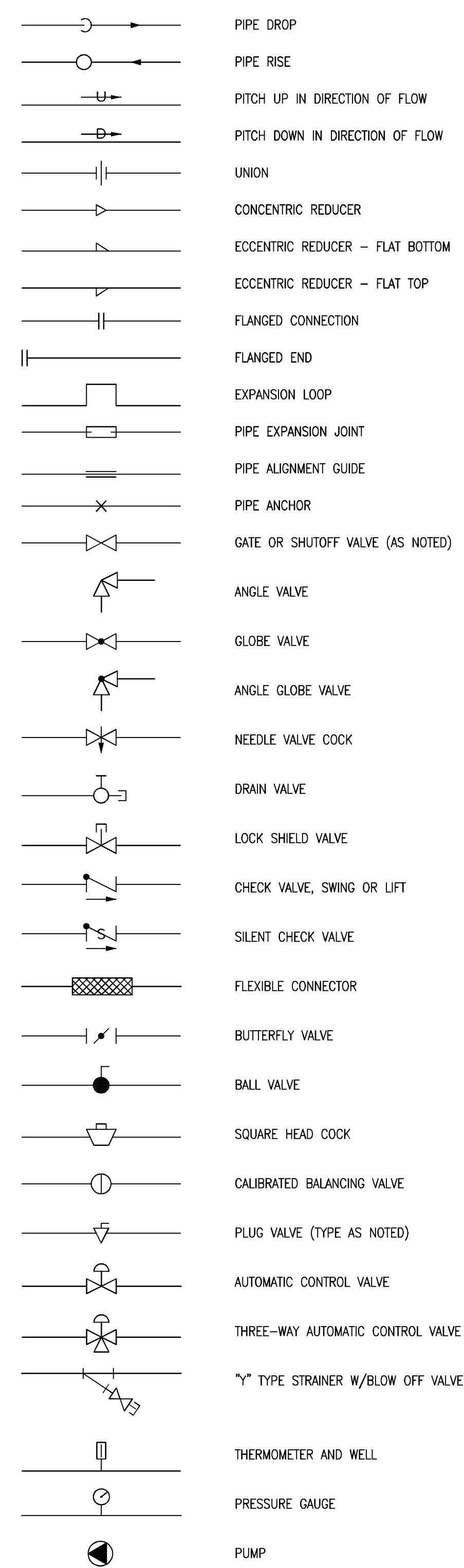
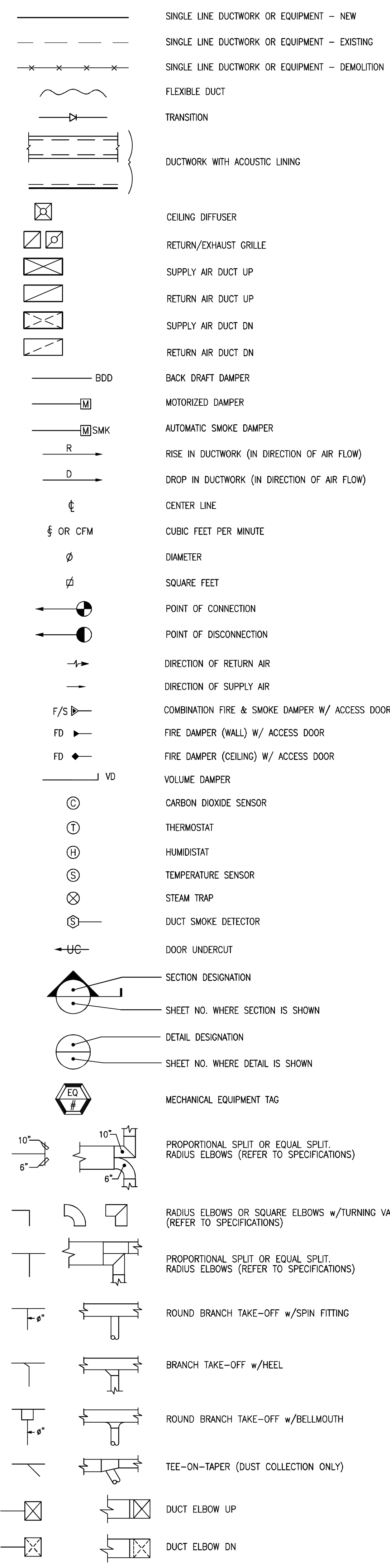


HVAC BASIC PIPING SYMBOLS
(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)



HVAC BASIC DUCTWORK SYMBOLS
(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)



HVAC ABBREVIATIONS
(NOT ALL ABBREVIATIONS ARE NECESSARILY USED ON THIS PROJECT)

AAV	AUTOMATIC AIR VENT	IN.	INCH OR INCHES
AC	AIR CONDITIONING	LAT	LEAVING AIR TEMPERATURE
ACU	AIR CONDITIONING UNIT	LD	LINEAR DIFFUSER
AD	ACCESS DOOR	LF	LINEAR FEET
AFF	ABOVE FINISHED FLOOR	LWB	LEAVING WET BULB TEMPERATURE
AHU	AIR HANDLING UNIT	LWT	LEAVING WATER TEMPERATURE
BCU	BLOWER COIL UNIT	MBH	THOUSAND BTU PER HOUR
BHP	BRAKE HORSEPOWER	MER	MECHANICAL EQUIPMENT ROOM
BR	BOTTOM REGISTER	MIN	MINIMUM
BT	BOTTOM THROAT	MOO	MOTOR OPERATED DAMPER
BTU	BRITISH THERMAL UNIT	(N)	NEW
BTUH	BTU PER HOUR	NC	NORMALLY CLOSED
CD	CEILING DIFFUSER	NIC	NOT IN CONTRACT
CFM	CUBIC FEET PER MINUTE	NO	NORMALLY OPEN
CG	CEILING GRILLE	NO.	NUMBER
CLG	CEILING	NTS	NOT TO SCALE
CO	CLEANOUT	OA	OUTSIDE AIR
COND	CONDENSATE	OA	OUTSIDE AIR INTAKE
CR	CEILING REGISTER	OED	OPEN END DUCT
CUH	CABINET UNIT HEATER	PSI	POUNDS PER SQUARE INCH
CV	CONSTANT VOLUME	PSIA	PSI ABSOLUTE
DB	DRY BULB	PSIG	PSI GAUGE
DDC	DIRECT DIGITAL CONTROL	RA	RETURN AIR
DWM	DIAMETER	(RE)	RELOCATED EXISTING
DMPR	DAMPER	REFRIG	REFRIGERANT
DN	DOWN	RF	RETURN FAN
DX	DIRECT EXPANSION	RG	RETURN GRILLE
(E)	EXISTING TO REMAIN	RH	RELATIVE HUMIDITY
(ERR)	EXISTING TO BE REMOVED	RHC	RE-HEAT COIL
(ERR)	EXISTING TO BE REMOVED & RELOCATED	RLA	RUNNING LOAD AMPS
EA	EXHAUST AIR	RPM	REVOLUTIONS PER MINUTE
EAT	ENTERING AIR TEMPERATURE	RR	RETURN REGISTER
EDB	ENTERING DRY BULB TEMPERATURE	(RRD)	EXISTING TO BE REMOVED AND RETURN TO OWNER
EF	EXHAUST FAN	RTU	ROOFTOP AIR HANDLING UNIT
EG	EXHAUST GRILLE	SA	SUPPLY AIR
EL	ELEVATION	SD	SMOKE DAMPER
EMS	ENERGY MANAGEMENT SYSTEM	SF	SUPPLY FAN
ER	EXHAUST REGISTER	SP	STATIC PRESSURE
ESP	EXTERNAL STATIC PRESSURE	SOFT	SQUARE FEET
EWB	ENTERING WET BULB	SPEC	SPECIFICATION
EWT	ENTERING WATER TEMPERATURE	TDH	TOTAL DYNAMIC HEAD
EXH	EXHAUST	TEMP	TEMPERATURE
'F	DEGREES FAHRENHEIT	TG	TRANSFER GRILLE
FA	FREE AREA (SQ.FT.)	TR	TOP REGISTER
FC	FLEXIBLE CONNECTION	TRANS	TRANSITION
FDU	FAN COIL UNIT	T-STAT	THERMOSTAT
FD	FIRE DAMPER	TYP	TYPICAL
FIN FL	FINISHED FLOOR	UH	UNIT HEATER
FLA	FULL LOAD AMPERES	UH	VOLUME DAMPER
FFM	FEET PER MINUTE	VFD	VARIABLE FREQUENCY DRIVE
GAL	GALLON	VAV	VARIABLE AIR VOLUME
GPH	GALLONS PER HOUR	VIV	VARIABLE INLET VANES
GPM	GALLONS PER MINUTE	W	WIDTH
GRD	GRILLES, REGISTERS & DIFFUSERS	W/	WITH
HT	HEIGHT	WB	WET BULB
HP	HORSEPOWER	W.C.	WATER COLUMN
HR	HOUR	W.G.	WATER GAUGE
HV	HEATING AND VENTILATING	WH	WATER HEATER
HX	HEAT EXCHANGER	WMS	WIRE MESH SCREEN
HZ	HERTZ (FREQUENCY)		

