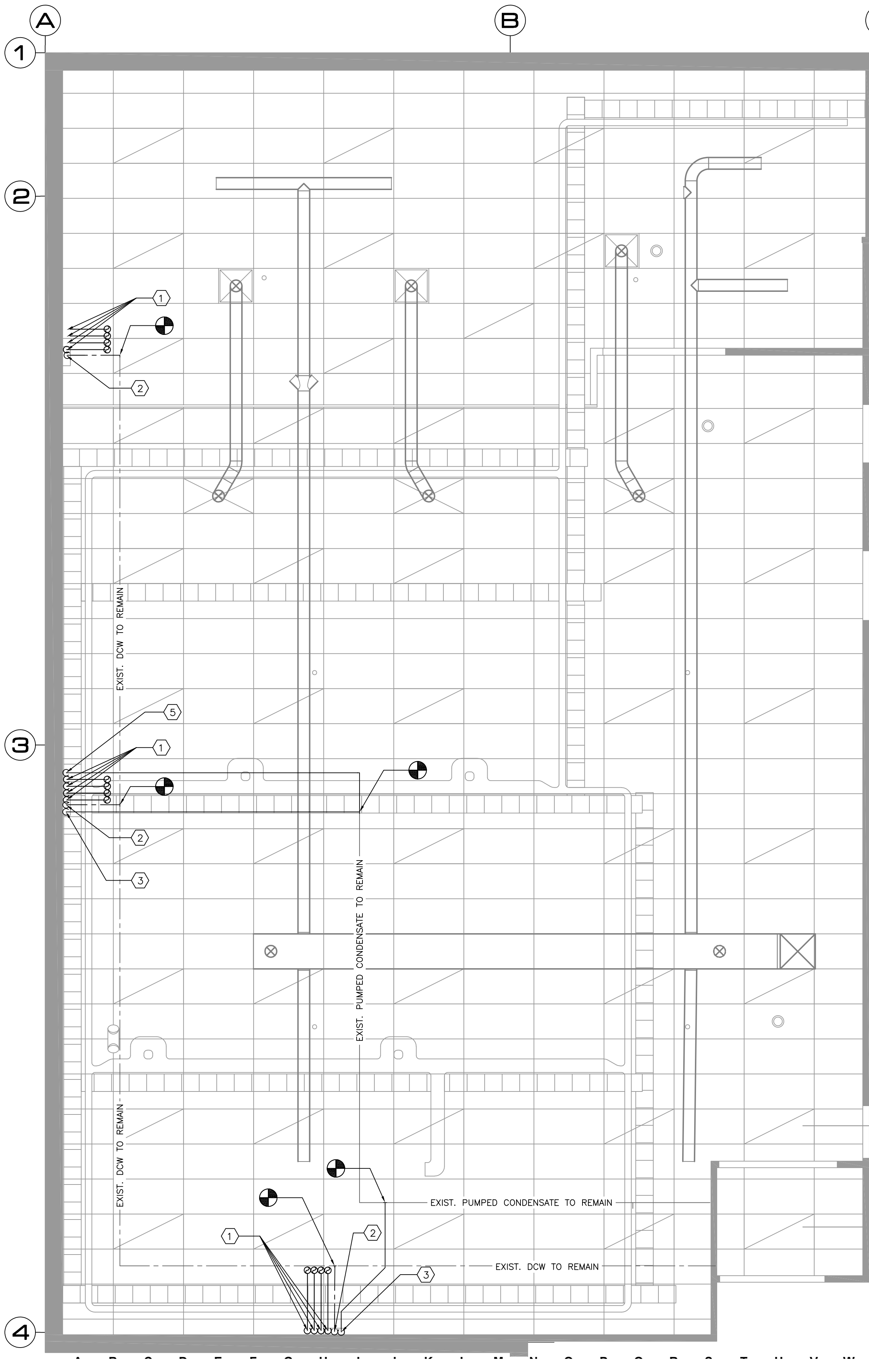
Quantum Engineering Co., P.C.
48 THATCHER ST. SELKIRK, NEW YORK 12158
TEL: 518-767-9450 FAX 518-767-9442
Q&P PROJECT: 2428 DRAWN BY: ARW
FILE: BC CHECKED BY: ARW

**MECHANICAL
REMOVALS
FLOOR PLANS**

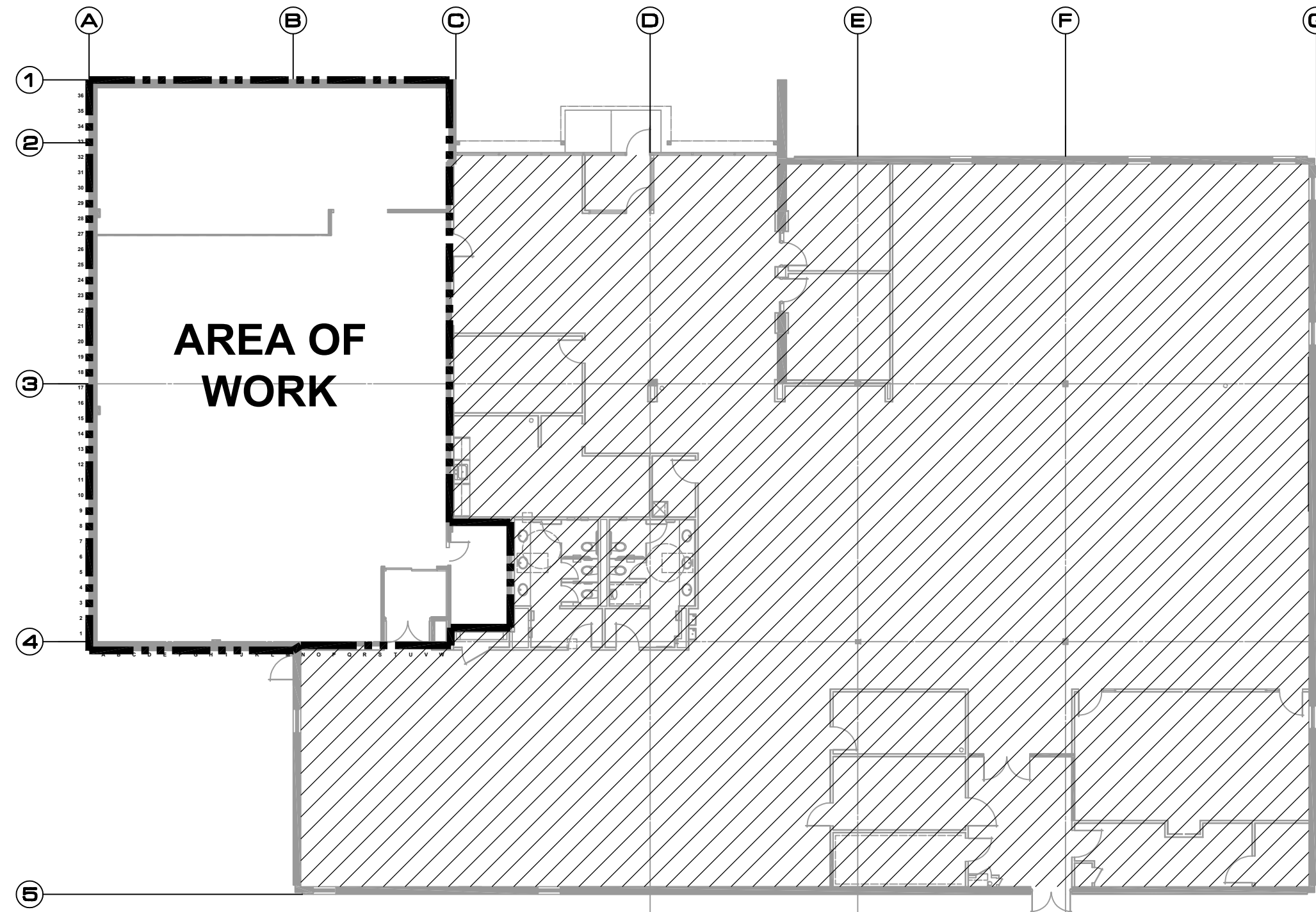
MD1.1



2 NEW WORK FLOOR PLAN
M1.1 SCALE: 1/4" = 1'-0"



3 NEW WORK REFLECTED CEILING PLAN
M1.1 SCALE: 1/4" = 1'-0"



1 KEY PLAN
M1.1 SCALE: 1/16" = 1'-0"

CODED NOTES:

- NEW REFRIGERANT PIPING TO BE RUN AS SHOWN. HOT GAS LINE TO BE SIZED AT 7/8" & LIQUID LINE TO BE SIZED AT 5/8". BOTH LINES SHALL BE INSULATED (DOWNSIZE VERTICAL RISERS ONE TRADE SIZE).
- NEW DCW FOR CRAC UNIT HUMIDIFIER TO BE RUN AS SHOWN (DCW TO BE SIZED AT 1/2" OD CU).
- NEW PUMPED CONDENSATE PIPING TO BE RUN AS SHOWN (PUMPED CONDENSATE PIPING TO BE SIZED AT 1/2" OD CU).
- NEW LIEBERT DS DOWNFLOW 35KW (10 TON) MODEL W/ DIGITAL SCROLL COMPRESSORS TO BE PLACED AS SHOWN.
- PUMPED CONDENSATE LINE FOR CRAC-1 TO FOLLOW NEW SHORTENED PATH (PUMPED CONDENSATE PIPING TO BE SIZED AT 1/2" OD CU).
- EXISTING PERFORATED FLOOR TILE TO BE REPLACED WITH NEW SOLID FLOOR TILE TO MATCH EXISTING.
- EXISTING SOLID FLOOR TILE TO BE REPLACED WITH PERFORATED FLOOR TILE TO MATCH EXISTING.
- EXISTING FLOOR TILE (SOLID OR PERFORATED) TO BE REPLACED WITH NEW FAN ASSISTED PERFORATED FLOOR TILE. PROVIDE DEGREE CONTROLS HOTSPOTR MODEL HT-510-24T WITH PERF TILE ATTACHED HAVING (2) TEMPERATURE SENSORS, AND NEMA 5-15P PLUG. INSTALL TEMP SENSORS AT FRONT DOORS OF IT CABINETS. ONE (1) SENSOR SHALL BE ONE-THIRD UP THE DOOR, AND ONE (1) SENSOR SHALL BE TWO-THIRDS UP THE DOOR.
- PROVIDE WALL MOUNTED NETWORK SWITCH/CONTROLLER FOR CRAC COMMUNICATIONS AND TEAMWORK ASSIST.

UNIFORM CODE STATEMENT:
TO THE BEST OF THE REGISTERED DESIGN PROFESSIONAL'S KNOWLEDGE, BELIEF, AND OPINION, THE DESIGN AND CONSTRUCTION OF THE PROJECT AND/OR SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 UNIFORM CODE.

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NYSIF CRAC UNIT REPLACEMENT
8 COMPUTER DRIVE WEST
ALBANY, NY

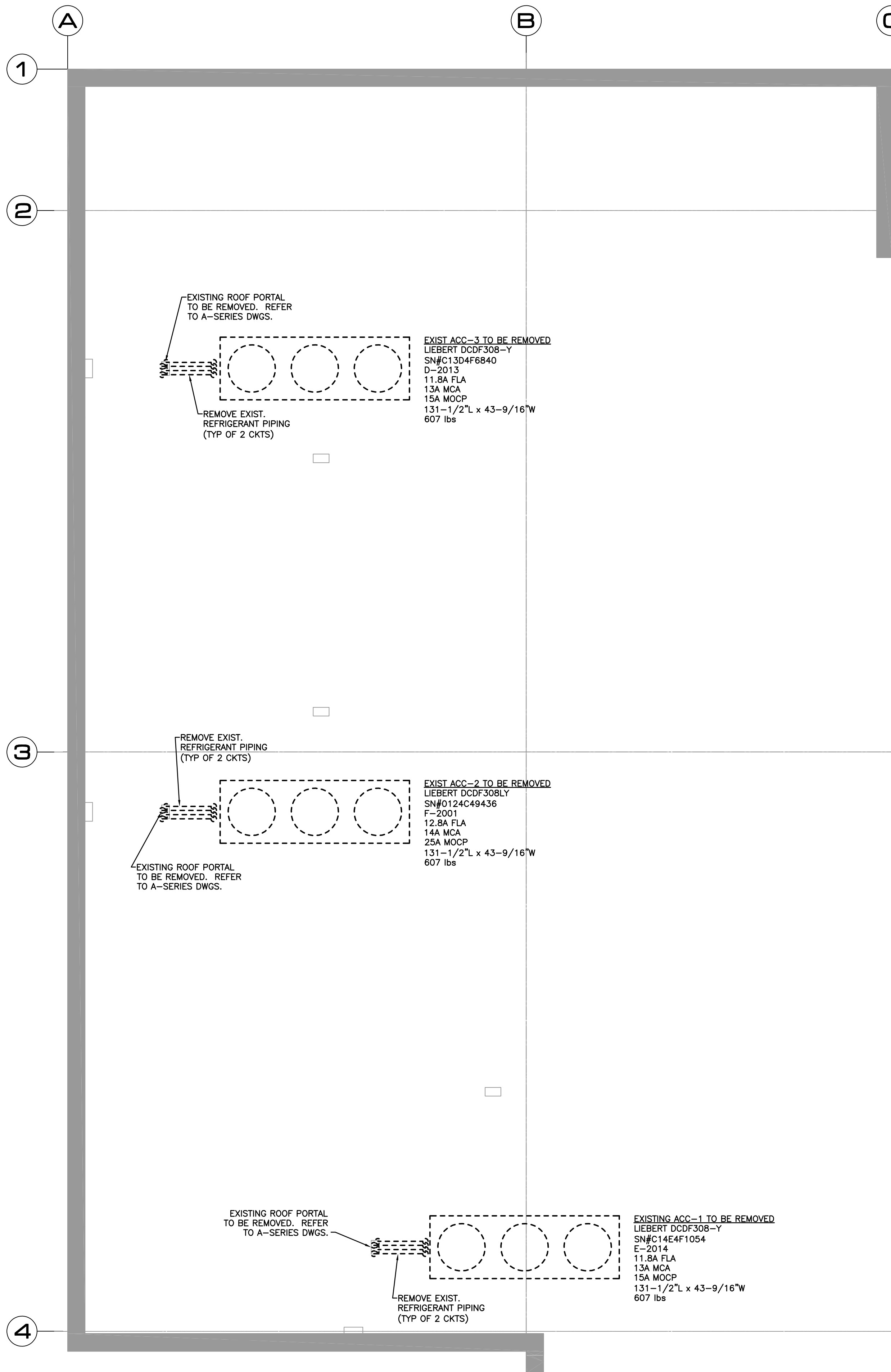
SCALE: AS NOTED

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48 THATCHER ST. SELKIRK, NEW YORK 12158
TEL: 518-767-9450 FAX 518-767-9442
Q&P PROJECT: SUBS FILE: DRAWN BY: CHECKED BY:

