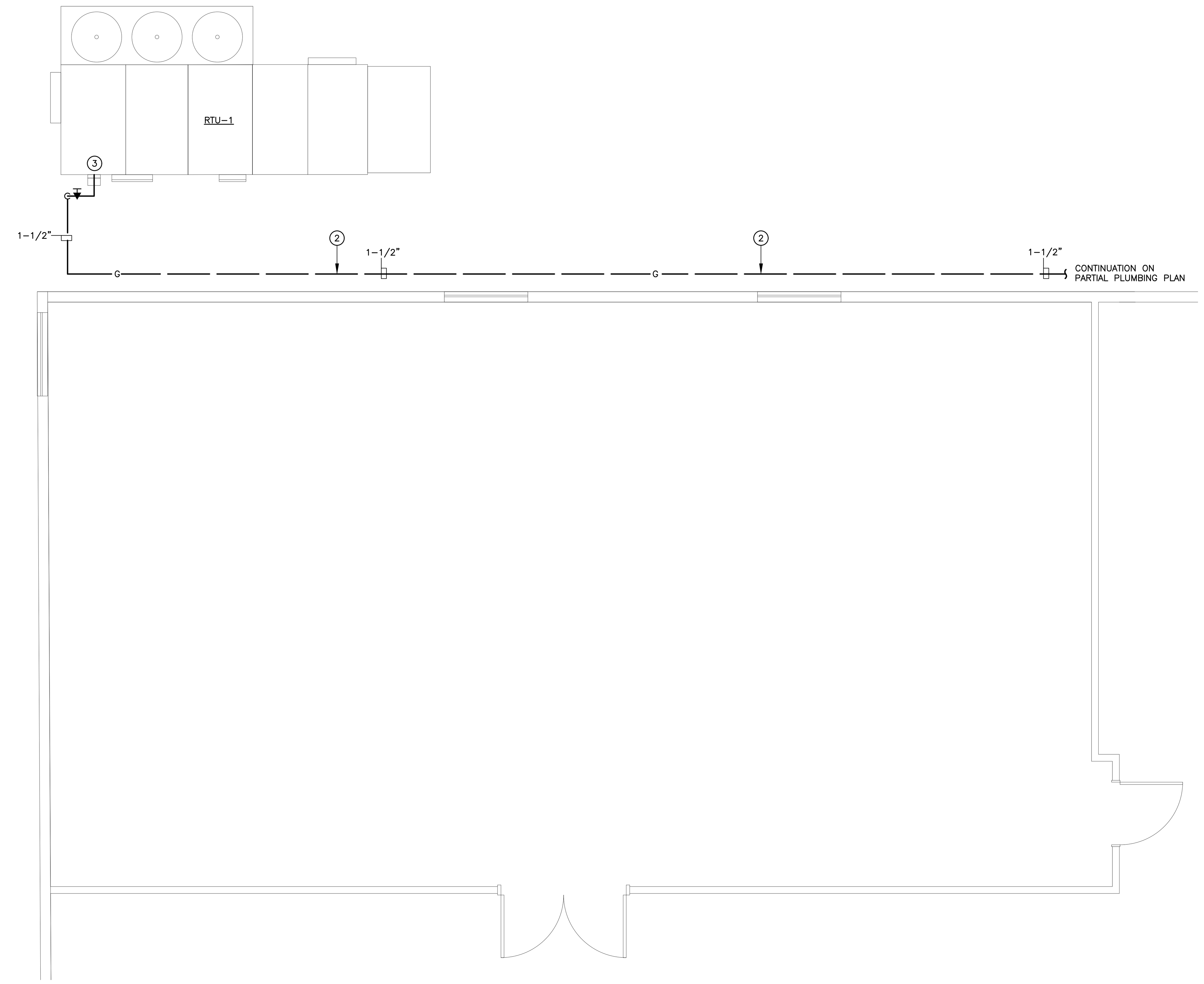
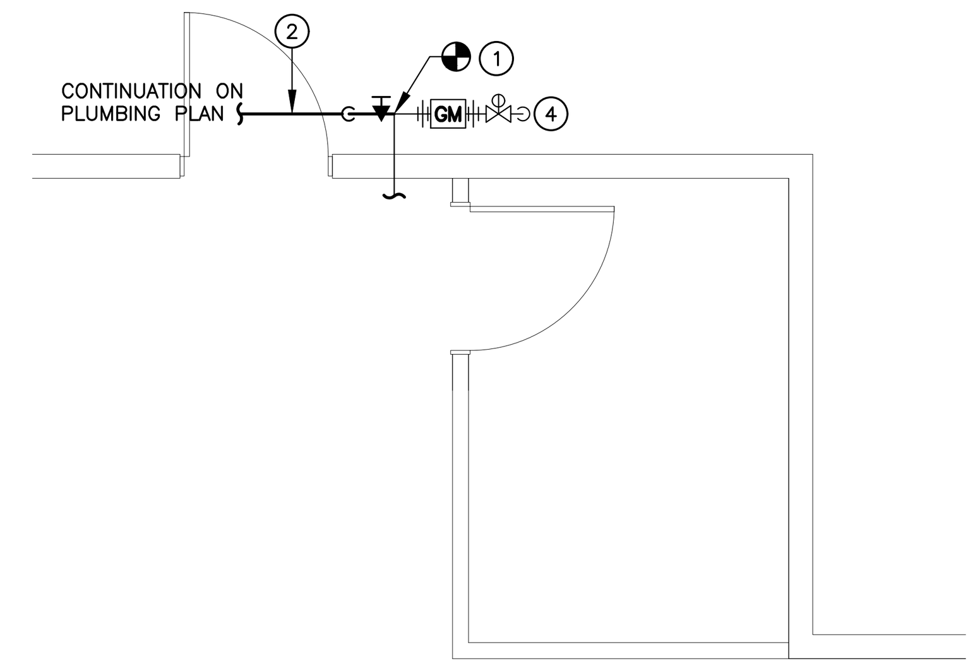


PLUMBING PLAN
SCALE: 1/4"= 1'-0"

PLUMBING DRAWING NOTES

1. CONNECT NEW 1-1/2" NATURAL GAS PIPING TO EXISTING 4" PIPING. PROVIDE 1-1/2" SHUTOFF VALVE ABOVE GROUND BEFORE GOING BELOW GRADE.
2. RUN NEW 1-1/2" GAS PIPING UNDERGROUND TO RTU-1.
3. PROVIDE 1-1/2" GAS PIPING WITH 200 CFH @ 14" OF W.C. OF NATURAL GAS AND MAKE FINAL CONNECTIONS TO RTU-1. COORDINATE WITH HVAC CONTRACTOR WITH ALL FINAL EQUIPMENT REQUIREMENTS.
4. CONTRACTOR SHALL COORDINATE WITH LOCAL GAS COMPANY FOR INCREASED GAS LOAD AND THEIR REQUIREMENTS.



PARTIAL PLUMBING PLAN
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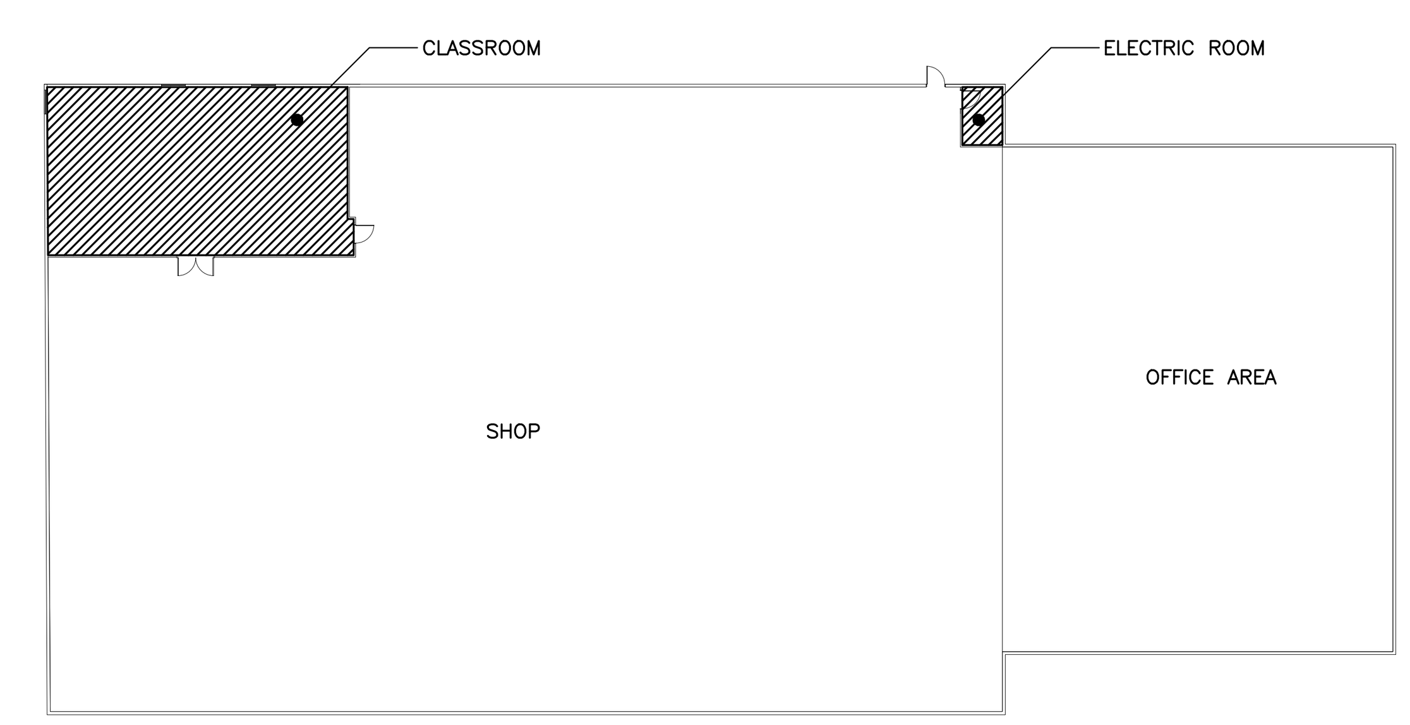

KEY PLAN
SCALE: 1/32"= 1'-0"

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TITLE:
PLUMBING PLANS

SHEET NUMBER:
P-1

PLUMBING SPECIFICATIONS

TECHNICAL REQUIREMENTS

THESE SPECIFICATIONS CALL OUT CERTAIN DUTIES OF THE CONTRACTOR AND HIS SUBCONTRACTOR. THEY ARE NOT INTENDED AS SUBCONTRACT DOCUMENTS, NOR ARE THEY INTENDED AS A MATERIAL LIST OF ITEMS REQUIRED BY THE CONTRACT.

PROVIDE ALL ITEMS AND WORK CALLED FOR IN THIS DIVISION OF THE SPECIFICATIONS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THIS INCLUDES ALL INCIDENTALS, EQUIPMENT, APPLIANCES, SERVICES, HOISTING, SCAFFOLDING, SUPPORTS, TOOLS, SUPERVISION LABOR, CONSUMABLE ITEMS, FEES, LICENSES, ETC., NECESSARY TO PROVIDE COMPLETE SYSTEMS. PERFORM START UP AND CHECK OUT EACH ITEM AND SYSTEM TO PROVIDE FULLY OPERABLE SYSTEMS.

INTENT OF DRAWINGS

DO NOT SCALE DRAWINGS. CHECK EXISTING SPACE CONDITIONS AT THE JOB SITE.

CODES AND STANDARDS

INTERNATIONAL BUILDING CODE IBC, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

INTERNATIONAL PLUMBING CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

NFPA 101, LIFE SAFETY CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

NFPA 54: NATIONAL FUEL GAS CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

NFPA 70: NATIONAL ELECTRICAL CODE, 2020 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

CONNECTICUT DEPARTMENT OF PUBLIC HEALTH CODE.

OCCUPATIONAL SAFETY AND HEALTH STANDARDS.

DEPARTMENT OF ENVIRONMENTAL PROTECTION.

INTERNATIONAL ENERGY CONSERVATION CODE, 2021, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

STATE DEMOLITION CODE.

LOCAL BUILDING CODE.

ICC/ANSI A117.1, 2017, ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

COMPLY WITH ALL APPLICABLE GOVERNMENTAL REGULATIONS. COMPLY WITH ALL FEDERAL, STATE, CITY, INSURANCE UNDERWRITERS AND OTHER APPLICABLE CODES AND ORDINANCES. IF ANY CONFLICT ARISES BETWEEN THESE SPECIFICATIONS, CODES AND ORDINANCES, IMMEDIATELY NOTIFY THE ENGINEER. DO NOT DEVIATE FROM THE SPECIFICATIONS NOR INSTALL ANY WORK WHICH MAY BE IN CONFLICT WITH CODES AND ORDINANCES UNTIL THE CONFLICT IS RESOLVED AND THE SOLUTION APPROVED BY THE ENGINEER.

SUBMITTALS

PRODUCT DATA: SUBMIT MANUFACTURER'S TECHNICAL PRODUCT DATA, INCLUDING RATED CAPACITIES OF SELECTED MODEL CLEARLY INDICATED, FURNISHED SPECIALTIES AND ACCESSORIES; AND INSTALLATION INSTRUCTIONS.

SHOP DRAWINGS: SUBMIT MANUFACTURER'S ASSEMBLY TYPE SHOP DRAWINGS INDICATING DIMENSIONS, ROUGHING–IN REQUIREMENTS, REQUIRED CLEARANCES, AND METHODS OF ASSEMBLY OF COMPONENTS AND ANCHORAGES.

MAINTENANCE DATA: SUBMIT MAINTENANCE DATA AND PARTS LISTS FOR EACH TYPE OF PLUMBING FIXTURE AND ACCESSORY; INCLUDING "TROUBLE SHOOTING" MAINTENANCE GUIDE. INCLUDE THIS DATA, PRODUCT DATA AND SHOP DRAWINGS IN MAINTENANCE MANUAL.

CERTAIN TERMS SUCH AS "SHALL, PROVIDE, INSTALL, COMPLETE, START–UP" ARE NOT USED IN SOME PARTS OF THESE SPECIFICATIONS. THIS DOES NOT INDICATE ITEMS SHALL BE LESS THAN COMPLETELY INSTALLED OR THAT SYSTEMS SHALL BE LESS THAN COMPLETE.

PERMITS AND FEES

SECURE AND PAY COSTS OF PERMITS, CERTIFICATES, LICENSES, INSPECTIONS AND APPROVALS.

ADJUSTMENTS

UPON COMPLETION OF WORK, PERFORM THE FOLLOWING ADJUSTMENT PROCEDURES:

ADJUST SYSTEMS COMPONENTS FOR PROPER PERFORMANCE.
OPEN AND CLOSE VALVES, SET IN PROPER OPERATING POSITION.

ACCESSIBILITY

PLACE VALVES, UNIONS, DRAINS, AND ITEMS REQUIRING MAINTENANCE, ADJUSTMENT, OR REPAIR, IN ACCESSIBLE LOCATIONS. COORDINATE ACCESS PANELS WITH ARCHITECT.

REFERENCE PUBLICATIONS

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) AND AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) PUBLICATIONS ARE REFERRED TO HEREIN, BECAUSE THESE PUBLICATIONS ARE REVISED FREQUENTLY, DATES FOLLOWING PUBLICATION NUMBERS HAVE BEEN OMITTED. REFER TO LATEST EDITION.

COORDINATION OF WORK

TRANSMIT TO OTHER TRADES ALL INFORMATION REQUIRED FOR WORK TO BE PROVIDED UNDER THEIR RESPECTIVE SECTIONS IN AMPLE TIME FOR INSTALLATION.

WHEREVER WORK INTERCONNECTS WITH WORK OF OTHER TRADES, COORDINATE WITH OTHER TRADES TO INSURE THAT ALL TRADES HAVE THE INFORMATION NECESSARY SO THEY MAY PROPERLY INSTALL ALL THE NECESSARY CONNECTIONS AND EQUIPMENT. IDENTIFY ALL WORK ITEMS (VALVES, DRAINS, ETC.) IN AN APPROVED MANNER IN ORDER THAT THE CEILING SUBCONTRACTOR WILL KNOW WHERE TO INSTALL ACCESS DOORS AND PANELS.

CONSULT WITH OTHER TRADES REGARDING EQUIPMENT SO, WHEREVER POSSIBLE, MOTORS AND CONTROL ARE OF THE SAME MANUFACTURER.

FURNISH AND SET ALL SLEEVES FOR PASSAGE OF PIPES AND CONDUITS THROUGH STRUCTURAL MASONRY AND CONCRETE WALL AND FLOORS, AND ELSEWHERE AS WILL BE REQUIRED FOR THE PROTECTION OF EACH PIPE PASSING THROUGH BUILDING SURFACES.

PROVIDE REQUIRED SUPPORTS AND HANGERS FOR PIPING, FIXTURES AND EQUIPMENT, SO LOADING WILL NOT EXCEED ALLOWABLE LOADINGS OF STRUCTURE.

CONFORM THE PLUMBING WORK TO THE REQUIREMENTS HEREIN. PROVIDE OFFSETS, FITTINGS, DRAINS, AND ACCESSORIES WHICH MAY BE REQUIRED. INVESTIGATE THE STRUCTURAL AND FINISH CONDITIONS AFFECTING THE WORK, AND ARRANGE THE WORK ACCORDINGLY. PROVIDE SUCH PIPING, FITTINGS, VALVES AND ACCESSORIES AS MAY BE REQUIRED TO MEET SUCH CONDITIONS.

PIPING IDENTIFICATION

CONSPICUOUSLY IDENTIFY NEW PIPING WITH SELF–ADHERING VINYL PLASTIC COLOR BANDS AND PIPE MARKERS IMPRINTED WITH LEGEND, BASED ON ANSO A13.1 "SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS".

APPLY LEGENDS TO FEED AND CROSS MAIN PIPING ADJACENT TO CHANGES IN DIRECTION WHERE PIPES PASS THROUGH WALLS OR FLOORS, AT INTERVALS NOT EXCEEDING 40 FEET IN STRAIGHT PIPING RUNS, AND ADJACENT TO CROSS MAIN CONNECTIONS WITH FEED MAIN.

MINIMUM LETTER SIZE:

1/2" FOR PIPING 3/4" TO 1–1/4" OD
3/4" FOR PIPING 1–1/2" TO 2" OD
1–1/4" FOR PIPING 2–1/2" TO 6" OD

MINIMUM COLOR BAND WIDTH:

8" FOR PIPING 3/4" TO 2" OD
12" FOR PIPING 2–1/2" TO 6" OD

OPERATING INSTRUCTIONS

INSTRUCT OWNER'S OPERATING PERSONNEL ON PROPER CARE, MAINTENANCE AND OPERATING PROCEDURES.

MAINTENANCE MANUAL

INCLUDE FOLLOWING IN MANUALS:

MANUFACTURER'S DESCRIPTIVE DATA
MANUFACTURER'S WARRANTY & SERVICE CERTIFICATES
INSTRUCTIONS FOR PERIODIC CLEANING AND MAINTENANCE
PROCEDURES FOR SYSTEMS START–UP AND SHUT–DOWN
VALVE LOCATION AND TAG NUMBER CHARTS.

CLEANING

CLEAN PIPING PRIOR TO PAINTING.

UPON COMPLETION OF WORK, PERFORM THE FOLLOWING CLEANING PROCEDURES:

REMOVE PROTECTIVE COVERS AFTER PAINTING
CLEAN PIPING AND EQUIPMENT
REMOVE SURPLUS MATERIALS AND RUBBISH
RESTORE DAMAGED SURFACE FINISHES

ADJUSTMENTS

UPON COMPLETION OF WORK, PERFORM THE FOLLOWING ADJUSTMENT PROCEDURES:

ADJUST SYSTEMS COMPONENTS FOR PROPER PERFORMANCE
OPEN AND CLOSE VALVES, SET IN PROPER OPERATING POSITION.
SEAL CONTROL VALVES OPEN

GUARANTEE

SUPPLY TWO COPIES OF A WARRANTY COUNTERSIGNED AND GUARANTEED BY CONTRACTOR, STATING THAT IMPERFECT SYSTEM OPERATION AND ALL DEFECTS IN LABOR AND MATERIALS WILL BE REPAIRED WITHOUT COST TO OWNER FOR A PERIOD OF ONE YEAR FROM DATE OF SUBSTANTIAL COMPLETION, AND STATING THAT ALL PLUMBING EQUIPMENT HAS BEEN FULLY SERVICED AND LEFT IN PROPER OPERATING CONDITION.

ALSO GUARANTEE THAT SERVICING WILL BE PROVIDED WITHOUT COST DURING GUARANTEE PERIOD.

PIPE SLEEVE INSTALLATION

PROVIDE FOR PIPING PASSING THROUGH WALLS, PARTITIONS AND SLAB, SLEEVES SIZED AT LEAST 1 INCH LARGER THAN OD OF PIPE.

SLEEVES ARE REQUIRED FOR PIPING PASSING THROUGH FIRE–RATED WALLS CONSTRUCTED OF METAL STUDS AND GYPSUM WALLBOARD.

TERMINATE SLEEVES THROUGH WALLS, PARTITIONS AND CEILINGS FLUSH WITH FINISHED SURFACES: THROUGH SLABS 1/2" ABOVE FLOOR FINISH IN HABITABLE SPACES AND 2" ABOVE ROUGH FINISH IN PIPE SPACES AND OTHER UNFINISHED AREAS.

SET SLEEVES IN PLACE BEFORE PLACING CONCRETE, OR SECURELY FASTEN AND GROUT IN PLACE WITH CONCRETE. EXERCISE CARE IN LOCATING AND SETTING OF SLEEVES TO ASSURE ACCURATE ALIGNMENT. IN ABSENCE OF SLEEVES, USE CORE DRILLED HOLES AND PROVIDE CURBS TO PREVENT PASSAGE OF WATER.

FILL VOID SPACES BETWEEN PIPING AND PIPE SLEEVES WITH PENETRATION SEAL, OR APPROVED ELASTROMERIC CAULKING MATERIALS.

FIRE STOPPING

FILL VOID SPACE BETWEEN PIPING AND PIPING SLEEVES WITH DOW CORNING 3 – 6548 RTV SILICONE FOAM, OR WITH FIBROUS GLASS SEALED WITH FIRE TESTED AND APPROVED ELASTOMERIC CAULKING MATERIALS.

INSTALLATION – GENERAL

PREPARATION: CUT PIPE AND TUBING ENDS SQUARE, REMOVE BURRS AND REAM TO ORIGINAL BORE. CLEAN JOINT SURFACES PRIOR TO ASSEMBLY. WIPE OFF EXCESS JOINING COMPOUNDS AND FLUX RESIDUE.

SCREWED: USE AMERICAN STANDARD TAPER PIPE THREADS CUT SHARP AND TRUE AND SUITABLE FOR NORMAL ENGAGEMENT. SCREW THREADED ITEMS UP CLOSE TO SHOULDERS WITH NOT MORE THAN THREE INCOMPLETE THREADS EXPOSED. DO NOT USE LAMP WICK, CORD, WOOL OR OTHER "WICKING" MATERIALS. REPAIR LEAKS WITH NEW MATERIALS, DO NOT PEEN OR CAULK. "TEFLON" PIPE JOINT TAPE OR JOINT COMPOUNDS COMPOSED OF RED LEAD AND GRAPHITE GROUND IN LINSEED OIL WILL BE PERMITTED, APPLIED TO MALE THREADS ONLY.

MECHANICAL COUPLINGS: USE MANUFACTURER'S MATERIALS AND METHODS.

PIPE HANGER AND SUPPORT INSTALLATION

REFER TO MSS–SP–58; STANDARD FOR PIPE HANGERS AND SUPPORTS.

SUPPORT, ANCHOR AND GUIDE PIPING SYSTEMS TO WITHSTAND STATIC AND DYNAMIC LOAD CONDITIONS, TO ALLOW FOR EXPANSION AND CONTRACTION; TO PREVENT VIBRATION AND SWAYING; TO MAINTAIN ALIGNMENT AND MINIMIZE VERTICAL DEFLECTION.

DO NOT SUPPORT PIPING FROM OTHER PIPING OR DUCTWORK. DO NOT USE WIRE, TAPE, METAL BAND, OR OTHER MAKE–SHIFT DEVICES AS MEANS OF SUPPORT OR ATTACHMENT.

TESTING

GENERAL: TEST PLUMBING SYSTEMS TO SATISFACTION OF BUILDING OFFICIAL. DO NOT CLOSE IN, CONCEAL, OR COVER UP ANY WORK UNTIL IT HAS BEEN TESTED, INSPECTED, AND APPROVED BY ENGINEER AND LOCAL OFFICIALS.

FLUSH PIPING, PRIOR TO TESTING, TO REMOVE FOREIGN MATERIAL WHICH MAY HAVE ENTERED DURING COURSE OF INSTALLATION. CLEAN FILTERS AND STRAINERS AFTER FLUSHING.

PLUMBING MATERIALS

EXTERIOR UNDERGROUND GAS PIPING – 2" AND UNDER SHALL BE DRAWN COPPER TUBE; COMPLY WITH ASTM B 88, TYPE K TUBE, FITTINGS SHALL BE ASME B16.22, WROUGHT COPPER AND STREAMLINED PATTERN, BRONZE FLANGES AND FLANGE FITTINGS; ASME B16.24, CLASS 150 AND SHALL HAVE PROTECTIVE COATING FOR UNDERGROUND TUBING; FACTORY – APPLIED, EXTRUDED PE A MINIMUM OF 0.022 INCH THICK.
ALTERNATIVE MATERIAL; PE PIPE ASTM D 2513, SDR 11 WITH PE FITTINGS; ASTM D 2683, SOCKET – FUSION TYPE OR ASTM D 3261, BUTT FUSION TYPE FITTINGS. ALL PIPING INSTALLED BELOW GRADE SHALL COMPLY PER NFPA 54 INSTALLATION REQUIREMENTS.