MECHANICAL NOTES

- PRIOR TO SUBMITTING A BID THE CONTRACTOR SHALL EXAMINE ALL DRAWINGS AND SPECIFICATIONS AND VISIT THE SITE TO BECOME ACQUAINTED WITH THE CONSTRUCTION AND THE EXTENT OF THE WORK. NO EQUIPMENT OR MATERIAL IS TO BE ORDERED OR FABRICATED PRIOR TO FIELD VERIFICATION OF ALL MEASUREMENTS, CLEARANCES, POTENTIAL CONFLICTS WITH EXISTING CONDITIONS OR THAT OF OTHER TRADES ON THE JOB.
- CONTRACTOR SHALL PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE, WHETHER SPECIFIED OR IMPLIED.
- CONTRACTOR SHALL VISIT THE JOB PRIOR TO SUBMITTING A BID.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST APPLICABLE INTERNATIONAL BUILDING CODE, MECHANICAL CODE, FUEL GAS CODE, PLUMBING CODE, NEC CODE AND ALL OTHER STATE AND LOCAL AUTHORITIES HAVING JURISDICTION.
- CONTRACTOR SHALL GIVE ALL NOTICES, OBTAIN AND PAY FOR ALL PERMITS, DEPOSITS AND FEES NECESSARY.
- DO NOT SCALE THE DRAWINGS FOR EXACT DIMENSIONS. THE DESIGN DRAWINGS ARE ARCHITECTURAL AND INDICATE THE GENERAL LAYOUT AND CONNECTIONS. CONTRACTOR SHALL VERIFY ALL CONDITIONS, DIMENSIONS, ETC. AT THE JOB SITE.
- CONTRACTOR SHALL REVIEW THE WORK OF OTHER TRADES TO PREVENT INTERFERENCE BETWEEN BEAMS, STRUCTURES, PIPING, LIGHTING FIXTURES ETC. BEFORE PROCEEDING WITH NEW WORK.
- CONTRACTOR SHALL GUARANTEE THE ENTIRE JOB AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE. THIS GUARANTEE SHALL BE BINDING REGARDLESS OF MANUFACTURER'S GUARANTEE AND CONTRACTOR SHALL REMOVE AND REPLACE ALL DEFECTIVE MATERIAL REGARDLESS OF CAUSE (EXCEPT FOR DEFECTS TRACEABLE TO IMPROPER MAINTENANCE OR MALICIOUS DESTRUCTION OCCURRING AFTER THE SYSTEM HAS BEEN TURNED OVER).
- ALL MATERIALS USED ANYWHERE IN THE WORK SHALL HAVE NFPA RATING AS FOLLOWS:
A. FLAME SPREAD- NOT OVER 25
B. SMOKE DEVELOPED- NOT OVER 50
C. FUEL CONTRIBUTED- NOT OVER 25
ALL MATERIALS SHALL BE "SELF-EXTINGUISHING"
- CONTRACTOR SHALL SUBMIT 1/4" SCALE SHEET METAL SHOP DRAWINGS FOR APPROVAL PRIOR TO FABRICATION. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- SUBMIT TO THE ARCHITECT FOR APPROVAL, SPECIFICATION SHEETS OF ALL EQUIPMENT SUPPLIED OR INSTALLED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
A. AIR CONDITIONING UNITS
B. GRILLES, REGISTERS, AND DIFFUSERS
C. CONTROLS
D. PIPING
E. INSULATION
F. FANS
- ALL MECHANICAL EQUIPMENT AND APPLIANCES INSTALLED SHALL BEAR THE LABEL OF AN APPROVED AGENCY.
- EQUIPMENT AND MATERIALS ARE SPECIFIED TO ESTABLISH A STANDARD OF QUALITY. ALL MATERIALS AND EQUIPMENT USED FOR THIS CONTRACT SHALL BE NEW AND UNUSED AND OF THE LATEST MODEL OR DESIGN AVAILABLE.
- ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT INSULATION IS APPLIED.
- CONTRACTOR SHALL PROVIDE 1-INCH THICK (R-5) FOAM BOARD INSULATION PAINTED TO MATCH THE ROOM'S FINISH FOR ALL THERMOSTATS MOUNTED ON MASONRY WALLS.
- THE CONTRACTOR SHALL FURNISH AND INSTALL ALL STRUCTURAL STEEL, SUPPORTS, BRACES, HANGERS, ETC., REQUIRED FOR HIS CONTRACT UNLESS OTHERWISE NOTED. CONTRACTOR SHALL COORDINATE ALL EQUIPMENT SUPPORT LOCATION AND INSTALLATION WITH ROOFING AND STRUCTURAL CONTRACTORS.
- ALL DUCT SIZES SHOWN ARE INSIDE CLEAR.
- MAXIMUM ALLOWABLE LENGTH FOR FLEXIBLE DUCT IS SIX (6) FEET.
- MECHANICAL CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING AND PATCHING EITHER ENGAGING HIS OWN GENERAL SUBCONTRACTOR OR ONE QUALIFIED BY THE OWNER.
- CONTRACTOR SHALL INFORM THE ENGINEER OF ANY QUESTIONS OR DISCREPANCIES PRIOR TO PRECURSOR AND/OR FABRICATION OF ANY MATERIALS AND INSTALLATION.
- INSTALL ALL EQUIPMENT IN ACCORDANCE TO THE MANUFACTURER'S WRITTEN GUIDELINES.
- MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONNECTIONS, SUPPORTS, TERMINATIONS & ACCESSORIES ASSOCIATED WITH AIR HANDLING UNITS, FANS, ETC.
- MECHANICAL CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR WHO WILL PROVIDE POWER WIRING TO ALL MECHANICAL EQUIPMENT. MECHANICAL CONTRACTOR SHALL PROVIDE ALL CONTROL AND INTERLOCK WIRING AND ALL THERMOSTATS AND ACCESSORIES.
- SUPPORT ALL EQUIPMENT, PIPING AND DUCTWORK WITH VIBRATION ISOLATION HANGERS AS REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION.
- ALL EXTERIOR WALL OPENINGS SHALL BE SLEEVED, PROPERLY CAULKED AND SEALED WITH A HIGH QUALITY SEALANT TO PREVENT INFILTRATION OF MOISTURE AND OUTSIDE AIR.
- PROVIDE VOLUME DAMPERS AT ALL DUCT BRANCHES AND RUNOUTS. PROVIDE OPPOSED BLADE VOLUME DAMPERS AT ALL REGISTERS, GRILLES AND DIFFUSER NECKS IN SUPPLY, RETURN AND EXHAUST DUCTWORK WHETHER SHOWN ON DRAWINGS OR NOT.
- PROVIDE AT MINIMUM 10 GAUGE STEEL SLEEVES FOR ALL DUCT PENETRATIONS THROUGH FIRE WALLS, FLOORS AND PARTITIONS. PROVIDE PIPE SLEEVES FOR ALL MECHANICAL PIPING PENETRATING THROUGH FIRE WALLS, FLOORS AND PARTITIONS. SEAL ALL ANNULAR SPACE BETWEEN SLEEVES AND DUCTWORK OR PIPING WITH A FIRE BARRIER MATERIAL.
- PROVIDE FLEXIBLE CONNECTIONS ON ALL DUCTS AND PIPING CONNECTIONS TO ANY MOTOR DRIVEN MECHANICAL EQUIPMENT (I.E. FANS, AIR HANDLERS, PUMPS, ETC.) INSTALL FLEXIBLE COPPER GROUNDING STRIPS ACROSS ALL FLEXIBLE CONNECTIONS.
- THE INSIDE OF ALL DUCTWORK VISIBLE THROUGH A GRILLE OR DIFFUSER SHALL BE PAINTED FLAT BLACK.
- ACCESS PANELS SHALL BE PROVIDED TO SERVICE ALL VALVES, DAMPERS, HEATERS, CONCEALED MECHANICAL EQUIPMENT, TRAPS, CLEANOUTS AND DISCHARGE SIDE OF ELECTRIC HEATERS.
- FINAL LOCATIONS FOR MOUNTING ALL THERMOSTATS SHALL BE COORDINATED WITH THE ENGINEER PRIOR TO INSTALLING ANY CONTROL WORK. ALL COMMON AREA THERMOSTATS SHALL BE EQUIPPED WITH A LOCKING COVERS. MOUNT ALL THERMOSTATS TO COMPLY WITH ADA REQUIREMENTS.
- UPON COMPLETION OF THE WORK, REMOVE ALL EXCESS MATERIAL, DEBRIS, TOOLS AND EQUIPMENT FROM THE SITE, AND LEAVE THE PREMISES IN A BROOM CLEAN CONDITION.
- CONTRACTOR SHALL PROVIDE THREE (3) COMPLETE SETS OF BOUND OPERATING AND MAINTENANCE INSTRUCTIONS. CONTRACTOR SHALL INSTRUCT THE OWNER OR HIS AGENT WITH REGARD TO THE PROPER USE OF THE SYSTEM UNTIL SUCH INSTRUCTION IS COMPLETE TO THE OWNER'S SATISFACTION.
- TESTING, ADJUSTING, AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). TESTING, ADJUSTING, AND BALANCING SHALL BE PERFORMED IN ACCORDANCE WITH THE AABC OR NEBB STANDARDS.
- CONTRACTOR SHALL ENSURE THAT ALL MECHANICAL DEVICES WILL BE INSTALLED IN LOCATIONS WHICH AFFORD ACCESSIBILITY FOR MAINTENANCE AND REPAIR. COORDINATE INSTALLATION AMONG ALL TRADES TO AVOID INTERFERENCES AND LOCATE EQUIPMENT TO PROVIDE CLEARANCES WHICH EXCEED THOSE RECOMMENDED BY THE EQUIPMENT MANUFACTURER.
- CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE SAFETY OF EXISTING STRUCTURE.
- THERMOSTAT WIRING SHALL BE INSTALLED IN CONCEALED SPACE, WALL OR CHASE - COORDINATE WITH THE OWNER REPRESENTATIVE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION SCHEDULING AND ASSOCIATED HOISTING STAGING AND ERECTING OF MATERIALS. ALL ELEMENTS OF THE EXISTING PROPERTY SHALL BE PROTECTED AGAINST DAMAGE RESULTING FROM THESE ACTIVITIES.
- ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO PERFORM STARTUP SERVICES. COMPLETE INSTALLATION AND STARTUP CHECKS SHALL BE ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND STARTUP REPORTS SHALL BE PROVIDED TO ARCHITECT/ENGINEER FOLLOWING COMPLETION. STARTUP SHALL BE PROVIDED FOR ALL EQUIPMENT SUPPLIED OR INSTALLED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
A. AIR CONDITIONING UNITS
B. HEATERS
C. PUMPS
D. FANS
E. BOILERS
F. CHILLERS
G. CONDENSERS & HEAT PUMPS
H. CONTROLS