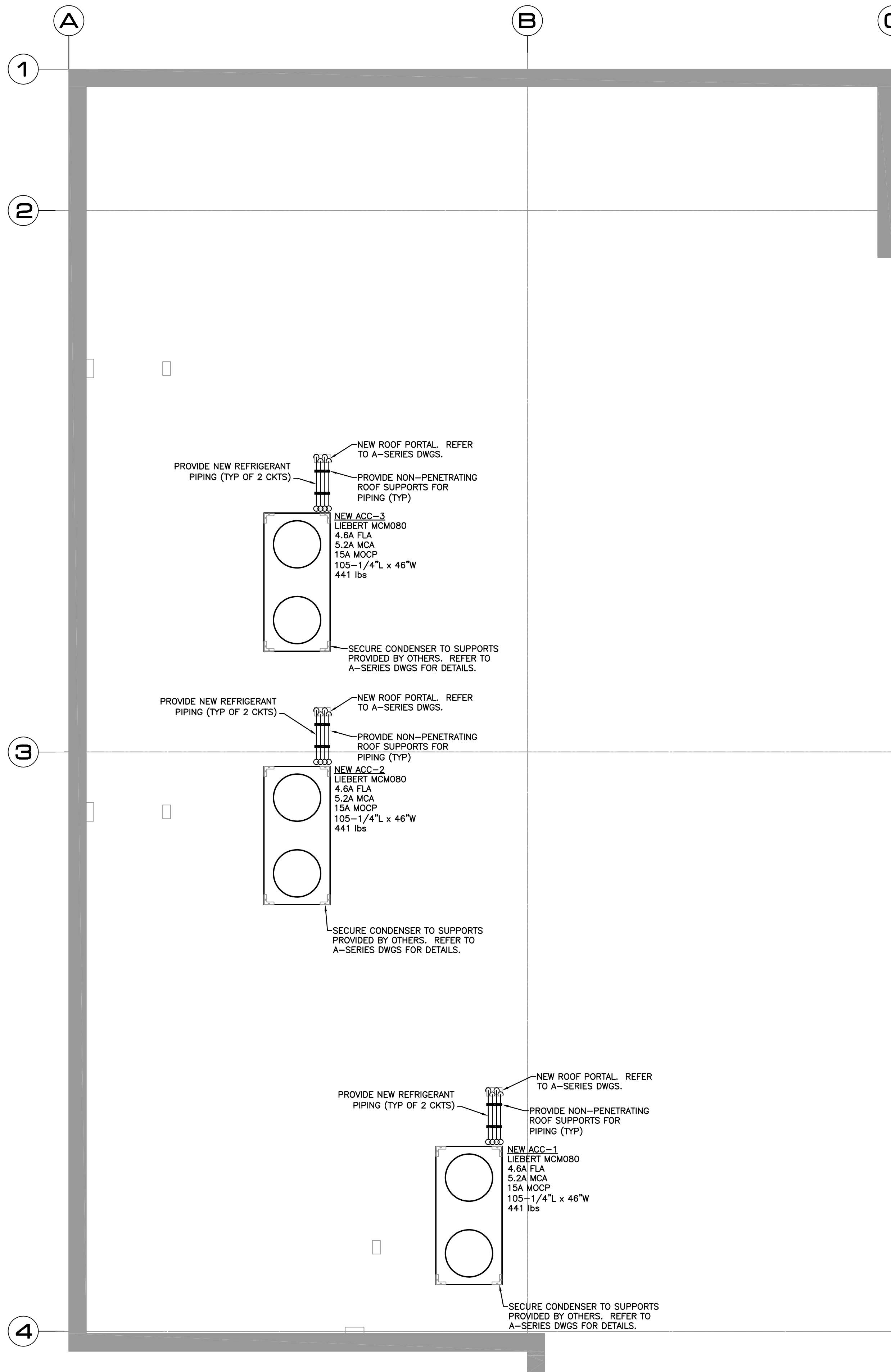
REVISION	REVISION DESCRIPTION	DATE

MECHANICAL
NEW WORK
FLOOR PLANS

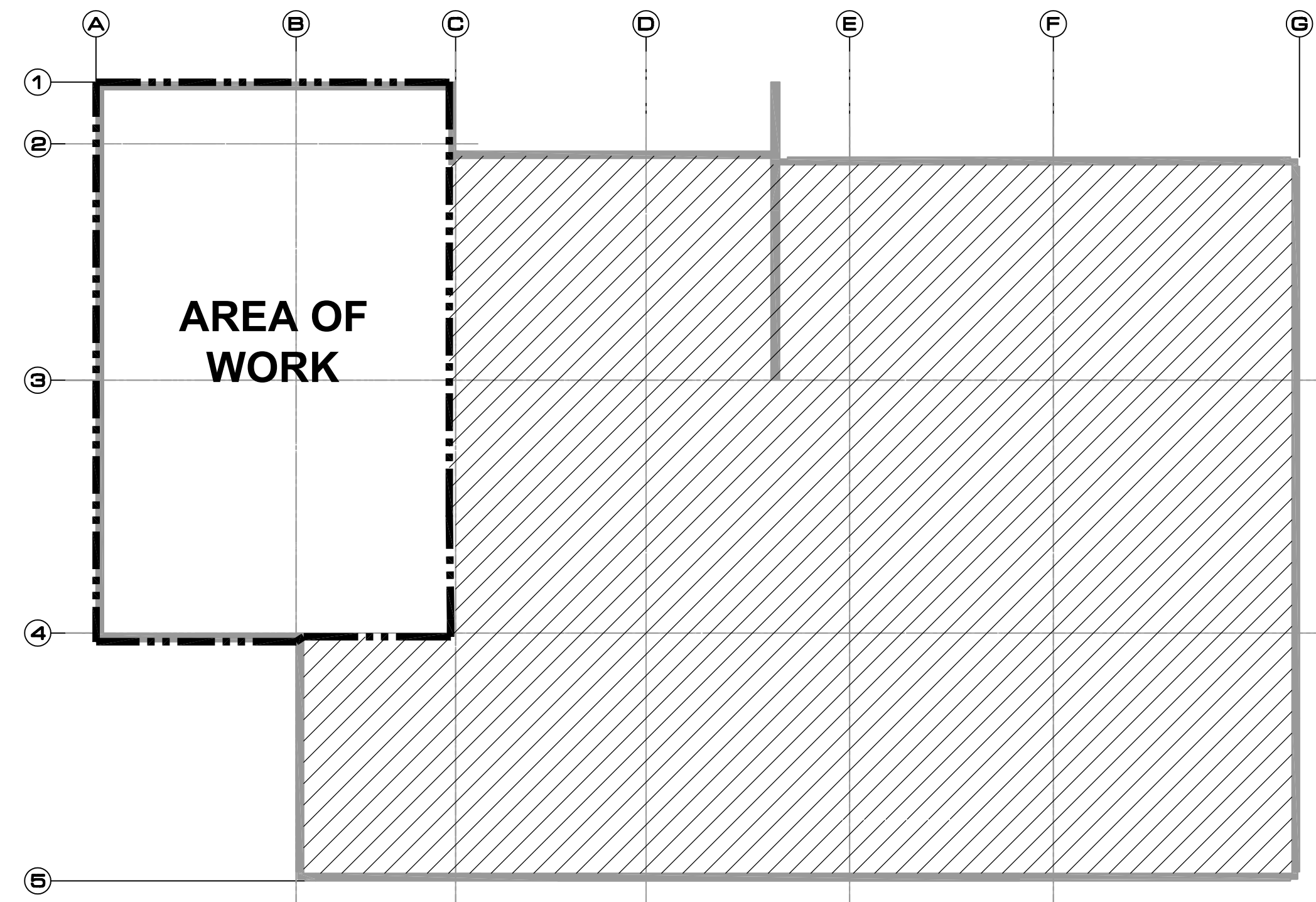
M1.1



2 MECHANICAL ROOF PLAN – REMOVALS
M1.2 SCALE: 1/4" = 1'-0"



3 MECHANICAL ROOF PLAN – NEW WORK
M1.2 SCALE: 1/4" = 1'-0"



1 KEY PLAN
M1.2 SCALE: 1/16" = 1'-0"

UNIFORM CODE STATEMENT:
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NYSIF CRAC UNIT REPLACEMENT
8 COMPUTER DRIVE WEST
ALBANY, NY

M1.2
SCALE: AS NOTED

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REVISION	DESCRIPTION	DATE

MECHANICAL
ROOF PLANS

M1.2

GENERAL NOTES	
1.	ALL WORK SHALL BE IN ACCORDANCE WITH NEW YORK STATE BUILDING CODE, NEW YORK ENERGY CODE, AND ALL APPLICABLE REFERENCED STANDARDS.
2.	ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC).
3.	THE ELECTRICAL WORK INCLUDES THE FURNISHING, INSTALLATION AND CONNECTING OF ALL NECESSARY ELECTRICAL APPARATUS, CONTROLS AND RELATED EQUIPMENT TO MAKE ALL FACILITIES UNDER THE CONTRACT FULLY OPERATIONAL, INCLUDING BUT NOT LIMITED TO CONDUITS, RACEWAYS, WIRE, PULL BOXES, CIRCUIT BREAKERS, WIRING DEVICES, DISCONNECT SWITCHES, CONTROLS, MOTORS, LIGHTING FIXTURES, ETC.
4.	CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY CLAMPS, BRACKETS, ANGLES, AND ALL OTHER ITEMS FOR THE PROPER SUPPORT OF EQUIPMENT WHETHER INDICATED ON DRAWINGS OR NOT.
5.	ALL SUPPORTS NECESSARY FOR MOUNTING AND/OR SUPPORTING EQUIPMENT, FIXTURES, APPARATUS, ETC., SHALL BE OF STEEL OR SIMILAR MATERIAL (WOOD SUPPORTS ARE NOT ACCEPTABLE).
6.	ALL PRODUCTS SHALL BE NEW, CLEAN, UNDamaged, AND FREE OF DEFECTS AND CORROSION.
7.	ALL PRODUCTS SHALL BE SHIPPED AND STORED IN A MANNER WHICH SHALL PROTECT THEM FROM DAMAGE, WEATHER AND ENTRY OF DERRIS. IF ITEMS ARE DAMAGED, THEY SHALL NOT BE INSTALLED. THE CONTRACTOR SHALL TAKE IMMEDIATE MEASURE TO OBTAIN REPLACEMENT OR REPAIR IN ORDER TO MAINTAIN THE SCHEDULE.
8.	CONTRACTOR SHALL VERIFY THAT ALL MATERIALS HE OR HIS SUPPLIERS SELECT CONFORM TO THE REQUIREMENTS OF THE DRAWINGS. TRANSMITTAL OF DRAWING INFORMATION TO MANUFACTURERS SUPPLYING MATERIALS, AND ADHERENCE TO THESE REQUIREMENTS IS THE CONTRACTOR'S RESPONSIBILITY. APPROVAL OF MANUFACTURER'S NAME BY THE ENGINEER DOES NOT RELEASE THE CONTRACTOR OF THE RESPONSIBILITY FOR PROVIDING MATERIALS WHICH COMPLY IN ALL RESPECTS WITH THE REQUIREMENTS IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL SUBMIT PRODUCT INFORMATION AND SHOP DRAWINGS FOR ALL MATERIALS USED ON THE PROJECT.
9.	CONTRACTOR SHALL MINIMIZE INTERFERENCE WITH THE WORKING ROUTINE OF OCCUPIED AREAS, BY COORDINATING THE PERFORMANCE OF THE WORK IN A MANNER ACCEPTABLE TO ALL GROUPS INVOLVED.
10.	CONTRACTOR SHALL NOT INTERRUPT ANY OF THE BUILDING'S ELECTRICAL SERVICES IN ANY WAY WITHOUT EXPRESSED PERMISSION OF THE OWNER. AMPLE WRITTEN NOTICE OF SHUTDOWNS SHALL BE GIVEN WELL IN ADVANCE TO THE OWNER. INTERRUPTIONS AND INTERFERENCE SHALL BE MADE AS BRIEF AS POSSIBLE AND ONLY AT TIMES AS STATED BY THE OWNER. WHEN TEMPORARY LOSS OF SERVICES IS UNAVOIDABLE, IT SHALL BE MADE AT TIMES AS SHALL CAUSE THE LEAST INTERFERENCE WITH THE ESTABLISHED ROUTINE.
11.	CONTRACTOR SHALL LAYOUT AND INSTALL THEIR WORK IN ADVANCE OF FINISH CONSTRUCTION.
12.	ALL WORK DESCRIBED ON THE DRAWINGS AND ALL WORK REQUIRED BY THIS CONTRACT SHALL BE EXECUTED IN A THOROUGHLY SUBSTANTIAL AND WORKMANLIKE MANNER BY SKILLED MECHANICS IN THE VARIOUS TRADES INVOLVED. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLING, CONNECTING AND ADJUSTING ALL EQUIPMENT.
13.	ALL CONDUCTORS AND BUSBARS SHALL BE COPPER, UNLESS OTHERWISE NOTED. ALL CONDUCTORS SHALL BE AT LEAST #12 AWG COPPER UNLESS OTHERWISE NOTED.
14.	WIRE SIZES ARE BASED ON THE 60 DEGREE CELSIUS AMPACITIES FOR WIRE SIZES #12 THRU #1 AWG AND 75 DEGREE CELSIUS AMPACITIES FOR WIRE SIZES LARGER THAN #1/0 AWG PER NEC 110.14(C).
15.	ALL DEVICES, EQUIPMENT, FIXTURES, AND THE LIKE MUST BE GROUNDED BY USE OF A PROPERLY SIZED GROUNDING CONDUCTOR. MECHANICAL/ELECTRICAL BONDS OF THE METALLIC RACEWAY SYSTEM SHALL BE MAINTAINED.

PROJECT NOTES	
CLOSE-OUT NOTES:	
1.	THE EC SHALL PROVIDE THE OWNER WITH ALL SPECIAL TOOLS NEEDED FOR PROPER OPERATION, ADJUSTMENT AND MAINTENANCE OF EQUIPMENT.
WORK ENVIRONMENT:	
1.	THE EC SHALL CLEAN UP AND REMOVE FROM THE SITE ALL RUBBISH, DEBRIS AND TRASH ACCUMULATED DURING THE DAY AS A RESULT OF EC'S WORK OR HIS PRESENCE ON THE JOB.
MECHANICAL RELATED NOTES:	
1.	REFER TO MECHANICAL PLANS FOR LOCATIONS OF MECHANICAL EQUIPMENT. LOCATE DISCONNECT SWITCHES IN ACCORDANCE WITH THE NEC.

PROJECT PHASING NOTES	
1.	INSTALL NEW CRAC-3/ACC-3. POWER EQUIPMENT WITH TEMPORARY FEEDS.
2.	COMMISSION AND START-UP NEW CRAC-3/ACC-3. EXISTING CRAC-3/ACC-3 TO REMAIN OPERATIONAL AT THIS POINT.
3.	DECOMMISSION AND REMOVE EXISTING CRAC-1/ACC-1.
4.	INSTALL NEW CRAC-1/ACC-1.
5.	COMMISSION AND START-UP NEW CRAC-1/ACC-1.
6.	DECOMMISSION AND REMOVE EXISTING CRAC-2/ACC-2.
7.	INSTALL NEW CRAC-2/ACC-2.
8.	COMMISSION AND START-UP NEW CRAC-2/ACC-2.
9.	DECOMMISSION AND REMOVE EXISTING CRAC-3/ACC-3.
10.	PROVIDE PERMANENT POWER TO NEW CRAC-3/ACC-3.