ABOVE GROUND NATURAL GAS PIPING 2" & UNDER SHALL BE SCHEDULE 40 BLACK PIPE, ASTM A53 WITH THREADED BLACK MALLEABLE – IRON FITTINGS ASME B16.3 150# CLASS STANDARD PATTERN.

ABOVE GROUND NATURAL GAS PIPING 2–1/2" & LARGER SHALL BE SCHEDULE 40 BLACK PIPE, ASTM A53 WITH BUTT WELDED OR SOCKET WELDED WROUGHT BLACK STEEL FITTINGS ASTM A234 150# CLASS STANDARD PATTERN. ALL GAS PIPING 2–1/2" & LARGER SHALL BE WELDED IN ACCORDANCE WITH N.F.P.A. 54, A.G.A. & N.B.F.U.

VALVES

BALL VALVE – 2" AND SMALLER: LEAD FREE BRONZE BODY AND BALL, TEFLON SEATS AND SEALS, LEVER HANDLE, 400 PSI WOG, NIBCO, APOLLO OR EQUAL.

GAS VALVE – 2" AND SMALLER: BRONZE PLUG VALVE, TWO–PIECE FULL PORT BRONZE BALL VALVE WITH BRONZE TRIM OR 1–PIECE FULL PORT BRONZE BALL VALVE WITH BRONZE TRIM. APOLLO, MILWAUKEE, OR EQUAL.

GAS VALVE – 2–1/2" AND LARGER: FLANGED BRONZE PLUG VALVE OR CAST–IRON, NON–LUBRICATED PLUG VALVE. HOMESTEAD, McDONALD, OR EQUAL.

PIPE HANGER MATERIAL STANDARDS

BOLTING – ASTM A307, GRADE A
CAST IRON – ASTM A48, GRADE 30
FORGOINGS – AST, A521, GRADE CA
MALLEABLE IRON – ASTM A47, ASTM A197
STEEL – ASTM A36, ASTM A569, ASTM A570
STEEL PIPE – ASTM A53, ASTM A120
STEEL ROD – ASTM A36, ASTM A575

PIPE HANGER COMPONENTS

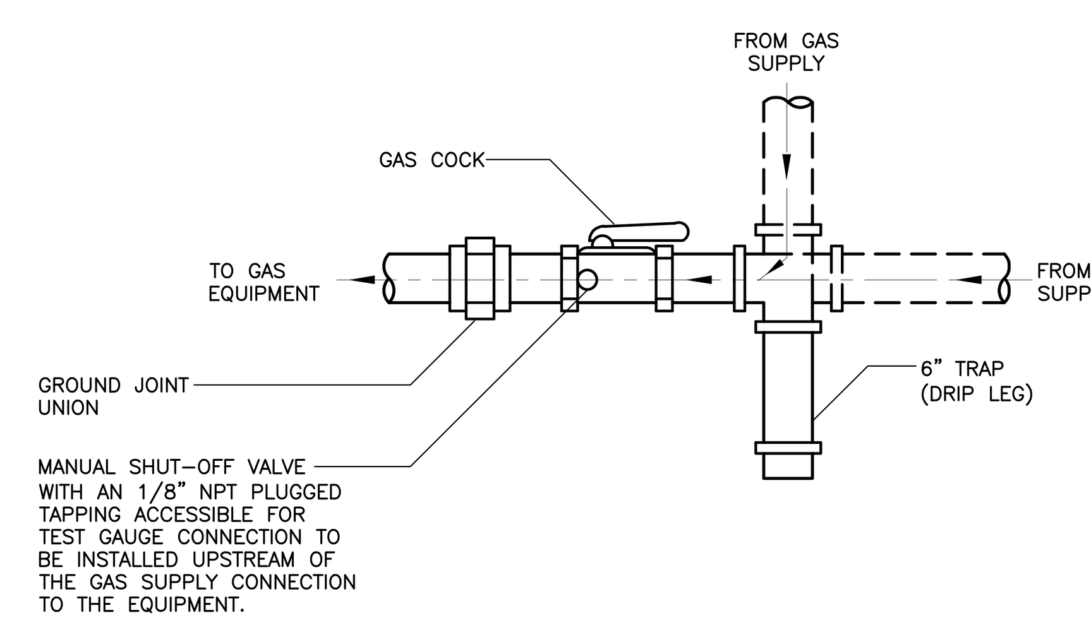
COMPONENTS: DESIGNED WITH MINIMUM SAFETY FACTOR OF 5; OF ALL METAL CONSTRUCTION; ASSEMBLED WITH CORROSION RESISTANT SQUARE HEAD MACHINE BOLTS AND SQUARE OR HEX HEAD NUTS, STEEL WASHERS; IN SUCH A MANNER AS TO PREVENT SELF–DISENGAGEMENT.

PIPE ATTACHMENTS: CAPABLE OF VERTICAL ADJUSTMENT UNDER LOAD, SHAPED TO OD IF PIPING, SIZED ALLOW CONTINUOUS INSULATION.

SURFACE FINISH – GENERALLY: CORROSION RESISTANT PAINT COATING.

SURFACE FINISH – UNINSULATED COPPER AND BRASS PIPING; COPPER–PLATED OR PLASTIC COATED.

SURFACE FINISH – CHROME PLATED PIPING: CHROME PLATED.



TYPICAL GAS CONNECTION TO EQUIPMENT DETAIL

N.T.S.

PLUMBING GENERAL NOTES

PLUMBING GENERAL NOTES

1. THESE GENERAL NOTES ARE APPLICABLE TO ALL PLUMBING DRAWINGS.
2. DRAWINGS ARE DIAGRAMMATIC AND SHOW GENERAL INTENT OF WORK, SEE DETAILS, SCHEDULES AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
3. PLUMBING CONTRACTOR MUST REVIEW DRAWINGS OF THE OTHER TRADES AS PART OF THIS CONTRACT FOR ADDITIONAL WORK REQUIRED AND OR COORDINATION OF HIS WORK FOR OPERATIONS OR CONNECTIONS TO OTHER SYSTEMS.
4. THE PLUMBING CONTRACTOR SHALL PROVIDE PIPE EXPANSION JOINTS ON PIPING PASSING THRU ALL BUILDING EXPANSION JOINT LOCATIONS AS REQUIRED PER BUILDING CODES WHETHER OR NOT SHOWN ON DRAWINGS. REVIEW ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR EXACT BUILDING EXPANSION JOINT LOCATIONS AND EXPANSION DIMENSIONS.
5. THE PLUMBING CONTRACTOR SHALL INSTALL ALL PIPING EQUIPMENT AND ACCESSORIES IN ACCORDANCE WITH THE LATEST STATE BUILDING CODE AND LOCAL AUTHORITIES HAVING JURISDICTION. COORDINATION BETWEEN TRADES IS REQUIRED TO INSURE COMPLIANCE WITH THE GOVERNING CODES.

ABBREVIATIONS

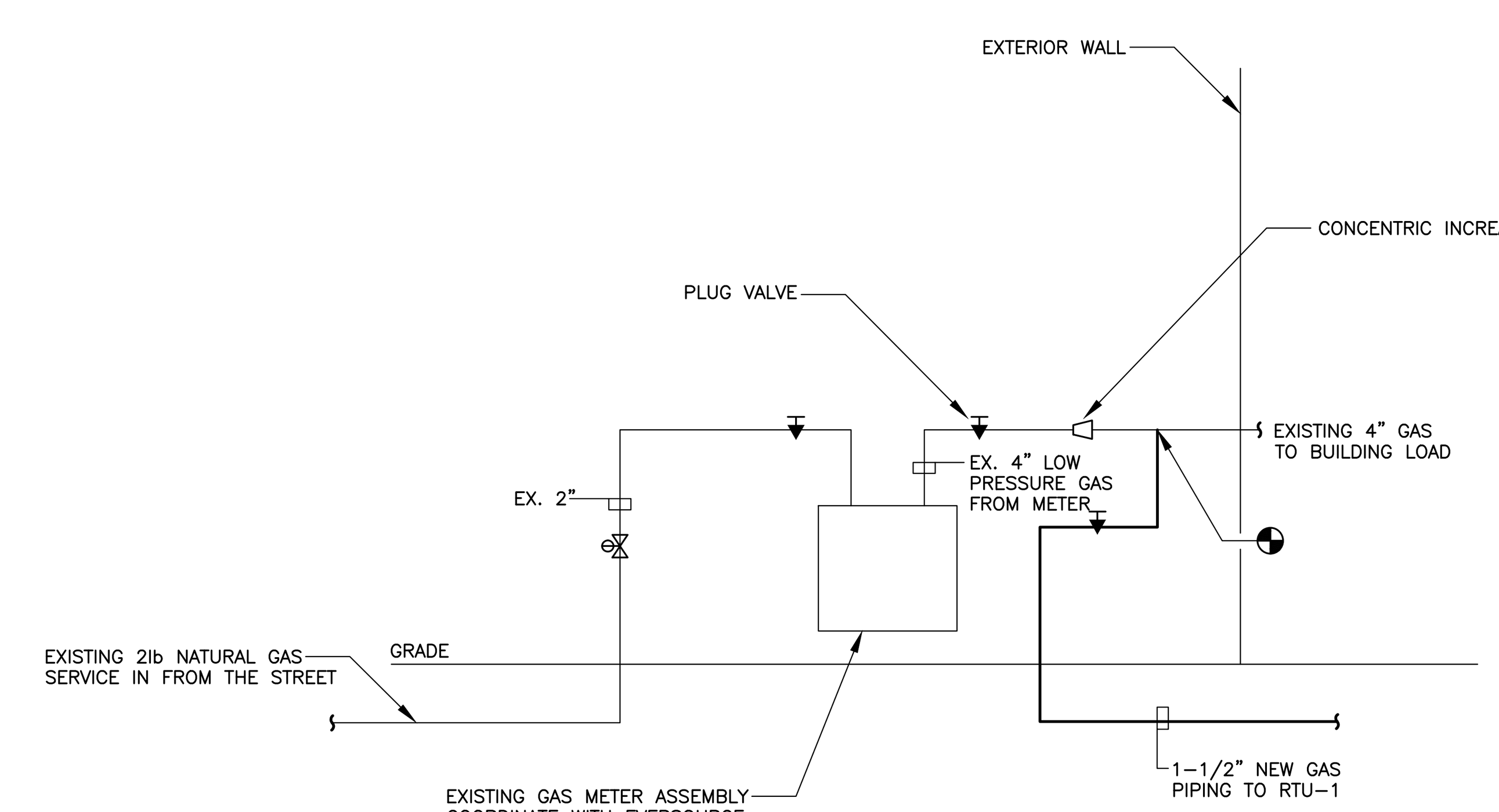
AFF	ABOVE FINISHED FLOOR
CFH	CUBIC FEET PER HOUR
CTE	CONNECT TO EXISTING
G	GAS
MBH	THOUSAND B.T.U. PER HOUR
NIC	NOT IN CONTRACT
PSI	POUNDS PER SQUARE INCH
RTU	ROOF TOP UNIT
TYP	TYPICAL
VIF	VERIFY IN FIELD

PLUMBING PIPING LEGEND

—G—	GAS (NATURAL OR LPG)
	DIRECTION OF FLOW
	PIPE DOWN
	PIPE DROP
	PIPE RISE
	PIPE ANCHOR
	PIPE GUIDE or SLEEVE
	PIPE EXPANSION FITTING (AT BLDG. EXP.JOINTS)
	VIBRATION ISOLATION FITTING
	PLUGGED OR CAPPED PIPE

PLUMBING SYMBOL LEGEND

	PRESSURE GAUGE
	UNION
	BALL VALVE
	GAS VALVE (BALL OR PLUG)
	GAS PRESSURE REGULATOR
GM	GAS METER
1	PLUMBING WORK ITEM NOTE
1	PLUMBING FIXTURE DESIGNATION
	CONNECT TO EXISTING



EXISTING NATURAL GAS METER ASSEMBLY DETAIL

N.T.S.

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STATE OF CONNECTICUT — PETER J. PYCELA — No 19460 — LICENSED PROFESSIONAL ENGINEER

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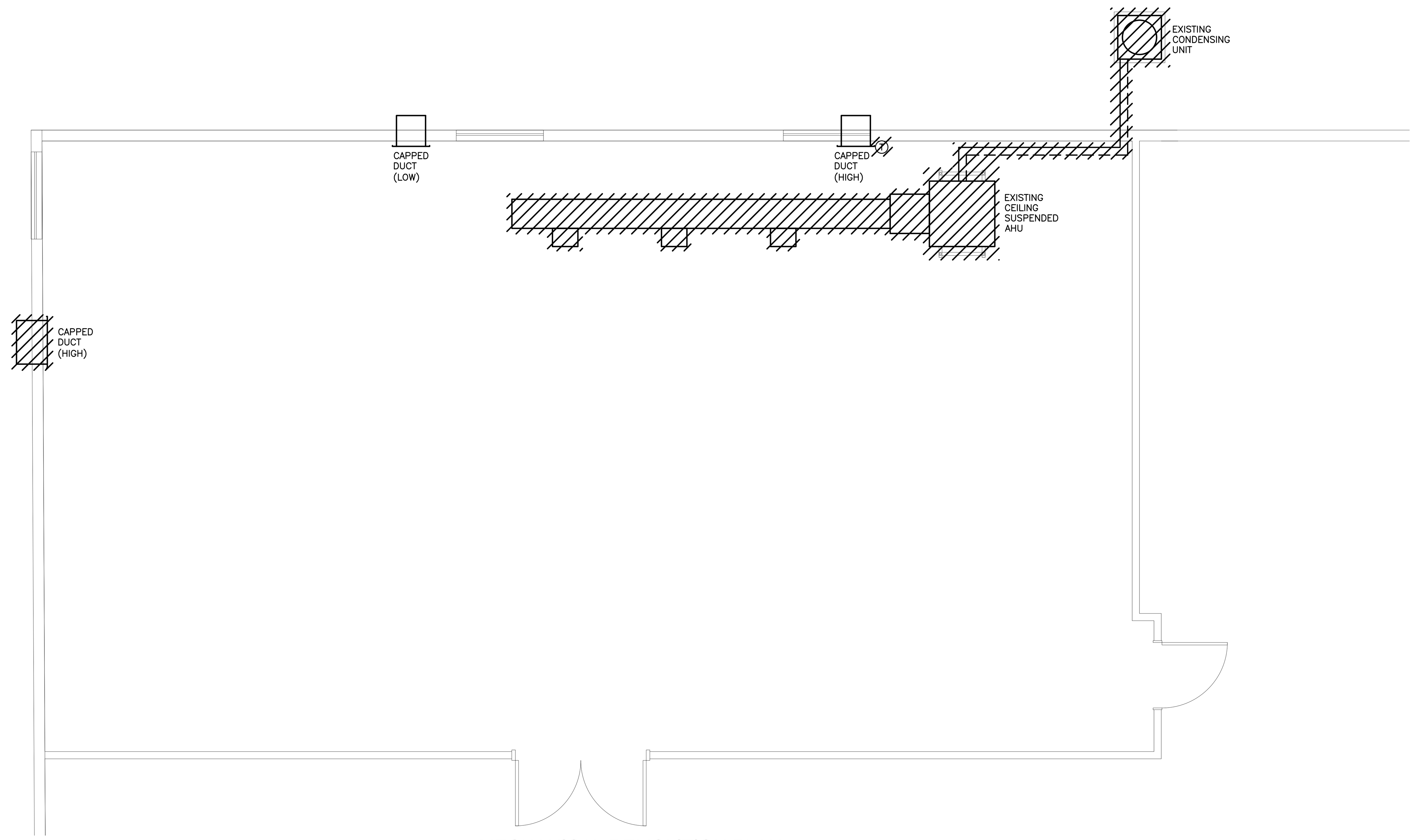
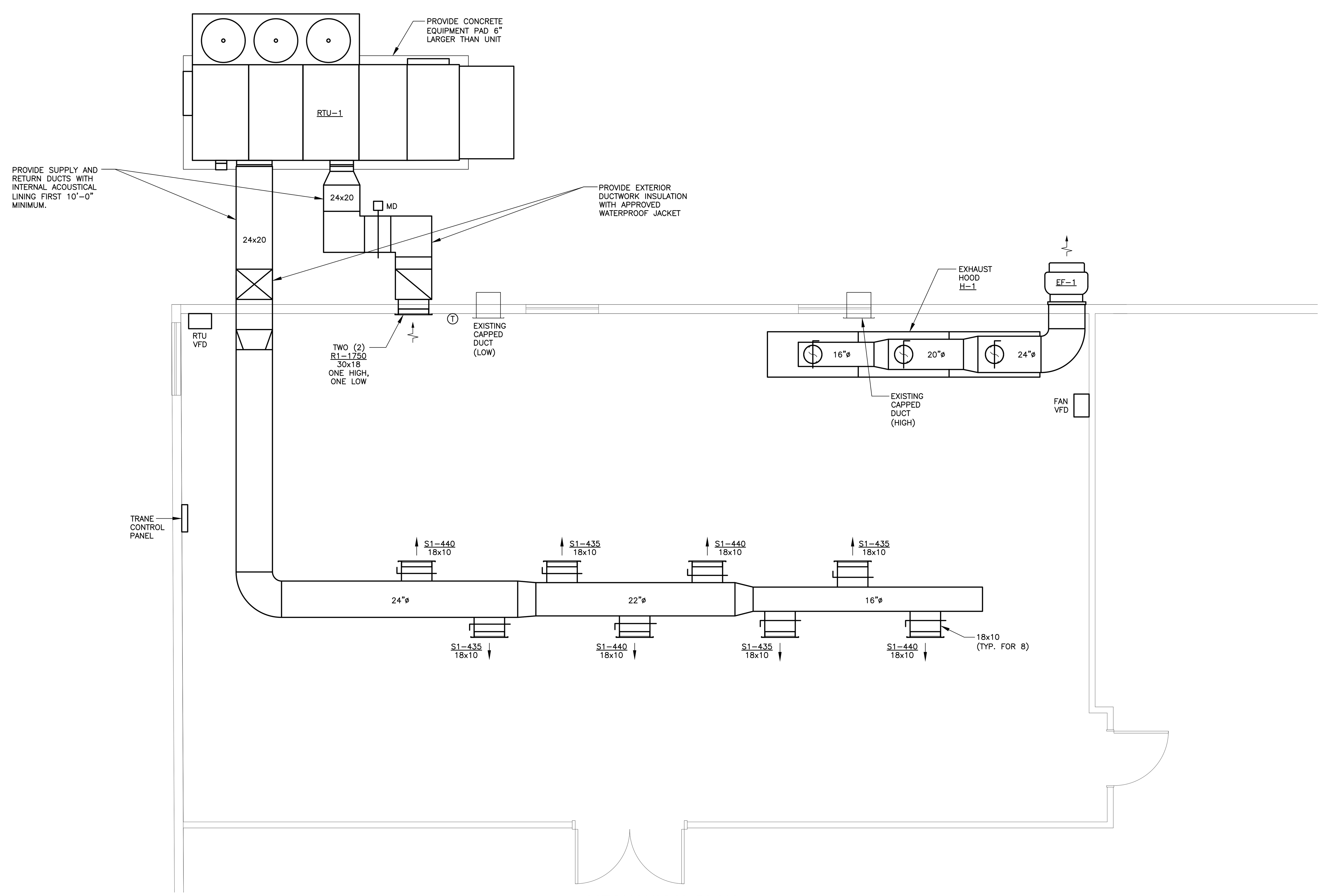
TITLE:
PLUMBING NOTES, LEGENDS, DETAILS AND SPECIFICATIONS

SHEET NUMBER:
P-2



MECHANICAL DEMOLITION PLAN
SCALE: 1/4"= 1'-0"



MECHANICAL PLAN
SCALE: 1/4"= 1'-0"

SEQUENCE OF OPERATION

GENERAL

- PROVIDE ALL TEMPERATURE, OPERATION AND SAFETY CONTROLS, LOW VOLTAGE CONTROL WIRING, HARDWARE, SOFTWARE, AND ACCESSORIES NECESSARY TO ACHIEVE A FULLY OPERATIONAL HVAC CONTROL SYSTEM BY. "DDC CONTRACTOR" POWER WIRING SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR. PROVIDE FULL GRAPHICS.

RTU-1

1. DDC SYSTEM SHALL START/STOP ROOF TOP UNIT.
2. ROOF TOP UNIT SHALL RUN CONTINUOUSLY SUBJECT TO SAFETY DEVICES.
3. AT ANY TIME THE UNIT IS OFF THE OUTSIDE AIR DAMPER SHALL CLOSE VIA SPRING RETURN ACTUATOR DX COOLING SHALL NOT OPERATE.
4. IF SUPPLY FAN FAILURE IS DEDICATED BY THE DDC SYSTEM AFTER AN ADJUSTABLE TIME DELAY, THE DDC SYSTEM WILL SHUT THE ROOF TOP UNIT DOWN AND REPORT ROOF TOP UNIT FAILURE ALARM.
5. TEMPERATURE CONTROL:
   THE RTU CONTROL PANEL SYSTEM SHALL STAGE DX COOLING, MODULATE REHEAT AND MIXED AIR SETPOINT IN SEQUENCE TO MAINTAIN THE ROOM TEMPERATURE SETPOINT.
6. RTU WILL MODULATE GAS FURNACE TO MAINTAIN ROOM TEMPERATURE.
7. SAFETY:
   ON SIGNAL FROM FREEZE-STAT WITH MANUAL RESET, OUTSIDE AIR DAMPER SHALL CLOSE, SUPPLY FAN SHUT DOWN, DDC SYSTEM SHALL INDICATE ALARM CONDITION. ON SIGNAL FROM SMOKE DETECTORS WITH MANUAL RESET, OUTSIDE AIR DAMPER SHALL CLOSE, SUPPLY FAN SHALL SHUTDOWN AND DDC SYSTEM SHALL INDICATE ALARM CONDITION. THE DIRTY FILTER CONDITION ON EACH FILTER BANK SHALL BE REPORTED TO THE BAS.
8. INTERLOCK WITH FIRE ALARM SYSTEM.
9. ECONOMIZER PROVIDE ENTHALPY CONTROLS.

EF-1 & RTU RETURN DAMPER

THE FAN SHALL BE INTERLOCKED WITH THE RTU AND RTU RETURN DAMPER. WHEN THE HOOD IS ACTIVATED BY A WALL MOUNTED SWITCH BY THE HOOD, THE RTU RETURN DAMPER WILL CLOSE AND ONCE CLOSED VIA END SWITCHES EF-1 WILL OPERATE. EF-1 WILL ONLY OPERATE IF RTU IS ACTIVATED VIA PROOF OF FAN. RETURN DAMPER SHALL BE OPEN WHEN EF-1 IS NOT ACTIVATED.