Revisions	
No.	Description
11/17/21	ISSUED FOR BID

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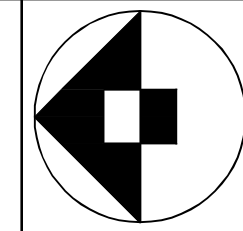


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Project
NEW MAINTENANCE BUILDING
FOR
ATLANTIC COUNTY
INSTITUTE OF TECHNOLOGY
5080 ATLANTIC AVE.
MAYS LANDING, NJ 08330

Drawing
MECHANICAL
COVER SHEET



Scale AS NOTED	Job 19033	Sheet MO.0
Drawn AT	Date 11/17/21	

GENERAL FIRESTOPPING NOTE
CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING OR EXCEEDING WALL/CEILING/FLOOR ASSEMBLY RATINGS FOR ALL PENETRATIONS. CONTRACTOR SHALL VERIFY LOCATION AND RATING OF ALL FIRE ASSEMBLIES AND PROVIDE INTUMESCENT COLLARS AT ALL PENETRATIONS AND FIRE RATED CAULKING AS REQUIRED.

DRAWING NOTES:

- DRAWINGS ARE DIAGRAMMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOID INTERFERENCES ENCOUNTERED. REFER TO STRUCTURAL DRAWINGS FOR LOCATIONS OF NEW AND EXISTING BEAMS, TRUSSES AND LINTELS. COORDINATE DUCTWORK AND EQUIPMENT LOCATIONS AS REQUIRED.
- CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.
- ALL EXHAUST SHALL TERMINATE ON EXTERIOR A MINIMUM OF 3 FEET FROM ALL OPERABLE WINDOWS AND OTHER OPENINGS TO BUILDING AND 25 FEET FROM ANY INTAKES.
- MAINTAIN ALL EQUIPMENT A MINIMUM OF 10'-0" FROM ANY ROOF EDGE.
- COORDINATE ALL EQUIPMENT, DUCTWORK, VENTING AND PENETRATIONS WITH BUILDING STRUCTURE.

KEY NOTES:

- DOUBLE EXHAUST BOX DUAL 6" PORT MFG. VENT MODEL DHEB-66-FC. COLOR SELECTED BY ARCHITECT.
- COORDINATE ELEVATION AND SUPPORT OF OUTDOOR UNITS WITH ARCHITECT, CIVIL AND STRUCTURAL CONTRACTOR. PROVIDE 4" CONCRETE EQUIPMENT PAD AND PROVIDE RAISED BASE SUPPORT, OR WALL MOUNT SUPPORT, SECURE ALL EQUIPMENT AND SUPPORTS TO MEET WINDSPEED REQUIREMENTS AND RAISED 24" ABOVE GRADE.
- ROUTE REFRIGERATION LINES TO ASSOCIATED CONDENSING UNIT. PROVIDE HIDE LINE CHANNELS FOR EXPOSED PIPES.
- PROVIDE CONDENSATE PUMP AND ROUTE 3/4" CONDENSATE PIPING TO MOP SINK IN JANITOR CLOSET. TERMINATE 1" ABOVE SINK.
- EXTEND 4" COMBUSTION AIR INTAKE AND 4" EXHAUST TO SIDE WALL CONCENTRIC VENT KIT.

Revisions		
No.	Date	Description
1	11/17/21	ISSUED FOR BID

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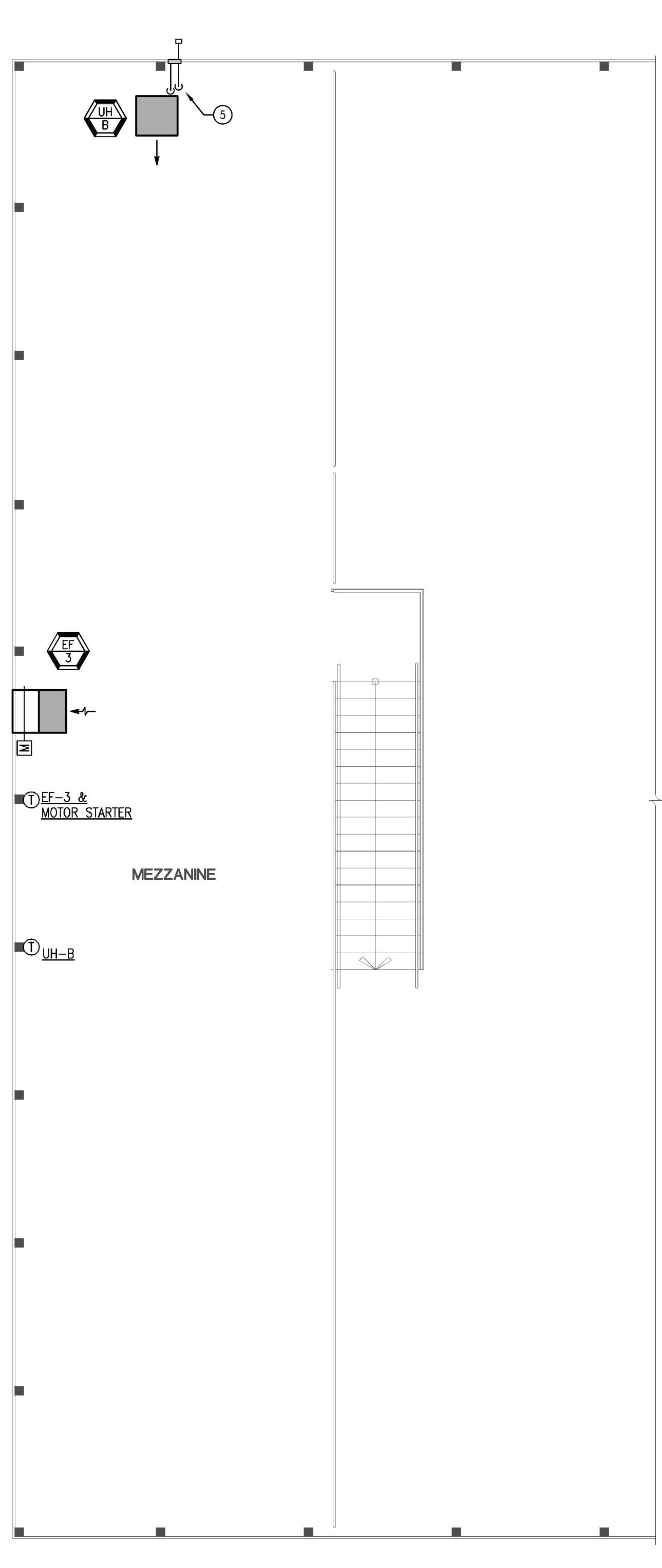


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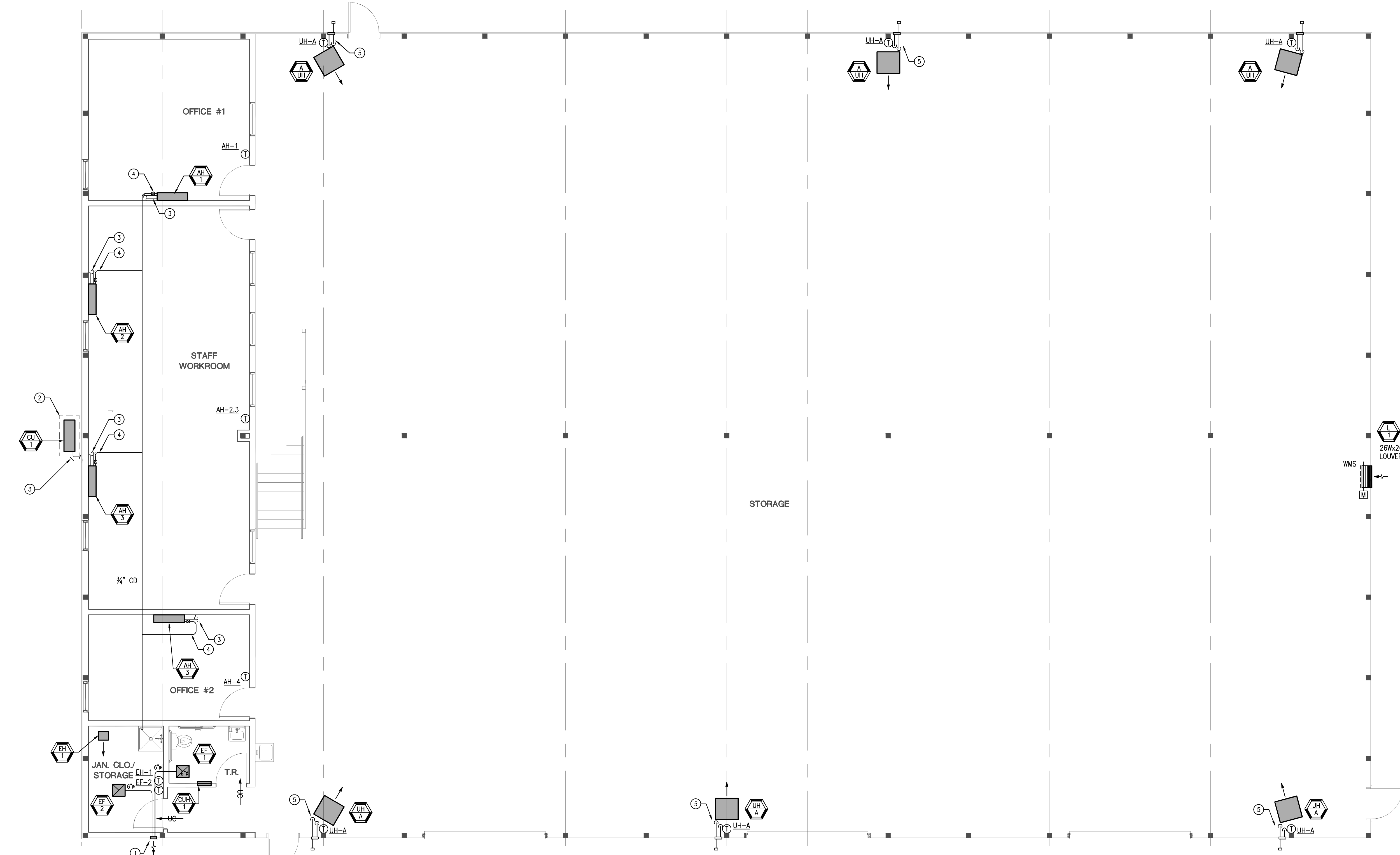
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Project
NEW MAINTENANCE BUILDING FOR ATLANTIC COUNTY INSTITUTE OF TECHNOLOGY
5080 ATLANTIC AVE.
MAYS LANDING, NJ 08330