ABBREVIATIONS	
ABBREVIATION	DESCRIPTION
A	ABANDON IN PLACE
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFI OR AFCI	ARC FAULT CIRCUIT INTERRUPT
BMS/BAS/ATC	BUILDING MGT/AUTOMATIC TEMP CTRL SYSTEM
C	MOUNTED ON OR ABOVE CEILING
CL	CENTER LINE
CLG	CEILING
D	DEDICATED CIRCUIT
E	EXISTING TO REMAIN IN PLACE
EC	ELECTRICAL CONTRACTOR
EL	ELEVATOR
EM	EMERGENCY
ER	ELEVATOR RECALL
EXH	EXHAUST
GFI OR GFCI	GROUND FAULT CIRCUIT INTERRUPT
LA	LIGHTNING ARRESTOR
LGT/LGTS	LIGHT/LIGHTS
MC	MECHANICAL CONTRACTOR
MCC	MOTOR CONTROL CENTER
N/A	NOT APPLICABLE
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
N/R	NOT REQUIRED
NTS	NOT TO SCALE
OC	ON CENTER
PC	PLUMBING CONTRACTOR
PWR	POWER
R	REMOVED COMPLETE AND RELOCATED
RAF	RAISED ACCESS FLOOR
RCPT/RCPTS	RECEPTACLE/RECEPTACLES
RM	ROOM
RT	REMOVE AND TURN OVER TO OWNER
SM	SURFACE MOUNTED
SPD	SURGE PROTECTIVE DEVICE
SS	SURGE SUPPRESSOR
S/S	STAINLESS STEEL
TBD	TO BE DETERMINED
TR	TAMPER RESISTANT
UON	UNLESS OTHERWISE NOTED
VIF	VERIFY IN FIELD
VR	VANDAL RESISTANT
WG	WIRE GUARD
WM	WIREMOLD
WP	WEATHER PROOF
X	TO BE REMOVED
XFMR	TRANSFORMER

DEFINITIONS	
CONCEALED:	EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED BEHIND WALL FURRING, WITHIN PARTITIONS, OR HUNG CEILINGS (PERMANENT OR REMOVABLE), IN TRENCHES, OR IN CRAWL SPACES.
EXPOSED:	NOT INSTALLED UNDERGROUND OR CONCEALED.
NOTED:	AS INDICATED ON THE DRAWINGS AND/OR SPECIFIED.
INDICATED:	AS INDICATED ON THE DRAWINGS.
SHOWN:	AS SHOWN ON THE DRAWINGS.
WIRING:	CONDUITS, FITTINGS, WIRES, JUNCTION AND OUTLET BOXES, SWITCHES, CUTOUTS, RECEPTACLES, AND ITEMS NECESSARY OR REQUIRED IN CONNECTION WITH OR RELATING THERETO.
PROVIDE:	FURNISH AND INSTALL.
FURNISH:	SUPPLY/OBTAIN/PURCHASE AN ITEM.
INSTALL:	TO PUT IN PLACE, CONNECT, MAKE READY TO USE.

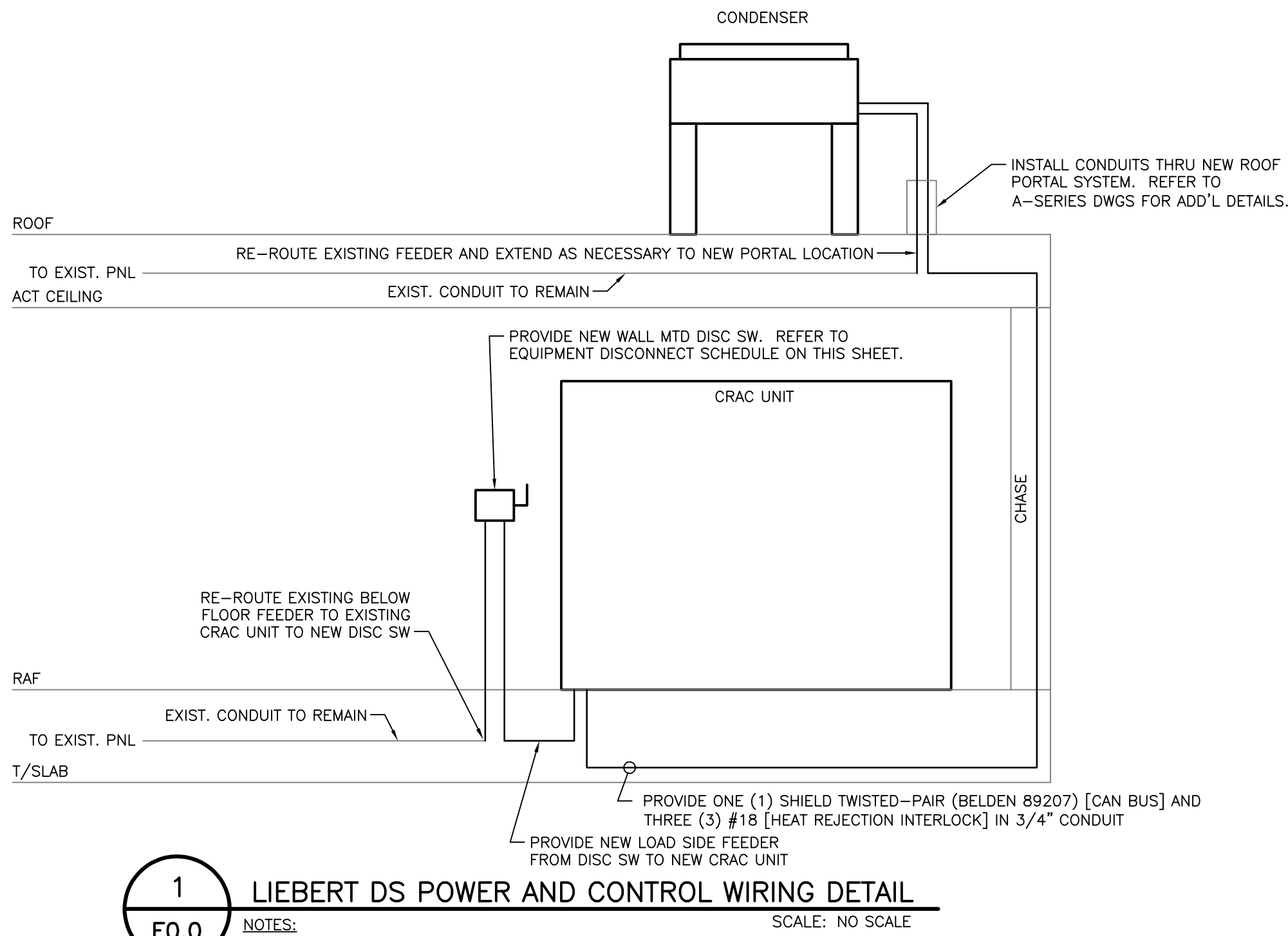
EQUIPMENT DISCONNECT SCHEDULE										
TAG	DESCRIPTION	LOCATION	FED FROM	VOLTS-PH	KW-HP-MCA	MOCP	FEEDER	DISCONNECT	UNIT CONTROL	NOTES
CRAC-1	COMPUTER ROOM AIR-CONDITIONER	SERVER ROOM	EXIST.	208/3ø	63.1 FLA	80A	(3) #3 + (1) #8G IN 1-1/4"C	N1/200/80	INTEGRAL TO UNIT	1
CRAC-2	COMPUTER ROOM AIR-CONDITIONER	SERVER ROOM	EXIST.	208/3ø	63.1 FLA	80A	(3) #3 + (1) #8G IN 1-1/4"C	N1/200/80	INTEGRAL TO UNIT	1
CRAC-3	COMPUTER ROOM AIR-CONDITIONER	SERVER ROOM	EXIST.	208/3ø	63.1 FLA	80A	(3) #3 + (1) #8G IN 1-1/4"C	N1/200/80	INTEGRAL TO UNIT	1
ACC-1	AIR-COOLED CONDENSER	ROOF	EXIST.	208/3ø	4.6 FLA	15A	(3) #12 + (1) #12G IN 3/4"C	INTEGRAL TO UNIT	INTEGRAL TO UNIT	-
ACC-2	AIR-COOLED CONDENSER	ROOF	EXIST.	208/3ø	4.6 FLA	15A	(3) #12 + (1) #12G IN 3/4"C	INTEGRAL TO UNIT	INTEGRAL TO UNIT	-
ACC-3	AIR-COOLED CONDENSER	ROOF	EXIST.	208/3ø	4.6 FLA	15A	(3) #12 + (1) #12G IN 3/4"C	INTEGRAL TO UNIT	INTEGRAL TO UNIT	-
NOTES:										
1. EC TO PROVIDE DISC SW TO INTERCEPT EXISTING 175A FEEDER AND PROVIDE NEW LOAD SIDE FEEDER TO NEW CRAC UNIT. REFER TO DETAIL 1 ON THIS SHEET.						3. NOT USED				
2. NOT USED						4. NOT USED				

DISCONNECT LEGEND	
N/R	NOT REQUIRED
NIC	NOT IN CONTRACT
DISCONNECT KEY	
N1 / 30 / 20	# : FUSE SIZE NF: NON-FUSED DISCONNECT DISCONNECT AMPACITY NEMA ENCLOSURE RATING
TOGGLE	HEAVY DUTY TOGGLE SWITCH
UNIT CONTROL KEY	
C / N1 / PB	HCA: HAND-OFF-AUTO PB: PUSH BUTTON NEMA ENCLOSURE RATING C: COMBINATION MAGNETIC M: MANUAL
VFD	VARIABLE FREQUENCY DRIVE
ATC	AUTOMATIC TEMPERATURE CONTROL

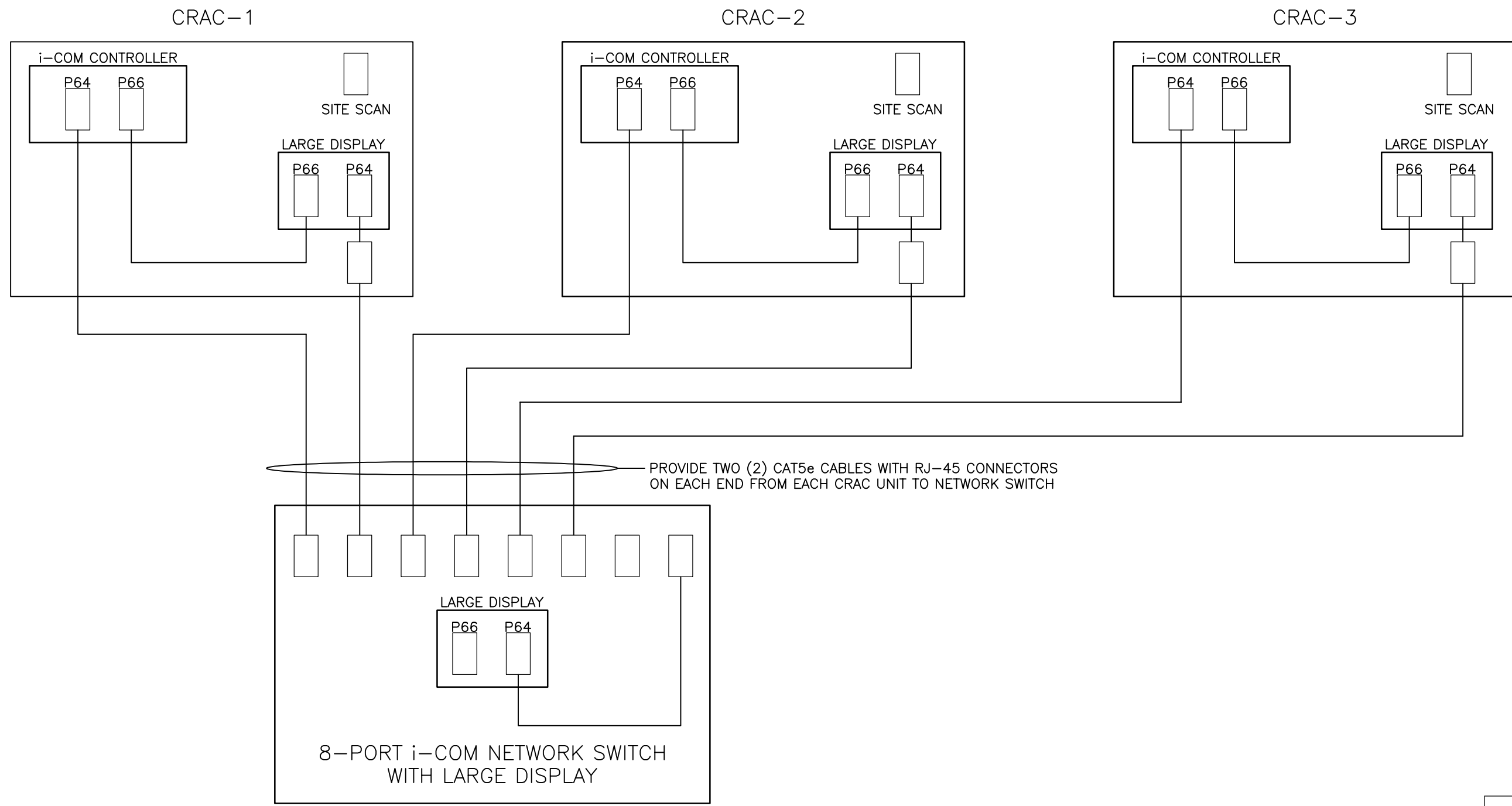
POWER SYMBOLS LEGEND	
SYMBOL	DESCRIPTION
⊕xx	DUPLEX RECEPTACLE, 20A, 120VAC GFI - GROUND FAULT INTERRUPTER GFP - GROUND FAULT PROTECTED ##" - MOUNTING HEIGHT UC - DROP CORD USB - INTEGRAL USB PORTS
⊕xx	QUADRUPLEX RECEPTACLE, 20A, 120VAC GFI - GROUND FAULT INTERRUPTER GFP - GROUND FAULT PROTECTED ##" - MOUNTING HEIGHT UC - DROP CORD USB - INTEGRAL USB PORTS
⊙	SPECIALTY RECEPTACLE TO MATCH EQUIPMENT REQUIREMENTS. REFER TO MANUFACTURERS INSTALLATION INFORMATION.
⊞xx	JUNCTION BOX SM - SURFACE MOUNT
⊕	MOTOR
⊕	MOTOR WITH NON-FUSED DISCONNECT SWITCH
⊞	NON-FUSED DISCONNECT SWITCH

PANEL LE-M		EXISTING TO REMAIN		120/208		VOLTS	
MAINS	225A	MAIN BKR	225	3	PHASE	4	WIRE
OPTIONS: TOP FEED <input checked="" type="checkbox"/> SUBFEED LUGS <input type="checkbox"/> SUBFEED BKR <input type="checkbox"/> SURFACE MTD <input type="checkbox"/> 100% NEUTRAL BOTTOM FEED <input type="checkbox"/> FEEDTHRU LUGS <input checked="" type="checkbox"/> ISOLATED GND <input type="checkbox"/> RECESSED MTD <input type="checkbox"/> BREAKER A/C MINIMUM 100k							
DESCRIPTION	WATTS	TRIP		TRIP	WATTS	DESCRIPTION	
RTU-1	-	40	1	2	60	-	RTU-2
-	-	-	3	4	-	-	-
-	-	-	5	6	-	-	-
RTU-3	-	25	7	8	25	-	RTU-4
-	-	-	9	10	-	-	-
-	-	-	11	12	-	-	-
RTU-5	-	40	13	14	20	-	HOT WATER HEATER
-	-	-	15	16	-	-	-
-	-	-	17	18	20	-	EFT-1
EFT-1	-	20	19	20	20	-	EFT-1
-	-	-	21	22	-	-	-
ECH-1	-	20	23	24	20	-	EF-1 / EF-2 / EF-3
-	-	-	25	26	20	-	UH-1 IN LOADING DOCK
1 TEMP CRAC FEED	-	80	27	28	20	-	SPARE
-	-	-	29	30	20	-	SPARE
-	-	-	31	32	20	-	SPARE
1 TEMP ACC FEED	-	15	33	34	20	-	SPARE
-	-	-	35	36	20	-	SPARE
-	-	-	37	38	20	-	ATC
SPARE	-	20	39	40	20	-	ATC
SPARE	-	20	41	42	20	-	ATC
-	-	-	TOTAL	-	TOTAL	-	-
MANUFACTURER	SQUARE D	MODEL	NOOD	NEMA	1		

PANEL SCHEDULE NOTES:	
1.	PROVIDE BREAKER TO TEMPORARILY FEED NEW CRAC-3/ACC-3 WHILE THE EXISTING CRAC-3/ACC-3 ARE STILL OPERATIONAL. REMOVE BREAKER AND ASSOCIATED TEMPORARY WIRING ONCE PERMANENT WIRING TO CRAC-3/ACC-3 IS INSTALLED.