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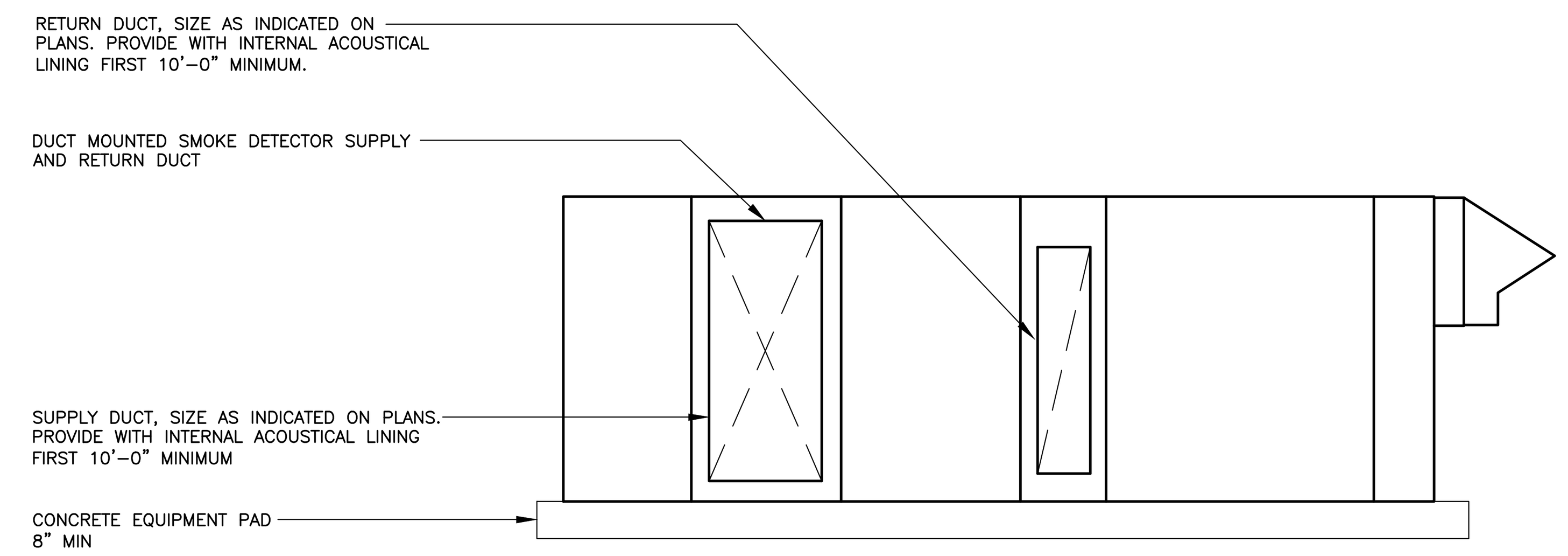
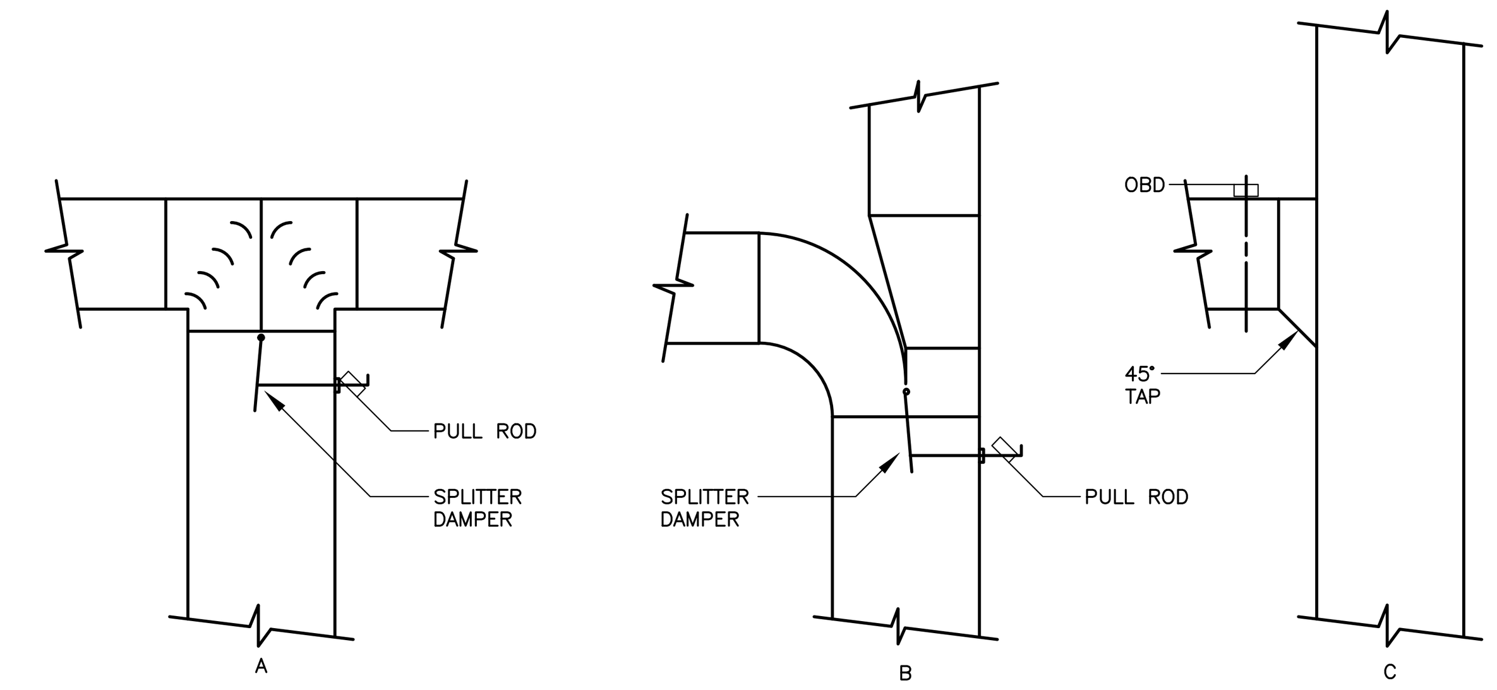
MECHANICAL PLANS

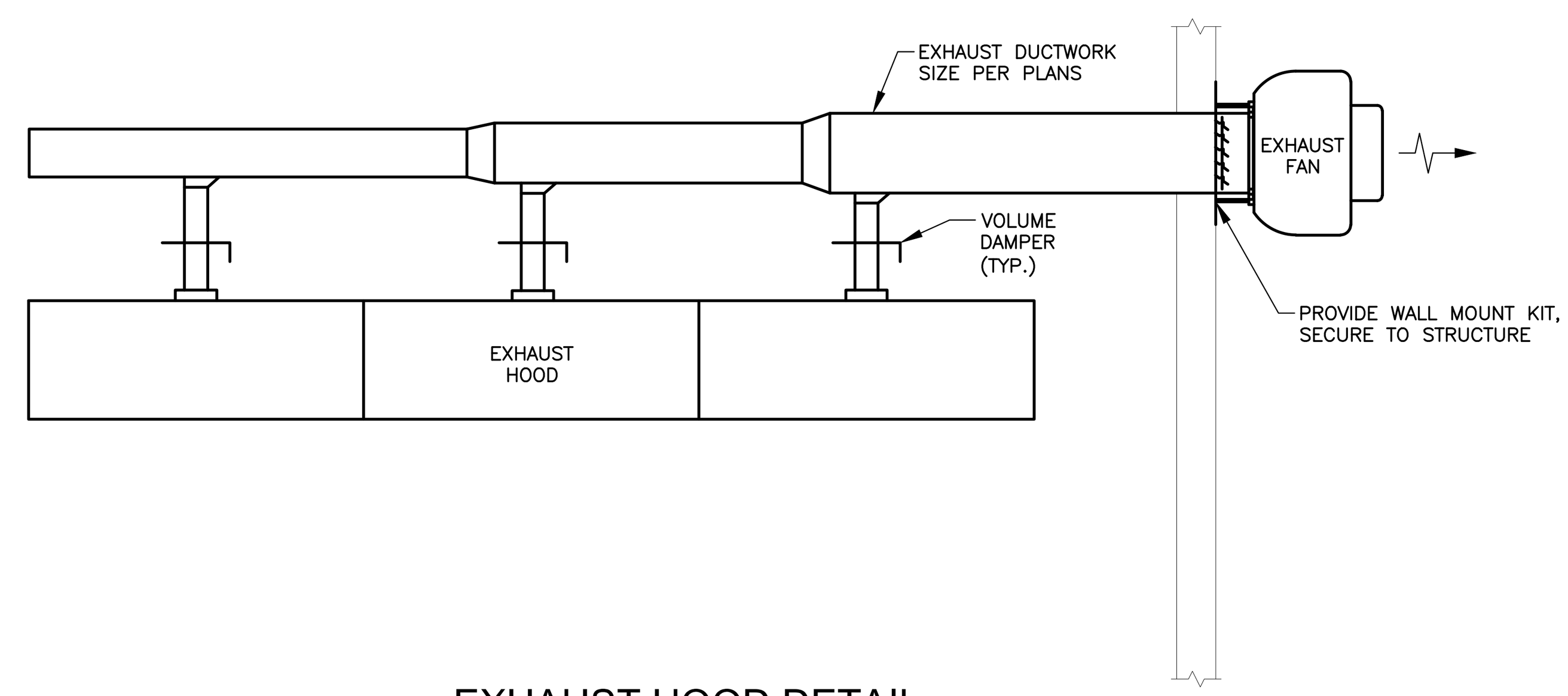
SHEET NUMBER:
M-1



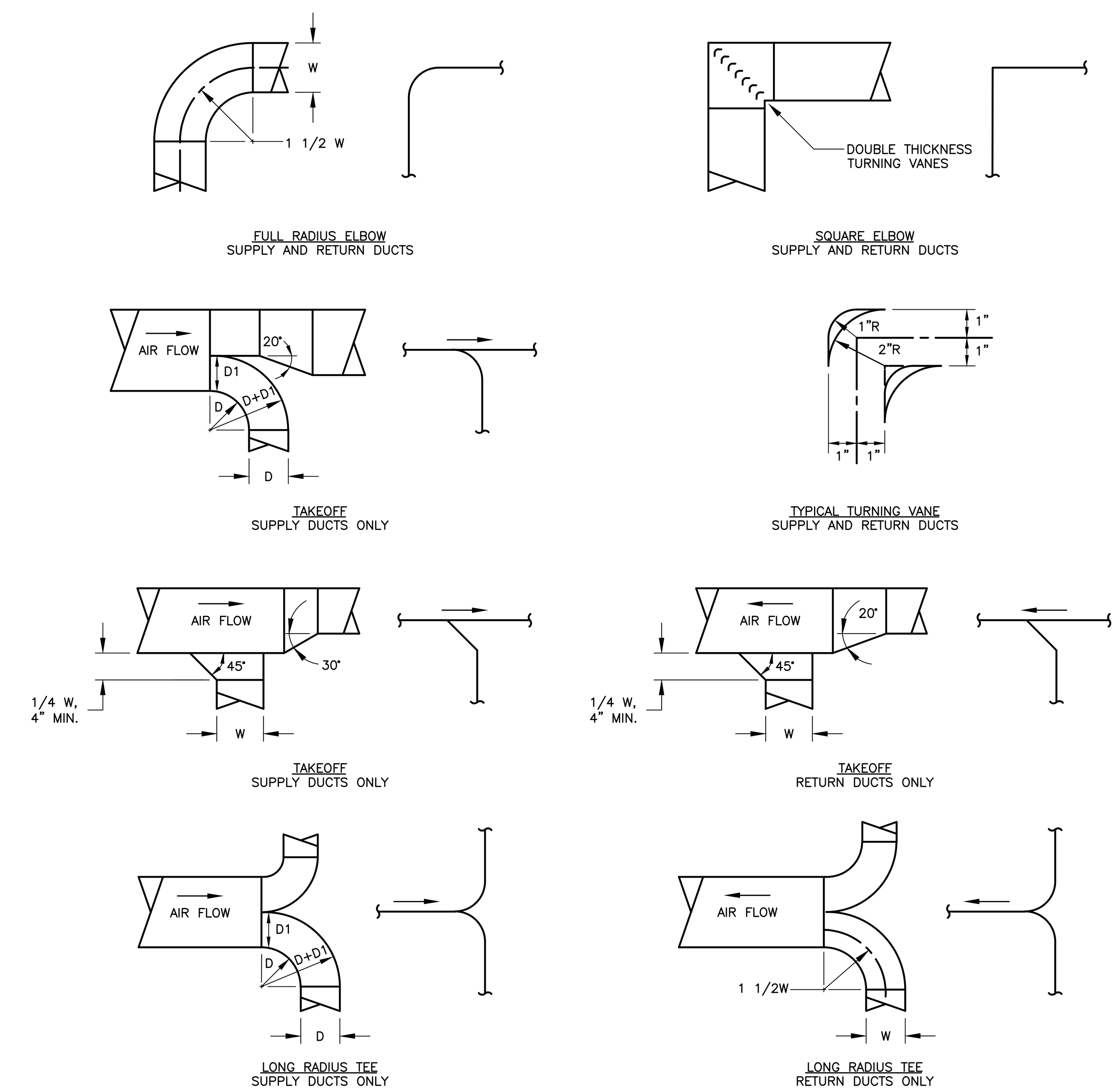
AIR HANDLER ROOF TOP UNIT DETAIL
N.T.S.

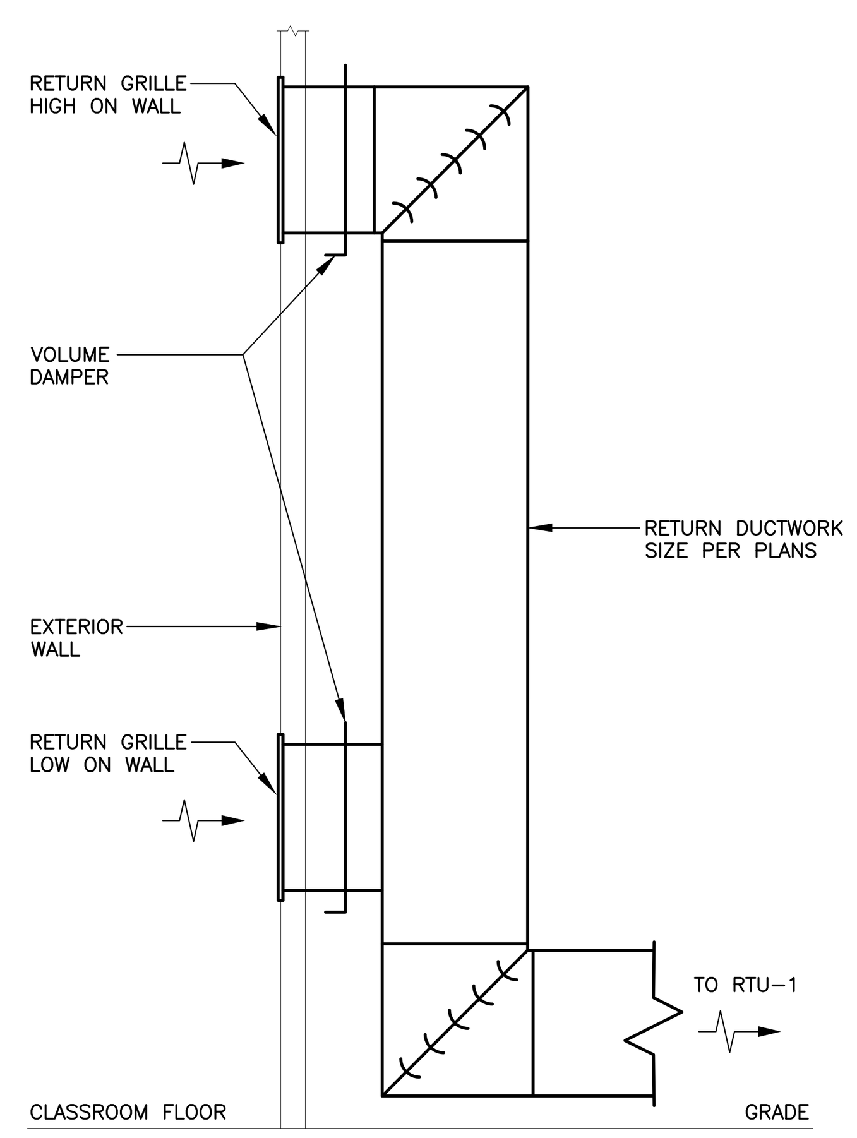


TYPICAL DUCT DETAIL
SCALE: N.T.S.

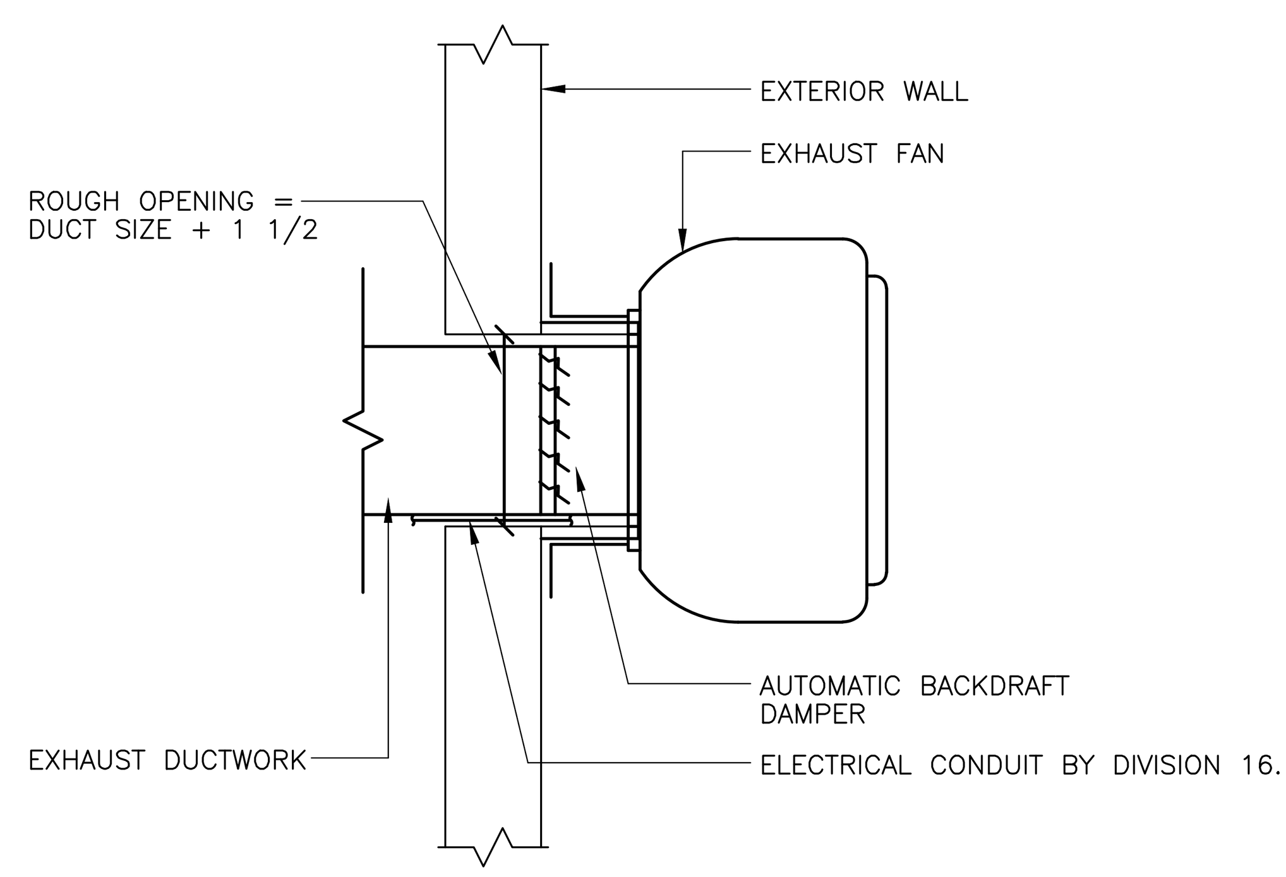


EXHAUST HOOD DETAIL
N.T.S.





RTU-1 RETURN AIR DUCTWORK DETAIL
N.T.S.



SIDEWALL EXHAUST FAN DETAIL
N.T.S.

TYPICAL DUCT DETAILS WITH SINGLE LINE REPRESENTATION
SCALE: N.T.S.

INNOVATIVE ENGINEERING SERVICES, LLC
WALLINGFORD, CT 06492
WEB: WWW.IESLLC.BIZ

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DESIGNED:	IES
DRAFTED:	IES
APPROVED:	IES
SCALE:	AS NOTED
PROJECT NO.:	26027
DATE:	05/22/2026

TITLE:
MECHANICAL DETAILS

SHEET NUMBER:
M-2

Digitally signed by Peter J Pycela
Contact Info: ppycela@iesllc.biz
Date: 2026.05.22 09:02:27-04'00'

AIR HANDLING UNIT SCHEDULE

GENERAL DATA								COOLING COIL DATA										HEATING COIL DATA						ELECTRICAL DATA		NOTES
SYMBOL	MANUFACTURER MODEL NUMBER	AREA SERVED	LOCATION	COOLING (CFM)	HEATING (CFM)	ESP (IN)	SPEED	#ROWS/ F.P.I.	GROSS TOTAL COOLING (MBH)	GROSS SENSIBLE COOLING (MBH)	NET TOTAL COOLING (MBH)	NET SENSIBLE COOLING (MBH)	EAT DB/WB (DEG F°)	LAT DB/WB (DEG F°)	SUCTION TEMP (DEG F°)	FACE VELOCITY (FPM)	#HIGH/ ROW/ F.P.T.	INPUT CAPACITY (MBH)	OUTPUT CAPACITY (MBH)	EAT (DEG F°)	LAT (DEG F°)	AIR PD (IN. WG)	CONTROL	MCA–VOLT–PH	
RTU–1	TRANE HORIZON (OAD/N REV6– OADG/OANG) D015	CLASSROOM	OUTDOOR PAD	3500	3500	2.0	–	6 / 14	173.1	115.1	165.2	107.2	79.4/66.2	48.8/48.8	45	288	–	200	160	51.2	93.3	0.31	–	95–208–3	1,2

NOTES:

1. PROVIDE WITH VFD.
2. PROVIDE BACnet CONTROLS.

EXHAUST FAN SCHEDULE

SYMBOL	MANUFACTURER MODEL NUMBER	LOCATION	SERVING	TYPE	AIR FLOW CFM	ESP IN. WS.	FAN RPM	DRIVE	CONTROL	BHP	HP	ELECTRICAL				SONES	NOTES
												VOLTS	PHASE	MCA	MOP		
EF–1	GREENHECK CUE–160A	EXTERIOR WALL	EXHAUST HOOD	SIDEWALL	3500	1.13	1725	DIRECT	WALL SWITCH	1.97	2.0	208	3	9.38	20	27	1–12

NOTES:

1. CURB CAP SIZE – 22 SQUARE.
2. SIDEWALL MOUNTING – FAN CONFIGURED FOR WALL MOUNTED APPLICATIONS.
3. WALL BRACKET WILL BE MOUNTED TO THE WALL.
4. UL/cUL 705 LISTED – "POWER VENTILATORS".
5. SWITCH, NEMA–1, TOGGLE.
6. JUNCTION BOX MOUNTED & WIRED IN WEATHER–PROTECTED MOTOR COMPARTMENT.
7. WALL BRACKET – GALVANIZED, UNDER SIZED 0.5 IN. (SHIPPED LOOSE) (PN 916648).
8. COATED WITH HI–PRO POLYESTER, CONCRETE GRAY–RAL 7023, FAN AND ATTACHED ACC.
9. FASTENER MATERIAL: STAINLESS.
10. ALUMINUM WHEEL MATERIAL.
11. CONDUIT CHASE QTY 1.
12. UNIT WARRANTY: 1 YR (STANDARD).

HOOD SCHEDULE

SYMBOL	MANUFACTURER MODEL NUMBER	EQUIPMENT LOCATION	SERVING	AIR FLOW CFM	SP IN W.G.	EXH DUCT SIZE (IN)	OVERALL LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)	WEIGHT (LBS)	NOTES
H–1	HEMCO 13080X	CLASSROOM	CLASSROOM	3500	–	–	180	30	18	–	

GRILLE, DIFFUSER AND REGISTER SCHEDULE

SYMBOL	MANUFACTURER MODEL NUMBER	DUTY	TYPE	BORDER TYPE	CONSTRUCTION			NOTES
					OBD	FRAME	BLADES	
S1	TITUS 300FL	SUPPLY	L.F.	DUCT MOUNTED	–	–	–	6
R1	TITUS 350RL	RETURN	L.F.	SIDEWALL	–	–	–	

TYPES:

L.S. – LINEAR SLOT
L.B. – LINEAR BAR
D.D. – DIRECTIONAL DIFFUSER
P.F. – PERFORATED FACE
L.F. – LOUVERED FACE
C.C. – CUBE CORE
S.W. – SIDE WALL
S.W./C.G.–SIDE WALL OR CEILING

NOTES:

1. SQUARE TO ROUND TRANSITION.
2. OPPOSED BLADE DAMPER.
3. DOUBLE DEFLECTION.
4. FACE VELOCITY 600 FPM MAX.
5. 45° DEFLECTION (FIXED).
6. 45° DEFLECTION (FULLY ADJUSTABLE).
7. NC LEVEL NOT TO EXCEED 25.
8. INSULATED PLENUM BOOT.
9. HINGED CORE WITH 1" DISPOSABLE FILTER.

DESIGNATIONS:

SYMBOL
FLOW (CFM)
S1–150
NECK SIZE
6x6
TYPICAL RDG

MECHANICAL LEGEND

- DIFFUSER/GRILLE – SUPPLY
- GRILLE/REGISTER – RETURN
- GRILLE/REGISTER – EXHAUST
- ROUND DUCT UP
- ROUND DUCT DN
- SIDEWALL GRILLE/REGISTER – SUPPLY/RETURN/EXHAUST
- LINEAR SLOT DIFFUSER/BAR GRILLE – SUPPLY
- AIR FLOW DIRECTION INDICATOR – SUPPLY
- AIR FLOW DIRECTION INDICATOR – RETURN
- DUCT RISER – SUPPLY/COMBUSTION AIR
- DUCT DROP – SUPPLY/COMBUSTION AIR
- DUCT RISER – RETURN/EXHAUST
- DUCT DROP – RETURN/EXHAUST
- THERMOSTAT
- VOLUME DAMPER
- FIRE DAMPER
- MOTORIZED DAMPER
- REDUCER
- CD — CONDENSATE WASTE
- RLL — REFRIGERANT LIQUID LINE
- RSL — REFRIGERANT SUCTION LINE
- DIRECTION OF FLOW
- PIPE DOWN
- PIPE RISE

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AMB	AMBIENT
AMP	AMPERE (AMP, AMPS)
BAL	BALANCE
BTU	BRITISH THERMAL UNIT
CAP	CAPACITY
CFM	CUBIC FEET PER MINUTE
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CLG	COOLING
CU	CONDENSING UNIT
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
°F	DEGREES FAHRENHEIT
FC	FLEXIBLE CONNECTION
FD	FIRE DAMPER
FPM	FEET PER MINUTE
FT	FEET
FTR	FIN TUBE RADIATION
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
H–1	HUMIDIFIER
HWC	HOT WATER COIL
HP	HORSE POWER
HTR	HEATING RETURN (HOT WATER)
HTS	HEATING SUPPLY (HOT WATER)
HTG	HEATING
Hz	FREQUENCY
IN.	INCH
IN. WG	INCHES WATER GAUGE
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LBS/HR	POUNDS PER HOUR
LWT	LEAVING WATER TEMPERATURE
MBH	BTU PER HOUR (THOUSAND)
N.T.S.	NOT TO SCALE
O.A.	OUTSIDE AIR
OED	OPEN END DUCT
P–1	PUMP
PD	PRESSURE DROP
PH	PHASE
PSI	POUNDS PER SQUARE INCH
RDG	REGISTER DIFFUSER GRILLE
RET	RETURN
RH	RELATIVE HUMIDITY
RPM	ROTATIONS PER MINUTE
SP–1	SUMP PUMP
SQ.FT.	SQUARE FEET
SUP	SUPPLY
T&P	TEMPERATURE & PRESSURE RELIEF VALVE
TYP	TYPICAL
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
VD	VOLUME DAMPER
VIF	VERIFY IN FIELD
WB	WET BULB
WP	WORKING PRESSURE
ZC	ZONE CONTROLLER
ZV	ZONE VALVE

MECHANICAL DEMOLITION NOTES

1. THE MECHANICAL CONTRACTOR SHALL REMOVE ALL MECHANICAL EQUIPMENT, ACCESSORIES, CONTROLS AND ASSOCIATED PIPING AS SHOWN OR INDICATED ON THE DRAWINGS.
2. NO EQUIPMENT OR DEVICES THAT HAVE BEEN DISCONNECTED AND OR ABANDONED SHALL REMAIN.
3. THE MECHANICAL CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH THE EXISTING SYSTEMS AND CONDITIONS IN AREAS OF RENOVATION.
4. ANY SYSTEMS OR EQUIPMENT TO REMAIN ACTIVE DURING RENOVATION SHALL BE KEPT IN OPERATION BY PROVIDING TEMPORARY CONNECTIONS AS REQUIRED UNTIL NEW SYSTEMS ARE INSTALLED AND OPERATIONAL.
5. THE MECHANICAL CONTRACTOR SHALL COORDINATE WITH THE OWNER, CM, AND OR GENERAL CONTRACTOR ANY AND ALL PHASING OF THE MECHANICAL DEMOLITION WORK IN ORDER TO SATISFY THE CONSTRUCTION SCHEDULE AND OWNERS OCCUPANCY REQUIREMENTS.
6. ANY MECHANICAL EQUIPMENT TO BE REMOVED AND REUSED OR TURNED OVER TO THE OWNER, AT OWNERS REQUEST, OR AS INDICATED ON THE DRAWINGS SHALL BE CAREFULLY REMOVED AND STORED TO PREVENT DAMAGE.
7. THE MECHANICAL CONTRACTOR SHALL ALSO REVIEW THE ARCHITECTURAL DEMOLITION DRAWINGS AS PART OF THIS CONTRACT FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
8. ALL SERVICE INTERRUPTIONS SHALL BE COORDINATED AND APPROVED WITH THE OWNER IN ADVANCE PRIOR TO COMMENCEMENT OF ANY WORK.
9. THE MECHANICAL CONTRACTOR SHALL COORDINATE HIS DEMOLITION WORK WITH THAT OF OTHER TRADES IN ORDER TO AVOID CONFLICTS.