Drawing MECHANICAL FLOOR PLANS			
Scale AS NOTED	Job 19033	Sheet M1.0	
Drawn AT	Date 11/17/21		



02 MEZZANINE FLOOR PLAN — MECHANICAL
SCALE: 3/16" = 1'-0"



01 FLOOR PLAN — MECHANICAL
SCALE: 3/16" = 1'-0"

DUCTLESS MINI SPLIT UNIT SCHEDULE																
TAG	SERVICE	TYPE	BASIS OF DESIGN MANUF.	INDOOR MODEL NO.	NOMINAL TONNAGE CAPACITY	FAN DATA				INDOOR NOM. CAP.		ELECTRICAL DATA			REMARKS	
						CFM	OA	E.S.P. IN W.G.	SOUND LEVEL (INDOOR)	TOTAL COOLING (MBH)	TOTAL HEATING (MBH)	VOLTAGE	AMPS	MCA		MCCP
AH-1	OFFICE#1	WALL-MOUNTED	TRANE/MITSUBISHI	TPKFYP012LM140A	1.00	297	-	-	43 dB(A)	12	13.5	208/10/60	0.04	0.24	15	ALL
AH-2	STAFF WORK ROOM	WALL-MOUNTED	TRANE/MITSUBISHI	TPKFYP008LM140A	0.66	237	-	-	43 dB(A)	8	9.0	208/10/60	0.03	0.24	15	ALL
AH-3	STAFF WORK ROOM	WALL-MOUNTED	TRANE/MITSUBISHI	TPKFYP008LM140A	0.66	237	-	-	43 dB(A)	8	9.0	208/10/60	0.03	0.24	15	ALL
AH-4	OFFICE#2	WALL-MOUNTED	TRANE/MITSUBISHI	TPKFYP006LM140A	0.50	191	-	-	43 dB(A)	6	6.7	208/10/60	0.02	5.63	15	ALL

NOTES/ACCESSORIES:

1. PROVIDE BLUE DIAMOND CONDENSATE PUMP AND DRAIN PAN LEVEL SENSOR/CONTROL AND FASCIA KIT MOUNT PUMP UNDER UNIT.
2. PROVIDE MANUFACTURER'S MODEL TAR-40MAAU WIRED PROGRAMMABLE LOCAL THERMOSTAT WITH CLEAR LOCKABLE COVER.
3. PROVIDE FACTORY START-UP AND TRAINING.
4. PROVIDE MOUNTING ACCESSORIES AS REQUIRED FOR MOUNTING TYPE.
5. DISCONNECT SWITCH PROVIDE BY ELECTRICAL CONTRACTOR.
6. COORDINATE POWER & WIRING REQUIREMENTS WITH ELECTRICAL CONTRACTOR.
7. PROVIDE WASHABLE FILTER.

AIR COOLED HEAT PUMP SCHEDULE																		
TAG	SERVICE	BASIS OF DESIGN MANUF.	MODEL NO.	NOMINAL TONNAGE CAPACITY	NOMINAL SYSTEM CONNECTED CAPACITY (%)	COOLING CAPACITY		HEATING CAPACITY		ELECTRICAL DATA			SOUND PRESS. dBA	COOLING EFF.		AHRI COP	APPROX WEIGHT (LBS.)	REMARKS
						TOTAL (MBH)	CORRECTED COOLING TOTAL CAP. (BTUH)	TOTAL (MBH)	CORRECTED HEATING TOTAL CAP. (BTUH)	VOLTAGE	MCA	MCCP		IEER	SEER			
HP-1	OFFICES	TRANE MITSUBISHI	TUMYH0361AK4	3.0	94%	36	35464.6	42	41969.6	208/10/60	36	44	65	13.2	18.7	4	278	ALL

NOTES/ACCESSORIES:

1. DISCONNECT SWITCH PER MODULE PROVIDED BY ELECTRICAL CONTRACTOR.
2. HYPER HEAT PUMP CONDENSER.
3. PROVIDE WITH COLD WEATHER STAND OR WALL MOUNTED. COORDINATE LOCATION WITH ARCHITECT.
4. PROVIDE WITH HEADER FOR 4 BRANCHES.
5. PROVIDE DRAIN PAN AND DEFROST HEATER.

FAN SCHEDULE													
TAG	SERVICE	BASIS OF DESIGN MANUF.	MODEL NO.	TYPE	CFM	SP. IN. W.G.	FRPM	HP/WATTS	FL (AMPS)	VOLTAGE	NOISE LEVEL (SONES)	CONTROL	REMARKS
EF-2	JANITOR CLOSET	PANASONIC	FV-051VKS2	CEILING	80	0.25	1113	13.4 WATTS	0.2	120/14/60	0.5	SEE NOTES	1 - 4
EF-3	STORAGE	GREENHECK	SBE-1H20-4	WALL	2,000	0.25	893	1/4 HP	5.8	115/14/60	14.2	SEE NOTES	2,5,6,7,8

NOTES/ACCESSORIES:

1. PROVIDE WITH INTEGRAL BACKDRAFT DAMPER, DISCONNECT AND HANGER KIT.
2. PROVIDE CONTROLS, RELAYS, TRANSFORMERS AND WIRING AS REQUIRED TO OPERATE SYSTEM.
3. SWITCH AND WIRING PROVIDED BY ELECTRICAL CONTRACTOR.
4. PROVIDE BUILT-IN FAN CONTROL MOTION SENSOR - FV-MSVK1 AND WALL SWITCH FOR FAN ON/OFF - FV-WCSW11-W/A.
5. PROVIDE FAN WALL HOUSING, BURGULAR BARS, WIRE MESH SCREEN, MOTORIZED DAMPER.
6. PROVIDE THERMOSTAT.
7. PROVIDE MOTOR STARTER OPERATE FAN, INTERLOCK WITH THERMOSTAT, FAN AND MOTORIZED DAMPERS.
8. DISCONNECT BY ELECTRICAL CONTRACTOR.

ELECTRIC HEATER SCHEDULE											
TAG	LOCATION	TYPE	BASIS OF DESIGN MANUF.	MODEL	AIRFLOW		HEATING CAPACITY		ELECTRICAL DATA		REMARKS
					CFM	BTUH	KW	VOLTAGE	AMP		
EH-1	JANITOR CLOSET / STORAGE	ELECTRIC UNIT HEATER	INDEECO	ULR-925U03000VA	300	-	2.25	208/14/60	11.2		1-5
CUH-1	TOILET	WALL HEATER	INDEECO	WR-930U0500B	40	-	0.50	120/14/60	4.6		1,4,5,6

NOTES/ACCESSORIES:

1. MOUNT FROM WALL OR CEILING AS REQUIRED. PROVIDE MOUNTING ACCESSORIES AS REQUIRED FOR MOUNTING TYPE.
2. DISCONNECT BY E.C., M.C. TO COORDINATE.
3. PROVIDE WITH REMOTE THERMOSTAT WITH CLEAR LOCKABLE COVER AND INSULATED WALL MOUNT PLATE.
4. PROVIDE AUTOMATIC RESET THERMAL CUTOUT.
5. FINAL COLOR SELECTION BY OWNER/ARCHITECT
6. PROVIDE WITH SINGLE-POLE TAMPER-PROOF THERMOSTAT AND BUILT-IN DISCONNECT SWITCH.