1 LIEBERT DS POWER AND CONTROL WIRING DETAIL	
NOTES:	
1.	ALL WIRING BY EC.
2.	TYPICAL OF 3.
SCALE: NO SCALE	



2 LIEBERT iCOM CONTROL WIRING DETAIL	
NOTES:	
1.	ALL WIRING BY EC.
SCALE: NO SCALE	

UNIFORM CODE STATEMENT: TO THE BEST OF THE REGISTERED DESIGN PROFESSIONAL'S KNOWLEDGE, BELIEF AND OPINION, THE DESIGN, CONSTRUCTION AND/OR SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 UNIFORM CODE.	ENERGY CODE STATEMENT: TO THE BEST OF THE REGISTERED DESIGN PROFESSIONAL'S KNOWLEDGE, BELIEF AND OPINION, THE DESIGN, CONSTRUCTION AND/OR SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 ENERGY CODE.
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SCALE: AS NOTED

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ELECTRICAL
LEGENDS, NOTES,
AND SCHEDULES

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SECTION 260519 -- LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

- PART 1 GENERAL
- 1.01 REFERENCE STANDARDS
- A. ASTM B3 -- STANDARD SPECIFICATION FOR SOFT OR ANNEALED COPPER WIRE 2013 (REAPPROVED 2018).
 - B. ASTM B8 -- STANDARD SPECIFICATION FOR CONCENTRIC-LAY-STRANDED COPPER CONDUCTORS, HARD, MEDIUM-HARD, OR SOFT 2011 (REAPPROVED 2017).
 - C. ASTM B33 -- STANDARD SPECIFICATION FOR TIN-COATED SOFT OR ANNEALED COPPER WIRE FOR ELECTRICAL PURPOSES 2010, WITH EDITORIAL REVISION (2020).
 - D. ASTM B787/B787M -- STANDARD SPECIFICATION FOR 19 WIRE COMBINATION UNILAY-STRANDED COPPER CONDUCTORS FOR SUBSEQUENT INSULATION 2004 (REAPPROVED 2020).
 - E. NECA 1 -- STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION 2015.
 - F. NEMA WC 70 -- POWER CABLES RATED 2000 VOLTS OR LESS FOR THE DISTRIBUTION OF ELECTRICAL ENERGY 2021.
 - G. NFPA 70 -- NATIONAL ELECTRICAL CODE MOST RECENT EDITION ADOPTED BY AUTHORITY HAVING JURISDICTION, INCLUDING ALL APPLICABLE AMENDMENTS AND SUPPLEMENTS.
 - H. UL 44 -- THERMOSET-INSULATED WIRES AND CABLES CURRENT EDITION, INCLUDING ALL REVISIONS.
 - I. UL 83 -- THERMOPLASTIC-INSULATED WIRES AND CABLES CURRENT EDITION, INCLUDING ALL REVISIONS.
 - J. UL 486A-486B -- WIRE CONNECTORS CURRENT EDITION, INCLUDING ALL REVISIONS.
 - K. UL 486C -- SPLICING WIRE CONNECTORS CURRENT EDITION, INCLUDING ALL REVISIONS.
 - L. UL 486D -- SEALED WIRE CONNECTOR SYSTEMS CURRENT EDITION, INCLUDING ALL REVISIONS.
- 1.02 SUBMITTALS
- A. PRODUCT DATA: PROVIDE MANUFACTURER'S STANDARD CATALOG PAGES AND DATA SHEETS FOR CONDUCTORS AND CABLES, INCLUDING DETAILED INFORMATION ON MATERIALS, CONSTRUCTION, RATINGS, LISTINGS, AND AVAILABLE SIZES, CONFIGURATIONS, AND STRANDING.
- 1.03 QUALITY ASSURANCE
- A. COMPLY WITH REQUIREMENTS OF NFPA 70.
- B. PRODUCT LISTING ORGANIZATION QUALIFICATIONS: AN ORGANIZATION RECOGNIZED BY OSHA AS A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) AND ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
- 1.04 DELIVERY, STORAGE, AND HANDLING
- A. RECEIVE, INSPECT, HANDLE, AND STORE CONDUCTORS AND CABLES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

PART 2 PRODUCTS

- 2.01 CONDUCTOR AND CABLE APPLICATIONS
- A. DO NOT USE CONDUCTORS AND CABLES FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING.
- B. PROVIDE SINGLE CONDUCTOR BUILDING WIRE INSTALLED IN SUITABLE RACEWAY UNLESS OTHERWISE INDICATED, PERMITTED, OR REQUIRED.
- C. NONMETALLIC-SHEATHED CABLE IS NOT PERMITTED.
- D. UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE IS NOT PERMITTED.
- E. SERVICE ENTRANCE CABLE IS NOT PERMITTED.
- F. ARMORED CABLE IS NOT PERMITTED.
- G. METAL-GLAD CABLE IS NOT PERMITTED.
- 2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS
- A. PROVIDE PRODUCTS THAT COMPLY WITH REQUIREMENTS OF NFPA 70.
- B. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.
- C. PROVIDE NEW CONDUCTORS AND CABLES MANUFACTURED NOT MORE THAN ONE YEAR PRIOR TO INSTALLATION.
- D. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE ALL REQUIRED CONDUIT, BOXES, WIRING, CONNECTORS, ETC. AS REQUIRED FOR A COMPLETE OPERATING SYSTEM.
- E. COMPLY WITH NEMA WC 70.
- F. THERMOPLASTIC-INSULATED CONDUCTORS AND CABLES: LISTED AND LABELED AS COMPLYING WITH UL 83.
- G. THERMOSET-INSULATED CONDUCTORS AND CABLES: LISTED AND LABELED AS COMPLYING WITH UL 44.
- H. CONDUCTORS FOR GROUNDING AND BONDING: ALSO COMPLY WITH SECTION 260526.

1. CONDUCTOR MATERIAL:
- 1. PROVIDE COPPER CONDUCTORS ONLY. ALUMINUM CONDUCTORS ARE NOT ACCEPTABLE FOR THIS PROJECT. CONDUCTOR SIZES INDICATED ARE BASED ON COPPER.
 - 2. COPPER CONDUCTORS: SOFT DRAWN ANNEALED, 98 PERCENT CONDUCTIVITY, UNCOATED COPPER CONDUCTORS COMPLYING WITH ASTM B3, ASTM B8, OR ASTM B787/B787M UNLESS OTHERWISE INDICATED.
 - 3. TINNED COPPER CONDUCTORS: COMPLY WITH ASTM B33.
- J. MINIMUM CONDUCTOR SIZE:
- 1. BRANCH CIRCUITS: 12 AWG.
 - a. EXCEPTIONS:
 - 1) 20 A, 120 V CIRCUITS LONGER THAN 75 FEET: 10 AWG. FOR VOLTAGE DROP.
 - 2) 20 A, 120 V CIRCUITS LONGER THAN 150 FEET: 8 AWG. FOR VOLTAGE DROP.
 - 3) 20 A, 277 V CIRCUITS LONGER THAN 150 FEET: 10 AWG. FOR VOLTAGE DROP.
 - 2. CONTROL CIRCUITS: 14 AWG.
- K. WHERE CONDUCTOR SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70 BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED.
- L. CONDUCTOR COLOR CODING:
- 1. COLOR CODE CONDUCTORS AS INDICATED UNLESS OTHERWISE REQUIRED BY THE AUTHORITY HAVING JURISDICTION. MAINTAIN CONSISTENT COLOR CODING THROUGHOUT PROJECT.
 - 2. COLOR CODING METHOD: INTEGRALLY COLORED INSULATION.
 - a. CONDUCTORS SIZE 4 AWG AND LARGER MAY HAVE BLACK INSULATION COLOR CODED USING VINYL COLOR CODING ELECTRICAL TAPE.
 - 3. COLOR CODE:
 - a. 480Y/277 V, 3 PHASE, 4 WIRE SYSTEM:
 - 1) PHASE A: BROWN.
 - 2) PHASE B: ORANGE.
 - 3) PHASE C: YELLOW.
 - 4) NEUTRAL/GROUNDED: GRAY.
 - b. 208Y/120 V, 3 PHASE, 4 WIRE SYSTEM:
 - 1) PHASE A: BLACK.
 - 2) PHASE B: RED.
 - 3) PHASE C: BLUE.
 - 4) NEUTRAL/GROUNDED: WHITE.
 - c. EQUIPMENT GROUND, ALL SYSTEMS: GREEN.
- M. FOR MODIFICATIONS OR ADDITIONS TO EXISTING WIRING SYSTEMS, COMPLY WITH EXISTING COLOR CODE WHEN EXISTING CODE COMPLIES WITH NFPA 70 AND IS APPROVED BY THE AUTHORITY HAVING JURISDICTION.
- N. FOR CONTROL CIRCUITS, COMPLY WITH MANUFACTURER'S RECOMMENDED COLOR CODE.

- 2.03 SINGLE CONDUCTOR BUILDING WIRE
- A. DESCRIPTION: SINGLE CONDUCTOR INSULATED WIRE.
- B. CONDUCTOR STRANDING:
- 1. FEEDERS AND BRANCH CIRCUITS:
 - a. SIZE 10 AWG AND SMALLER: SOLID.
 - b. SIZE 8 AWG AND LARGER: STRANDED.
 - 2. CONTROL CIRCUITS: STRANDED.
- C. INSULATION VOLTAGE RATINGS: 600 V.
- D. INSULATION:
- 1. COPPER BUILDING WIRE: TYPE THHN/THWN OR THHN/THWN-2.
- 2.04 WIRING CONNECTORS
- A. DESCRIPTION: WIRING CONNECTORS APPROPRIATE FOR THE APPLICATION, SUITABLE FOR USE WITH THE CONDUCTORS TO BE CONNECTED, AND LISTED AS COMPLYING WITH UL 486A-486B OR UL 486C AS APPLICABLE.
- B. CONNECTORS FOR GROUNDING AND BONDING: COMPLY WITH SECTION 260526.
- C. WIRING CONNECTORS FOR SPLICES AND TAPS:
- 1. COPPER CONDUCTORS SIZE 8 AWG AND SMALLER: USE TWIST-ON INSULATED SPRING CONNECTORS.
 - 2. COPPER CONDUCTORS SIZE 8 AWG AND LARGER: USE MECHANICAL CONNECTORS OR COMPRESSION CONNECTORS.
- D. WIRING CONNECTORS FOR TERMINATIONS:
- 1. PROVIDE TERMINAL LUGS FOR CONNECTING CONDUCTORS TO EQUIPMENT FURNISHED WITH TERMINATIONS DESIGNED FOR TERMINAL LUGS.
 - 2. COPPER CONDUCTORS SIZE 8 AWG AND LARGER: USE MECHANICAL CONNECTORS OR COMPRESSION CONNECTORS WHERE CONNECTORS ARE REQUIRED.
 - 3. CONDUCTORS FOR CONTROL CIRCUITS: USE CRIMPED TERMINALS FOR ALL CONNECTIONS.
- E. DO NOT USE INSULATION-PIERCING OR INSULATION-DISPLACEMENT CONNECTORS DESIGNED FOR USE WITH CONDUCTORS WITHOUT STRIPPING INSULATION.
- F. DO NOT USE PUSH-IN WIRE CONNECTORS AS A SUBSTITUTE FOR TWIST-ON INSULATED SPRING CONNECTORS.
- G. TWIST-ON INSULATED SPRING CONNECTORS: RATED 600 V, 221 DEGREES F FOR INSULATION AND 302 DEGREES F FOR HIGH TEMPERATURE APPLICATIONS; PRE-FILLED WITH SEALANT AND LISTED AS COMPLYING WITH UL 486D FOR DAMP AND WET LOCATIONS.
- H. MECHANICAL CONNECTORS: PROVIDE BOLTED TYPE OR SET-SCREW TYPE.
- 1. COMPRESSION CONNECTORS: PROVIDE CIRCUMFERENTIAL TYPE OR HEX TYPE CRIMP CONFIGURATION.
 - 2. CRIMPED TERMINALS: NYLON-INSULATED, WITH INSULATION GRIP AND TERMINAL CONFIGURATION SUITABLE FOR CONNECTION TO BE MADE.