MECHANICAL GENERAL NOTES

1. THESE GENERAL NOTES ARE APPLICABLE TO ALL MECHANICAL DRAWINGS.
2. DRAWINGS ARE DIAGRAMMATIC AND SHOW GENERAL INTENT OF WORK. SEE DETAILS, SCHEDULES AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
3. MECHANICAL CONTRACTOR MUST REVIEW DRAWINGS OF THE OTHER TRADES AS PART OF THIS CONTRACT FOR ADDITIONAL WORK REQUIRED AND OR COORDINATION OF HIS WORK FOR OPERATIONS OR CONNECTIONS TO OTHER SYSTEMS.

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TITLE:
MECHANICAL NOTES, LEGENDS AND SCHEDULES

SHEET NUMBER:
M-3

Freeman Companies, LLC. G:\IES Projects\2026 Projects\Team PJP\26027 Manufacturing Alliance Service Center\Contract Documents\26027 M-3.dwg May 22, 2026 9:00 AM IES-MEP.ctb Plotted By: lrogalski

MECHANICAL (HVAC) SPECIFICATIONS

GENERAL

SCOPE

THE GENERAL SCOPE OF THE HVAC WORK IS TO REMOVE EXISTING SYSTEMS, MODIFY THE EXISTING SYSTEMS, AND PROVIDE NEW SYSTEMS AS INDICATED ON THESE DOCUMENTS

THE WORK TO BE DONE UNDER THIS DIVISION OF THE SPECIFICATIONS INCLUDE THE FURNISHING OF ALL EQUIPMENT, SUPPLIES, LABOR, SUPERVISION AND ALL MATERIALS NOT SPECIFICALLY MENTIONED BUT NECESSARY OR REQUIRED TO PROVIDE COMPLETE AND FULLY OPERATIONAL HVAC SYSTEMS. IT IS THE INTENTION OF THE SPECIFICATIONS AND DRAWINGS TO CALL FOR FINISHED WORK, TESTED AND READY FOR OPERATION.

IT IS THE INTENT THAT ALL MECHANICAL WORK AND MATERIALS NECESSARY TO COMPLETE THE ENTIRE PROJECT IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS, WHETHER SPECIFICALLY MENTIONED HERE OR NOT, SHALL BE FURNISHED. ALL WORK AND MATERIALS NECESSARY TO FULFILL THIS INTENT SHALL BE SUPPLIED UNDER THE MECHANICAL SPECIFICATIONS WITHOUT ADDITIONAL COST TO THE OWNER.

DEFINITIONS

'FURNISH' OR 'PROVIDE' – TO FURNISH, ERECT, INSTALL AND CONNECT UP COMPLETE AND READY FOR OPERATION PARTICULAR WORK REFERRED TO, UNLESS SPECIFICALLY INDICATED OR SPECIFIED OTHERWISE.

'WORK' – LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND ALL OTHER ITEMS CUSTOMARILY FURNISHED AND/OR REQUIRED FOR PROPER AND COMPLETE INSTALLATION OF WORK.

'EXPOSED' – NOT INSTALLED UNDERGROUND OR 'CONCEALED' AS DEFINED ABOVE.

'INDICATE' OR 'SHOWN' – AS INDICATED OR SHOWN ON DRAWINGS OR SPECIFIED WITH SPECIFICATIONS.

'PIPING' – PIPE, FITTINGS, FLANGES, VALVES, CONTROLS, HANGERS, TRAPS, DRAINS, INSULATION AND ITEMS CUSTOMARILY OR REQUIRED IN CONNECTION WITH OR RELATING TO SUCH PIPING.

'SUPPLY' – TO PURCHASE, PRODUCE, ACQUIRE AND DELIVER COMPLETE WITH ALL RELATED ITEMS.

'INSTALL' – TO ERECT, MOUNT AND CONNECT UP COMPLETE WITH ALL RELATED ACCESSORIES.

'NOTED' – AS INDICATED ON DRAWINGS AND/OR SPECIFIED.

CODES, RULES, PERMITS AND FEES

THIS CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS AND PAY ALL STATE AND LOCAL TAXES, FEES AND OTHER COSTS IN CONNECTION WITH HIS WORK; FILE ALL NECESSARY PLANS, PREPARE ALL DOCUMENTS AND OBTAIN ALL NECESSARY APPROVALS OF ALL STATE AND LOCAL DEPARTMENTS HAVING JURISDICTION; OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION FOR HIS WORK AND DELIVERY OF SAME TO THE OWNER BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK.

THIS CONTRACTOR SHALL INCLUDE IN THE WORK, WITHOUT EXTRA COST TO THE OWNER, ANY LABOR, MATERIALS, SERVICES, APPARATUS, DRAWINGS (IN ADDITION TO CONTRACT DRAWINGS AND DOCUMENTS), IN ORDER TO COMPLY WITH ALL APPLICABLE LAWS, ORDINANCES, RULES AND REGULATIONS WHETHER OR NOT SHOWN ON THE DRAWINGS AND/OR SPECIFIED.

THIS CONTRACTOR SHALL PERFORM AND FILE ALL TESTS IN ACCORDANCE WITH THE CURRENT REGULATIONS OF THE STATE AND LOCAL AUTHORITIES. HE SHALL FURNISH AND INSTALL SIGNS REQUIRED BY THE STATE AND LOCAL AUTHORITIES.

ALL MATERIALS FURNISHED AND ALL WORK INSTALLED SHALL COMPLY WITH THE RULES AND RECOMMENDATIONS OF THE NATIONAL BOARD OF FIRE UNDERWRITERS, WITH ALL REQUIREMENTS OF LOCAL UTILITIES COMPANIES, WITH THE RECOMMENDATIONS OF THE FIRE INSURANCE RATING ORGANIZATION HAVING JURISDICTION.

CODES, REGULATIONS AND STANDARDS

ALL MECHANICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING APPROVED CODES, REGULATIONS AND STANDARDS:

IBC – INTERNATIONAL BUILDING CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

IMC – INTERNATIONAL MECHANICAL CODE, 2021 EDITION. WITH 2022 CONNECTICUT AMENDMENTS.

IFC – INTERNATIONAL FIRE CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

2022 CONNECTICUT STATE FIRE SAFETY CODE

STATE DEMOLITION CODE

LOCAL BUILDING CODE

NFPA – NATIONAL FIRE PROTECTION CODE

NFPA 70 – NATIONAL ELECTRICAL CODE, 2020 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

NFPA 72 – NATIONAL FIRE ALARM CODE, 2019 EDITION

NFPA 99 – HEALTH CARE FACILITIES CODE, 2021 EDITION

NFPA 101 – LIFE SAFETY CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

IECC – INTERNATIONAL ENERGY CONSERVATION CODE, 2021, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

ICC/ANSI A117.1, 2017, ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES, AS AMENDED BY THE STATE OF CONNECTICUT 2018 AMENDMENTS.

ANSI – AMERICAN NATIONAL STANDARDS INSTITUTE

ASTM – AMERICAN SOCIETY FOR TESTING AND MATERIALS

OSHA – OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

U.L. – UNDERWRITERS LABORATORIES

EPA – ENVIRONMENTAL PROTECTION AGENCY

COMPLY WITH REQUIREMENTS OF LOCAL AUTHORITY HAVING JURISDICTION.

INSURANCE

THE MECHANICAL CONTRACTOR SHALL FURNISH STATUTORY COMPENSATION INSURANCE CERTIFICATES FOR PERSONAL AND PROPERTY DAMAGE DISABILITY/LIABILITY AS REQUIRED BY THE OWNER AND/OR AS HEREINBEFORE DESCRIBED.

GUARANTEE AND SERVICE

THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF ACCEPTANCE OF THE INSTALLATION. IN ADDITION, THE CONTRACTOR SHALL PROVIDE, FREE OF CHARGE, ONE YEAR'S MAINTENANCE GUARANTEE ON MAINTAINED SERVICE AND ADJUSTMENT OF ALL EQUIPMENT IN THIS CONTRACT.

ALL COMPRESSORS TO HAVE (5) FIVE YEAR EXTENDED WARRANTEES.

DRAWINGS AND INTENT

DRAWINGS ARE INTENDED AS WORKING DRAWINGS FOR GENERAL LAYOUT OF THE VARIOUS HVAC SYSTEMS. HOWEVER, LAYOUT OF EQUIPMENT, ACCESSORIES, SPECIALTIES, DUCTWORK, AND PIPING SYSTEMS ARE DIAGRAMMATIC UNLESS SPECIFICALLY DIMENSIONED, AND DO NOT NECESSARILY INDICATE EVERY REQUIRED PIPE, VALVE, FITTINGS, TRAP, ELBOW, TRANSITION, OFFSETS, OR SIMILAR ITEMS REQUIRED FOR A COMPLETE INSTALLATION.

ALL EXISTING CONDITIONS ARE NOT INDICATED ON THE DOCUMENTS AND THOSE SHOWN ARE APPROXIMATIONS. THE CONTRACTOR IS TO VERIFY, IN THE FIELD, ALL EXISTING CONDITIONS.

EXAMINATION OF PREMISES – SPECIAL NOTE: NO CONSIDERATION OR ALLOWANCE WILL BE GRANTED FOR FAILURE TO VISIT SITE, OR ANY ALLEGED MISUNDERSTANDING OF MATERIAL TO BE FURNISHED, OR WORK TO BE DONE; IT BEING THAT TENDER OF PROPOSAL INDICATED WITH ITS AGREEMENT TO ITEMS AND CONDITIONS REFERRED TO HEREIN OR INDICATED ON AFOREMENTIONED DRAWINGS.

MEASUREMENTS

ALL MEASUREMENTS TAKEN AT THE BUILDING SHALL TAKE PRECEDENCE OVER SCALE DIMENSIONS. EVERY PART OF THE PLANS SHALL BE FITTED TO THE ACTUAL CONDITIONS AT THE BUILDING. IF IN CONFLICT WITH SCALE DIMENSIONS, CONTACT ARCHITECT FOR CLARIFICATION.

TEMPORARY SERVICES

THE HVAC CONTRACTOR IS TO COORDINATE WITH THE GENERAL CONTRACTOR, PRIOR TO PERFORMING WORK REQUIRING INTERRUPTION OF EXISTING SERVICES, THE CONTRACTOR SHALL SECURE FROM THE OWNER, APPROVAL OF THE PROPOSED OPERATION.

WORK SHALL BE ARRANGED FOR CONTINUOUS PERFORMANCE WHENEVER POSSIBLE. THE MECHANICAL CONTRACTOR SHALL PROVIDE TEMPORARY SERVICES AND/OR CONNECTIONS WHERE REQUIRED AND/OR SCHEDULE AND PERFORM OVERTIME WORK FOR ANY OPERATION WHICH REQUIRED SHUTDOWN OF THE FACILITIES AT NO ADDITIONAL COST TO THE OWNER.

THE AREA OF CONSTRUCTION AND/OR ADJACENT SPACES MAY BE OCCUPIED DURING THE CONSTRUCTION PERIOD. THE CONTRACTOR IS TO TAKE ALL NECESSARY MEASURES AND PROVIDE ALL MATERIALS TO ENSURE A SAFE ENVIRONMENT FOR THE FACILITY'S OCCUPANTS.

CONTINUITY OF EXISTING SYSTEMS

WHEREVER AN EXISTING SYSTEM IS REMOVED, PARTIALLY REMOVED, OR MODIFIED THE REMAINING SYSTEM IS TO FUNCTION FULLY AS BEFORE.

MAINTAIN CONTINUITY OF THE EXISTING AIR SYSTEMS, HYDRONIC SYSTEMS, AND CONTROL SYSTEMS TO THE AREAS NOT AFFECTED BY THIS ALTERATION.

SCAFFOLDING, RIGGING AND HOISTING

UNLESS OTHERWISE SPECIFIED, CONTRACTOR SHALL FURNISH ALL SCAFFOLDING, RIGGING, HOISTING AND SERVICES NECESSARY FOR ERECTION AND DELIVERY INTO THE PREMISES OF ANY EQUIPMENT AND APPARATUS FURNISHED.

THE CONTRACTOR SHALL REMOVE SAME FROM PREMISES WHEN NO LONGER REQUIRED.

HOUSEKEEPING

THIS CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING STOCK OF MATERIALS AND EQUIPMENT STORED ON PREMISES, AT LOCATIONS DESIGNATED FOR SUCH USE, IN A NEAT AND ORDERLY MANNER.

THIS CONTRACTOR SHALL AT ALL TIMES, KEEP THE PREMISES FREE FROM ACCUMULATION OF WASTE MATERIAL OR RUBBISH CAUSED BY HIS EMPLOYEES AT WORK. HE SHALL REMOVE HIS RUBBISH AND SURPLUS MATERIALS FROM THE JOB SITE AT THE END OF EACH WORK DAY AND SHALL LEAVE THE PREMISES AND HIS WORK IN A CLEAN AND ORDERLY CONDITION.

ALL MATERIAL SCHEDULED FOR REMOVAL IS TO BE DISPOSED OF IN A MANNER MEETING ALL FEDERAL, STATE, AND LOCAL REGULATIONS.

PROTECTION OF MATERIALS AND EQUIPMENTS

CLOSE PIPE OPENINGS WITH CAPS OR PLUGS DURING INSTALLATION.

PROVIDE TEMPORARY CLOSURES ON OPEN ENDED DUCTS DURING CONSTRUCTION PERIOD.

TIGHTLY COVER AND PROTECT FIXTURES AND EQUIPMENT AGAINST DIRT, WATER AND CHEMICAL OR MECHANICAL INJURY.

AT COMPLETION OF ALL WORK, FIXTURES, EXPOSED MATERIALS AND EQUIPMENT SHALL BE THOROUGHLY CLEANED.

WORK NOT INCLUDED

ALL ELECTRICAL WORK
CUTTING AND PATCHING
LINTELS AND STRUCTURAL FRAMING
ALL CONCRETE WORK
ALL PAINTING

THIS CONTRACTOR SHALL FURNISH THE GENERAL CONTRACTOR WITH THE SIZES AND LOCATIONS OF CHASES AND OPENINGS WHICH OCCUR IN WALLS, PARTITIONS, FLOORS, ROOFS, ETC., REQUIRED FOR THE INSTALLATION OF THE WORK CALLED FOR UNDER THIS CONTRACT. THIS WORK WILL BE DONE BY THE GENERAL CONTRACTOR, EXCEPT CUTTING REQUIRED FOR THE INSTALLATION OF HANGERS.

SHOP DRAWINGS

PRIOR TO DELIVERY TO THE JOB SITE, BUT SUFFICIENTLY IN ADVANCE OF REQUIREMENTS NECESSARY TO ALLOW ENGINEER AMPLE TIME FOR REVIEW, CONTRACTOR SHALL SUBMIT FOR APPROVAL, FIVE (5) COPIES OF EACH SHOP DRAWING.

INDICATE ON EACH SUBMISSION:

1. PROJECT NAME AND LOCATION
2. ARCHITECT AND ENGINEER
3. ITEM IDENTIFICATION
4. APPROVAL STAMP OF PRIME CONTRACTOR

ALL DUCTWORK SHOP DRAWINGS AND COORDINATION DRAWINGS SHALL BE SUBMITTED ON 3/8 IN SCALE DRAWINGS AND SHALL INCLUDE LOCATIONS AND SIZES OF EXISTING EQUIPMENT ALONG WITH NEW WORK. DRAWINGS SHALL INDICATE LOCATIONS OF HANGERS, SUPPORTS, EXPANSION JOINTS, GUIDES, ANCHORS AND ANCHOR LOADS.

COORDINATION DRAWINGS SHALL INDICATE ALL MEP EQUIPMENT, DUCTS AND PIPES AND PERTINENT ARCHITECTURAL ITEMS. MOUNTING HEIGHTS SHALL BE NOTED.

SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:

1. DUCTWORK LAYOUT, SHEET METAL DETAILS/STANDARDS
2. COORDINATION DRAWINGS

SUBMITTALS

PRIOR TO DELIVERY TO THE JOB SITE, BUT SUFFICIENTLY IN ADVANCE OF REQUIREMENTS NECESSARY TO ALLOW ENGINEER AMPLE TIME FOR REVIEW, CONTRACTOR SHALL SUBMIT FOR APPROVAL, FIVE (5) COPIES OF EACH SHOP DRAWING.

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3. ITEM IDENTIFICATION
4. APPROVAL STAMP OF PRIME CONTRACTOR

SUBMIT SUBMITTALS ON THE FOLLOWING:

1. PIPING MATERIALS
2. PIPING SPECIALTIES
3. PIPING INSULATIONS
4. DUCT MATERIALS
5. DUCTWORK SPECIALTIES
6. DUCTWORK INSULATORS
7. AIR OUTLETS (RGD)
8. HEATING EQUIPMENT
9. AIR CONDITIONING EQUIPMENT
10. FANS
11. CONTROLS
12. HYDRONIC SYSTEMS BALANCING REPORTS
13. AIR SYSTEMS BALANCING REPORTS

EQUIPMENT DEVIATION

THE PLANS AND/OR SPECIFICATIONS INDICATE THE NAME, MODEL NUMBER OR TYPE OF EQUIPMENT OR MATERIALS SPECIFIED TO SET THE STANDARD OF THE EQUIPMENT FOR THE PROJECT. THE ENGINEER WILL ENTERTAIN THE USE OF OTHER MANUFACTURER'S EQUIPMENT OF LIKE FUNCTIONS AND EQUAL QUALITY. FINAL ACCEPTANCE OF SUBSTITUTES IS AT THE ENGINEER'S DISCRETION. SHOULD THE BIDDER DESIRE TO USE EQUIPMENT OR MATERIALS OR A MANUFACTURER OTHER THAN THOSE SPECIFIED OR SHOWN, HE SHALL ATTACH A RIDER TO THE BID FORM LISTING THE DEDUCTIONS AND/OR ADDITIONS TO HIS BASE BID, TOGETHER WITH THE MANUFACTURE'S NAME AND MODEL NUMBERS OF THE EQUIPMENT OR MATERIALS HE PROPOSED TO FURNISH AS 'SUBSTITUTES'. IF NO SUBSTITUTE INFORMATION IS FURNISHED, IT WILL BE EXPRESSLY UNDERSTOOD THAT ALL EQUIPMENT AND MATERIALS NAMED WILL BE FURNISHED IN FULL ACCORDANCE WITH THE PLANS AND/OR SPECIFICATIONS.

RECORD DRAWINGS

CONTRACTOR SHALL KEEP ACCURATE RECORD OF ALL DEVIATIONS IN WORK AS ACTUALLY INSTALLED FROM WORK INDICATED PAYING PARTICULAR ATTENTION TO DIMENSIONING OUTSIDE UNDERGROUND UTILITY LINES, THEIR OFFSETS AND VALVES.

AT THE CLOSE-OUT OF THE PROJECT THE CONTRACTOR IS TO DELIVER TO THE OWNER TWO SETS OF "AS-BUILT" DRAWINGS COPIES OF ALL APPROVED SHOP DRAWINGS.

OWNER'S INSTRUCTIONS AND SYSTEM OPERATION

THE CONTRACTOR IS TO INSTRUCT THE OWNER, OR HIS REPRESENTATIVE, ON THE OPERATION AND MAINTENANCE PROCEDURES FOR ALL OF THE INSTALLED SYSTEMS AND EQUIPMENT. IN ADDITION TO THE VERBAL INSTRUCTIONS, THESE INSTRUCTIONS SHALL BE WRITTEN IN LAYMAN'S LANGUAGE AND SHALL BE INSERTED IN VINYL-COVERED THREE-RING LOOSE LEAF BINDER. THIS INFORMATION IN BINDER SHALL BE FIRST SENT TO AND APPROVED BY THE ARCHITECT/ENGINEER BEFORE TURNING OVER TO OWNER.

INSTALLATIONS

SLEEVES

PROVIDE NO. 22 GA. GALVANIZED IRON SLEEVES EXTENDED THROUGH CONSTRUCTION AT ALL PENETRATIONS THROUGH CEILINGS, WALLS AND PARTITIONS.

FOR INSULATED PIPING THE SLEEVE IS TO BE SIZED TO ALLOW INSULATION TO PASS THROUGH SLEEVE, PROVIDE 1/2 INCH SPACE BETWEEN PIPE AND/OR INSULATION AND SLEEVE.

FIRE SEAL ALL SLEEVES IN ACCORDANCE WITH BUILDING CODE AND APPLICABLE SECTIONS OF THE NFPA.

EXPANSION ANCHORS

SUSPEND HANGERS FROM EXPANSION ANCHORS IN SOLID CONCRETE SLABS SIMILAR TO HILTI HDI. PROVIDE HANGER IN PLACE WITH DOUBLE NUTS.

PROVIDE PROTECTION SHIELDS IN INSULATED PIPING. INSTALL HANGERS OVER INSULATION AND SHIELDS.

WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING HANGER RODS IN REQUIRED LOCATIONS, PROVIDE ADDITIONAL STEEL FRAMING AS REQUIRED AND REVIEWED.

HANGERS AND SUPPORTING

PIPE HANGING AND SUPPORTING – PIPING SHALL NOT BE SUPPORTED BY OTHER PIPING, BUT SHALL BE SUPPORTED WITH PIPE HANGERS SUITABLE FOR THE SIZE OF PIPE AND PROPER STRENGTH AND QUALITY AT PROPER INTERVALS SO THAT THE PIPING CANNOT BE MOVED ACCIDENTALLY FROM THE INSTALLED POSITION AS FOLLOWS:

PROVIDE CLEVIS HANGERS	AT CENTER OF CENTER SPACING (UNLESS OTHERWISE NOTED)
1/2 INCH PIPE OR TUBING	6 FEET
3/4 INCH OR 1 INCH PIPE OR TUBING	8 FEET
1-1/4 INCH OR LARGER (HORIZONTAL)	10 FEET
1-1/4 INCH OR LARGER (VERTICAL)	EVERY FLOOR LEVEL

DUCT HANGING AND SUPPORTING – DUCTWORK SHALL NOT BE SUPPORTED BY OTHER DUCTWORK OR PIPING, BUT SHALL BE SUPPORTED WITH HANGERS OF TYPE AND AT SPACING AS PER SMACNA STANDARDS.

VIBRATION AND SEISMIC CONTROL

QUIET OPERATION – ALL WORK SHALL OPERATE UNDER ALL CONDITIONS OF LOAD WITHOUT ANY SOUND OR VIBRATION WHICH IS OBJECTIONABLE IN THE OPINION OF THE ENGINEER. IN CASE OF MOVING MACHINERY, SOUND OR VIBRATION NOTICEABLE OUTSIDE OF ROOM IN WHICH IT IS INSTALLED, OR ANNOYING INSIDE ITS OWN ROOM, WILL BE CONSIDERED OBJECTIONABLE BY THE ENGINEER AND SHALL BE REMEDIED IN APPROVED MANNER BY THE CONTRACTOR AT HIS EXPENSE.

PROVIDE FLEXIBLE PIPE CONNECTIONS AT ALL PIPING CONNECTED TO MOVING EQUIPMENT.

PROVIDE FLEXIBLE DUCT CONNECTIONS AT ALL DUCTWORK CONNECTED TO MOVING EQUIPMENT. FLEXIBLE CONNECTIONS SHALL BE 29 OZ. NEOPRENE COATED FIBERGLASS, 6" WIDE. BURNING PROPERTIES SHALL CONFORM TO NFPA 90A. FASTEN TO DUCTWORK PER MANUFACTURER'S RECOMMENDATIONS. FABRIC SHALL NOT BE STRESSED OTHER THAN BY AIR PRESSURE. ALLOW AT LEAST ONE INCH SLACK TO INSURE THAT NO VIBRATION IS TRANSMITTED.

PROVIDE VIBRATION ISOLATION SPRINGS OR PADS AT MOUNTING AND SUPPORTS FOR ALL EQUIPMENT CAPABLE OF TRANSMITTING VIBRATIONS.

SEISMIC RESTRAINTS

SEISMIC RESTRAINTS DESIGNED AND CONSTRUCTED FOR LATERAL FORCES IN ANY DIRECTION SHALL BE PROVIDED FOR ALL MECHANICAL EQUIPMENT IN ACCORDANCE WITH THE STATE BUILDING CODE.

SEISMIC RESTRAINTS SHALL NOT BE REQUIRED FOR THE FOLLOWING:

1. PIPING IN BOILER AND MECHANICAL ROOMS LESS THAN 1-1/4 INCH INSIDE DIAMETER.
2. ALL OTHER PIPING LESS THAN 2-1/2 INCH INSIDE DIAMETER.
3. RECTANGULAR AIR-HANDLING DUCTS LESS THAN 6 SQUARE FEET IN CROSS-SECTIONAL AREA.
4. ROUND AIR-HANDLING DUCTS LESS THAN 28 INCHES IN DIAMETER.
5. PIPING SUSPENDED BY INDIVIDUAL HANGERS 12 INCHES OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.
6. DUCTS SUSPENDED BY HANGERS 12 INCHES OR LESS IN LENGTH FROM THE TOP OF THE DUCT TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.