GAS-FIRED UNIT HEATER SCHEDULE											
TAG	BASIS OF DESIGN MANUFACTURER	MODEL	INPUT (MBH)	OUTPUT (MBH)	STAGE HEATING	FAN HP/(WATTS)	WEIGHT (LBS)	ELECTRICAL DATA			REMARKS
								VOLTAGE	FLA	MCCP	
UH-A	REZNOR	UDZ 75	75	62.25	2	0.06	77	115/14/60	3.7	15	ALL
UH-B	REZNOR	UDZ 30	30	24.60	1	0.02	58	115/14/60	1.9	15	ALL

NOTES/ACCESSORIES:

1. HORIZONTAL THROW.
2. PROVIDE WITH REMOTE THERMOSTAT WITH CLEAR LOCKABLE COVER AND INSULATED WALL PLATE.
3. PROVIDE WITH DISCONNECT SWITCH AND SUSPENSION KIT TO MATCH STRUCTURE.
4. MOUNT FROM WALL OR CEILING AS REQUIRED. PROVIDE MOUNTING ACCESSORIES AS REQUIRED FOR MOUNTING TYPE.
5. COORDINATE FINAL MOUNTING HEIGHT WITH OWNER AND ARCHITECT.
6. RECOMMEND HEIGHT BOTTOM OF UNIT AFF UH-A 18FT AND UH-B 6.5FT.
7. PROVIDE TWO STAGE GAS VALVE FOR UH-A.
8. PROVIDE REZNOR HORIZONTAL THRU WALL CONCENTRIC VENT KITS.
9. REFER TO PLAN FOR QUANTITIES.

LOUVER SCHEDULE (INTAKE)						
TAG	SERVICE	AIRFLOW CFM	BASIS OF DESIGN MANUF.	MODEL	SIZE (LxWxD)	REMARKS
L-1	OUTSIDE AIR INTAKE	2,000	GREENHECK	EHH-601DE	26x26x6	ALL

NOTES/ACCESSORIES:

1. PROVIDE LOUVER WITH 1/2" MESH SCREEN AND BURGULAR BARS.
2. COORDINATE LOUVER LOCATION, SIZES AND DEPTH WITH ARCHITECT.
3. FINISH/COLOR OF ALL LOUVERS SHALL BE DETERMINED BY OWNER/ARCHITECT.
4. LOUVER BLADES ARE HORIZONTAL.
5. INTERLOCK MOTORIZED DAMPER, LOUVER TO OPEN WHEN EF-3 IS ON AND CLOSE WHEN FAN IS OFF.

Revisions		
No.	Date	Description
11/17/21		ISSUED FOR BID

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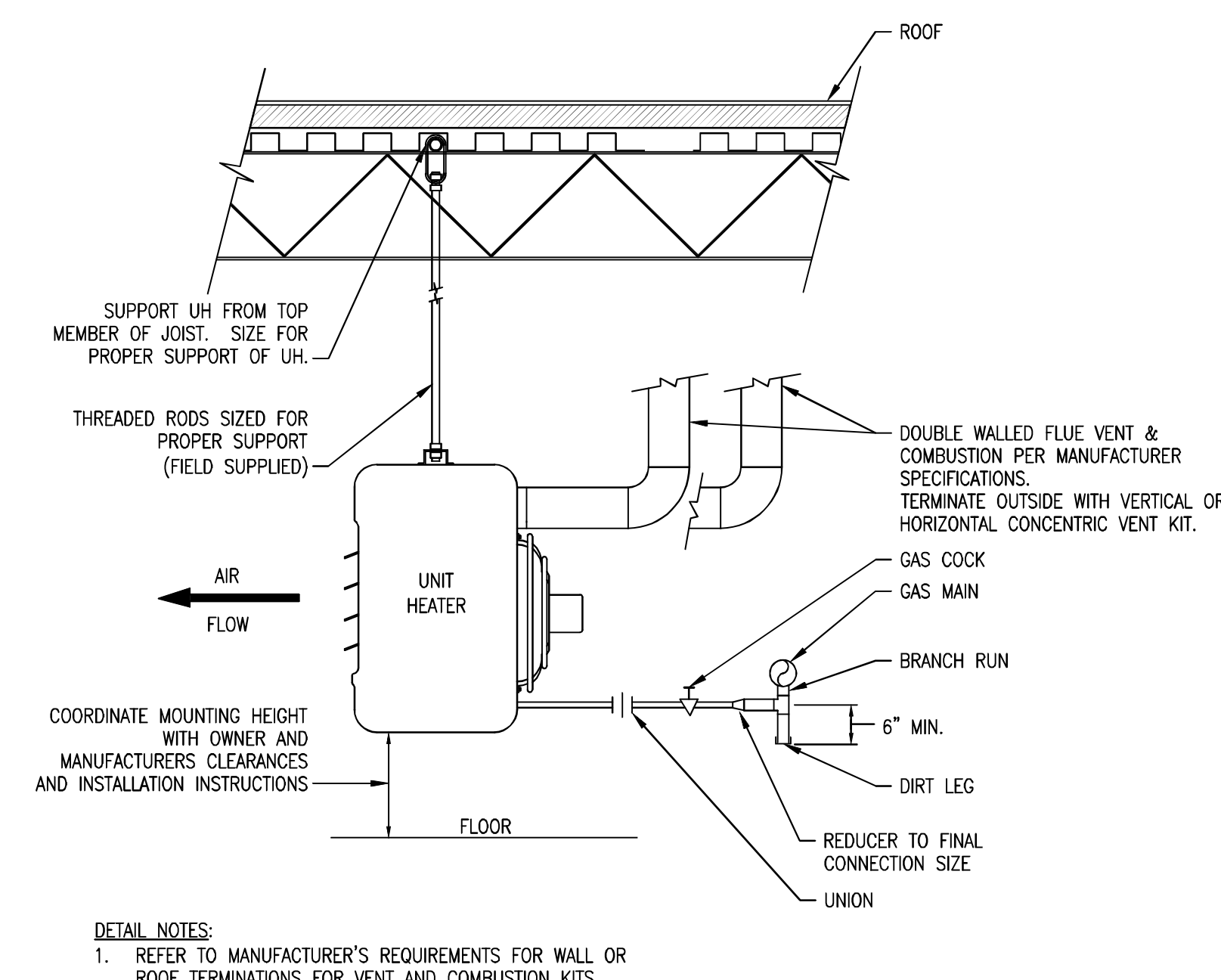
Project
NEW MAINTENANCE BUILDING FOR ATLANTIC COUNTY INSTITUTE OF TECHNOLOGY
5080 ATLANTIC AVE.
MAYS LANDING, NJ 08330

Drawing
MECHANICAL SCHEDULES

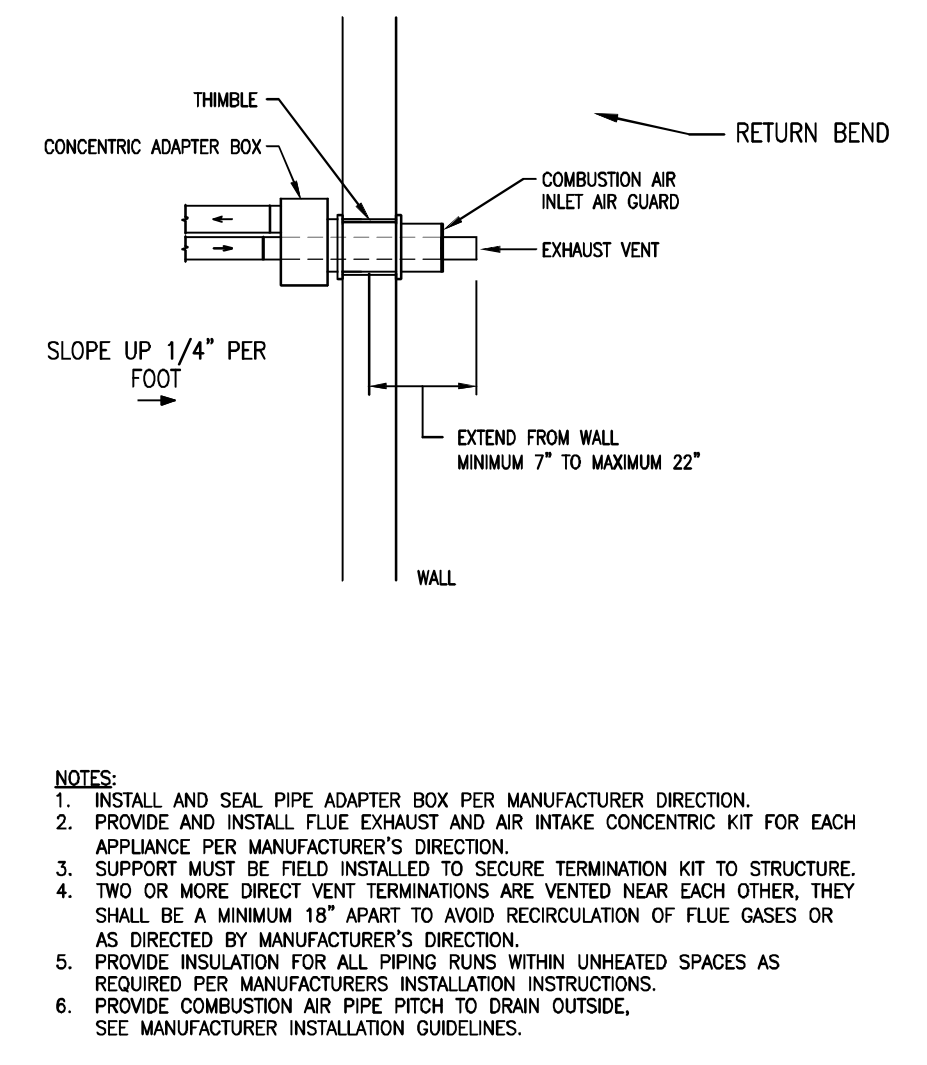
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Drawn AT
Date 11/17/21