PART 3 EXECUTION

- 3.01 EXAMINATION
- A. VERIFY THAT INTERIOR OF BUILDING HAS BEEN PROTECTED FROM WEATHER.
- B. VERIFY THAT WORK LIKELY TO DAMAGE WIRE AND CABLE HAS BEEN COMPLETED.
- C. VERIFY THAT RACEWAYS, BOXES, AND EQUIPMENT ENCLOSURES ARE INSTALLED AND ARE PROPERLY SIZED TO ACCOMMODATE CONDUCTORS AND CABLES IN ACCORDANCE WITH NFPA 70.
- D. VERIFY THAT FIELD MEASUREMENTS ARE AS INDICATED.
- E. VERIFY THAT CONDITIONS ARE SATISFACTORY FOR INSTALLATION PRIOR TO STARTING WORK.
- 3.02 PREPARATION
- A. CLEAN RACEWAYS THOROUGHLY TO REMOVE FOREIGN MATERIALS BEFORE INSTALLING CONDUCTORS AND CABLES.
- 3.03 INSTALLATION
- A. CIRCUITING REQUIREMENTS:
- 1. UNLESS DIMENSIONED, CIRCUIT ROUTING INDICATED IS DIAGRAMMATIC.
 - 2. WHEN CIRCUIT DESTINATION IS INDICATED WITHOUT SPECIFIC ROUTING, DETERMINE EXACT ROUTING REQUIRED.
 - 3. ARRANGE CIRCUITS BY SIZES.
 - 4. INCLUDE CIRCUIT LENGTHS REQUIRED TO INSTALL CONNECTED DEVICES WITHIN 10 FT OF LOCATION INDICATED.
 - 5. MAINTAIN SEPARATION OF CLASS 1, CLASS 2, AND CLASS 3 REMOTE-CONTROL, SIGNALING, AND POWER-LIMITED CIRCUITS IN ACCORDANCE WITH NFPA 70.
- B. CIRCUITING ADJUSTMENTS: UNLESS OTHERWISE INDICATED, WHEN BRANCH CIRCUITS ARE INDICATED AS SEPARATE, COMBINING THEM TOGETHER IN A SINGLE RACEWAY IS NOT PERMITTED.
- C. COMMON NEUTRALS: UNLESS OTHERWISE INDICATED, SHARING OF NEUTRAL/GROUNDED CONDUCTORS AMONG UP TO THREE SINGLE PHASE BRANCH CIRCUITS OF DIFFERENT SIZES INSTALLED IN THE SAME RACEWAY IS NOT PERMITTED. PROVIDE DEDICATED NEUTRAL/GROUNDED CONDUCTOR FOR EACH INDIVIDUAL BRANCH CIRCUIT.
- D. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- E. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP).
- D. INSTALLATION IN RACEWAY:
- 1. TAPE ENDS OF CONDUCTORS AND CABLES TO PREVENT INFILTRATION OF MOISTURE AND OTHER CONTAMINANTS.
 - 2. PULL ALL CONDUCTORS AND CABLES TOGETHER INTO RACEWAY AT SAME TIME.
 - 3. DO NOT DAMAGE CONDUCTORS AND CABLES OR EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM PULLING TENSION AND SIDEWALL PRESSURE.
 - 4. USE SUITABLE WIRE PULLING LUBRICANT WHERE NECESSARY, EXCEPT WHEN LUBRICANT IS NOT RECOMMENDED BY THE MANUFACTURER.
 - 5. PARALLEL CONDUCTORS OF THE SAME LENGTHS AND TERMINATE IN THE SAME MANNER.
- F. SECURE AND SUPPORT CONDUCTORS AND CABLES IN ACCORDANCE WITH NFPA 70 USING SUITABLE SUPPORTS AND METHODS APPROVED BY THE AUTHORITY HAVING JURISDICTION. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM RACEWAYS, PIPING, DUCTWORK, OR OTHER SYSTEMS.
- 1. INSTALLATION ABOVE SUSPENDED CEILINGS: DO NOT PROVIDE SUPPORT FROM CEILING SUPPORT SYSTEM. DO NOT PROVIDE SUPPORT FROM CEILING GRID OR ALLOW CONDUCTORS AND CABLES TO LAY ON CEILING TILES.
 - 2. INSTALL CONDUCTORS WITH A MINIMUM OF 12 INCHES OF SLACK AT EACH OUTLET.
 - 3. NEATLY TRAIN AND BUNDLE CONDUCTORS INSIDE BOXES, WIREWAYS, PANELBOARDS AND OTHER EQUIPMENT ENCLOSURES.
- G. GROUP OR OTHERWISE IDENTIFY NEUTRAL/GROUNDED CONDUCTORS WITH ASSOCIATED UNGROUNDED CONDUCTORS INSIDE ENCLOSURES IN ACCORDANCE WITH NFPA 70.

SECTION 260519 -- LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (CONT.)

- J. MAKE WIRING CONNECTIONS USING SPECIFIED WIRING CONNECTORS.
- 1. MAKE SPLICES AND TAPS ONLY IN ACCESSIBLE BOXES. DO NOT PULL SPLICES INTO RACEWAYS OR MAKE SPLICES IN CONDUIT BODIES OR WIRING GUTTERS.
 - 2. REMOVE APPROPRIATE AMOUNT OF CONDUCTOR INSULATION FOR MAKING CONNECTIONS WITHOUT CUTTING, NICKING OR DAMAGING CONDUCTORS.
 - 3. DO NOT REMOVE CONDUCTOR STRANDS TO FACILITATE INSERTION INTO CONNECTOR.
 - 4. CLEAN CONTACT SURFACES ON CONDUCTORS AND CONNECTORS TO SUITABLE REMOVE CORROSION, OXIDES, AND OTHER CONTAMINANTS. DO NOT USE WIRE BRUSH ON PLATED CONNECTOR SURFACES.
 - 5. MECHANICAL CONNECTORS: SECURE CONNECTIONS ACCORDING TO MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.
 - 6. COMPRESSION CONNECTORS: SECURE CONNECTIONS USING MANUFACTURER'S RECOMMENDED TOOLS AND DIES.
 - 7. INSULATE SPLICES AND TAPS THAT ARE MADE WITH UNSULATED CONNECTORS USING METHODS SUITABLE FOR THE APPLICATION, WITH INSULATION AND MECHANICAL STRENGTH AT LEAST EQUIVALENT TO UNSULATED CONDUCTORS.
 - a. DRY LOCATIONS: USE INSULATING COVERS SPECIFICALLY DESIGNED FOR THE CONNECTORS, ELECTRICAL TAPE, OR HEAT SHRINK TUBING.
 - b. FOR TAPED CONNECTIONS, FIRST APPLY ADEQUATE AMOUNT OF RUBBER SPLICING ELECTRICAL TAPE OR ELECTRICAL FILLER TAPE, FOLLOWED BY OUTER COVERING OF VINYL INSULATING ELECTRICAL TAPE.
 - 8. INSULATE ENDS OF SPARE CONDUCTORS USING VINYL INSULATING ELECTRICAL TAPE.
- M. FIELD-APPLIED COLOR CODING: WHERE VINYL COLOR CODING ELECTRICAL TAPE IS USED IN LIEU OF INTEGRALLY COLORED INSULATION AS PERMITTED IN PART 2, PROVIDE COLOR CODING. APPLY HALF OVERLAPPING TURNS OF TAPE AT EACH TERMINATION AND AT EACH LOCATION CONDUCTORS ARE ACCESSIBLE.
- N. IDENTIFY CONDUCTORS AND CABLES IN ACCORDANCE WITH SECTION 260553.
- O. INSTALL FIRESTOPPING TO PRESERVE FIRE RESISTANCE RATING OF PARTITIONS AND OTHER ELEMENTS, USING MATERIALS AND METHODS SPECIFIED IN SECTION 078400.
- P. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE FINAL CONNECTIONS TO ALL EQUIPMENT AND DEVICES, INCLUDING THOSE FURNISHED BY OTHERS, AS REQUIRED FOR A COMPLETE OPERATING SYSTEM.

END OF SECTION

SECTION 260526 -- GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- PART 1 GENERAL
- 1.01 REFERENCE STANDARDS
- A. NECA 1 -- STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION 2015.
 - B. NFPA 70 -- NATIONAL ELECTRICAL CODE MOST RECENT EDITION ADOPTED BY AUTHORITY HAVING JURISDICTION, INCLUDING ALL APPLICABLE AMENDMENTS AND SUPPLEMENTS.
 - C. UL 467 -- GROUNDING AND BONDING EQUIPMENT CURRENT EDITION, INCLUDING ALL REVISIONS.
- 1.02 SUBMITTALS
- A. PRODUCT DATA: PROVIDE MANUFACTURER'S STANDARD CATALOG PAGES AND DATA SHEETS FOR GROUNDING AND BONDING SYSTEM COMPONENTS.
- 1.03 QUALITY ASSURANCE
- A. COMPLY WITH REQUIREMENTS OF NFPA 70.
- B. PRODUCT LISTING ORGANIZATION QUALIFICATIONS: AN ORGANIZATION RECOGNIZED BY OSHA AS A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) AND ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
- 1.04 DELIVERY, STORAGE, AND HANDLING
- A. RECEIVE, INSPECT, HANDLE, AND STORE PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- PART 2 PRODUCTS
- 2.01 GROUNDING AND BONDING REQUIREMENTS
- A. EXISTING WORK: WHERE EXISTING GROUNDING AND BONDING SYSTEM COMPONENTS ARE INDICATED TO BE REUSED, THEY MAY BE REUSED ONLY WHERE THEY ARE FREE FROM CORROSION, AND INTEGRITY AND CONTINUITY ARE VERIFIED, AND WHERE ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION.
- B. DO NOT USE PRODUCTS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING.
- C. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE ALL REQUIRED GROUNDING, BONDING, SUPPORTS, ACCESSORIES, ETC. AS NECESSARY FOR A COMPLETE GROUNDING AND BONDING SYSTEM.
- D. WHERE CONDUCTOR SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70 BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED.
- E. BONDING AND EQUIPMENT GROUNDING:
- 1. PROVIDE BONDING FOR EQUIPMENT GROUNDING CONDUCTORS, EQUIPMENT GROUND BUSES, METALLIC EQUIPMENT ENCLOSURES, METALLIC RACEWAYS AND BOXES, DEVICE GROUNDING TERMINALS, AND OTHER NORMALLY NON-CURRENT-CARRYING CONDUCTIVE MATERIALS ENCLOSED ELECTRICAL CONDUCTORS/EQUIPMENT OR LIKELY TO BECOME EXPOSED AS INDICATED AND IN ACCORDANCE WITH NFPA 70.
 - 2. PROVIDE INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH FEEDER AND BRANCH CIRCUIT RACEWAY. DO NOT USE RACEWAYS AS SOLE EQUIPMENT GROUNDING CONDUCTOR.
 - 3. WHERE CIRCUIT CONDUCTOR SIZES ARE INCREASED FOR VOLTAGE DROP, INCREASE SIZE OF EQUIPMENT GROUNDING CONDUCTOR PROPORTIONALLY IN ACCORDANCE WITH NFPA 70.
 - 4. UNLESS OTHERWISE INDICATED, CONNECT WIRING DEVICE GROUNDING TERMINAL TO BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTOR AND TO OUTLET BOX WITH BONDING JUMPER.
 - 5. TERMINATE BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTORS ON SOLIDLY BONDED EQUIPMENT GROUND BUS ONLY. DO NOT TERMINATE ON NEUTRAL (GROUNDED) OR ISOLATED/INSULATED GROUND BUS.
 - 6. PROVIDE BONDING JUMPER ACROSS EXPANSION OR EXPANSION/DEFLECTION FITTINGS PROVIDED TO ACCOMMODATE CONDUIT MOVEMENT.
- 2.02 GROUNDING AND BONDING COMPONENTS
- A. GENERAL REQUIREMENTS:
- 1. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.
 - 2. PROVIDE PRODUCTS LISTED AND LABELED AS COMPLYING WITH UL 467 WHERE APPLICABLE.
- B. CONDUCTORS FOR GROUNDING AND BONDING, IN ADDITION TO REQUIREMENTS OF SECTION 260526:
- 1. USE INSULATED COPPER CONDUCTORS UNLESS OTHERWISE INDICATED.
- C. CONNECTORS FOR GROUNDING AND BONDING:
- 1. DESCRIPTION: CONNECTORS APPROPRIATE FOR THE APPLICATION AND SUITABLE FOR THE CONDUCTORS AND ITEMS TO BE CONNECTED; LISTED AND LABELED AS COMPLYING WITH UL 467.
 - 2. UNLESS OTHERWISE INDICATED, USE MECHANICAL CONNECTORS OR COMPRESSION CONNECTORS FOR ACCESSIBLE CONNECTIONS.

PART 3 EXECUTION

- 3.01 EXAMINATION
- A. VERIFY THAT WORK LIKELY TO DAMAGE GROUNDING AND BONDING SYSTEM COMPONENTS HAS BEEN COMPLETED.
- B. VERIFY THAT FIELD MEASUREMENTS ARE AS INDICATED.
- C. VERIFY THAT CONDITIONS ARE SATISFACTORY FOR INSTALLATION PRIOR TO STARTING WORK.
- 3.02 INSTALLATION
- A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- B. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP).
- C. MAKE GROUNDING AND BONDING CONNECTIONS USING SPECIFIED CONNECTORS.
- 1. REMOVE APPROPRIATE AMOUNT OF CONDUCTOR INSULATION FOR MAKING CONNECTIONS WITHOUT CUTTING, NICKING OR DAMAGING CONDUCTORS. DO NOT REMOVE CONDUCTOR STRANDS TO FACILITATE INSERTION INTO CONNECTOR.
 - 2. REMOVE NONCONDUCTIVE PAINT, ENAMEL, OR SIMILAR COATING AT THREADS, CONTACT POINTS, AND CONTACT SURFACES.
 - 3. EXOTHERMIC WELDS: MAKE WELDING CONNECTIONS USING MOLDS AND WELD MATERIAL SUITABLE FOR THE ITEMS TO BE CONNECTED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
 - 4. MECHANICAL CONNECTORS: SECURE CONNECTIONS ACCORDING TO MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.
 - 5. COMPRESSION CONNECTORS: SECURE CONNECTIONS USING MANUFACTURER'S RECOMMENDED TOOLS AND DIES.
- D. IDENTIFY GROUNDING AND BONDING SYSTEM COMPONENTS IN ACCORDANCE WITH SECTION 260553.

END OF SECTION

SECTION 260529 -- HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

- PART 1 GENERAL
- 1.01 REFERENCE STANDARDS
- A. ASTM B633 -- STANDARD SPECIFICATION FOR ELECTRODEPOSITED COATINGS OF ZINC ON IRON AND STEEL 2019.
 - B. MFMA-4 -- METAL FRAMING STANDARDS PUBLICATION 2004.
 - C. NECA 1 -- STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION 2015.
 - D. NFPA 70 -- NATIONAL ELECTRICAL CODE MOST RECENT EDITION ADOPTED BY AUTHORITY HAVING JURISDICTION, INCLUDING ALL APPLICABLE AMENDMENTS AND SUPPLEMENTS.
- 1.02 ADMINISTRATIVE REQUIREMENTS
- A. COORDINATION:
- 1. COORDINATE SIZES AND ARRANGEMENT OF SUPPORTS AND BASES WITH THE ACTUAL EQUIPMENT AND COMPONENTS TO BE INSTALLED.
 - 2. COORDINATE THE WORK WITH OTHER TRADES TO PROVIDE ADDITIONAL FRAMING AND/OR PERMANENT SUPPORTS UNLESS SPECIFICALLY INDICATED OR PERMITTED.
 - 3. COORDINATE COMPATIBILITY OF SUPPORT AND ATTACHMENT COMPONENTS WITH MOUNTING SURFACES AT THE INSTALLED LOCATIONS.
 - 4. COORDINATE THE ARRANGEMENT OF SUPPORTS WITH DUCTWORK, PIPING, EQUIPMENT AND OTHER POTENTIAL CONFLICTS INSTALLED UNDER OTHER TRADES OR BY OTHERS.
- B. SEQUENCING:
- 1. DO NOT INSTALL PRODUCTS ON OR PROVIDE ATTACHMENT TO CONCRETE SURFACES UNTIL CONCRETE HAS FULLY CURED IN ACCORDANCE WITH SECTION 033000.
- 1.03 SUBMITTALS
- A. PRODUCT DATA: PROVIDE MANUFACTURER'S STANDARD CATALOG PAGES AND DATA SHEETS FOR CHANNEL (STRUT) FRAMING SYSTEMS, NON-PENETRATING ROOFTOP DETAILS, AND POST-INSTALLED CONCRETE AND MASONRY ANCHORS.
- B. SHOP DRAWINGS: INCLUDE DETAILS FOR FABRICATED HANGERS AND SUPPORTS WHERE MATERIALS OR METHODS OTHER THAN THOSE INDICATED ARE PROPOSED FOR SUBSTITUTION.
- 1.04 QUALITY ASSURANCE
- A. COMPLY WITH NFPA 70.
- B. COMPLY WITH APPLICABLE BUILDING CODE.
- C. PRODUCT LISTING ORGANIZATION QUALIFICATIONS: AN ORGANIZATION RECOGNIZED BY OSHA AS A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) AND ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
- 1.05 DELIVERY, STORAGE, AND HANDLING
- A. RECEIVE, INSPECT, HANDLE, AND STORE PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