SEISMIC RESTRAINT FOR DUCTWORK; PROVIDE REQUIRED BRACING MATERIAL. DUCTWORK SHALL BE SUPPORTED AND BRACED TO RESIST ALL DIRECTIONAL (TRANSVERSE, LONGITUDINAL AND VERTICAL) FORCES EQUAL TO 10 PERCENT OF THE WEIGHT OF THE DUCT SYSTEM.

IDENTIFICATION

ALL IDENTIFICATION LABELING IS TO COMPLY WITH ASME A13.1

ALL PIPING IS TO BE LABELED WITH INDICATIONS OF SERVICE AND DIRECTION OF FLOW.

ALL DUCTWORK IS TO BE LABELED WITH INDICATIONS OF SERVICE, DIRECTION OF FLOW AND ASSOCIATED SYSTEM DESIGNATION.

ALL EQUIPMENT IS TO HAVE PERMANENT LABELS INDICATING EQUIPMENT DESIGNATION.

PIPING INSTALLATION

SIZES AND APPROXIMATE LOCATION OF PIPING SYSTEMS ARE SHOWN ON THE DRAWINGS. CHECK CAREFULLY WITH THE ARCHITECTURAL DRAWINGS, DRAWINGS SHOWING WORK OF OTHER TRADES, AND EXISTING FIELD CONDITIONS TO MAKE SURE THAT THERE WILL BE NO CONFLICT BETWEEN THESE TRADES AND THE PIPING SYSTEMS. PIPES SHALL BE OFFSET AS REQUIRED TO CLEAR STRUCTURAL MEMBERS AND EXISTING FIELD CONDITIONS.

PIPING TO BE INSTALLED WITH PROPER PITCH TO LOW POINTS. PROVIDE DRAIN VALVES AT ALL LOW POINTS AND AIR VENTS AT ALL HIGH POINTS OF THE PIPING SYSTEM.

INSTALL PIPING TO ALLOW FOR PIPE EXPANSION.

DUCT INSTALLATION

SIZES AND APPROXIMATE LOCATION OF ALL DUCTS ARE SHOWN ON THE DRAWINGS. CHECK CAREFULLY WITH THE ARCHITECTURAL DRAWINGS, DRAWINGS SHOWING WORK OF OTHER TRADES, AND EXISTING FIELD CONDITIONS TO MAKE SURE THAT THERE WILL BE NO CONFLICT BETWEEN THESE TRADES AND THE DUCTS. DUCTS SHALL BE OFFSET AS REQUIRED TO CLEAR STRUCTURAL MEMBERS AND EXISTING FIELD CONDITIONS; IF NECESSARY, THE DIMENSIONS OF THE DUCT MAY BE ALTERED PROVIDED THE CROSS-SECTIONAL AREA IS IN NO CASE REDUCED.

FIELD QUALITY CONTROL

PERFORM THE FOLLOWING FIELD TESTS AND INSPECTIONS ACCORDING TO SMACNA'S "HVAC AIR DUCT LEAKAGE TEST MANUAL" AND PREPARE TEST REPORTS:

DISASSEMBLE, REASSEMBLE AND SEAL SEGMENTS OF SYSTEMS TO ACCOMMODATE LEAKAGE TESTING AND FOR COMPLIANCE WITH TEST REQUIREMENTS.

CONDUCT TESTS AT STATIC PRESSURES EQUAL TO MAXIMUM DESIGN PRESSURE OF SYSTEM OR SECTION BEING TESTED. IF PRESSURE CLASSES ARE NOT INDICATED, TEST ENTIRE SYSTEM AT MAXIMUM SYSTEM DESIGN PRESSURE. DO NOT PRESSURIZE SYSTEMS ABOVE MAXIMUM DESIGN OPERATING PRESSURE. GIVE SEVEN DAYS ADVANCE NOTICE FOR TESTING.

MAXIMUM ALLOWABLE LEAKAGE: COMPLY WITH REQUIREMENTS FOR LEAKAGE CLASS 3 FOR ROUND AND FLAT-OVAL DUCTS, LEAKAGE CLASS 12 FOR RECTANGULAR DUCTS IN PRESSURE CLASSES LOWER THAN AND EQUAL TO 2-INCH WG (500 PA) (BOTH POSITIVE AND NEGATIVE PRESSURES), AND LEAKAGE CLASS 6 FOR PRESSURE CLASSES FROM 2- TO 10- WG (500 TO 2500 PA).

REMAKE LEAKING JOINTS AND RETEST UNTIL LEAKAGE IS EQUAL TO OR LESS THAN MAXIMUM ALLOWABLE.

MATERIALS

DISSIMILAR METALS

WHENEVER DISSIMILAR PIPING MATERIALS ARE CONNECTED THE TWO SHALL BE SEPARATED WITH AN 'INSULATION' CONNECTION (DIELECTRIC) FITTING.

PIPING

STEAM & CONDENSATE RETURN PIPING

STANDARD WEIGHT, SCHEDULE 40, OPEN HEARTH STEEL, NATIONAL OR EQUAL. FITTINGS FOR STEEL PIPE SHALL BE AS FOLLOWS: GENERALLY, BUTT WELDING FITTINGS OVER TWO INCHES SHALL BE USED AND EITHER SOCKET-WELD OR SCREWED FOR TWO INCHES AND UNDER. WELDING FITTINGS SHALL BE STANDARD FORGED STEEL WITH CHAMFERED ENDS. ALL BRANCHES SHALL BE WELDED WITH EITHER WELDOLETE OR TEES.

HOT WATER HEATING PIPING

TYPE L COPPER TUBING WITH SWEAT FITTINGS WITH 95-5 SOLDER OR STANDARD WEIGHT, SCHEDULE 40, OPEN HEARTH STEEL, NATIONAL OR EQUAL. FITTINGS FOR STEEL PIPE SHALL BE AS FOLLOWS: GENERALLY, BUTT WELDING FITTINGS OVER TWO INCHES SHALL BE USED AND EITHER SOCKET-WELD OR SCREWED FOR TWO INCHES AND UNDER. WELDING FITTINGS SHALL BE STANDARD FORGED STEEL WITH CHAMFERED ENDS. ALL BRANCHES SHALL BE WELDED WITH EITHER WELDOLETE OR TEES, OR MATCH EXISTING MATERIALS.

CHILLED WATER PIPING

TYPE L COPPER TUBING WITH SWEAT FITTINGS WITH 95-5 SOLDER OR STANDARD WEIGHT, SCHEDULE 40, OPEN HEARTH STEEL, NATIONAL OR EQUAL. FITTINGS FOR STEEL PIPE SHALL BE AS FOLLOWS: GENERALLY, BUTT WELDING FITTINGS OVER TWO INCHES SHALL BE USED AND EITHER SOCKET-WELD OR SCREWED FOR TWO INCHES AND UNDER. WELDING FITTINGS SHALL BE STANDARD FORGED STEEL WITH CHAMFERED ENDS. ALL BRANCHES SHALL BE WELDED WITH EITHER WELDOLETE OR TEES, OR MATCH EXISTING MATERIALS.

CONDENSER WATER PIPING

TYPE L COPPER TUBING WITH SWEAT FITTINGS WITH 95-5 SOLDER OR PVC (EXCEPT IF LOCATED IN A SPACE USED AS AN AIR PLENUM) OR MATCH EXISTING MATERIALS.

CONDENSATION DRAIN PIPING

TYPE DWV COPPER TUBING WITH DWV SWEAT FITTINGS OR PVC (EXCEPT IF LOCATED IN A SPACE USED AS AN AIR PLENUM)

REFRIGERANT PIPING

TYPE ACR SERVICE COPPER TUBING MEETING ASTM B280: HARD DRAWN (ANY SIZE) OR SOFT DRAWN (1-5/8" ID OR SMALLER), OR AS PER MANUFACTURER'S RECOMMENDATIONS.

PIPE INSULATION

THE FOLLOWING PIPING SYSTEMS ARE TO BE INSULATED:

STEAM SUPPLY PIPING
STEAM CONDENSATE RETURN PIPING WITHIN 10'-0" OF THE FLOOR
HEATING HOT WATER SUPPLY AND RETURN PIPING
CHILLED WATER SUPPLY AND RETURN PIPING
CONDENSATION DRAIN PIPING
REFRIGERANT SUCTION LINE PIPING

HOT WATER & STEAM HEATING AND CHILLED WATER PIPING INSULATION

INSULATE WITH RIGID PREFORMED FIBERGLASS WITH AP-T PLUS JACKET, SCHULLER MICRO-LOK OR EQUAL. INSULATION THICKNESS SHALL BE 1" THICK FOR BELOW 1 ½" OR SMALLER PIPING, 1-1/2" THICK FOR 2" TO 3" PIPING AND 2" THICK FOR PIPING 4" AND LARGER. PROVIDE ZESTON COVERS ON ALL FITTINGS.

CONDENSATE DRAIN PIPING INSULATION

INSULATE WITH 1/2" THICK HEAVY DENSITY FIBERGLASS 25 ASJ WITH VAPOR BARRIER AND LAP ADHESIVE JACKET. INSULATION ON FITTINGS SHALL BE FIBERGLASS WITH PRE-MOLDED JACKET.

REFRIGERANT PIPING INSULATION

INSULATE SUCTION LINE AND LIQUID WITH ARMAFLEX INSULATION. MINIMUM INSULATION THICKNESS SHALL BE 1".

VALVES AND SPECIALTIES

BALANCING FITTINGS

PROVIDE "B & G" CIRCUIT SETTER BALANCING FITTINGS ON ALL WATER SYSTEMS WHENEVER REQUIRED FOR BALANCING OF SYSTEMS.

HOT AND CHILLED WATER VALVES

BALL TYPE VALVES TO BE JAMESBURY, CLINCHER, OR APOLLO GATE TYPE VALVES TO BE MILWAUKEE #F-2885M (FLANGED) OS&Y TYPE VALVES TO BE IRON BODY, BRONZE MOUNTED OR (SCREWED), BRONZE, RISING STEM. CHECK VALVES TO BE CRANE/JENKINS VALVES.

THERMOMETERS

SHALL BE TRERICE UNIVERSAL ANGLE TYPE #L80732, SOLID LIQUID FILLED, 4 ½" DIAL SIZE. FURNISH WITH SEPARABLE SOCKET WITH 2" EXTENSION NECK.

STEAM SPECIALTIES

ALL STEAM TRAPS AND SPECIALTIES TO BE B & G OR SARCO.

DUCTWORK

SHEET METAL DUCTWORK

ALL DUCTWORK SHALL BE CONSTRUCTED OF #1 QUALITY SHEETS OF GALVANIZED STEEL FREE OF CRACKS OR BLEMISHES. WHEN PITTSBURGING OR SNAP LOCKING A JOINT, THE GALVANIZED STEEL SHALL NOT BE CHIPPED OFF. ALL PARTS OF THE SHEET METAL DUCT SYSTEM SHALL BE OF THE GAGE, CONSTRUCTION, HANGING METHOD, AND INSTALLED IN STRICT ACCORDANCE WITH THE CURRENT EDITION OF THE SMACNA STANDARDS, INCLUDING DUCT LEAKAGE REQUIREMENTS.

FLEXIBLE DUCTWORK

FLEXIBLE DUCTS TO BE INSULATED TYPE; UL 181, CLASS 1, 2-PLY VINYL FILM SUPPORTED BY HELICALLY WOUND, SPRING-STEEL WIRE WITH FIBROUS-GLASS INSULATION AND POLYETHYLENE VAPOR BARRIER FILM. THE LENGTH OF FLEXIBLE DUCT IS NOT TO EXCEED 12'-0". FLEXIBLE DUCT MAY ONLY BE USED ON THE SUPPLY AIR SIDE OF LOW PRESSURE DUCT SYSTEMS.

MOISTURE LADEN AIR DUCTWORK

DUCTWORK WHICH CONVEYS AIR WITH A HIGH MOISTURE CONTENT, SUCH AS SHOWER EXHAUST AIR, SHALL BE CONSTRUCTED OF ALUMINUM SHEET MATERIAL MEETING SMACNA STANDARDS.

DUCT INSULATION

SOUND (ACOUSTIC) INSULATION

PROVIDE INTERNAL SOUND INSULATION IN ALL DUCTS WITHIN 10'-0" OF THE DISCHARGE OF AN AIR HANDLING UNIT AND WHERE INDICATED ON THE DRAWINGS. THE DUCTWORK SHALL BE LINED WITH JOHNS MANVILLE PERMACOTE LINACOUSTIC. THICKNESS, UNLESS SPECIFIED OTHERWISE, SHALL BE 1". LINER SHALL BE APPLIED TO DUCT IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND SMACNA GUIDELINES, LATEST EDITION. WHERE SOUND INSULATION IS INDICATED, DUCTWORK SIZES DENOTED ARE THE INSIDE DIMENSIONS AFTER THE INSULATION HAS BEEN INSTALLED.

THERMAL INSULATION

COVER ALL CONCEALED UNLINED SUPPLY AIR AND OUTSIDE AIR DUCTWORK WITH FIBERGLASS DUCT WRAP HAVING A MIN. R-6, EQUAL TO JOHNS MANVILLE R-SERIES MICROLITE WITH F.R.G. VAPOR BARRIER. ALL SUPPLY DUCTS, LOCATED IN ATTIC SHALL BE INSULATED TO MINIMUM R-8. COVER ALL EXPOSED UNLINED SUPPLY AIR AND OUTSIDE AIR DUCTWORK WITH RIGID FIBERGLASS BOARD INSULATION HAVING MIN. R-6. PROVIDE ALL TAPE, MASTICS, SEALANTS, MOUNTING PINS, AND ETC. TO INSTALL INSULATION AS RECOMMENDED BY THE MANUFACTURER.

THERMAL INSULATION SCHEDULE

INSULATE DUCTS IN COMPLIANCE WITH THE INTERNATIONAL ENERGY CONSERVATION CODE. COMMERCIAL DUCTWORK SHALL BE INSULATED TO R-6 WHEN IN UNCONDITIONED SPACES AND R-8 WHEN LOCATED OUTSIDE THE BUILDING. COMMERCIAL DUCTWORK IN CONDITIONED SPACES DOES NOT REQUIRE INSULATION. RESIDENTIAL DUCTS OUTSIDE THE BUILDING ENVELOPE SHALL BE INSULATED TO A MINIMUM OF R-8. RESIDENTIAL DUCTWORK INSIDE THE BUILDINGS THERMAL ENVELOPE DOES NOT REQUIRE INSULATION. ALL EXTERIOR DUCTS TO BE INSULATED TO A MINIMUM OR R-8.

DUCT SEALING

SEAL ALL DUCTWORK IN COMPLIANCE WITH THE INTERNATIONAL ENERGY CONSERVATION CODE.

COMMERCIAL DUCTS, SEAL ALL LONGITUDINAL AND TRANSVERSE JOINTS, SEAMS AND CONNECTIONS.

RESIDENTIAL DUCTS, VERIFY DUCT LEAKAGE WITH POST CONSTRUCTION OR ROUGH-IN TEST. RESIDENTIAL DUCT LEAKAGE VERIFICATION NOT REQUIRED IF AIR HANDLER AND ALL DUCTS ARE LOCATED WITHIN "CONDITIONED SPACE."

DUCT INSULATION – EXTERIOR DUCTWORK

EXTERIOR DUCTWORK SHOULD FIRST BE WRAPPED WITH 1-1/2" THICK RIGID FIBERGLASS INSULATION, COVERED WITH #907 MASTIC, WEATHERPROOF MEMBRANE APPLIED AND WRAPPED FOR THE ENTIRE LENGTH, THEN RE-APPLY MASTIC AS FINAL SEALING AGENT.

DUCT CLEANING – EXISTING DUCTWORK

COMPLY WITH NADCA ARC, INCLUDING ITEMS IDENTIFIED AS "RECOMMENDED," "ADVISED," AND "SUGGESTED." PERFORM ELECTRICAL LOCKOUT AND TAGOUT ACCORDING TO OWNER'S STANDARDS OR AUTHORITIES HAVING JURISDICTION. REMOVE NON-ADHERED SUBSTANCES AND DEPOSITS FROM WITHIN THE HVAC SYSTEM. COMPLETE CLEANING IN ACCORDANCE WITH OWNER-CONTRACTOR AGREED-UPON SCOPE OF WORK. SYSTEMS AND COMPONENTS TO BE CLEANED: ALL AIR-MOVING AND DISTRIBUTION EQUIPMENT. DEBRIS REMOVED FROM THE HVAC SYSTEM SHALL BE DISPOSED OF ACCORDING TO APPLICABLE FEDERAL, STATE, AND LOCAL REQUIREMENTS.

DUCT ACCESSORIES

VOLUME DAMPERS

SINGLE BLADE OR OPPOSED BLADE MULTI-LOUVER TYPE AS DETAILED IN SMACNA STANDARDS. PROVIDE END BEARING FOR ALL DAMPERS. QUADRANT OR OTHER OPERATOR FOR EXTERNALLY INSULATED DUCT SHALL HAVE STAND-OFF MOUNT SO OPERATION IS CLEAR OF THE INSULATION. PROVIDE VOLUME DAMPER IN DUCTWORK AT ALL RUN-OUT DUCT TO EACH CEILING DIFFUSER, AT ALL BRANCH DUCTS AND WHERE INDICATED.

SMOKE AND/OR FIRE DAMPERS

PROVIDE SMOKE AND/OR FIRE DAMPERS AS REQUIRED, WHETHER INDICATED OR NOT, AT ALL FIRE AND SMOKE RATED PARTITIONS. REVIEW ARCHITECTURAL PLANS FOR DESIGNATIONS. FIRE DAMPERS SHALL BE RUSKIN IBD 2, VERTICAL OR HORIZONTAL, STYLE B OR STYLE C FOR ROUND DUCTS, OR EQUAL. EACH SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH NFPA 90A LATEST EDITION AND BEAR U.L. LABEL AND SHALL CONFORM TO BULLETIN #UL-555. INSTALL IN ALL RATED WALLS AND CEILINGS AS REQUIRED AND/OR INDICATED ON DRAWINGS.

DUCT ACCESS DOORS

PROVIDE ACCESS DOORS, SIZED AND LOCATED FOR MAINTENANCE WORK, UPSTREAM WHERE POSSIBLE, FOR EACH DUCT MOUNTED SMOKE DETECTOR AND EACH FIRE DAMPER OR DEVICE WITHIN THE DUCT THAT REQUIRES SERVICE OR INSPECTION. ACCESS SECTIONS IN INSULATED DUCTS SHALL BE DOUBLE-WALL, INSULATED. REFER TO SMACNA STANDARDS. PROVIDE LOCK TYPE 2 (DOOR LATCH, NOT SASH LOCK).

COMMERCIAL APPLICATIONS

MOTORIZED DAMPERS

PROVIDE MOTORIZED SHUTOFF DAMPERS ON EXHAUST AND OUTDOOR AIR SUPPLY OPENINGS IN COMPLIANCE WITH THE IECC.

EQUIPMENT

CONTROLS

PROVIDE DDC SYSTEM.

GENERAL

PROVIDE ALL TEMPERATURE, OPERATION AND SAFETY CONTROLS, LOW VOLTAGE CONTROL WIRING, HARDWARE, SOFTWARE, AND ACCESSORIES NECESSARY TO ACHIEVE A FULLY OPERATIONAL HVAC CONTROL SYSTEM. POWER WIRING SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR.

PROVIDE A PROGRAMMABLE THERMOSTAT(S) IN COMPLIANCE WITH THE INTERNATIONAL ENERGY CONSERVATION CODE INCLUDING SETBACK (55°F HEAT, 85° COOL) DEADBAND (5°F COMMERCIAL) AND TIMECLOCK (7 DAY COMMERCIAL)

TESTING AND BALANCING

GENERAL

COMPLETELY TEST AND BALANCE HOT AND CHILLED WATER SYSTEMS AND ALL SUPPLY, RETURN AND EXHAUST AIR SYSTEMS AND PROVE THE CAPACITIES OF THE SYSTEM AND THE SYSTEM COMPONENTS. SUBMIT RESULTS TO ENGINEER FOR APPROVAL

GENERAL PIPE TEST

UNLESS OTHERWISE NOTED, TEST ALL PIPING HYDROSTATICALLY AT NOT LESS THAN 200 PSIG (# PER SQUARE INCH PRESSURE) FOR TWO HOURS AND ALL DEFECTIVE MATERIAL SHALL BE REPLACED. BEFORE MAKING FINAL APPROVAL, THE SUBCONTRACTOR SHOULD PRODUCE A WRITTEN STATEMENT, SIGNED BY A REPRESENTATIVE OF THE OWNER'S UNDERWRITER, THAT THE WORK HAS BEEN COMPLETED AND TESTED IN ACCORDANCE WITH APPROVED SPECIFICATIONS AND PLANS. UNLESS OTHERWISE NOTED, PERFORM PRESSURE TESTS AND OBTAIN APPROVAL OF TEST RESULTS BEFORE STARTING CLEANING OR CONCEALING OF PIPE UNDER INSULATION OR OTHER FINISH. INSULATION REMOVAL AND REINSTALLATION WHICH IS REQUIRED BECAUSE INSULATION WAS INSTALLED PRIOR TO TESTING SHALL BE DONE BE THE CONTRACTOR AT NO EXTRA COST.

TESTS ARE SATISFACTORY ONLY WHEN JOISTS SHOW NO VISIBLE LEAKS AND TEST PRESSURE REMAINS CONSTANT AFTER CONTINUOUS TEST PERIOD. REPAIR LEAKS, AND REMOVE AND REPLACE DEFECTIVE PIPE, FITTINGS AND JOISTS WITH NEW MATERIAL, UNTIL ACCEPTED BY ARCHITECT AND INSPECTING AUTHORITY. WICKING, CAULKING, COMPOUNDING, PEENING, OR OTHER MAKESHIFT TYPE OF REPAIRS ARE NOT PERMITTED. REPEAT TESTS AFTER REPAIRS UNTIL SYSTEMS ARE PROVEN TIGHT.

HOT OR CHILLED WATER PIPE TEST

TESTS SHALL BE MAINTAINED AS LONG AS NECESSARY TO COMPLETELY INSPECT PIPING (MINIMUM 4 HOURS).

TEST WATER PIPING BY APPLYING HYDROSTATIC PRESSURE USING PUMP; ENSURE THAT LINES ARE VENTED OF ALL AIR.

FOLLOWING PRECAUTIONS SHALL BE TAKEN DURING PRESSURE TESTS:

1. HOT WATER SYSTEM RELIEF VALVE SHALL BE REMOVED.
2. SYSTEM PRESSURE GAUGES WITH SCALE RANGES LOWER THAN TEST PRESSURE SHALL BE REMOVED OR ISOLATED.
3. WATER CONTROL VALVES SHALL BE REMOVED.

REFRIGERANT PIPE TEST

TEST FOR LEAKS BY FILLING SYSTEM WITH DRY NITROGEN. COMPRESSOR SUCTION AND DISCHARGE VALVES SHALL BE CLOSED. EXPANSION VALVES SHALL BE PLUGGED. USE SEPARATE PUMP OR AVAILABLE GAS CYLINDER PRESSURE TO PRESSURIZE SYSTEM.

MAXIMUM TEST PRESSURE SHALL NOT EXCEED 120% OF FOLLOWING MINIMUM TEST PRESSURE:

A. REFRIGERANT HIGH SIDE PIPING: 250 PSIG
B. REFRIGERANT LOW SIDE PIPING

APPLY SOAPY WATER MIXTURE AND VISUALLY INSPECT EACH PIPE JOINT, VALVE PACKING AND BONNET, FLANGE, SIGHT GLASS, FITTING AND PIECE OF EQUIPMENT FOR LEAKAGE, LIQUID LEAK DETECTOR SHALL NOT BE USED EXCEPT WITH PRIOR WRITTEN APPROVAL FROM ARCHITECT. AFTER PRESSURE TESTS HAVE BEEN COMPLETED AND ACCEPTED, EVACUATE SYSTEMS TO ATMOSPHERE AND PROCEED WITH EVACUATION TESTS.

AIR SYSTEMS BALANCING

PROCURE THE SERVICES OF A CERTIFIED BALANCING CO. TO PERFORM THE TESTING AND BALANCING OF THE AIR SYSTEMS.

COMPLETELY TEST AND BALANCE ALL SUPPLY, RETURN AND EXHAUST AIR SYSTEMS AND PROVE THE CAPACITIES OF THE SYSTEM AND THE SYSTEM COMPONENTS. BALANCE THE GRILLES, REGISTERS, DIFFUSERS AND EQUIPMENT TO OBTAIN THE RESULTS INDICATED ON THE DWGS. SUBMIT A BALANCING REPORT INDICATING THE RESULTS TO ENGINEER FOR APPROVAL.

WATER SYSTEMS BALANCING

PROCURE THE SERVICES OF A CERTIFIED BALANCING CO. TO PERFORM THE TESTING AND BALANCING OF THE WATER SYSTEMS.

COMPLETELY TEST AND BALANCE ALL SUPPLY AND RETURN PIPING SYSTEMS. BALANCE FLOWS TO DESIGN/SCHEDULED LISTING FOR EACH PIECE OF EQUIPMENT (PUMP, COIL, TERMINAL UNIT, ETC.). INCLUDE SIZE, CV VALUE OF EACH CONTROL VALVE, AND EQUIPMENT SERVED IN THE FINAL BALANCING REPORT. SUBMIT THE REPORT TO THE ENGINEER FOR APPROVAL.