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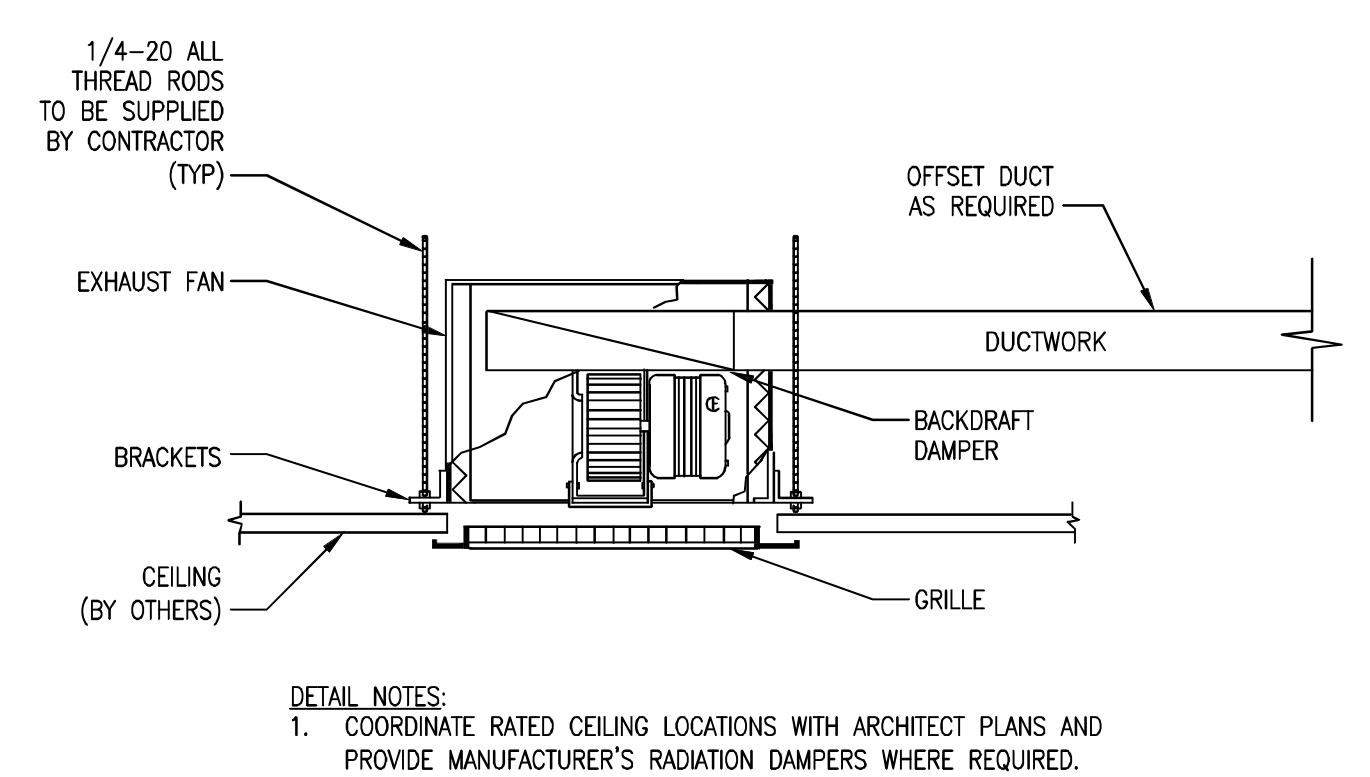
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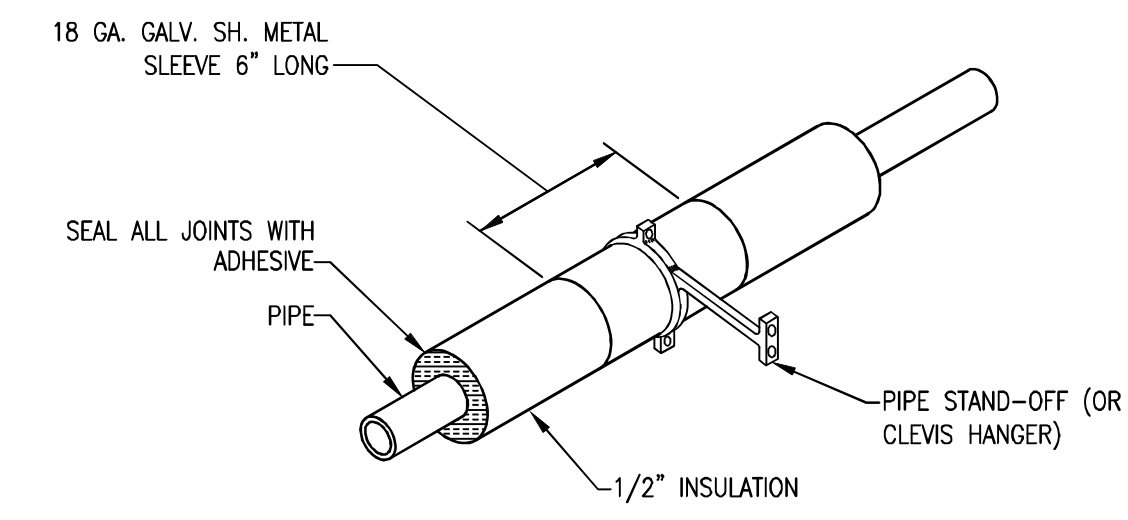
01 GAS FIRED UNIT HEATER DETAIL
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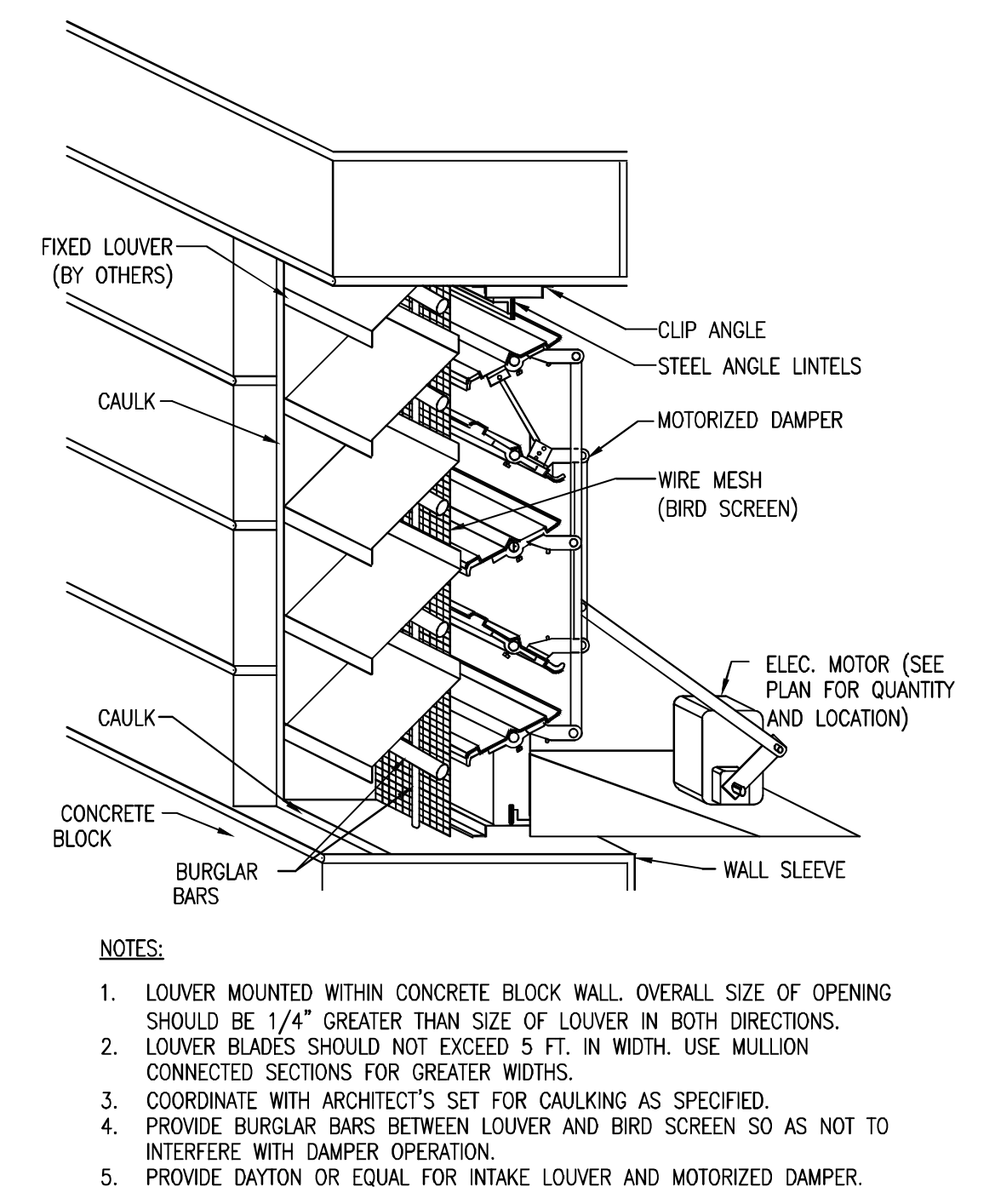
02 CONCENTRIC HORIZONTAL VENT DETAIL
SCALE: N.T.S.