PART 2 PRODUCTS

- 2.01 SUPPORT AND ATTACHMENT COMPONENTS
- A. GENERAL REQUIREMENTS:
- 1. PROVIDE HANGERS, SUPPORTS, ANCHORS, FASTENERS, FITTINGS, ACCESSORIES, AND HARDWARE AS NECESSARY FOR THE COMPLETE INSTALLATION OF ELECTRICAL WORK.
 - 2. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED, WHERE APPLICABLE.
 - 3. WHERE SUPPORT AND ATTACHMENT COMPONENT TYPES AND SIZES ARE NOT INDICATED, SELECT IN ACCORDANCE WITH MANUFACTURER'S APPLICATION CRITERIA AS REQUIRED, AND SUPPORTS WITH A MINIMUM SAFETY FACTOR OF 3. INCLUDE CONSIDERATION FOR VIBRATION, EQUIPMENT OPERATION, AND SHOCK LOADS WHERE APPLICABLE.
- D. DO NOT USE PRODUCTS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING.
- E. WHERE CONDUIT OR CABLE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70 BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED.
- F. MINIMUM CONDUIT SIZES:
- 1. BRANCH CIRCUITS: 3/4-INCH TRADE SIZE.
 - 2. BRANCH CIRCUIT HOMERUNS: 3/4-INCH TRADE SIZE.
 - 3. CONTROL CIRCUITS: 1/2-INCH TRADE SIZE.
- 2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)
- A. DESCRIPTION: NFPA 70, TYPE RMC GALVANIZED STEEL RIGID METAL CONDUIT COMPLYING WITH ANSI C80.1 AND LISTED AND LABELED AS COMPLYING WITH UL 6.
- B. FITTINGS:
- 1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 6.
 - 2. MATERIAL: USE STEEL OR MALLEABLE IRON.
 - a. DO NOT USE DIE CAST ZINC FITTINGS.
 - 3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.
- 2.04 ALUMINUM RIGID METAL CONDUIT (RMC)
- A. DESCRIPTION: NFPA 70, TYPE RMC ALUMINUM RIGID METAL CONDUIT COMPLYING WITH ANSI C80.5 AND LISTED AND LABELED AS COMPLYING WITH UL 6A.
- B. FITTINGS:
- 1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 6A.
 - 2. MATERIAL: USE ALUMINUM.
 - 3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.
- 2.05 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)
- A. DESCRIPTION: NFPA 70, TYPE IMC GALVANIZED STEEL INTERMEDIATE METAL CONDUIT COMPLYING WITH ANSI C80.6 AND LISTED AND LABELED AS COMPLYING WITH UL 1242.
- B. FITTINGS:
- 1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 1242.
 - 2. MATERIAL: USE STEEL OR MALLEABLE IRON.
 - a. DO NOT USE DIE CAST ZINC FITTINGS.
 - 3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.

SECTION 260529 -- HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS (CONT.)

- G. NON-PENETRATING ROOFTOP SUPPORTS FOR LOW-SLOPE ROOFS: STEEL PEDESTALS WITH THERMOPLASTIC OR RUBBER BASES THAT REST ON TOP OF ROOFING MEMBRANE, NOT REQUIRING ANY ATTACHMENT TO THE ROOF STRUCTURE AND NOT PENETRATING THE ROOFING ASSEMBLY, WITH SUPPORT FIXTURES AS SPECIFIED.
- 1. BASE SIZES: AS REQUIRED TO DISTRIBUTE LOAD SUFFICIENTLY TO PREVENT INDENTATION OF ROOFING ASSEMBLY.
 - 2. ATTACHMENT/SUPPORT FIXTURES: AS RECOMMENDED BY MANUFACTURER, SAME TYPE AS INDICATED FOR EQUIVALENT INDOOR HANGERS AND SUPPORTS.
 - 3. MOUNTING HEIGHT: PROVIDE MINIMUM CLEARANCE OF 6 INCHES UNDER SUPPORTED COMPONENT TO TOP OF ROOFING.
- H. ANCHORS AND FASTENERS:
- 1. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED, USE THE ANCHOR AND FASTENER TYPES INDICATED FOR THE SPECIFIED APPLICATIONS.
 - 2. STEEL: USE BEAM CLAMPS, MACHINE BOLTS, OR WELDED THREADED STUDS.
 - 3. PLASTIC AND LEAD ANCHORS ARE NOT PERMITTED.
 - 4. POWDER-ACTUATED FASTENERS ARE NOT PERMITTED.
 - 5. HAMMER-DRIVEN ANCHORS AND FASTENERS ARE NOT PERMITTED.

PART 3 EXECUTION

- 3.01 EXAMINATION
- A. VERIFY THAT FIELD MEASUREMENTS ARE AS INDICATED.
- B. VERIFY THAT MOUNTING SURFACES ARE READY TO RECEIVE SUPPORT AND ATTACHMENT COMPONENTS.
- C. VERIFY THAT CONDITIONS ARE SATISFACTORY FOR INSTALLATION PRIOR TO STARTING WORK.
- 3.02 INSTALLATION
- A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- B. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP).
- C. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS.
- D. UNLESS SPECIFICALLY INDICATED OR APPROVED BY ARCHITECT, DO NOT PROVIDE SUPPORT FROM SUSPENDED CEILING SUPPORT SYSTEM OR CEILING GRID.
- E. UNLESS SPECIFICALLY INDICATED OR APPROVED BY ARCHITECT, DO NOT PROVIDE SUPPORT FROM ROOF DECK.
- F. DO NOT PENETRATE OR OTHERWISE NOTCH OR CUT STRUCTURAL MEMBERS WITHOUT APPROVAL OF STRUCTURAL ENGINEER.
- G. PROVIDE REQUIRED VIBRATION ISOLATION AND/OR SEISMIC CONTROLS IN ACCORDANCE WITH SECTION 260548.
- H. EQUIPMENT SUPPORT AND ATTACHMENT:
- 1. USE METAL FABRICATED SUPPORTS OR SUPPORTS ASSEMBLED FROM METAL CHANNEL (STRUT) TO SUPPORT EQUIPMENT AS REQUIRED.
 - 2. USE METAL CHANNEL (STRUT) SECURED TO STUDS TO SUPPORT EQUIPMENT SURFACE-MOUNTED ON HOLLOW STUD WALLS WHEN WALL STRENGTH IS NOT SUFFICIENT TO RESIST PULL-OUT.
 - 3. USE METAL CHANNEL (STRUT) TO SUPPORT SURFACE-MOUNTED EQUIPMENT IN WET OR DAMP LOCATIONS TO PROVIDE SPACE BETWEEN EQUIPMENT AND MOUNTING SURFACE.
 - 4. SECURELY FASTEN FLOOR-MOUNTED EQUIPMENT. DO NOT INSTALL EQUIPMENT SUCH THAT IT RELIES ON ITS OWN WEIGHT FOR SUPPORT.
- I. SECURE FASTENERS ACCORDING TO MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.
- J. REMOVE TEMPORARY SUPPORTS.
- 3.03 FIELD QUALITY CONTROL
- A. INSPECT SUPPORT AND ATTACHMENT COMPONENTS FOR DAMAGE AND DEFECTS.
- B. REPAIR CUTS AND ABRASIONS IN GALVANIZED FINISHES USING ZINC-RICH PAINT RECOMMENDED BY MANUFACTURER. REPLACE COMPONENTS THAT EXHIBIT SIGNS OF CORROSION.
- C. CORRECT DEFICIENCIES AND REPLACE DAMAGED OR DEFECTIVE SUPPORT AND ATTACHMENT COMPONENTS.

END OF SECTION

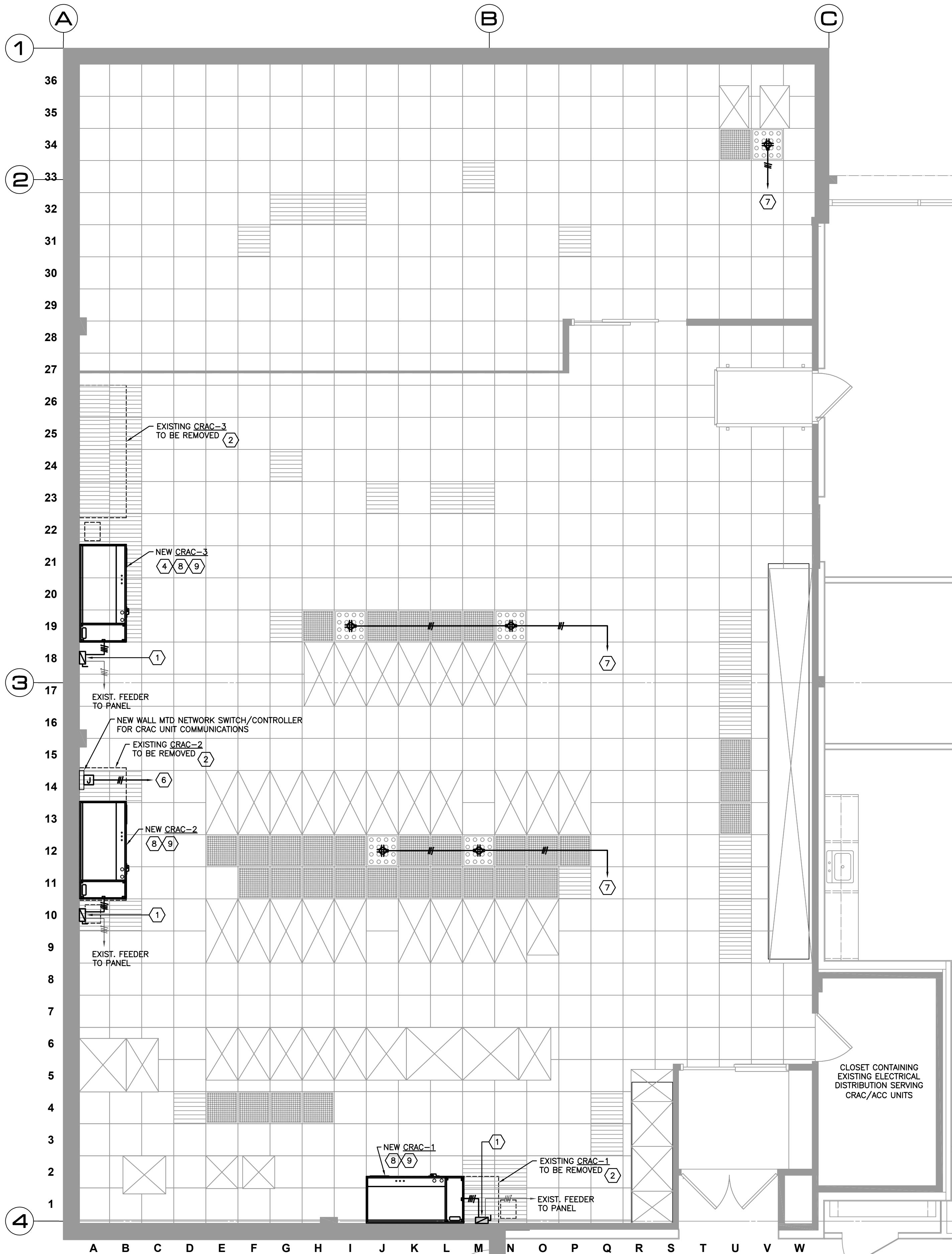
SECTION 260533.13 -- CONDUIT FOR ELECTRICAL SYSTEMS

- PART 1 GENERAL
- 1.01 REFERENCE STANDARDS
- A. ANSI C80.1 -- AMERICAN NATIONAL STANDARD FOR ELECTRICAL RIGID STEEL CONDUIT (ERSC) 2020.
 - B. ANSI C80.3 -- AMERICAN NATIONAL STANDARD FOR ELECTRICAL METALLIC TUBING -- STEEL (EMT-S) 2020.
 - C. ANSI C80.5 -- AMERICAN NATIONAL STANDARD FOR ELECTRICAL RIGID METAL CONDUIT -- ALUMINUM (EMC-A) 2020.
 - D. ANSI C80.6 -- AMERICAN NATIONAL STANDARD FOR ELECTRICAL INTERMEDIATE METAL CONDUIT 2018.
 - E. NECA 1 -- STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION 2015.
 - F. NECA 101 -- STANDARD FOR INSTALLING STEEL CONDUITS (RIGID, IMC, EMT) 2013.
 - G. NECA 102 -- STANDARD FOR INSTALLING ALUMINUM RIGID METAL CONDUIT 2004.
 - H. NEMA FB 1 -- FITTINGS, CAST METAL BOXES, AND CONDUIT BODIES FOR CONDUIT.
 - I. NEMA RW 1 -- POLYVINYL CHLORIDE (PVC) EXTERNALLY COATED GALVANIZED RIGID STEEL CONDUIT AND INTERMEDIATE METAL CONDUIT 2018.
 - J. NFPA 70 -- NATIONAL ELECTRICAL CODE MOST RECENT EDITION ADOPTED BY AUTHORITY HAVING JURISDICTION, INCLUDING ALL APPLICABLE AMENDMENTS AND SUPPLEMENTS.
 - K. UL 1 -- FLEXIBLE METAL CONDUIT CURRENT EDITION, INCLUDING ALL REVISIONS.
 - L. UL 6 -- ELECTRICAL RIGID METAL CONDUIT-STEEL CURRENT EDITION, INCLUDING ALL REVISIONS.
 - M. UL 6A -- ELECTRICAL RIGID METAL CONDUIT-ALUMINUM, RED BRASS, AND STAINLESS STEEL CURRENT EDITION, INCLUDING ALL REVISIONS.
 - N. UL 360 -- LIQUID-TIGHT FLEXIBLE METAL CONDUIT CURRENT EDITION, INCLUDING ALL REVISIONS.
 - O. UL 514A -- METALLIC OUTLET BOXES CURRENT EDITION, INCLUDING ALL REVISIONS.
 - P. UL 514B -- CONDUIT, TUBING, AND CABLE FITTINGS CURRENT EDITION, INCLUDING ALL REVISIONS.
 - Q. UL 797 -- ELECTRICAL METALLIC TUBING-STEEL CURRENT EDITION, INCLUDING ALL REVISIONS.
 - R. UL 797A -- ELECTRICAL METALLIC TUBING -- ALUMINUM AND STAINLESS STEEL CURRENT EDITION, INCLUDING ALL REVISIONS.
 - S. UL 1242 -- ELECTRICAL INTERMEDIATE METAL CONDUIT-STEEL CURRENT EDITION, INCLUDING ALL REVISIONS.
 - T. UL 2419 -- OUTLINE OF INVESTIGATION FOR ELECTRICALLY CONDUCTIVE CORROSION RESISTANT COMPOUNDS CURRENT EDITION, INCLUDING ALL REVISIONS.
- 1.02 ADMINISTRATIVE REQUIREMENTS
- A. COORDINATION:
- 1. COORDINATE MINIMUM SIZES OF CONDUITS WITH ACTUAL TYPE AND QUANTITY OF CONDUCTORS TO BE INSTALLED, INCLUDING ADJUSTMENTS FOR CONDUCTOR SIZES INCREASED FOR VOLTAGE DROP.
 - 2. COORDINATE ARRANGEMENT OF CONDUITS WITH STRUCTURAL MEMBERS, DUCTWORK, PIPING, EQUIPMENT, AND OTHER POTENTIAL CONFLICTS.
 - 3. VERIFY EXACT CONDUIT TERMINATION LOCATIONS REQUIRED FOR BOXES, ENCLOSURES, AND EQUIPMENT.
 - 4. COORDINATE WORK TO PROVIDE ROOF PENETRATIONS THAT PRESERVE INTEGRITY OF ROOFING SYSTEM AND DO NOT VOID ROOF WARRANTY.
 - 5. NOTIFY ARCHITECT OF CONFLICTS WITH OR DEVIATIONS FROM CONTRACT DOCUMENTS. OBTAIN DIRECTION BEFORE PROCEEDING WITH WORK.
- B. SEQUENCING:
- 1. DO NOT BEGIN INSTALLATION OF CONDUCTORS AND CABLES UNTIL INSTALLATION OF CONDUIT BETWEEN TERMINATION POINTS IS COMPLETE.
- 1.03 SUBMITTALS
- A. PRODUCT DATA: PROVIDE MANUFACTURER'S STANDARD CATALOG PAGES AND DATA SHEETS FOR CONDUITS AND FITTINGS.
- 1.04 QUALITY ASSURANCE
- A. PRODUCT LISTING ORGANIZATION QUALIFICATIONS: ORGANIZATION RECOGNIZED BY OSHA AS NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL) AND ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
- 1.05 DELIVERY, STORAGE, AND HANDLING
- A. RECEIVE, INSPECT, HANDLE, AND STORE CONDUIT AND FITTINGS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