No 19460

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NO.	DATE	DESCRIPTION
	05/22/26	Issued for Permit

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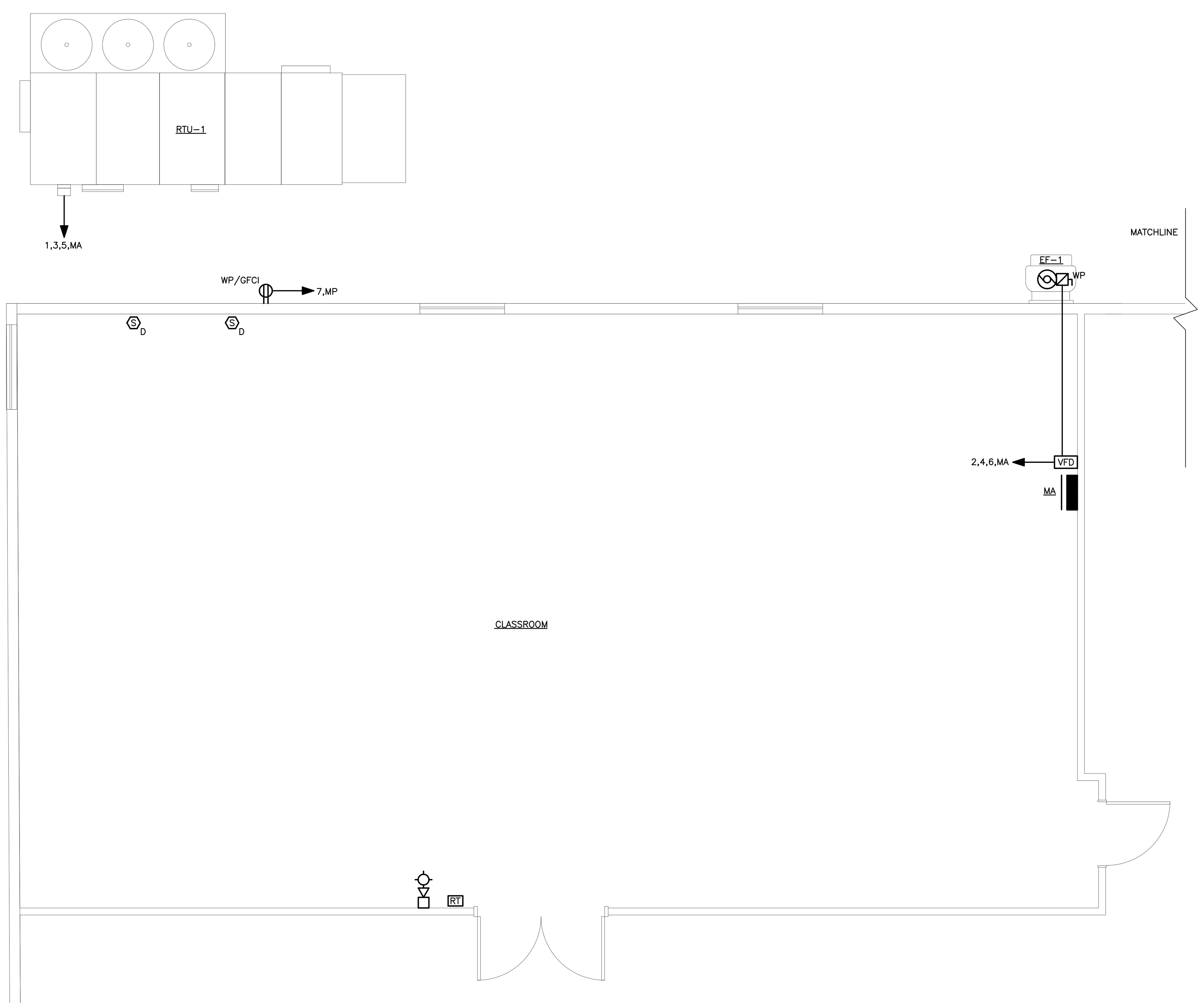
DESIGNED: IES
DRAFTED: IES
APPROVED: IES
SCALE: AS NOTED
PROJECT NO.: 26027
DATE: 05/22/2026

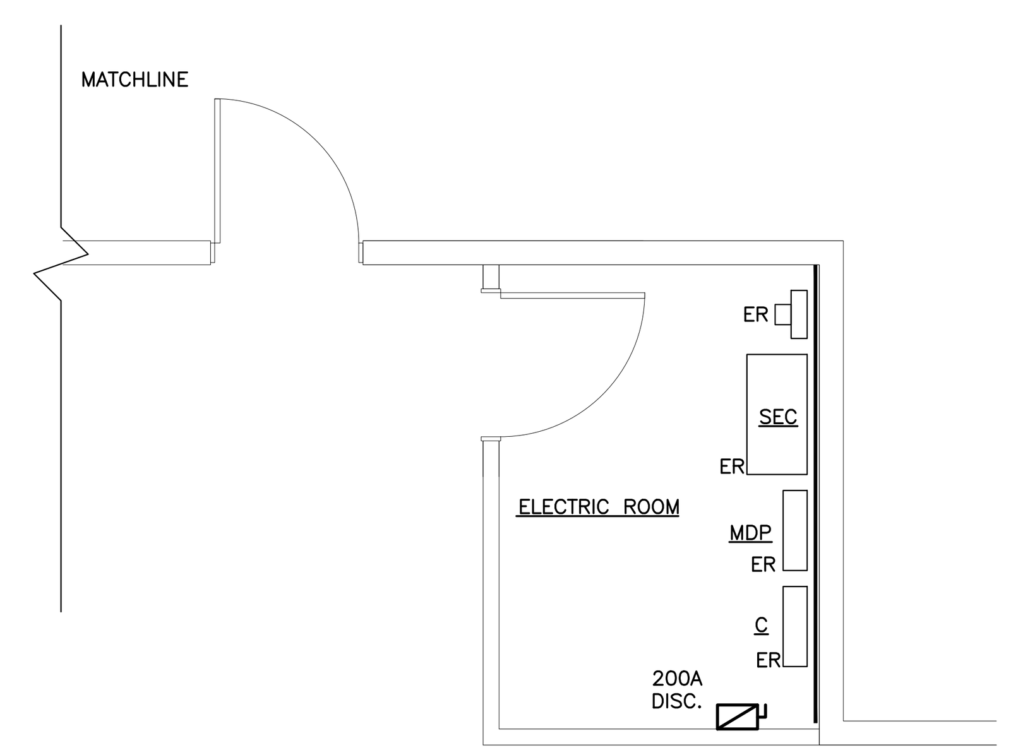
TITLE:
MECHANICAL SPECIFICATIONS

SHEET NUMBER:
M-4

ELECTRICAL DEMOLITION PLAN
SCALE: 1/4"= 1'-0"



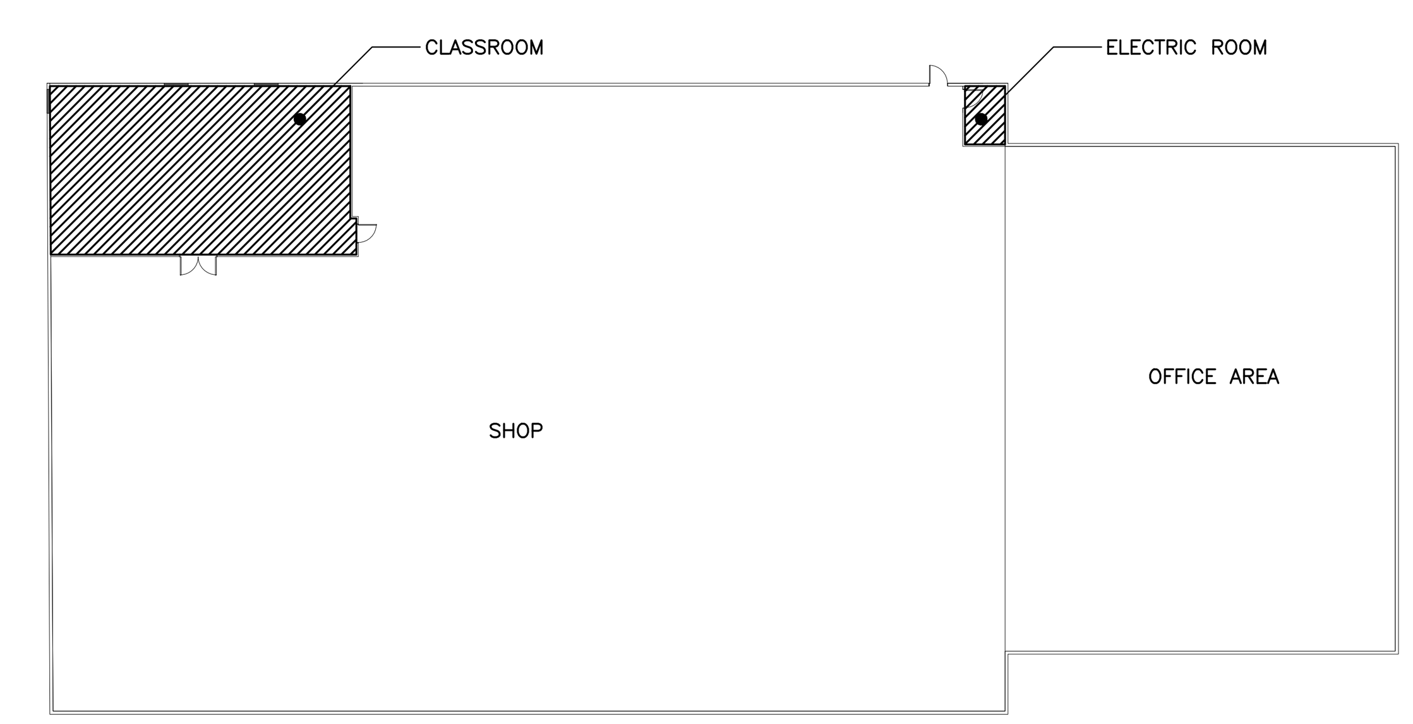
ELECTRICAL PLAN
SCALE: 1/4"= 1'-0"



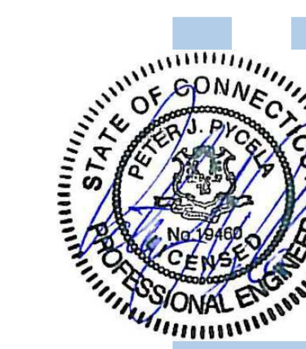
PARTIAL ELECTRICAL ROOM PLAN
SCALE: 1/4"= 1'-0"

ELECTRICAL DEMOLITION NOTES

1. ALL EXISTING ELECTRICAL EQUIPMENT AND/OR DEVICE SHOWN WITHOUT ("RR", "ER" OR "R") SHALL BE DISCONNECTED AND REMOVED, REMOVE ALL ASSOCIATED BACK BOX, CONDUIT AND WIRING BACK TO SOURCE OR LAST DEVICE
2. "RR" – INDICATES EXISTING ELECTRICAL EQUIPMENT AND/OR DEVICE TO BE REMOVED AND RELOCATED. (EXTEND EXISTING WIRING AS REQUIRED)
3. "ER" – INDICATES EXISTING ELECTRICAL EQUIPMENT AND/OR DEVICE TO REMAIN.
4. "R" – INDICATES EXISTING ELECTRICAL DEVICE TO BE REPLACED WITH NEW DEVICE IN KIND WITHIN EXISTING LOCATION, REUSE BACK BOX AND WIRING, PROVIDE NEW FACE PLATE TO DEVICE.
5. NO EQUIPMENT OR DEVICES THAT HAVE BEEN DISCONNECTED AND OR ABANDONED SHALL REMAIN.
6. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH THE EXISTING SYSTEMS AND CONDITIONS IN AREAS OF RENOVATION.
7. ANY SYSTEMS OR EQUIPMENT TO REMAIN ACTIVE DURING RENOVATION SHALL BE KEPT IN OPERATION BY PROVIDING TEMPORARY CONNECTIONS AS REQUIRED UNTIL NEW SYSTEMS ARE INSTALLED AND OPERATIONAL.
8. THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE OWNER, CM, AND OR GENERAL CONTRACTOR ANY AND ALL PHASING OF THE MECHANICAL DEMOLITION WORK IN ORDER TO SATISFY THE CONSTRUCTION SCHEDULE AND OWNERS OCCUPANCY REQUIREMENTS.
9. ANY ELECTRICAL EQUIPMENT TO BE REMOVED AND REUSED OR TURNED OVER TO THE OWNER, AT OWNERS REQUEST, OR AS INDICATED ON THE DRAWINGS SHALL BE CAREFULLY REMOVED AND STORED TO PREVENT DAMAGE.
10. THE ELECTRICAL CONTRACTOR SHALL ALSO REVIEW THE ARCHITECTURAL DEMOLITION DRAWINGS AS PART OF THIS CONTRACT FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
11. ALL SERVICE INTERRUPTIONS SHALL BE COORDINATED AND APPROVED WITH THE OWNER IN ADVANCE PRIOR TO COMMENCEMENT OF ANY WORK.
12. THE ELECTRICAL CONTRACTOR SHALL COORDINATE HIS DEMOLITION WORK WITH THAT OF OTHER TRADES IN ORDER TO AVOID CONFLICTS.



KEY PLAN
SCALE: 1/32"= 1'-0"



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DESIGNED:	IES
DRAFTED:	IES
APPROVED:	IES
SCALE:	AS NOTED
PROJECT NO.:	26027
DATE:	05/22/2026

TITLE:
ELECTRICAL FLOOR PLANS

SHEET NUMBER:
E-1

Freeman Companies, LLC. G:\IES Projects\2026 Projects\Team PJP\26027 Manufacturing Alliance Service Center\Contract Documents\26027 E-1.dwg May 22, 2026 9:00 AM IES-MEP.ctb Plotted By: ppycela

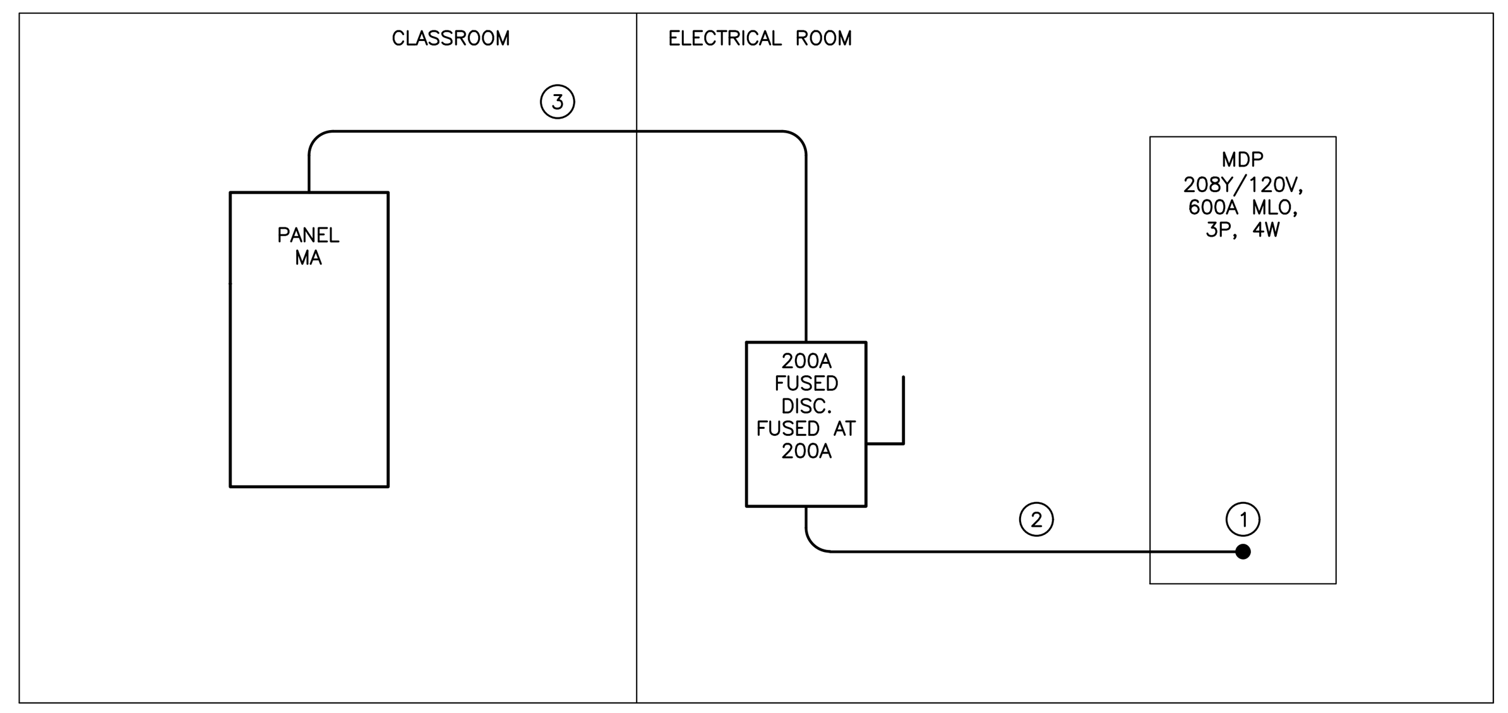
PANEL MA

RATING: 208Y/120V, 3P, 4W
MAIN BUS: ☒ CU ☐ AL 225A MAIN BUS
MAIN DEVICE: M.L.O.
INTERRUPTING RATING: 10KAIC

LOCATION: CLASSROOM
MOUNTING: ☐ FLUSH ☒ SURFACE
TRIM: ☐ SINGLE DOOR ☒ DOOR-IN-DOOR

CKT. NO.	CKT. BKR. TRIP AMPS	CKT. BKR. POLES	DESCRIPTION	WIRE & CONDUIT	KVA	A	B	C	KVA	WIRE & CONDUIT	DESCRIPTION	CKT. BKR. POLES	CKT. BKR. TRIP AMPS	CKT. NO.
1	110	3	RTU-1	1-1/2"C, 3#2, #6G	10.1				1.1	3/4"C, 3#12, #12G	EF-1	3	20	2
3	–	–	–	–	10.1				1.1	–	–	–	–	4
5	–	–	–	–	10.1				1.1	–	–	–	–	6
7	20	1	OUTDOOR RECEPTACLE	3/4"C, 3#12, #12G	0.2				0.0	–	SPARE	1	20	8
9	20	1	SPARE	–	0.0				0.0	–	SPARE	1	20	10
11	20	1	SPARE	–	0.0				0.0	–	SPARE	1	20	12
13	20	1	SPARE	–	0.0				0.0	–	SPACE	–	–	14
15	–	–	SPACE	–	0.0				0.0	–	SPACE	–	–	16
17	–	–	SPACE	–	0.0				0.0	–	SPACE	–	–	18
19	–	–	SPACE	–	0.0				0.0	–	SPACE	–	–	20
21	–	–	SPACE	–	0.0				0.0	–	SPACE	–	–	22
23	–	–	SPACE	–	0.0				0.0	–	SPACE	–	–	24
				TOTALS PER PHASE		11.4	11.2	11.2						
				GRAND TOTAL	33.8									

NOTE: PROVIDE DOOR LOCK.



PANEL RISER DIAGRAM

SCALE: NONE

RISER DIAGRAM NOTES

(1) PROVIDE FEED THROUGH LUG PROVISIONS OR TAP BUS.
(2) 2"C, 4#3/0, #1G. NEC ARTICLE 240.21 (B)(2) 25' TAP RULE.
(3) 2"C, 4#3/0, #6G

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
S_{TT}	MANUAL MOTOR STARTER WITH THERMAL OVERLOAD PROTECTION
	SINGLE RECEPTACLE (TAMPER RESISTANT)
	DUPLEX RECEPTACLE (TAMPER RESISTANT)
	EXISTING PANELBOARD/LOAD CENTER
	208Y/120V PANEL
	CONDUIT AND WIRE
1,LP	HOMERUN TO PANELBOARD, NUMBERS/LETTERS INDICATE CIRCUIT AND PANELBOARD TERMINATION UNLESS OTHERWISE INDICATED.
J	JUNCTION BOX
	MOTOR
	SAFETY DISCONNECT SWITCH
	FUSIBLE SAFETY DISCONNECT SWITCH
FACP	FIRE ALARM CONTROL PANEL
S D	FIRE ALARM DUCT SMOKE DETECTOR
VFD	VARIABLE FREQUENCY DRIVE MODEL# ABB ACH480-01-03A3-3-SERIES

ABBREVIATIONS

A	AMPERE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AWG	AMERICAN WIRE GAUGE
C	CONDUIT
CB	CIRCUIT BREAKER
CLG	MOUNTED IN CEILING
CKT	CIRCUIT
DWG	DRAWING
ELEC	ELECTRICAL
ER	EXISTING TO REMAIN
GF	GROUND FAULT CIRCUIT INTERRUPTER
JB	JUNCTION BOX
MTD	MOUNTED
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
P	POLE
ø	PHASE
RR	TO BE REMOVED AND RELOCATED
UON	UNLESS OTHERWISE NOTED
V	VOLT
W	WATT
WP	WEATHERPROOF

GENERAL NOTES

1. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK REQUIRED FOR A COMPLETE, FULLY OPERABLE INSTALLATION. ALL WORK TO BE DONE IN ACCORDANCE WITH THE LATEST APPROVED ISSUE OF THE NEC AND APPLICABLE LOCAL CODES.
2. PRIOR TO SUBMISSION OF BIDS GIVE WRITTEN NOTICE TO ARCHITECT AND ENGINEER OF ANY MATERIAL OR APPARATUS THAT IS INADEQUATE, UNSUITABLE FOR THE USE, IN VIOLATION OF LAWS, ORDINANCES, RULES, CODES OR ANY REGULATIONS OF AUTHORITIES HAVING JURISDICTION OR ANY NECESSARY ITEMS OF WORK THAT HAS BEEN OMITTED. CONTRACTOR AFFIRMS THAT ABSENT SUCH NOTICE, ALL SYSTEMS WILL FUNCTION SATISFACTORILY WITHOUT ADDITIONAL EXTRA COMPENSATION.
3. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING A BID AND ADHERE TO THE CONTENTS OF THE BID DOCUMENTS. ANY DEVIATIONS FROM THE INFORMATION PROVIDED IN THE DOCUMENTS MUST BE LISTED IN WRITING. INNOVATIVE ENGINEERING SERVICES, LLC HAS THE RIGHT TO BE COMPENSATED FOR REVIEW OF VALUE ENGINEERING OR SUBSTITUTED MATERIALS AND EQUIPMENT.
4. ELECTRICAL CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED TO THEIR ORIGINAL CONDITION. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING, PATCHING, PAINTING, CLEAN-UP, ELECTRICAL DEBRIS REMOVAL AND GENERAL COORDINATION OF THE WORK EFFORT AS REQUIRED FOR THE INSTALLATION OF THE ELECTRICAL ITEMS OF WORK.
5. THE DRAWINGS SHOW THE GENERAL LAYOUT AND SOME OF THE DETAIL, BUT THEY DO NOT SHOW EVERY FITTING, BEND, ... ETC. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL SUCH MATERIALS TO MAKE A COMPLETE INSTALLATION.
6. ALL PART NUMBERS ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR. THEY ARE NOT TO BE CONSIDERED THE COMPLETE SPECIFICATION OF THE PRODUCT. THE PART NUMBER AND DESCRIPTION WILL BE THE COMPLETE SPECIFICATION. IN THE EVENT OF A DISCREPANCY BETWEEN THE TWO, THE MORE STRINGENT, MORE COSTLY FEATURE/PERFORMANCE WILL BE REQUIRED.
7. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR TESTING OF ALL PHASES OF THE WORK AND TO DEMONSTRATE TO OWNER THAT THE EQUIPMENT IS IN FULL OPERATING ORDER.
8. DO NOT SCALE DRAWINGS; ACTUAL FIELD MEASUREMENTS AND DIMENSIONS TAKE PRECEDENCE IN ALL CASES.
9. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT, AIA DOCUMENT A 201, LATEST EDITION.
10. ELECTRICAL CONTRACTOR SHALL INSTALL ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND OR REQUIREMENTS FOR PROPER OPERATION AND MAINTENANCE.
11. ELECTRICAL CONTRACTOR SHALL WARRANT AND GUARANTEE ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER.
12. PROVIDE INDEPENDENT SEISMIC SUPPORT OF ALL ELECTRICAL EQUIPMENT PER THE LATEST ADOPTED VERSION OF THE INTERNATIONAL BUILDING CODE.
13. ALL ELECTRICAL PENETRATIONS TO BE FIREPROOFED TO MAINTAIN INTEGRITY OF FIRE WALLS/FLOORS/CEILINGS.
14. ALL THE WIRE SIZES ARE BASED ON COPPER, ALUMINUM IS NOT TO BE USED UNLESS NOTED OTHERWISE.
15. MINIMUM CONDUCTOR SIZE FOR A FULLY LOADED 20A CIRCUIT, UNLESS OTHERWISE NOTED, SHALL BE #12 FOR ALL BRANCH CIRCUIT RUNS UP TO THE FIRST OUTLET; OVER 60 FEET, #10; OVER 105 FEET, #8; INCREASE CONDUIT SIZE TO SUIT.
16. CIRCUIT NUMBERS ARE INDICATED FOR INTENT ONLY. THE ELECTRICAL CONTRACTOR SHALL ADJUST ACCORDINGLY IN THE FIELD, TO BALANCE CIRCUITS EVENLY ON ALL PHASES.
17. ALL WIRING METHODS ARE TO BE IN ACCORDANCE WITH THE CURRENT ISSUE OF THE NATIONAL ELECTRICAL CODE, AND APPLICABLE LOCAL CODES. ALL WIRING IS TO BE IN CONDUIT, UNLESS SPECIFICALLY NOTED OTHERWISE. ALL WIRING IS TO BE CONCEALED.
18. ELECTRICAL CONTRACTOR MUST COORDINATE LED DRIVER WITH DIMMER SWITCH FOR COMPATIBILITY.
19. SHARED NEUTRALS ARE NOT TO BE USED. PROVIDE SEPARATE NEUTRALS FOR ALL CIRCUITS INCLUDING SWITCHES PER THE LATEST EDITION OF THE NEC.
20. FOR ALL ROOFTOP OR GRADE LEVEL HVAC EQUIPMENT, THE ELECTRICAL CONTRACTOR SHALL SUPPLY A GFCI WP, 20A RECEPTACLE FOR EQUIPMENT SERVICING. ALL DISCONNECT SWITCHES ARE TO BE HEAVY DUTY, FUSED, WEATHER PROOF (WP) DEVICES.
21. RISER DIAGRAMS ARE PROVIDED TO SHOW DIAGRAMMATIC GENERAL WIRING REQUIREMENTS. WIRING IS TO BE PROVIDED FOR THE PARTICULAR VENDOR/SYSTEM APPROVED FOR THE PROJECT. ALL WIRING IS TO BE CONCEALED.
22. PROVIDE DRAG LINES IN ALL EMPTY RACEWAYS.
23. ELECTRICAL CONTRACTOR TO VERIFY LIGHTING FIXTURE MOUNTING HEIGHT REQUIREMENTS FOR VARIOUS CEILING TYPES AND ORDER APPROPRIATE HARDWARE.
24. COORDINATE EXACT PLACEMENT OF EQUIPMENT WITH OWNER, MAKE FIELD ADJUSTMENTS AS REQUIRED TO AVOID CONFLICTS, VERIFY WITH OWNER.
25. ELECTRICAL CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR FOR ITEMS SUPPLIED BY THE MECHANICAL/OTHER DIVISIONS BUT INSTALLED BY THE ELECTRICAL CONTRACTOR. ELECTRICAL CONTRACTOR TO REVIEW ALL THE PLANS FOR THE PROJECT AND ASSIST IN PROVIDING COORDINATION DRAWINGS WITH OTHER TRADES.
26. ELECTRICAL CONTRACTOR TO VERIFY LOADS, SETTINGS, OVERCURRENT PROTECTION... ETC TO INSURE COMPATIBILITY OF EQUIPMENT.
27. PROVIDE LAMICOID NAMEPLATES AND TYPEWRITTEN PANEL SCHEDULES FOR ALL PANEL BOARDS, DISTRIBUTION AND DISCONNECT EQUIPMENT, MODIFIED OR PROVIDED AS NEW AS PART OF THE SCOPE OF WORK. ALTERNATE LABELING PROVISIONS MUST BE APPROVED BY THE ENGINEER.
28. REFER TO ARCHITECTURAL DRAWINGS FOR THE EXACT LOCATION AND MOUNTING HEIGHTS OF ALL DEVICES AND OUTLETS.
29. CONTRACTOR TO PROVIDE ALL COORDINATION FOR UTILITY SERVICES INCLUDING TEMPORARY SERVICE FOR THE PROJECT. THIS INCLUDES POWER UTILITY, TELEPHONE COMPANY AND CABLE TV OPERATOR.
30. DISCONNECT SWITCHES AND CIRCUIT BREAKER USED AS SWITCHES SHALL BE INSTALLED IN ACCORDANCE WITH ALL LOCAL CODES AND THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE "NEC" SECTION 110.26 TABLE 110.26(A)(1) AND SECTION 404.8. ALL DISCONNECT SWITCHES AND CIRCUIT BREAKERS SHALL BE LOCATED SO THAT THEY MAY BE OPERATED FROM A READILY ACCESSIBLE PLACE. THEY SHALL BE INSTALLED SUCH THAT THE CENTER OF THE GRIP OF THE OPERATING HANDLE OF THE SWITCH OR CIRCUIT BREAKER, WHEN IN ITS HIGHEST POSITION, IS NOT MORE THAN 6'-7" ABOVE THE FLOOR OR WORKING PLATFORM WITH 36" CLEAR IN FRONT.
31. ALL NEW FIRE ALARM DEVICES SHALL MATCH THE EXISTING BUILDING STANDARD MANUFACTURER. THE FIRE ALARM SYSTEM'S SOFTWARE AND DISPLAY SHALL BE UPGRADED AS REQUIRED WITH NEW ROOM NAMES AND FLOOR PLAN LAYOUT. THE FIRE ALARM SYSTEM SHALL BE TESTED UPON COMPLETION OF ALL NEW AND/OR RELOCATED FIRE ALARM DEVICES ACCORDING TO [NFPA72 14.4.1.2.1.4] WHEN CHANGES ARE MADE TO SITE SPECIFIC SOFTWARE, THE FOLLOWING SHALL APPLY:
   (1) ALL FUNCTIONS KNOWN TO BE AFFECTED BY THE CHANGE, OR IDENTIFIED BY A MEANS THAT INDICATES CHANGES, SHALL BE 100 PERCENT TESTED.
   (2) IN ADDITION, 10 PERCENT OF INITIATING DEVICES THAT ARE NOT DIRECTLY AFFECTED BY THE CHANGE, UP TO A MAXIMUM OF 50 DEVICES, ALSO SHALL BE TESTED AND CORRECT SYSTEM OPERATION SHALL BE VERIFIED.
   (3) A REVISED RECORD OF COMPLETION IN ACCORDANCE WITH 10.18.2.1 SHALL BE PREPARED TO REFLECT THESE CHANGES.