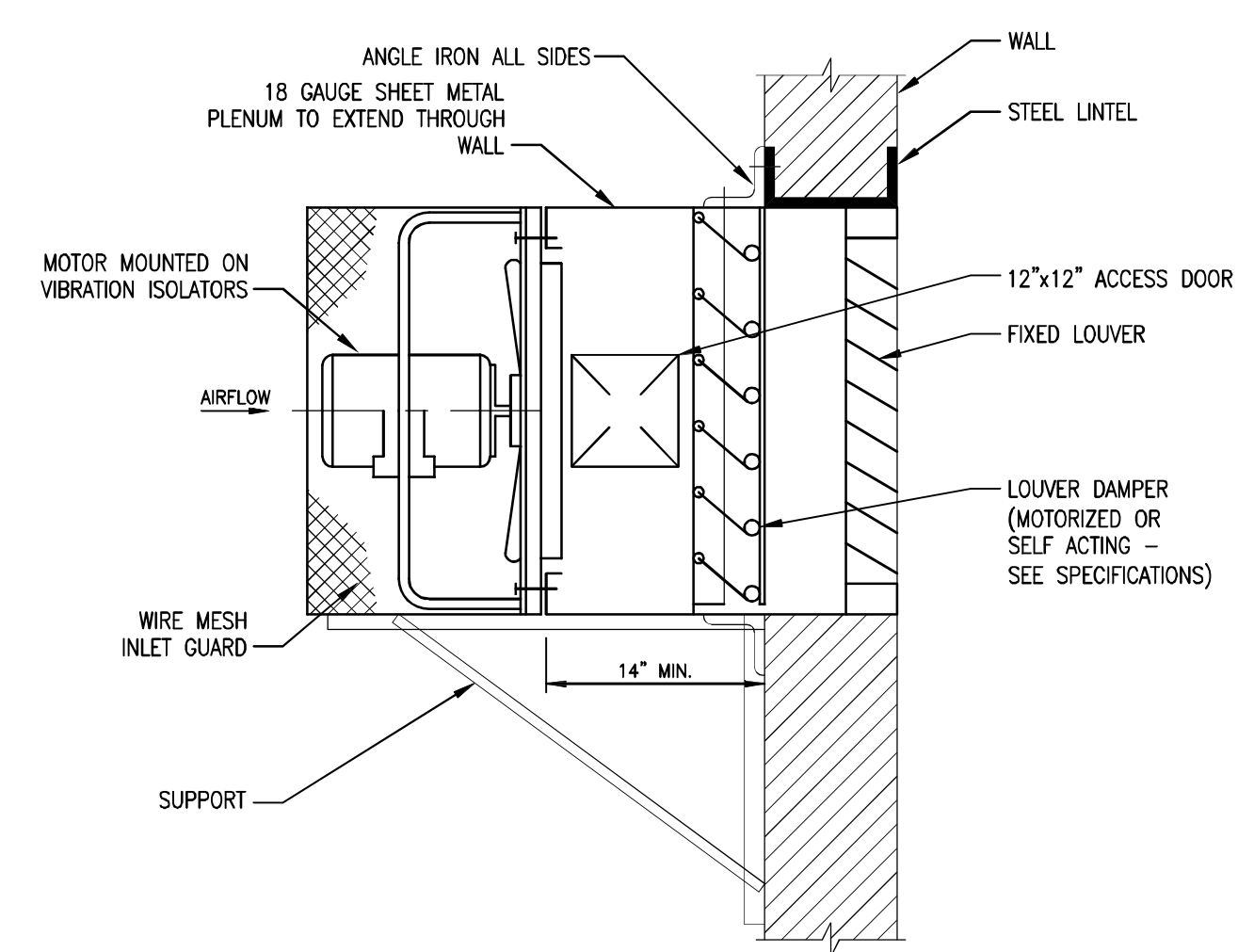
03 TYPICAL EXHAUST FAN DETAIL
SCALE: N.T.S.



04 PIPE INSULATION SUPPORT DETAIL
SCALE: N.T.S.



05 FRESH AIR INTAKE LOUVER DETAIL
SCALE: N.T.S.



06 PROPELLER FAN DETAIL
SCALE: N.T.S.

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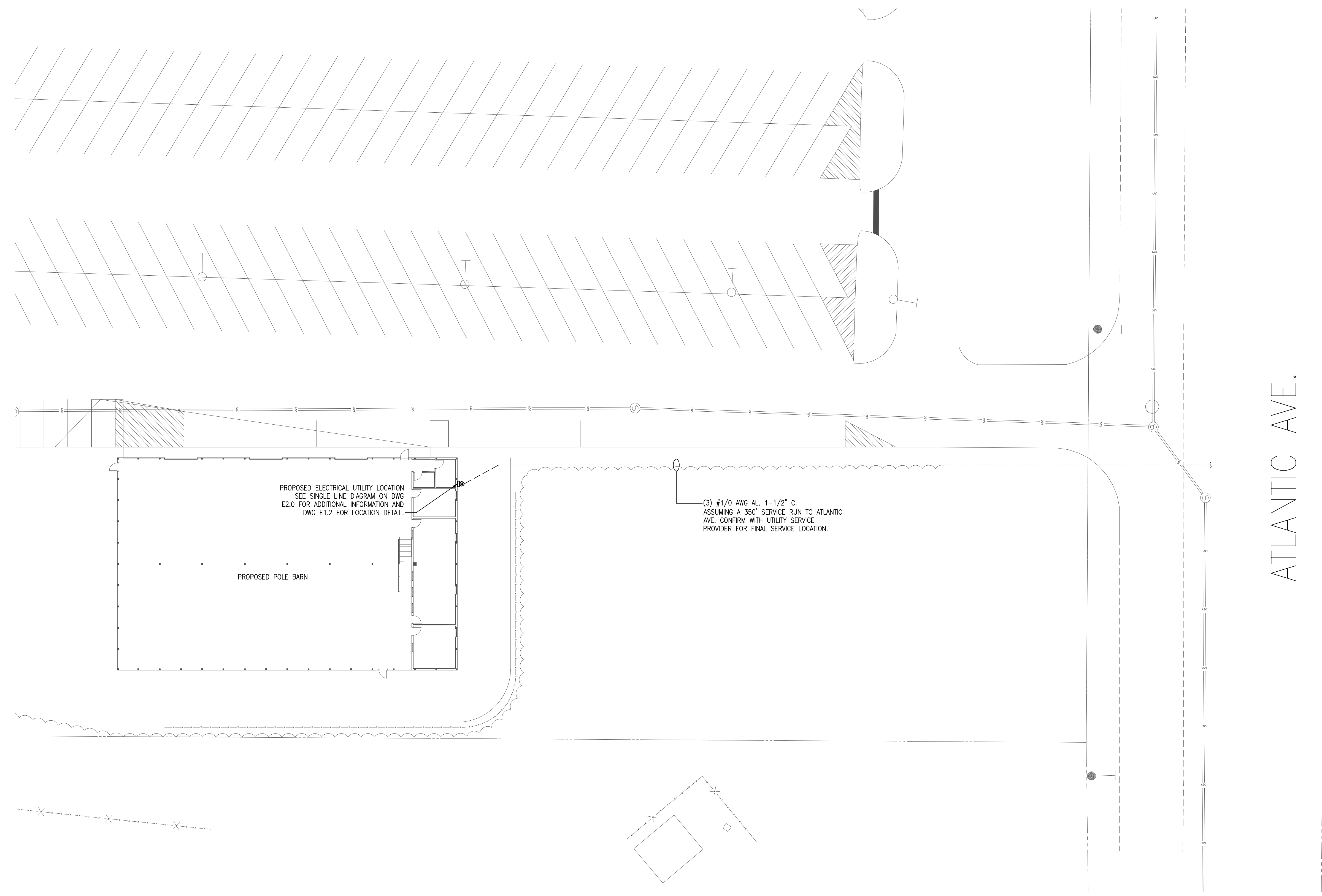
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Drawing
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Scale AS NOTED
Job 19033
Sheet M3.0