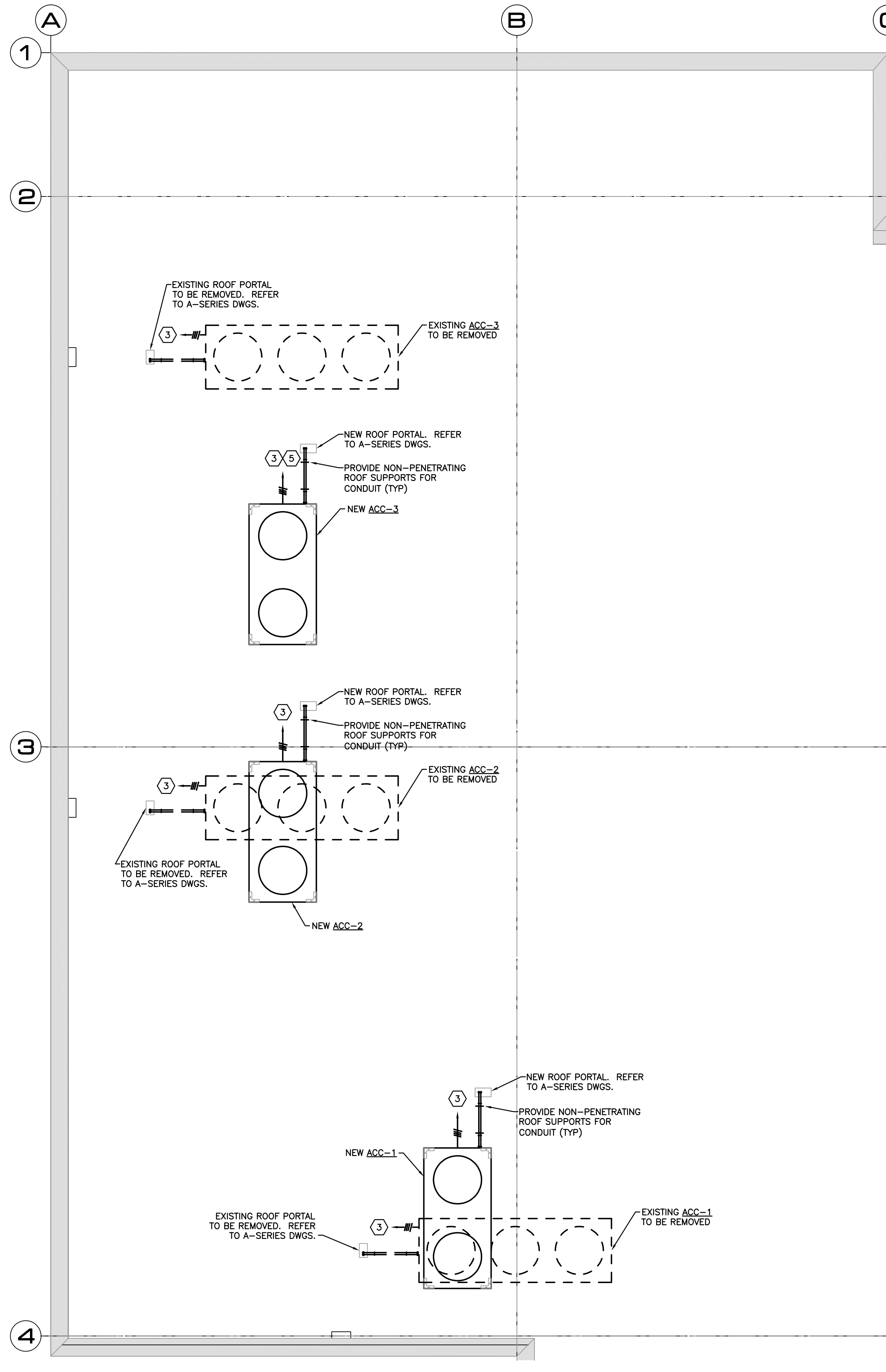
PART 2 PRODUCTS

- 2.01 CONDUIT APPLICATIONS
- A. DO NOT USE CONDUIT AND ASSOCIATED FITTINGS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70, MANUFACTURER'S INSTRUCTIONS, AND PRODUCT LISTING.
- B. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED, USE CONDUIT TYPES INDICATED FOR SPECIFIED APPLICATIONS. WHERE MORE THAN ONE LISTED APPLICATION APPLIES, COMPLY WITH MOST RESTRICTIVE REQUIREMENTS. WHERE CONDUIT TYPE FOR PARTICULAR APPLICATION IS NOT SPECIFIED, USE GALVANIZED STEEL RIGID METAL CONDUIT.
- C. EXPOSED, INTERIOR, NOT SUBJECT TO PHYSICAL DAMAGE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC), ALUMINUM RIGID METAL CONDUIT (RMC), GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC), OR ALUMINUM ELECTRICAL METALLIC TUBING (EMT).
- D. EXPOSED, INTERIOR, SUBJECT TO PHYSICAL DAMAGE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC), ALUMINUM RIGID METAL CONDUIT (RMC), OR GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC).
- E. LOCATIONS SUBJECT TO PHYSICAL DAMAGE INCLUDE, BUT ARE NOT LIMITED TO:
- a. WHERE EXPOSED BELOW GRADE, EXCEPT WITHIN ELECTRICAL AND COMMUNICATION ROOMS OR CLOSETS.
- F. EXPOSED, EXTERIOR, NOT SUBJECT TO SEVERE PHYSICAL DAMAGE: USE PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC).
- G. FLEXIBLE CONNECTIONS TO VIBRATING EQUIPMENT:
- 1. DRY LOCATIONS: USE FLEXIBLE METAL CONDUIT (FMC).
 - 2. DAMP, WET, OR CORROSIVE LOCATIONS: USE LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC).
 - 3. MAXIMUM LENGTH: 6 FEET UNLESS OTHERWISE INDICATED.
4. VIBRATING EQUIPMENT INCLUDES, BUT IS NOT LIMITED TO:
- a. TRANSFORMERS.
 - b. MOTORS.
- G. FISHED IN EXISTING WALLS, WHERE NECESSARY: USE FLEXIBLE METAL CONDUIT (FMC), GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT), OR STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT).
- 2.02 CONDUIT -- GENERAL REQUIREMENTS
- A. COMPLY WITH NFPA 70.
- B. EXISTING WORK: WHERE EXISTING CONDUITS ARE INDICATED TO BE REUSED, THEY MAY BE REUSED ONLY WHERE THEY COMPLY WITH SPECIFIED REQUIREMENTS, ARE FREE FROM CORROSION, AND INTEGRITY IS VERIFIED BY PULLING MANDREL THROUGH THEM.
- C. FITTINGS FOR GROUNDING AND BONDING: SEE SECTION 260526 FOR ADDITIONAL REQUIREMENTS.
- D. PROVIDE CONDUIT, FITTINGS, SUPPORTS, AND ACCESSORIES REQUIRED FOR COMPLETE RACEWAY SYSTEM.
- E. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR PURPOSE INTENDED.
- F. MINIMUM CONDUIT SIZE, UNLESS OTHERWISE INDICATED:
- 1. BRANCH CIRCUITS: 3/4-INCH TRADE SIZE.
 - 2. BRANCH CIRCUIT HOMERUNS: 3/4-INCH TRADE SIZE.
 - 3. CONTROL CIRCUITS: 1/2-INCH TRADE SIZE.
- 2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)
- A. DESCRIPTION: NFPA 70, TYPE RMC GALVANIZED STEEL RIGID METAL CONDUIT COMPLYING WITH ANSI C80.1 AND LISTED AND LABELED AS COMPLYING WITH UL 6.
- B. FITTINGS:
- 1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 6.
 - 2. MATERIAL: USE STEEL OR MALLEABLE IRON.
 - a. DO NOT USE DIE CAST ZINC FITTINGS.
 - 3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.
- 2.04 ALUMINUM RIGID METAL CONDUIT (RMC)
- A. DESCRIPTION: NFPA 70, TYPE RMC ALUMINUM RIGID METAL CONDUIT COMPLYING WITH ANSI C80.5 AND LISTED AND LABELED AS COMPLYING WITH UL 6A.
- B. FITTINGS:
- 1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 6A.
 - 2. MATERIAL: USE ALUMINUM.
 - 3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.
- 2.05 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)
- A. DESCRIPTION: NFPA 70, TYPE IMC GALVANIZED STEEL INTERMEDIATE METAL CONDUIT COMPLYING WITH ANSI C80.6 AND LISTED AND LABELED AS COMPLYING WITH UL 1242.
- B. FITTINGS:
- 1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 1242.
 - 2. MATERIAL: USE STEEL OR MALLEABLE IRON.
 - a. DO NOT USE DIE CAST ZINC FITTINGS.
 - 3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.

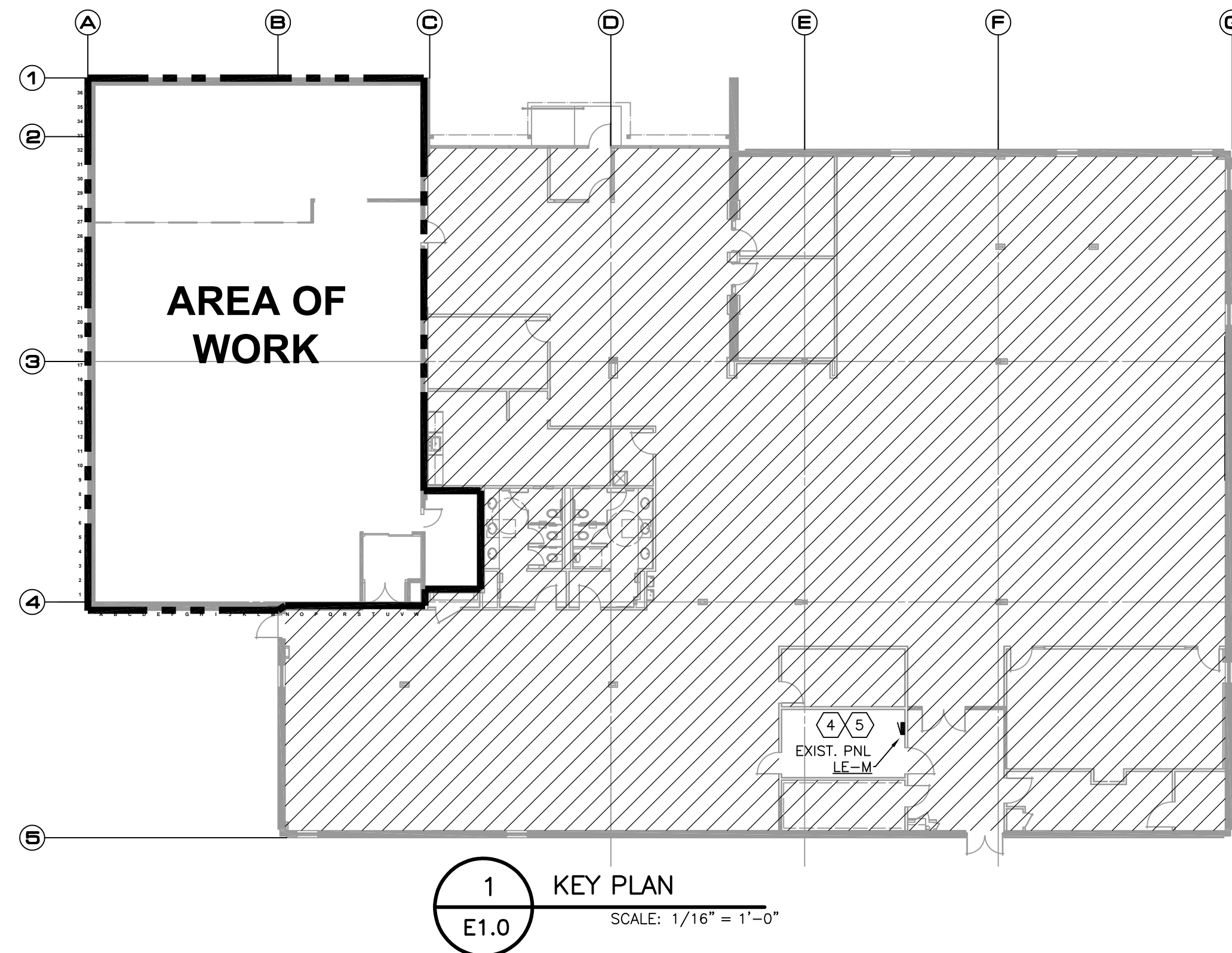
SECTION 260533.13 -- CONDUIT FOR ELECTRICAL SYSTEMS (CONT.)</



2 ELECTRICAL FIRST FLOOR PARTIAL PLAN
E1.0 SCALE: 1/4" = 1'-0"



3 ELECTRICAL ROOF PARTIAL PLAN
E1.0 SCALE: 1/4" = 1'-0"



1 KEY PLAN
E1.0 SCALE: 1/16" = 1'-0"

- CODED NOTES:**
- 1 PROVIDE NEW DISC SW AND RE-ROUTE EXISTING CRAC FEEDER TO LINE SIDE TERMINALS. PROVIDE NEW LOAD SIDE FEEDER TO NEW CRAC UNIT. REFER TO DETAIL 1 ON E0.0.
 - 2 DISCONNECT EXISTING BELOW RAISED ACCESS FLOOR FEEDER FROM REMOVED CRAC UNIT AND RE-ROUTE TO NEW WALL MOUNTED DISC SW TO SERVE NEW CRAC UNIT. REMOVE EXISTING CONTROL CONDUCTORS BETWEEN CRAC UNIT AND ACC. RETAIN CONTROL CONDUIT PATHWAYS FOR USE WITH NEW CRAC AND ACC.
 - 3 DISCONNECT EXISTING FEEDER FROM ACC AND EXTEND AS NECESSARY TO NEW ROOF PORTAL TO SERVE NEW ACC AT NEW LOCATION.
 - 4 PROVIDE TEMPORARY FEEDER FROM EXISTING PANEL LE-M CONSISTING OF (3) #3 + (1) #8G TO CRAC-3 WHILE THE EXISTING CRAC-3 REMAINS IN OPERATION. REMOVE TEMPORARY FEEDER ONCE CRAC-3 IS CONNECTED TO THE DECOMMISSIONED CRAC-3 FEEDER.
 - 5 PROVIDE TEMPORARY FEEDER FROM EXISTING PANEL LE-M CONSISTING OF (3) #12 + (1) #12G TO ACC-3 WHILE THE EXISTING ACC-3 REMAINS IN OPERATION. REMOVE TEMPORARY FEEDER ONCE ACC-3 IS CONNECTED TO THE DECOMMISSIONED ACC-3 FEEDER.
 - 6 PROVIDE NEW 120VAC, 20A CIRCUIT FROM EXISTING NON-UPS SERVER ROOM POWER DISTRIBUTION TO SUPPORT CRAC UNIT NETWORK SWITCH/CONTROLLER.
 - 7 INSTALL QUAD RECEPTACLE UNDER RAISED ACCESS FLOOR TO SERVE FAN-POWERED FLOOR TRAY. PROVIDE NEW 120VAC, 20A CIRCUIT FROM EXISTING NON-UPS SERVER ROOM POWER DISTRIBUTION.
 - 8 PROVIDE NEW CONTROL WIRING BETWEEN CRAC UNIT AND ACC. RE-USE EXISTING CONDUIT PATHWAYS TO THE GREATEST EXTENT POSSIBLE. RE-ROUTE AS NECESSARY TO NEW EQUIPMENT LOCATIONS. REFER TO DETAIL 1 ON E0.0.
 - 9 PROVIDE CAT5E CABLING BETWEEN NETWORK SWITCH/CONTROLLER AND CRAC UNITS. REFER TO DETAIL 2 ON E0.0.