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DESIGNED: IES
DRAFTED: IES
APPROVED: IES
SCALE: AS NOTED
PROJECT NO.: 26027
DATE: 05/22/2026

TITLE: ELECTRICAL NOTES, LEGENDS AND DETAILS

SHEET NUMBER: E-2

ELECTRICAL SPECIFICATIONS

PART 1 – GENERAL PROVISIONS FOR ELECTRICAL WORK

REFERENCES

THIS SECTION COVERS THE GENERAL REQUIREMENTS FOR ELECTRICAL WORK; EXAMINE ALL CONTRACT DRAWINGS AND ALL OTHER SECTIONS OF THE SPECIFICATIONS FOR ADDITIONAL WORK RELATED TO THE WORK OF THIS DIVISION.

DEFINITIONS

'PROVIDE' – TO FURNISH, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION OF PARTICULAR WORK REFERRED TO UNLESS, SPECIFICALLY OTHERWISE NOTED.

'INSTALL' – TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.

'WORK' – LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.

'WIRING' – RACEWAY, FITTINGS, WIRE, BOXES, MOUNTING HARDWARE AND RELATED ITEMS.

'CONCEALED' – EMBEDDED IN MASONRY OR OTHER CONSTRUCTION CAVITY, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS.

'SIMILAR' OR 'EQUAL' – EQUAL MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

'CONTRACTOR' – THE ELECTRICAL CONTRACTOR.

'NOTED' – AS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.

SCOPE

THIS WORK SHALL CONSIST OF THE FURNISHINGS OF ALL LABOR, MATERIALS AND SERVICES REQUIRED COMPLETE, READY FOR CORRECT OPERATION FOR ALL ELECTRICAL WORK CALL FOR BY THE ACCOMPANYING DRAWINGS AND SPECIFICATIONS. ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, STATE AND LOCAL CODES.

THE DATA INDICATED IN THESE DRAWINGS AND SPECIFICATIONS ARE AS EXACT AS COULD BE SECURED. BUT THEIR ABSOLUTE ACCURACY IS NOT GUARANTEED. DO NOT SCALE DRAWINGS. EXACT LOCATIONS, DISTANCES, LEVELS AND OTHER CONDITIONS WILL BE GOVERNED BY THE BUILDING. USE THE DRAWINGS AND SPECIFICATIONS FOR GUIDANCE AND SECURE THE ENGINEER'S APPROVAL OF CHANGES IN LOCATIONS. CIRCUITS, WHERE SHOWN ON AN ELECTRICAL DRAWINGS, ARE SO INDICATED PRIMARILY FOR THE PURPOSE OF INDICATING THE GENERAL CIRCUIT PLAN AND DO NOT NECESSARILY INDICATE THE EXACT LOCATION OF ROUTING OF THE RACEWAYS UNLESS SPECIFICALLY INDICATED. CIRCUITS SHALL BE RUN IN SUIT CONDITIONS CONSIDERING STRUCTURAL FEATURES, OTHER TRADES, CONSTRUCTION METHODS AND GOOD INSTALLATION PRACTICE.

BEFORE SUBMITTING A BID, THE CONTRACTOR SHALL VISIT THE SITE AND BECOME THOROUGHLY FAMILIAR WITH ALL EXISTING CONDITIONS UNDER WHICH THE WORK AND WORK OF OTHER TRADES WILL BE INSTALLED. THIS CONTRACT INCLUDES ALL NECESSARY OFFSETS, TRANSITIONS, MODIFICATIONS AND RELOCATION REQUIRED TO INSTALL ALL NEW EQUIPMENT IN NEW OR EXISTING SPACES. CONTRACTOR SHALL INCLUDE ANY MODIFICATIONS REQUIRED IN EXISTING ELECTRICAL EQUIPMENT FOR INSTALLATION OF NEW ELECTRICAL EQUIPMENT AND NEW EQUIPMENT OF OTHER TRADES. (LIGHTING FIXTURES, DEVICES, CONDUIT WIRING, ETC.) ALL NEW AND EXISTING EQUIPMENT AND SYSTEMS SHALL BE FULLY OPERATIONAL UNDER THIS CONTRACT BEFORE THE PROJECT IS CONSIDERED COMPLETE. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY ASSUMPTIONS THAT ARE MADE, ANY OMISSIONS OR ERRORS MADE AS A RESULT OF FAILURE TO VISIT THE SITE AND BECOME THOROUGHLY FAMILIAR WITH THE EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS OF ALL TRADES.

CODES, REGULATIONS AND STANDARDS

ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING APPROVED CODES, REGULATIONS AND STANDARDS:

IBC – INTERNATIONAL BUILDING CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

IFC – INTERNATIONAL FIRE CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

2022 CONNECTICUT STATE FIRE SAFETY CODE

STATE DEMOLITION CODE

LOCAL BUILDING CODE

NFPA – NATIONAL FIRE PROTECTION CODE

NFPA 70 – NATIONAL ELECTRICAL CODE, 2020 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

NFPA 72 – NATIONAL FIRE ALARM CODE, 2019 EDITION

NFPA 99 – HEALTH CARE FACILITIES CODE, 2021 EDITION

NFPA 101 – LIFE SAFETY CODE, 2021 EDITION, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

IECC – INTERNATIONAL ENERGY CONSERVATION CODE, 2021, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

ICC/ANSI A117.1, 2017, ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES, AS AMENDED BY THE STATE OF CONNECTICUT 2022 AMENDMENTS.

ANSI – AMERICAN NATIONAL STANDARDS INSTITUTE

ASTM – AMERICAN SOCIETY FOR TESTING AND MATERIALS

OSHA – OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

U.L. – UNDERWRITERS LABORATORIES

EPA – ENVIRONMENTAL PROTECTION AGENCY

IEEE – INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS

NEMA – NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

PERMITS, FEES AND INSPECTIONS

THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS, PAY FOR ALL GOVERNMENT, STATE SALES TAXES AND APPLICABLE FEES. THE CONTRACTOR SHALL FILE ALL DRAWINGS, COMPLETE ALL DOCUMENTS AND OBTAIN ALL NECESSARY APPROVALS FROM THE PROPER AUTHORITY OR AGENCY HAVING JURISDICTION. OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION COVERING WORK. THE CONTRACTOR SHALL SEE THAT ALL REQUIRED INSPECTIONS AND TESTS ARE MADE AND SHALL COOPERATE TO MAKE THESE TESTS AS THOROUGH AND AS READILY MADE AS POSSIBLE.

MATERIALS AND WORKMANSHIP

ALL MATERIALS AND APPARATUS REQUIRED FOR THE WORK, EXCEPT AS OTHERWISE SPECIFIED, SHALL BE NEW AND OF FIRST–CLASS QUALITY. IT SHALL BE FURNISHED, DELIVERED, ERECTED, CONNECTED, FINISHED IN EVERY DETAIL AND SO SELECTED AND ARRANGED AS TO FIT PROPERLY INTO THE BUILDING SPACES. WHERE NO SPECIFIC KIND OR QUALITY MATERIAL IS GIVEN, A FIRST–CLASS STANDARD ARTICLE AS ACCEPTED BY THE ENGINEER SHALL BE FURNISHED.

ALL EQUIPMENT AND MATERIALS SHALL BE SPECIFICATION GRADE AND BEAR THE UNDERWRITER'S LABEL. NO SUBSTITUTE OR ALTERNATE EQUIPMENT, MATERIAL, ETC. WILL BE CONSIDERED FOR THIS PROJECT.

ALL WORK SHALL BE OF A QUALITY CONSISTENT WITH GOOD TRADE PRACTICE AND SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER. THE ENGINEER/OWNER RESERVES THE RIGHT TO REJECT ANY WORK WHICH, IN HIS OPINION, HAS BEEN INSTALLED IN A SUBSTANDARD, DANGEROUS OR IN A UNSERVICEABLE MANNER. THE CONTRACTOR SHALL REPLACE REJECTED WORK IN A SATISFACTORY MANNER AT NO EXTRA COST TO THE OWNER.

GUARANTEES

ALL WORKMANSHIP AND MATERIALS SHALL BE FULLY GUARANTEED FOR A PERIOD OF ONE YEAR AFTER ACCEPTANCE OF THE ENTIRE INSTALLATION COVERED BY THIS CONTRACT. SHOULD ANY DEFECTS OCCUR DURING THE GUARANTEED PERIOD, THE CONTRACTOR SHALL REPAIR AND/OR REPLACE ALL DEFECTIVE EQUIPMENT, MATERIAL AND/OR WORK AT NO EXTRA CHARGE TO THE OWNER.

RECORD DRAWINGS

MAINTAIN, AT THE JOB SITE, A SET OF ELECTRICAL DRAWINGS INDICATING ALL CHANGES IN LOCATION AND CIRCUITING OF THE EQUIPMENT, PANELS, DEVICES, ETC. FROM THE ORIGINAL LAYOUT. CLEARLY MARK IN RED ALL CHANGES ON THE DRAWINGS. AT THE COMPLETION OF THE PROJECT THE CONTRACTOR SHALL TURN OVER THE RECORD DRAWINGS TO THE ENGINEER/OWNER.

COORDINATION

ALL WORK SHALL BE COORDINATED AND CARRIED OUT IN CONJUNCTION WITH ALL TRADES AND FULL COORDINATION DRAWINGS SHALL BE CREATED IN ORDER THAT ALL WORK MAY PROCEED WITH A MINIMUM OF DELAY AND INTERFERENCE.

SHOP DRAWINGS

SUBMIT ELECTRONIC PDF FORMAT OR EIGHT (8) COPIES FOR REVIEW, DETAILED SHOP DRAWINGS OF ALL EQUIPMENT AND MATERIAL SPECIFIED. THE CONTRACTOR SHALL REVIEW ALL SHOP DRAWINGS PRIOR TO SUBMISSION TO THE ENGINEER FOR REVIEW. NO MATERIAL OR EQUIPMENT MAY BE DELIVERED TO THE JOB SITE OR INSTALLED UNTIL CONTRACTOR HAS IN THEIR POSSESSION, APPROVED SHOP DRAWINGS FOR THE PARTICULAR MATERIAL OR EQUIPMENT. SHOP DRAWINGS SHALL BE SPECIFIC WITH ITEMS SUBMITTED FOR APPROVAL CLEARLY IDENTIFIED.

THE FOLLOWING IS A LIST OF ELECTRICAL ITEMS THAT MUST BE SUBMITTED FOR REVIEW:

a. SAFETY/DISCONNECT SWITCHES
b. CIRCUIT BREAKERS
c. FUSES
d. CONDUIT, WIRE AND CABLE
e. FIRE ALARM EQUIPMENT
f. DEVICES (RECEPTACLES, TOGGLE SWITCHES, ETC.)

OPERATING INSTRUCTIONS

THE CONTRACTOR SHALL FURNISH TO THE ENGINEER, FOUR (4) COMPLETE BOUND SETS OF TYPEWRITTEN OR BLUEPRINTED INSTRUCTIONS FOR OPERATING AND MAINTAINING ALL SYSTEMS AND EQUIPMENT INCLUDED IN THIS DIVISION. MANUFACTURER'S ADVERTISING LITERATURE OR CATALOGS WILL NOT BE ACCEPTABLE FOR OPERATING AND MAINTENANCE INSTRUCTIONS.

THE CONTRACTOR, IN THE ABOVE–MENTIONED INSTRUCTIONS, SHALL INCLUDE THE MAINTENANCE SCHEDULE FOR THE PRINCIPAL ITEMS OF EQUIPMENT FURNISHED UNDER THIS DIVISION.

AN AUTHORIZED MANUFACTURER'S REPRESENTATIVE SHALL ATTEST IN WRITING THAT HIS EQUIPMENT HAS BEEN PROPERLY INSTALLED PRIOR TO STARTUP. THESE LETTERS WILL BE BOUND INTO OPERATING AND MAINTENANCE BOOKS.

EQUIPMENT PROTECTION

PROPERLY AND COMPLETELY PROTECT AGAINST ALL DAMAGE, ALL APPARATUS, EQUIPMENT, ETC., INCLUDED IN THIS CONTRACT. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY DAMAGE TO FURNISHED APPARATUS, EQUIPMENT, ETC., UNTIL FINAL ACCEPTANCE.

PROPERTY PROTECTION

THE CONTRACTOR SHALL TAKE WHATEVER MEANS NECESSARY AND/OR REQUIRED TO PROTECT OWNER'S PROPERTY WITHIN THE WORKING AREAS FROM DUST, DEBRIS AND OTHER MATTER GENERATED BY THE WORK. NO WORK SHALL COMMENCE IN AREAS WHERE PROTECTION IS REQUIRED UNTIL APPROVAL HAS BEEN GIVEN TO THE CONTRACTOR BY THE OWNER.

MANUFACTURER'S INSTRUCTION

INSTALL ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS OR REQUIREMENTS FOR PROPER OPERATION AND MAINTENANCE.

EQUIPMENT PAINTING AND CLEANING

THOROUGHLY CLEAN ALL ELECTRICAL EQUIPMENT DEVICES AND ENCLOSURES UPON COMPLETION OF ALL WORK. REPAINT ANY EQUIPMENT WHOSE FINISH IS DAMAGED OR RUSTED. MATCH MANUFACTURER'S ORIGINAL FINISH.

DEMOLITION/REMOVAL AND RECONNECTION

BEFORE SUBMITTING A BID, THE CONTRACTOR SHALL VISIT THE SITE AND BECOME THOROUGHLY FAMILIAR WITH ALL EXISTING CONDITIONS UNDER WHICH HIS WORK WILL BE INSTALLED.

ALL EXISTING ACTIVE CIRCUITS WHICH FEED EQUIPMENT OR DEVICES THAT ARE TO REMAIN, SHALL BE MAINTAINED IN SERVICE AND SHALL BE PERMANENTLY REFED.

ALL ITEMS BEING REMOVED SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AND REMOVED FROM THE SITE UNLESS OTHERWISE INDICATED. EQUIPMENT AND DEVICES THE OWNER DOES NOT WISH TO RETAIN SHALL BECOME THE PROPERTY OF THIS CONTRACTOR AND SHALL BE REMOVED FROM THE SITE.

ALL MATERIAL CHOSEN TO BE RETAINED BY THE OWNER SHALL BE DELIVERED BY THE CONTRACTOR TO SUCH POINT AS DESIGNATED BY THE OWNER.

MATERIAL TO BE REUSED SHALL BE CAREFULLY REMOVED AND STORED AND SHALL BE REINSTALLED IN AS–FOUND CONDITION EXCEPT AS OTHERWISE INDICATED ON THE PLANS. DAMAGE OR LOSS OF MATERIAL TO BE REUSED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE REPAIRED OR REPLACED WITH THE EQUIVALENT MATERIAL ACCEPTABLE BY THE OWNER.

DISCONNECT AND REMOVE ALL EXISTING ELECTRICAL WORK IN CONTRACT AREA AS INDICATED ON DRAWINGS.

ALL WIRING, CABLING, AND RACEWAYS SHALL BE REMOVED BACK TO ORIGINATION PANEL, UNLESS OTHERWISE INDICTED.

CONTRACTOR SHALL KEEP PREMISES FREE FROM ACCUMULATION OF WASTE MATERIAL AND RUBBISH, AND AT COMPLETION OF WORK DAY, SHALL REMOVE ALL RUBBISH AND IMPLEMENTS TO A DESIGNATED LOCATION, IF AVAILABLE, LEAVING WORK AREAS BROOM CLEAN. UNUSED OUTLET BOXES AND PLASTER RINGS SHALL BE PROVIDED WITH BLANK COVER PLATES AND MATCH DEVICE PLATES WITHIN THE ROOM.

PENETRATION SEALANT

ALL PENETRATIONS SHALL BE SEALED WITH 3M INTUMESCENT FIRE BARRIER PENETRATION SEALANT, APPLIED PER MANUFACTURER'S AND U.L. GUIDELINES.

CUTTING, PATCHING, REPAIRING AND PAINTING

THE GENERAL CONTRACTOR SHALL PERFORM ALL CUTTING, PATCHING, REPAIRING AND PAINTING FOR ALL ELECTRICAL ITEMS AND EQUIPMENT CALLED FOR UNDER THIS CONTRACT.

FIRE STOPS AND SEALS

PENETRATIONS THROUGH FIRE–RATED WALLS, CEILING OR FLOORS IN WHICH CABLES OR CONDUITS PASS SHALL BE FILLED SOLIDLY BY U.L. APPROVED FIRE–STOP MATERIALS, CLASSIFIED FOR AN HOUR RATING EQUAL TO THE FIRE RATING OF THE WALL, CEILING OR FLOOR. PROVIDE TO 3M BRAND FIRE BARRIER CP25WB CAULK OR APPROVED EQUIVALENT.

SEALING BUSHINGS SHALL BE USED ON CONDUIT AND CABLE ENDS TO EFFECTIVELY PREVENT THE INTRUSION OF WATER, A DAMP OR CORROSIVE ATMOSPHERE, DRAFT OR DUST.

PART 2 – PRODUCTS

DESCRIPTION

ALL MATERIALS AND EQUIPMENT PROVIDED UNDER THIS SECTION SHALL BE NEW, FIRST GRADE, BEST OF THEIR RESPECTIVE KINDS AND IN NO WAY SHALL THEY BE LESS THAN THE QUALITY AND INTENT SET FOURTH UNDER THIS SECTION. THEY SHALL MEET THE REQUIREMENTS OF ALL STANDARDS SET UP TO GOVERN THE MANUFACTURER OF ELECTRICAL MATERIALS AND COMPLY WITH ALL APPLICABLE CODES AND STANDARDS.

WIRE

CONDUCTORS SHALL BE U.L. LISTED, 600 VOLTS, 90 DEG. C., SINGLE CONDUCTOR TYPE THWN/THHN. 98% CONDUCTIVITY, ANNEALED UNCOATED COPPER WITH PVC INSULATION COVERED WITH NYLON SHEATH JACKET. TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF UNDERWRITERS LABORATORIES STANDARD 83. WIRE SHALL BE IDENTIFIED BY SURFACE MARKING INDICATING MANUFACTURER'S IDENTIFICATION CONDUCTOR SIZE AND METAL, VOLTAGE RATING, U.L. SYMBOL AND TYPE DESIGNATION. CONDUCTORS SHALL BE STRANDED. MINIMUM SIZE SHALL BE #12 AWG UNLESS OTHERWISE INDICATED. MANUFACTURED BY ROME CABLE, TRIANGLE WIRE & CABLE, GENERAL CABLE OR ESSEX WIRE & CABLE.

RIGID GALVANIZED STEEL CONDUIT (RGS)

RIGID STEEL CONDUIT SHALL BE FULL WEIGHT, HEAVY WALL STEEL PIPE WITH GALVANIZED PROTECTIVE COATING. MANUFACTURED BY TRIANGLE WIRE AND CABLE, ALLIED TUBE AND CONDUIT, REPUBLIC OR STEELDUCT. CONDUIT FITTINGS SHALL BE MALLEABLE IRON, CADMIUM PLATED WITH FULL THREADED HUBS.

ELECTRIC METALLIC TUBING (EMT)

ELECTRICAL METALLIC TUBING SHALL BE GALVANIZED THIN WALL STEEL CONDUIT. MANUFACTURED BY TRIANGLE WIRE AND CABLE, ALLIED TUBE AND CONDUIT, REPUBLIC OR STEELDUCT. THE CONNECTORS AND COUPLINGS SHALL BE HEAVY DUTY, STEEL–ZINC PLATED, SET SCREW TYPE.

FLEXIBLE METALLIC CONDUIT (FMC)

FLEXIBLE METALLIC CONDUIT SHALL BE OF HEAVY GALVANIZED SHEET METAL STRIP IN INTERLOCKED CONSTRUCTION. MANUFACTURED BY TRIANGLE WIRE AND CABLE, AMERICAN FLEXIBLE CONDUIT OR ELECTRIC–FLEX. THE CONNECTORS SHALL BE SQUEEZE TYPE MALLEABLE IRON, CADMIUM PLATED.

LIQUID–TIGHT FLEXIBLE METAL CONDUIT (LFMC)

LIQUID–TIGHT FLEXIBLE CONDUIT SHALL BE CONSTRUCTED OF HEAVY GALVANIZED SHEET METAL STRIP, SPIRALLY–WOUND INTERLOCK CONSTRUCTION WITH AN EXTRUDED POLYVINYL GRAY JACKET. CONDUIT SHALL BE U.L. LABELED AND CONFORMED TO THE APPLICATION AND ENVIRONMENT IN WHICH IT WILL BE USED. ALL CONNECTIONS, COUPLINGS AND FITTINGS SHALL BE OF HIGH QUALITY STEEL–ZINC RATED TYPE SPECIFICALLY DESIGNED FOR THIS PURPOSE. MANUFACTURED BY O/Z GEDNEY OR ELECTRI–FLEX.