UNIFORM CODE STATEMENT:
TO THE BEST OF THE REGISTERED DESIGN PROFESSIONAL'S KNOWLEDGE, BELIEF, AND OPINION, THE DESIGN AND CONSTRUCTION OF THE PROJECT AND/OR SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 ENERGY CODE.

ENERGY CODE STATEMENT:
TO THE BEST OF THE REGISTERED DESIGN PROFESSIONAL'S KNOWLEDGE, BELIEF, AND OPINION, THE DESIGN AND CONSTRUCTION OF THE PROJECT AND/OR SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 ENERGY CODE.

NYSIF CRAC UNIT REPLACEMENT
8 COMPUTER DRIVE WEST
ALBANY, NY

REVISION	DESCRIPTION	DATE

Quantum Engineering Co., P.C.
48 THATCHER ST. SELKIRK, NY 12158
TEL: 518-767-9450 FAX 518-767-9442
Q&P PROJECT: 2428 DRAWN BY: AEW CHECKED BY: ACW

ELECTRICAL FLOOR PLANS

E1.0

E1.0

SCALE: AS NOTED

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work performed by Owner.
5. Multiple Work Packages.
6. Work under Owner's separate contracts.
7. Future work not part of this Project.
8. Owner's product purchase contracts.
9. Owner-furnished/Contractor-installed (OFICI) products.
10. Owner-furnished/Owner-installed (OFOI) products.
11. Contractor-furnished/Owner-installed (CFOI) products.
12. Contractor's use of site and premises.
13. Coordination with occupants.
14. Work restrictions.
15. Specification and Drawing conventions.
16. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 017300 "Execution" for coordination of Owner-installed products.

1.2 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.3 PROJECT INFORMATION

- A. Project Identification: **NYSIF CRAC UNIT REPLACEMENT; SD929.**

1. Project Location: **8 Computer Drive West Albany, NY.**

B. Owner:

1. Owner's Representative: Jessica Alber (jalber@nysif.com) (518-437-4651).

- C. Architect: Spring Line Design Architecture and Engineering; 73 Troy Road; East Greenbush, NY 12061; Tel: 518-487-4755; sld@springlinedesign.com.
- D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
 - 1. Mechanical Consultant : Quantum Engineering, Co; P.C.
 - 2. constructor. The terms "design-builder" and "Contractor" are synonymous.
- E. Project Coordinator for Multiple Contracts: Owner shall serve as Project coordinator.
- F. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Section 013100 "Project Management and Coordination." for requirements for using web-based Project software.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
 - 1. <The existing building is classified as a Group B occupancy with Type II B construction type. The scope of the work is classified as alteration level 2. The scope of the project involves replacement of three CRAC units in a 3000 sqft server room, replacement of three ACC condenser units at the roof and other Work indicated in the Contract Documents.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.5 WORK UNDER OWNER'S SEPARATE CONTRACTS

- A. Work with Separate Contractors: The awarded contractor will have the opportunity to subcontract but will not know what the Contractor will need to sub out until we receive the proposal. The awarded Contractor will perform or coordinate all of the work necessary to complete the project.

1.6 OWNER'S PRODUCT PURCHASE CONTRACTS

- A. Owner has negotiated Product Purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these Product Purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum unless otherwise indicated.

1. Contractor's responsibilities are same as if Contractor had negotiated Product Purchase contracts, including responsibility to renegotiate purchase and to execute final purchasing agreements.

1.7 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Limits on Use of Site: Limit use of Project site to **Work in areas** and **areas within the Contract limits** indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 1. Limits on Use of Site: Confine construction operations to **areas indicated in the Contract Drawings**.
 2. Driveways, Walkways and Entrances: Keep driveways **parking garage, loading areas**, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. A remote area of the parking lot small parking area will be provided to the contractor for materials. The staging area will be identified prior to the start of work. During off hours, the parking lot is available. No parking available on site during normal business hours, however street parking is available. Parking lot is available for the contractor to utilize during off hours.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.8 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy Project site and **existing** building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
 3. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between **Friday 6 p.m. to Monday 7 a.m.**, Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
 - 1. Weekend Hours: This work will be completed in one weekend.
 - 2. Work in Existing Building: Contractor is to sign in with security upon arrival. Any person working inside the building will be issued a temporary badge.
 - 3. Hours for Utility Shutdowns: **The data center must remain fully functional; the AC's must be replaced 1 at a time with no more than 1 AC offline at any time.**
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
 - 1. Notify **Owner** not less than **5** days in advance with a project safety plan prior to the commencement of work.
 - 2. Contractor is to replace each roof top unit one at a time so there is no lapse in climate control in the server room.
- D. Smoking and Controlled Substance Restrictions: Use of tobacco products, **alcoholic beverages**, and other controlled substances **within the existing building on Project site on Owner's property** is not permitted.
- E. Employee Identification: **Owner will provide** identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- F. Employee Screening: Comply with Owner's requirements for **Covid** screening of Contractor personnel working on Project site.
 - 1. Maintain list of approved screened personnel with Owner's representative.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations **scheduled on Drawings and published as part of the U.S. National CAD Standard.**
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUBSTITUTION PROCEDURES

- A. Substitutions include changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A provided at the end of this Section.
 - 2. Submit requests within three days after the Notice of Award.
 - 3. Identify product to be replaced and show compliance with requirements for substitutions. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified, a list of changes needed to other parts of the Work required to accommodate proposed substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.
- C. Architect will review proposed substitutions and notify Contractor of their acceptance or rejection by Change Order. If necessary, Architect will request additional information or documentation for evaluation.
 - 1. Architect will notify Contractor of acceptance or rejection of proposed substitution within five days of receipt of request, or three days of receipt of additional information or documentation, whichever is later.
- D. Do not submit unapproved substitutions on Shop Drawings or other submittals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 CONTRACT MODIFICATION PROCEDURES

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.
- B. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work.
 - 1. Proposal Requests are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time.
- C. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
- D. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor, for all changes to the Contract Sum or the Contract Time.
- E. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

- A. Subcontract List: Submit a written summary identifying individuals or firms proposed for each portion of the Work.
- B. Key Personnel Names: Prior to starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. List e-mail addresses and telephone numbers.
- C. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.
- D. Requests for Interpretation (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use forms included.
- E. Electronic Mail: Use electronic mail for purposes of managing project communication and documentation until Final Completion.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.
- B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 2. Architect will discard submittals received from sources other than the Contractor.
- C. Paper Submittals: Place a permanent label or title block on each submittal for identification. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect. Include the following information on the label:
 - 1. Project name.
 - 2. Date.
 - 3. Name and address of Contractor.
 - 4. Name and address of subcontractor or supplier.
 - 5. Number and title of appropriate Specification Section.

- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
 - 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with unique identifier, including project identifier, Specification Section number, and revision identifier.
 - 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
- E. Identify options requiring selection by Architect.
- F. Identify deviations from the Contract Documents on submittals.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections.
 - 1. Send electronic submittals as Portable Document Format (PDF) electronic files directly to the electronic mail account specifically established for Project.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2.2 SUBMITTALS

- A. Submit no less than three, but no more than five, paper copies of each submittal unless otherwise indicated. Architect will retain two copies.
- B. Product Data: Mark each copy to show applicable products and options. Include the following:
 - 1. Manufacturer's written recommendations, product specifications, and installation instructions.
 - 2. Wiring diagrams showing factory-installed wiring.
 - 3. Printed performance curves and operational range diagrams.
 - 4. Testing by recognized testing agency.
 - 5. Compliance with specified standards and requirements.
- C. Initial Color Selection Submittals:
 - 1. Color and pattern charts to be submitted in the same manner as paper submittals. Do not submit electronically.

- D. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches. Include the following:
 - 1. Dimensions and identification of products.
 - 2. Fabrication and installation drawings and roughing-in and setting diagrams.
 - 3. Wiring diagrams showing field-installed wiring.
 - 4. Notation of coordination requirements.
 - 5. Notation of dimensions established by field measurement.
- E. Electronic Shop Drawings: Shop Drawings submitted electronic to be submitted full scale without reduction or enlargement of original shop drawing. All shop drawings to have a written scale or a graphic scale, and the minimum text size is to be 1/8" high.
- F. Samples: Submit three Samples for review of kind, color, pattern, and texture and for a comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label. Samples will not be returned unless noted otherwise in specification for each product.
- G. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

2.3 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 SUBMITTAL REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Architect will review each submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp, and will mark stamp appropriately to indicate action.
- C. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.2 ACTION STAMPS

- A. Approved: Products, samples, or other submittals that are marked with an “Approved” stamp are approved as submitted by the Contractor for use in the Work provided it complies with the Contract Documents.
- B. Approved as Noted: Products, samples, or other submittals that are marked with an “Approved as Noted” stamp are approved with comments on the submittals. Such submittals may be used to complete the Work by the Contractor, provided it complies with the Contract Documents, and if the Contractor incorporates changes in the Work due to the reviewer’s comments. If the Contractor disagrees with or cannot incorporate the changes then the Contractor must resubmit to the Architect.
- C. Returned for Corrections: Products, samples, or other submittals that are marked with a “Returned for Corrections” stamp are not approved and the reviewer has made comments regarding items that need correction before approval can be granted. The Contractor is to incorporate changes and provide missing items as requested by the reviewer and resubmit to the Architect.
- D. Disapproved: Products, samples, or other submittals that are marked with a “Disapproved” stamp are not approved and are not to be used in the Work. The Contractor will submit another product or information that meets the performance requirements of the specification.
- E. Acknowledged: Products, samples, or other submittals that are marked with an “Acknowledged” stamp are items that do not require the Architect’s approval however they are stamped to indicate that the item has been received (for example: SDS sheets). No further submission is required.
- F. No Action Taken: Products, samples, or other submittals that are marked with a “No Action Taken” stamp are neither approved nor disapproved and the information bearing this stamp is not a required submittal.

END OF SECTION 013000

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Architect for a decision.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, notices, receipts for fee payments, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- E. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
- B. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- B. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.
 - 1. Show compliance with requirements for comparable product requests.
 - 2. Architect will review the proposed product and notify Contractor of its acceptance or rejection.
- C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.
- D. Compatibility of Options: If Contractor is given option of selecting between two or more products, select product compatible with products previously selected.
- E. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - 4. Store materials in a manner that will not endanger Project structure.
 - 5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
- F. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. Provide products that comply with the Contract Documents, are undamaged, and, unless otherwise indicated, are new at the time of installation.
 - 1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
 - 2. Where products are accompanied by the term "as selected," Architect will make selection.
 - 3. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Where the following headings are used to list products or manufacturers, the Contractor's options for product selection are as follows:
 - 1. Products:
 - a. Where requirements include "one of the following," provide one of the products listed that complies with requirements.
 - b. Where requirements do not include "one of the following," provide one of the products listed that complies with requirements or a comparable product.
 - 2. Manufacturers:
 - a. Where requirements include "one of the following," provide a product that complies with requirements by one of the listed manufacturers.
 - b. Where requirements do not include "one of the following," provide a product that complies with requirements by one of the listed manufacturers or another manufacturer.
 - 3. Basis-of-Design Product: Provide the product named, or indicated on the Drawings, or a comparable product by one of the listed manufacturers.
- C. Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Architect will consider Contractor's request for comparable product when the following conditions are satisfied:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications.
3. List of similar installations for completed projects, if requested.
4. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 EXECUTION REQUIREMENTS

- A. Cutting and Patching:
 - 1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 2. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.2 CLOSEOUT SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Operation and Maintenance Data: Submit one copy of manual.
- C. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit on digital media.
- D. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

- A. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
- B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
 - 1. Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other sections, including project record documents, operation and maintenance manuals, property surveys, similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 3. Submit maintenance material submittals specified in other sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner.

- C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner.
 3. Participate with Owner in conducting inspection and walkthrough with local authorities having jurisdiction.
 4. Remove temporary facilities and controls.
 5. Complete final cleaning requirements, including touchup painting.
 6. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1.4 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:
1. Submit a final Application for Payment.
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

- B. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

2.2 OPERATION AND MAINTENANCE DOCUMENTATION

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system.
- C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:
 - 1. Manufacturer's operation and maintenance documentation.
 - 2. Maintenance and service schedules.
 - 3. Maintenance service contracts. Include name and telephone number of service agent.
 - 4. Emergency instructions.
 - 5. Spare parts list and local sources of maintenance materials.
 - 6. Wiring diagrams.
 - 7. Copies of warranties. Include procedures to follow and required notifications for warranty claims

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Existing Conditions: The existence and location utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of utilities, mechanical and electrical systems, and other construction affecting the Work.
- B. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Verify compatibility with and suitability of substrates.
 - 2. Examine roughing-in for mechanical and electrical systems.
 - 3. Examine walls, floors, and roofs for suitable conditions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

- E. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.2 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations.
- C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.
- E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
- F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- G. Use products, cleaners, and installation materials that are not considered hazardous.

3.3 CUTTING AND PATCHING

- A. Provide temporary support of work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Cutting: Cut in-place construction using methods least likely to damage elements retained or adjoining construction.
 - 1. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- D. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - 1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.

2. Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance.
3. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

3.4 CLEANING

- A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 3. Remove debris from concealed spaces before enclosing the space.
- B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:
 1. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
 3. Remove labels that are not permanent.
 4. Clean transparent materials. Remove excess glazing compounds.
 5. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
 6. Vacuum carpeted surfaces and wax resilient flooring.
 7. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean light fixtures, lamps, globes, and reflectors.

3.5 OPERATION AND MAINTENANCE MANUAL PREPARATION

- A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 1. Prepare supplementary text if manufacturers' standard printed data are unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.

- C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams.

3.6 DEMONSTRATION AND TRAINING

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:
 - 1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION 017000