METAL CLAD CABLE (MC)

METAL CLAD CABLE SHALL BE INTERLOCKING GALVANIZED STEEL ARMOR CONSTRUCTION. COLOR CODED THERMOPLASTIC/NYLON INSULATION THHN, 90 DEGREE C., 600 VOLTS, COPPER CONDUCTORS AND INTERNAL INSULATED EQUIPMENT COPPER GROUND CONDUCTOR. MARKER TAPE AND CABLE TAPE OVER MINIMUM SIZE #12 AWG UNLESS OTHERWISE INDICATED. MANUFACTURED BY AMERICAN FLEXIBLE CONDUIT, TRIANGLE WIRE AND CABLE, GENERAL CABLE OR STANDARD CABLE.

FITTINGS

CONDUIT BODIES FOR RIGID GALVANIZED STEEL CONDUIT (RGS) SHALL BE MALLEABLE IRON–ZINC PLATED WITH TAPERED HUBS AND GASKETED ALUMINUM COVER.

CONDUIT BODIES FOR ELECTRICAL METALLIC TUBING (EMT) SHALL BE CAST ALUMINUM–ALUMINUM ENAMEL FINISH WITH SET SCREW HUBS AND ALUMINUM COVER.

INSULATION BUSHINGS SHALL BE HIGH IMPACT THERMOPLASTIC PHENOLIC WITH 150 DEG. C. UL TEMPERATURE RATING.

INSULATED GROUNDING BUSHINGS SHALL BE MALLEABLE IRON ZINC PLATED WITH MOLDED ON PHENOLIC INSULATION AND LAY–IN GROUNDING LUG.

CONDUIT LOCKNUTS SHALL BE HEAVY NUT STOCK STEEL–ZINC PLATED.

OFFSET NIPPLES SHALL BE MALLEABLE IRON ZINC PLATED WITH RIGID CONDUIT THREADING AND 3/4" OFFSET.

CONNECTORS AND COUPLINGS FOR ELECTRICAL METALLIC TUBING (EMT) SHALL BE HEAVY STEEL–ZINC PLATED WITH PRE–SET/PRE–SHAKED SET SCREWS.

CONDUIT STRAPS SHALL BE SNAP–TYPE, DOUBLE RIBBED STEEL–ZINC PLATED.

METAL CLAD CABLE AND FLEXIBLE METALLIC CONDUIT CONNECTORS SHALL BE MALLEABLE IRON–ZINC PLATED, MALE HUB THREADS WITH LOCKNUT.

CONDUIT FITTINGS SHALL BE MANUFACTURED BY O/Z GEDNEY, CROUSE–HINDS OR APPLETON.

SUPPORT FITTINGS

SUPPORT CHANNEL SHALL BE ROLL–FORMED #12 GAUGE STEEL, SOLID BASE OR BOLT HOLE BASE – HOT DIP GALVANIZED FINISH. COMPLETE WITH ANGLE FITTINGS, SPRING NUTS, CONDUIT SUPPORTS, 3/8" OR 1/2" THREADED RODS (SIZE REQUIRED FOR LOAD), ETC.

CABLE TIES

CABLE TIES SHALL BE FABRICATED OF ONE–PIECE HALLAR WITH NO METAL PARTS. MANUFACTURED BY BURNDY, T&B, PANDUIT OR BLACKBURN.

FUSES

FUSES SHALL NOT BE INSTALLED UNTIL EQUIPMENT IS READY TO BE ENERGIZED. THIS MEASURE PREVENTS FUSE DAMAGE DURING SHIPMENT OF THE EQUIPMENT FROM THE MANUFACTURER TO THE JOB SITE.

ALL FUSES SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. FUSES SHALL BE OF THE SAME MANUFACTURER, COPPER BUSSMAN, FERRAZ SHAWMUT OR LITTLEFUSE. FUSE TYPES DESCRIBE BELOW SHALL BE U.L. LISTED DUAL ELEMENT TIME DELAY TYPE.

CIRCUIT 0 TO 600 AMPERE SHALL BE PROTECTED BY DUAL ELEMENT, TIME DELAY, CURRENT LIMITING FUSES WITH AN INTERRUPTING RATING OF 200,000 A.I.C. U.L. LISTED CLASS 'RK1'.

FUSES SHALL HAVE VOLTAGE RATING BASED ON DISTRIBUTION REQUIREMENT SYSTEMS.

OUTLET BOXES

OUTLET BOXES SHALL BE GALVANIZED STEEL, FLUSH OR SURFACE MOUNTED AND OF PROPER TYPE AND SIZE AS REQUIRED FOR THE PARTICULAR APPLICATION. SIZE AND TYPE DICTATED BY THE NUMBER OF DEVICES, NUMBER OF CONDUCTORS AND WIRING METHOD UTILIZED. BOXES SHALL BE ADEQUATE SIZE FOR THE INSTALLATION OF CONDUCTORS WITHOUT EXCESSIVE BENDING OR CRIMPING OF THE CONDUCTORS AND DAMAGING OF CONDUCTOR INSULATION. MANUFACTURED BY STEEL CITY OR RACO.

OUTLET BOXES SHALL BE SECURED FIRMLY IN PLACE TO THE BUILDING STRUCTURE AND SET TRUE AND SQUARE. PROVIDE SUITABLE MEANS TO SUPPORT OUTLET BOX TO TAKE THE WEIGHT OF THE LIGHTING FIXTURE OR DEVICE. OUTLET BOXED OR BOX EXTENSION RINGS SHALL BE SET FLUSH TO THE FINISHED WALL OR CEILING. BOXES MUST BE ATTACHED THAT THEY WILL NOT 'ROCK', 'SHIFT' OR 'MOVE IN AND OUT' WHEN DEVICES ARE USED. IN NO CASE SHALL BOXES BE INSTALLED BACK–TO–BACK IN A COMMON WALL DIVIDING TWO SPACES.

WHERE MORE THAN ONE OUTLET IS SHOWN OR SPECIFIED TO BE THE SAME ELEVATION OR ONE ABOVE THE OTHER, ALIGN THEM EXACTLY ON CENTER LINES HORIZONTALLY OR VERTICALLY.

MULTIPLE SWITCHES SHOWN AT ONE LOCATION SHALL BE INSTALLED GANGED TOGETHER UNDER ONE WALL PLATE. SWITCHES SHALL BE ARRANGED IN AN ORDER APPROPRIATE TO THE LOCATIONS OF LIGHTING FIXTURE BEING CONTROLLED.

CIRCUIT BREAKERS

BRANCH CIRCUIT BREAKERS SHALL BE QUICK–MAKE, QUICK–BREAK, (PLUG–IN) (BOLT–IN) THERMAL MAGNETIC TYPE WITH VISIBLE CURRENT RATING AND TRIP POSITION. MANUFACTURED BY ABB, SIEMENS, SQUARE 'D' OR CUTLER HAMMER. REFER TO SCHEDULES FOR AIC RATING.

FOR CIRCUIT BREAKER SIZES 100 AMPS AND LARGER PROVIDE THE FOLLOWING. ELECTRONIC TRIP CIRCUIT BREAKERS WITH RMS SENSING; FIELD–REPLACEABLE RATING PLUG OR FIELD–REPLICABLE ELECTRONIC TRIP; AND THE FOLLOWING FIELD–ADJUSTABLE SETTINGS:

1. INSTANTANEOUS TRIP
2. LONG AND SHORT TIME PICKUP LEVELS
3. LONG AND SHORT TIME ADJUSTMENTS

ALL MULTI–POLE BREAKERS SHALL BE EQUIPPED WITH HANDLE TIES FOR MULTI–POLE USE.

PHASE SEQUENCE AND BALANCING

MAINTAIN CORRECT PHASE SEQUENCE OF ALL FEEDERS AND CIRCUITS WITH PHASE IDENTIFICATION THROUGHOUT THE ENTIRE SYSTEM. BALANCING ALL FEEDERS AND CIRCUITS TO WITHIN 10 PERCENT.

PHASE ROTATION

MAINTAIN CORRECT PHASE ROTATION FOR ROTATING MACHINES (MOTORS).

FIRE ALARM SYSTEM

FURNISH AND INSTALL 4010 SERIES ADDRESSABLE FIRE ALARM CONTROL PANEL. PROVIDE THE FOLLOWING MINIMUM FEATURES:

PERIPHERAL DEVICES

4098–9753 ANALOG DUCT SMOKE DETECTOR HOUSING WITH SAMPLING TUBES, EACH DETECTOR SHALL CONTAIN AN ADDRESSABLE CONTROL MODULE FOR FAN SHUTDOWN THAT CAN BE CONTROLLED INDEPENDENTLY OF THE DUCT DETECTOR. REMOTE TEST SWITCH.

DRY TRANSFORMER – K FACTOR RATED

DRY TYPE TRANSFORMER SHALL BE U.L. LISTED K–13 RATED, IN ACCORDANCE WITH ANSI C89.2 AND NEMA ST–20 STANDARDS. TEMPERATURE RISE OF 150 DEG. C., VENTILATED ENCLOSURE FOR INDOOR USE, PAINT COLOR ANSI #61 GRAY, 480 VOLTS PRIMARY, SECONDARY 208Y/120 VOLTS, THREE–PHASE, 60 HERTZ, 6– 2–1/2% TAPS (2 ABOVE/4 BELOW) WITH COPPER WINDINGS. DOUBLE SIZE NEUTRAL TERMINAL. SOUND RATING 42 TO 45 DECIBELS. MANUFACTURED BY ABB, SIEMENS, SQUARE 'D', OR CUTLER HAMMER.

SAFETY/DISCONNECT SWITCHES

DISCONNECT/SAFETY SWITCHES SHALL BE MOTOR RATED, METAL ENCLOSED, INTERLOCKING, FUSIBLE OR NONFUSED AS INDICATED. HEAVY DUTY TYPE, WITH APPROPRIATE VOLTAGE RATINGS, QUICK–MAKE, QUICK–BREAK MECHANISMS, SOLID NEUTRAL AND U.L. LISTED. SWITCHES SHALL HAVE PROPER TYPE METAL ENCLOSURES; STANDARD, WEATHERPROOF, DUSTPROOF, ETC., TO SUIT THEIR SPECIFIC LOCATIONS. MANUFACTURED BY ABB, SIEMENS, SQUARE 'D', OR CUTLER HAMMER.

MANUAL MOTORS STARTERS

FURNISH AND INSTALL FRACTIONAL HORSEPOWER MANUAL MOTOR STARTERS WITH ON–OFF CONTROL, THERMAL OVERLOAD RELAY AND PILOT LIGHTS. MANUFACTURED BY ABB, SIEMENS, SQUARE 'D', OR ALLEN BRADLEY.

	ABB	SQUARE 'D'	ALLEN BRADLEY	SIEMENS
1 POLE, SURFACE	CR101Y11	2510FG1P	600–TAX4	SMFFG1P
2 POLE, SURFACE	CR101H11	2510FG2P	600–TAX5	SMFFG2P

JUNCTION BOXES, PULLBOXES AND WIREWAYS

JUNCTION BOXES, PULLBOXES AND WIREWAYS SHALL BE OF PROPER TYPE AND SIZES AS REQUIRED. CODE GAUGE, GALVANIZED STEEL WITH KNOCKOUTS AND FLANGES TO RECEIVE THE COVERS. COVERS SHALL BE FLAT, OF THE SAME MATERIAL AS THE BOX AND FASTENED TO THE BOX WITH MACHINE SCREWS. MANUFACTURED BY HOFFMAN, SQUARE 'D', OR LEE PRODUCTS.

WIRING DEVICES

ALL DEVICES SHALL BE COMMERCIAL SPECIFICATION GRADE, U.L. LISTED, SELF–GROUNDING, GROUND LUG, SIDE/BACK WIRED. COLOR SHALL BE SELECTED BY ARCHITECT OR OWNER UNLESS OTHERWISE INDICATED. MANUFACTURED BY HUBBELL, LEVITON, OR PASS & SEYMOUR.

RECEPTACLES THAT HAVE A POWER FEED THRU (FEED IN – FEED OUT) ARRANGEMENT SHALL BE PIGTAILED. FEED THRU FEATURE ON DUPLEX RECEPTACLES USE IS NOT ACCEPTABLE.

RECEPTACLES: 20A	125V	HUBBELL	LEVITON	PASS & SEYMOUR
DUPLEX RECEPTACLE – TR		CRS20_TR	TBR20	TR20

WALL PLATES FOR SWITCHES AND RECEPTACLES SHALL BE SMOOTH THERMOPLASTIC OR NYLON IN FURNISHED AREAS. COLOR TO MATCH DEVICES. MANUFACTURED BY HUBBELL OR LEVITON.

WALL PLATES FOR SWITCHES AND RECEPTACLES SHALL HAVE PANELBOARD AND CIRCUIT DESIGNATION LABEL AT TOP OF PLATE.

RECEPTACLES LOCATED IN WET LOCATIONS SHALL BE INSTALLED WITH AN OUTLET ENCLOSURE CLEARLY MARKED 'SUITABLE FOR WET LOCATIONS WHILE IN USE'. THERE MUST BE A GASKET BETWEEN THE COVER AND THE BASE TO ASSURE A PROPER SEAL. THE ENCLOSURE MUST EMPLOY STAINLESS STEEL MOUNTING HARDWARE AND BE CONSTRUCTED OF IMPACT RESISTANT POLYCARBONATE. THE OUTLET ENCLOSURE SHALL BE U.L. LISTED. MANUFACTURED BY HUBBELL, OR APPROVED EQUAL.

POWER AND CONTROL WIRING

FURNISH AND INSTALL ALL POWER WIRING, CONTROL WIRING (120VAC), CONDUIT AND FITTINGS FOR ALL PLUMBING, HEATING AND VENTILATING AND AIR CONDITIONING EQUIPMENT AND FINAL CONNECTIONS. MANUAL MOTOR STARTERS SHALL BE FURNISHED, INSTALLED AND WIRED BY THE ELECTRICAL CONTRACTOR. EVERY MOTOR SHALL BE PROVIDED WITH RUNNING OVERLOAD PROTECTION. UPON COMPLETION OF WORK, CHECK OUT EACH ITEM. ITEMS TO BE CHECKED ARE VOLTAGE, ROTATION AND OVERLOAD PROTECTION.

PART 3 – EXECUTION

INSTALLATION

ALL WORK, MATERIALS AND MANNER OF INSTALLING SAME SHALL BE IN STRICT ACCORDANCE WITH THE LATEST REQUIREMENTS OF THE NATIONAL ELECTRIC CODE.

ALL CONDUIT AND WIRING SHALL BE INSTALLED CONCEALED UNLESS OTHERWISE NOTED.

WIRING IN UNFINISHED AREAS SHALL BE INSTALLED EXPOSED USING EMT OR RGS CONDUIT.

RACEWAYS

RACEWAYS, ENCLOSURES AND BOXES SHALL BE MECHANICALLY JOINED TO FORM A CONTINUOUS ELECTRICAL PATH.

THE CONTRACTOR SHALL PROVIDE APPROVED TYPE PULL BOXES AS REQUIRED.

MINIMUM SIZE CONDUIT SHALL BE 3/4" UNLESS OTHERWISE NOTED.

FURNISH NYLON PULL STRINGS IN ALL EMPTY CONDUIT RUNS.

FURNISH LOCKNUTS AND BUSHINGS FOR ALL CONDUIT TERMINATIONS IN ALL OUTLET BOXES, PANELS, PULL BOXES, CONDUIT STUBS, ETC.

RIGID GALVANIZED STEEL CONDUIT (RGS) SHALL BE USED FOR WIRING IN THE FOLLOWING LOCATIONS:

1. WITHIN CONCRETE SLABS
2. EXPOSED TO MOISTURE AND MECHANICAL DAMAGE
3. EXTERIOR INSTALLATIONS

ELECTRICAL METALLIC TUBING (EMT) SHALL BE USED FOR CONCEALED AND EXPOSED WIRING IN DRY LOCATIONS AS FOLLOWS:

1. EXPOSED TO MOISTURE WITH WATER PROOF COMPRESSION FITTINGS
2. INTERIOR LIGHTING, RECEPTACLE AND POWER BRANCH CIRCUIT WIRING

ALL CONDUIT SHALL BE INSTALLED IN PARALLEL AND PERPENDICULAR TO THE BUILDING LINES.

ALL CONDUIT SHALL BE SUPPORTED USING CADMIUM PLATED CONDUIT STRAPS AND HANGERS.

WIRING

PROVIDE WIRING TO ALL OUTLETS, EQUIPMENT, APPARATUS AND OTHER SPECIALTIES UNDER THIS DIVISION THAT WHICH FURNISHED OR PROVIDED UNDER OTHER DIVISIONS OR BY THE OWNER.

THE TERM 'WIRING' SHALL BE CONSIDERED TO BE COMPRISED OF THE CONDUIT, CONDUCTORS, CONNECTIONS, ETC.

ALL WIRING ON DRAWINGS IS SIZED FOR TYPE THWN/THHN COPPER CONDUCTORS.

MINIMUM SIZE WIRE SHALL BE #12 UNLESS OTHERWISE INDICATED. ALL WIRING SHALL BE COLOR CODED.

EXERCISE CAUTION IN PULLING CONDUCTORS INTO RACEWAYS SO AS NOT TO DAMAGE THE INSULATION. CABLE PULLING LUBRICANT SHALL BE USED TO ASSIST IN PULLING.

CONDUCTOR WITHIN PANELBOARDS, JUNCTION BOXES, TROUGHS AND OTHER EQUIPMENT WHERE CONCENTRATIONS OF CONDUCTORS ARE ENCLOSED, SHALL BE NEATLY ARRANGED AND TIED WITH CABLE TIES.

CIRCUITS SHALL BE SO CONNECTED TO THE PANELBOARDS THAT THE TOTAL LOAD IS DISTRIBUTED AS NEATLY AS POSSIBLE, EQUALLY BETWEEN EACH LINE AND NEUTRAL. 10% WILL BE CONSIDERED A REASONABLE AND ALLOWABLE UNBALANCE.

BRANCH CIRCUIT WIRING FOR SWITCHES, RECEPTACLES, DEVICES AND LIGHTING IN DRYWALL CONSTRUCTION AND ACCESSIBLE HUNG CEILING SPACE, HOME–RUN CIRCUIT SHALL BE INSTALLED WITHIN EMT RACEWAY, BRANCH WIRING WITHIN PARTITIONS SHALL BE IN METAL SHEATHED 'MC' TYPE CABLE. CABLE SHALL BE SUPPORTED FROM STRUCTURE 4" O.C. WITH APPROVED CABLE SUPPORTS. PROVIDE APPROPRIATE GROMMETS FOR HORIZONTAL RUNS IN METAL STUD PARTITIONS. CABLE SHALL NOT LAY ON CEILING STRUCTURE OR TILES. PROVIDE ANTI–SHORT BUSHINGS (RED HEAD) UNDER ARMOR JACKET AT TERMINATIONS.

COMMON NEUTRAL FOR MULTIPLE BRANCH CIRCUITS IS NOT ACCEPTABLE. PROVIDE SEPARATE NEUTRAL FOR EACH BRANCH CIRCUIT.

WIRING IN OUTLET BOXES, JUNCTION BOXES, CABINET PANELBOARDS OR EQUIPMENT SHALL HAVE A MINIMUM OF EIGHT (8") INCHES LENGTH LEADS FOR CONNECTING WIRING DEVICES TO MAKE UP CIRCUIT SPLICES.

PROVIDE FLEXIBLE METAL CONDUIT FOR DRY TYPE TRANSFORMER CONNECTIONS. LENGTH OF FLEXIBLE METAL CONDUIT DO NOT EXCEED THREE FEET (3').

INSTALL COPPER GREEN INSULATED GROUNDING CONDUCTOR IN ALL CONDUITS AND RACEWAYS.

SPLICING

SPLICING SHALL BE DONE WITH INSULATED OR NON–INSULATED CONNECTORS OF APPROPRIATE TYPES AND CURRENT–CARRYING CAPACITY. NON–INSULATED CONNECTORS SHALL BE WRAPPED WITH INSULATING TAPE TO THE THICKNESS OF THE INSULATION OF THE CONDUCTORS BEING SPLICED. ELECTRICAL TAPE SHALL BE 3M OR SUPER 88 SCOTCH VINYL FLAME–RETARDANT , COLD AND WEATHER RESISTANT.

SPLICES FOR CONDUCTORS, SIZES #10 AWG OR SMALLER SHALL BE MADE WITH U.L. LISTED SPRING–TYPE CONNECTORS OR APPROPRIATE CURRENT CARRYING CAPACITY.

SPLICES, TAPS AND TERMINALS FOR CONDUCTORS #8 AWG OR LARGER SHALL BE MADE WITH U.L. LISTED BOLTED PRESSURE CONNECTORS OF BRONZE OR COPPER CONSTRUCTION OR INSULATED MULTITAP CONNECTORS, OF APPROPRIATE CURRENT CARRYING CAPACITY. EQUAL TO O–Z/GEDNEY, BURNDY OR BLACKBURN.

CONDUCTOR IDENTIFICATION

CONDUCTORS #8 AWG AND SMALLER SHALL HAVE A COLOR–CODED INSULATION.

CONDUCTORS #6 AWG AND LARGER SHALL BE IDENTIFIED WITH TAPES APPLIED NEAR THE ENDS OF THE CONDUCTORS.

FEEDERS AND BRANCH CIRCUIT CONDUCTORS SHALL BE IDENTIFIED FOR PHASE ROTATION.

	208/120V/3PH
PHASE A	BLACK
PHASE B	RED
PHASE C	BLUE
NEUTRAL	WHITE
GROUND	GREEN

ALL FEEDERS, MAINS AND BRANCH CIRCUIT CONDUCTORS SHALL BE TAGGED AT BOTH ENDS WITH WIRE MARKERS IN ALL PANELS, MOTOR CONTROLS, JUNCTION BOXES, OUTLET BOXES AND DEVICE BOXES.

IDENTIFICATION

FURNISH AND INSTALL NAMEPLATES FOR ALL ELECTRICAL EQUIPMENT, IDENTIFYING ITEMS BY NAME, FUNCTION AND/OR CONTROL.

IDENTIFYING NAMEPLATES SHALL BE LAMINATED, PLASTIC TYPE, CONSISTING OF TWO BLACK PLASTIC SHEETS WITH ONE WHITE PLASTIC SHEET BONDED TO AND BETWEEN THE TWO OUTER BLACK SHEETS AND HAVING THE LETTERS ENGRAVED IN ONE BLACK TO THE DEPTH OF THE WHITE PLASTIC. FASTEN NAMEPLATES TO EQUIPMENT WITH SUITABLE ADHESIVES OR STAINLESS STEEL SCREWS.

ALL PANELS SHALL HAVE UPDATED TYPEWRITTEN CIRCUIT DIRECTORIES IDENTIFYING ALL BRANCH CIRCUITS. PROVIDE ADDITIONAL

USE PLASTIC–COATED WIRE MARKERS OF THE SELF–ADHESIVE. WRAPAROUND TYPE WITH PERMANENT FACTORY–PRINTED NUMBER, LETTERS AND SYMBOLS.

WIRE MARKERS SHALL BE SECURELY ATTACHED AT BOTH ENDS, IDENTIFYING PANEL AND CIRCUIT BREAKER NUMBERS.

ALL CONDUCTORS SHALL BE PERMANENTLY TAGGED AT TIME OF INSTALLATION. LABELS SHALL BE EQUAL TO T&B, PANDUIT OR IDEAL.

GROUNDING

ALL ELECTRICAL WORK SHALL BE GROUNDED AND BONDED IN FULL CONFORMANCE WITH THE LATEST APPROVED EDITION OF THE NATIONAL ELECTRICAL CODE AND LOCAL REQUIREMENTS.

ALL ELECTRICAL EQUIPMENT, TRANSFORMERS, PANELBOARD ENCLOSURES, MOTOR FRAMES, SAFETY SWITCHES, METAL ENCLOSURES, ELECTRICAL DEVICE CLOSURES AND ALL OTHER EQUIPMENT SHALL BE MADE TO FORM A CONTINUOUS CONDUCTING, GROUND PATH OF LOW IMPEDANCE FOR GROUND FAULT CIRCUITS AND OPERATION OF THE CIRCUIT PROTECTIVE DEVICES WITHIN EACH CIRCUIT.

PROVIDE GROUNDING CONDUCTOR IN ALL RACEWAYS.

GROUND CONNECTIONS WITH THE GROUNDING CONDUCTORS SHALL BE MADE AT EACH OUTLET BOX, LIGHTING FIXTURE, MOTOR AND OTHER EQUIPMENT COMPONENTS BY MEANS OF A POSITIVELY SECURED GROUNDING CLAMP, SCREW OR CLIP. CONNECTIONS TO GROUNDING RODS, OTHER GROUNDING ELECTRODE CONDUCTORS SHALL BE MADE WITH CADWELL TYPE, EXOTHEMIC WELD PROCESS UNLESS OTHERWISE NOTED. CONNECTIONS TO PIPES SHALL BE MADE WITH APPROVED BRONZE OR BRASS CLAMPS.

BONDING SHALL BE PROVIDED TO ASSURE ELECTRICAL CONTINUITY AND THE CAPACITY TO SAFELY CONDUCT ANY FAULT CURRENT LIKELY TO BE IMPOSED.

SEISMIC RESTRAINT

SEISMIC LATERAL RESTRAINTS DESIGNED TO RESIST HORIZONTAL MOVEMENT IN ANY DIRECTIONS SHALL BE INSTALLED IN ALL SUSPENDED CONDUITS 2–1/2 INCHES IN DIAMETER OR GREATER. QUANTITY AND LOCATION OF THE LATERAL RESTRAINTS SHALL BE BASED ON THE CONDUIT SYSTEM LAYOUT AND IN GENERAL, SHALL BE INSTALLED AT CONDUIT BENDS, JUNCTION BOXES AND APPROXIMATELY EVERY 20 FEET ALONG CONDUIT RUNS. SEISMIC LATERAL RESTRAINTS ARE NOT REQUIRED FOR ANY PIPING SUSPENDED BY INDIVIDUAL HANGERS 12 INCHES OR LESS IN LENGTH FROM TOP OF PIPING TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.

END OF ELECTRICAL SPECIFICATIONS

PETER J. PYCELA
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