Drawn AT
Date 11/17/21

HVAC SPECIFICATIONS		Revisions	
No.	Date	Description	
11/7/21		ISSUED FOR BID	
I. GENERAL		A. FURNISH AND INSTALL A COMPLETE ELECTRIC OR ELECTRONIC CONTROL SYSTEM TO PROVIDE TEMPERATURE CONTROL AS SPECIFIED UNDER DESCRIPTION OF OPERATION.	
A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A01, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.		B. WORK SHALL INCLUDE ALL WIRING, CONTROL EQUIPMENT, AND ACCESSORIES NECESSARY TO MAKE THIS SYSTEM COMPLETE. ALL WIRING SHALL BE 24 VOLT. COORDINATE WITH MANUFACTURER FOR INTERCONNECTION WITH CONTROLS INCLUDED IN EQUIPMENT. ALL CONTROL WORK SHALL BE INSTALLED BY THE HVAC CONTRACTOR.	
B. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE OBSERVED BY THE CONTRACTOR. THE CONTRACTOR SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.		C. ACCEPTABLE MANUFACTURERS 1) JOHNSON CONTROLS. 2) HONEYWELL, INC. 3) OR APPROVED EQUAL.	
C. INVESTIGATE EACH SPACE THOROUGHLY WHERE EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCEND FROM BUILDING OWNER AT WHAT TIMES OF DAY DETERMINED AS TO BE NOTED THROUGH ALL AREAS.		D. OPERATION OF TYPICAL CONTROL SAFETY DEVICES. 1) EXHAUST FANS, SUCH AS GENERAL OR TOILET (OPERATING INDEPENDENTLY); ALL SAFETY DEVICES SHALL BE INTERLOCKED WITH "HAND" AND "AUTOMATIC" POSITIONS IN SERIES WITH MOTOR CONTROLLER HOLDING COIL CIRCUIT. REMOTE STARTING SHALL BE THROUGH AUTOMATIC POSITION ONLY. "HAND" POSITION SHALL BE FOR MAINTENANCE OPERATION ONLY. 2) SAFETY DEVICES FOR ALL SYSTEMS, EXCEPT AS OTHERWISE NOTED BELOW.	
D. DUCTWORK AND PIPING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISERS OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF DUCTWORK AND PIPING TO AVOID OBSTRUCTIONS. EXACT LOCATIONS ARE SUBJECT TO APPROVAL OF ARCHITECT. COORDINATION WITH THE EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES IS REQUIRED.		a. ONE FREEZE PROTECTION THERMOSTAT PER COLLECTOR, WIRED TO STOP SUPPLY FAN. THERMOSTAT SHALL BE AUTOMATIC RESET TYPE. b. FOR SYSTEMS OVER 2,000 CFM, A DUCT MOUNTED SMOKE DETECTOR OF THE IONIZATION TYPE LOCATED IN THE RETURN DUCT SHALL STOP THE SUPPLY FAN AND ASSOCIATED WATERLOCKED EQUIPMENT SHOULD PRODUCTS OF COMBUSTION BE SENSED.	
E. SUPPORT ALL DUCTWORK AND PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING. INSERTS SHALL BE STEEL, SLOTTED TYPE AND FACTORY PAINTED. SINGLE ROD SHALL BE SIMILAR TO GRINNELL FIG. 281. MULTI-ROD SHALL BE SIMILAR TO FEE & MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS. MAXIMUM LENGTH INCLUDING PIPES, DUCTWORK CONTENTS AND COVERING SHALL NOT EXCEED 75 FEET. COORDINATE WITH THE ARCHITECT FOR DETAILS AND DETAILS FOR EXACT LOCATION OF DUCTWORK, PIPING AND EQUIPMENT.		E. SEQUENCE 1) CONSTANT VOLUME SYSTEM a. SINGLE TOILET AND JAMTOR CLOSET FANS SHALL ENERGIZE VIA A WALL SWITCH. BUILT-IN FAN CONTROL RUN DETECTION FROM MOTION SENSOR. COORDINATE WITH ELECTRICAL CONTRACTOR TO PROVIDE COMPLETE WORKING SYSTEM. b. WAREHOUSE VENTILATION FAN TO OPERATE WITH MOTOR STARTER AND THERMOSTAT. INTERLOCK OPERATION OPEN THE MOTORIZED DAMPER WHEN FAN IS RUNNING. PROVIDE ALL TRANSFORMERS AND RELAYS AS REQUIRED. COORDINATE WITH ELECTRICAL CONTRACTOR TO PROVIDE COMPLETE WORKING SYSTEM.	
F. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES, WHICH INVOLVE EXTRA COST, SHALL NOT BE MADE WITHOUT APPROVAL.		2) MOTOR CONTROLLERS A. PROVIDED BY HVAC CONTRACTOR AND INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR. B. NEMA ENCLOSURE, WEATHERPROOF WHERE MOUNTED OUTDOORS. C. WITH OVERLOAD PROTECTION. COORDINATE ALL MOTOR CONTROLLER TYPES AND SIZES WITH MOTOR TYPES AND SIZES. D. 1/2 HP AND SMALLER: PROVIDE MANUAL STARTER EXCEPT USE MAGNETIC TYPE WHERE AUTOMATICALLY CONTROLLED. E. 1/2 HP AND LARGER: PROVIDE MAGNETIC STARTER. 1) COMBINATION UNFUSED DISCONNECT SWITCH AND MAGNETIC STARTER EXCEPT AS NOTED. 2) OVERLOAD PROTECTION IN EACH PHASE LEG WITH RESET IN ENCLOSURE. 3) HOA SELECTOR SWITCH FOR AUTOMATICALLY OPERATED MOTORS. SAFETY CONTROLS COMMON TO BOTH CONTROLS. 4) RED, GREEN AND AMBER PILOT LIGHTS. 5) SWITCHES: HORSE-POWER RATED, EXTERNAL PADLOCKING TYPE. 6) HOLDING COILS: 10 VOLT, 120 VOLT. 7) CONTACTS: MAIN LINE AND MINIMUM (2) - NORMALLY OPEN, (2) - NORMALLY CLOSING OR INSPECTOR SHALL HAVE INSULATION REMOVABLE AND REPLACEABLE WITHOUT DAMAGE. 8) CONTROL TRANSFORMER: FOR MOTORS OVER 120 VOLTS, TO STEP DOWN CONTROL VOLTAGE TO 120 VOLTS, OF THE REQUIRED CAPACITY, WITH FUSE AND GROUND CONNECTION ON VOLTAGE SIDE. 9) FUSES: SIMILAR TO BUSSMAN. 10) RELAYS TO SUPPLEMENT AUXILIARY CONTACTS IN CONTROLLER. MINIMUM 10-WATT COIL AND TWO 10 AMP CONTACTS. 11) TERMINALS: SUITABLE FOR CONDUCTORS NOTED AND AS APPROVED. F. ACCEPTABLE MANUFACTURERS 1) CUTLER-HAMMER. 2) SQUARE D. 3) ALLEN BRADLEY.	
G. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MARKING UP THE WORK PROPOSAL.		20. EQUIPMENT A. FANS 1) GENERAL (APPLIES TO ALL FAN TYPES EXCEPT AS NOTED). a. PROVIDE CENTRIFUGAL TYPE, NEMA OVERLOADING DESIGN EXCEPT AS NOTED WITH MINIMUM CAPACITIES AS NOTED AND WITH CERTIFIED RATINGS BY ANCA. WHEEL SHALL BE FACTORIALY BALANCED STATICALLY AND DYNAMICALLY. BRAKE HORSEPOWER RATINGS SHALL NOT BE MORE THAN 5 PERCENT ABOVE WHAT IS NOTED ON DRAWINGS. DRIVES SHALL BE MATCHED. MULTIPLE V-BELT DRIVE UNLESS OTHERWISE NOTED WITH MINIMUM CAPACITY OF 1.4 TIMES RATED MOTOR HP. PULLEYS SHALL BE CAST IRON. b. MOTOR PULLEY SHALL BE VARIABLE FITCH DIAMETER EXCEPT FANS WITH VARIABLE INLET VANES. SUPPLY AND INSTALL ONE FIXED FITCH PULLEY CHARGE AS REQUIRED PER BALANCE SYSTEMS. COMPANION SHEAVES SHALL MAINTAIN BELT PARALLEL. BELT GUARDS SHALL BE IN COMPLIANCE WITH OSHA REGULATIONS AND WITH FACTORIALY OPENING FOR FAN SPEED MEASUREMENTS. MANUFACTURER SHALL PROVIDE REPLACEABLE FITCH PITCHED SHEAVES WHERE NEEDED TO BALANCE SYSTEM. c. PROVIDE REMOVABLE FLANGED SCREENS AT INLETS OR OUTLETS WHERE NO CONNECTING DUCTWORK IS INDICATED. d. BEARINGS BALL ROLLER OR TAPER. PROVIDE PRESSURE TYPE LUBRICATING FITTINGS WITH PRESSURE RELIEF FITTINGS EXTENDED TO ACCESSIBLE LOCATIONS. MINIMUM 1-30 LIFE RATING; 50,000 HOURS PER ABMA STANDARD B-10 OR 250,000 HOURS AVERAGE (B-50) LIFE AT MAXIMUM CATALOG RATING. 2) CABINET FANS SHALL HAVE ACOUSTICALLY INSULATED GALVANIZED STEEL FAN HOUSING, DIRECT DRIVEN CENTRIFUGAL FAN (S), INTERNAL VIBRATION ISOLATION, INTEGRAL LOUVERED FACE GRILLE WITH LIGHT, AND OUTLET DUCT CONNECTION WITH SELF-ACTING BACKDRIFT DAMPER. PROVIDE WALL VENTS OR ROOF CAPS AS REQUIRED ON PLANS. FANS SHALL BE SIMILAR TO GREENHECK SP.	
H. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT.		D. ELECTRICAL HEATERS 1) CABINET HEATERS SHALL BE RECESSED, BLOW THROUGH TYPE, WITH DIRECT DRIVEN DOUBLE BELT FORWARD CURVED CENTRIFUGAL FANS. TWO SPEED PERMANENT SPLIT CAPACITOR MOTOR WITH OVERLOAD PROTECTION, 16 GAUGE FURNITURE QUALITY STEEL, INTERNAL INSULATED, INLET AND OUTLET DISCHARGE GRILLES, HEATING FINS AND THROW AWAY TYPE FILTERS. 2) PROVIDE UNITS WITH ELECTRIC THERMOSTAT WITH CAPILLARY TUBES INTEGRALLY MOUNTED IN CABINET WITH OVERHEAT CUT OUT. BULE AND CAPILLARY TYPE THERMOSTAT SHALL SENSE TEMPERATURE ALONG ENTIRE LENGTH OF HEATING ELEMENT. PROVIDE A MANUAL 2-SPEED SWITCH, FAN DELAY SWITCH AND HIGH LIMIT THERMAL CUTOFF AUTOMATIC RESET TYPE, WIRED TO EACH HEATING ELEMENT. 3) BASEBOARD HEATERS SHALL BE WALL MOUNTED DESIGN, EPOXY POWDER COATED STEEL BODY AND PANEL WITH STAINLESS STEEL ELEMENTS AND ALUMINUM FINNS. C. DUCTLESS & DUCTED AIR-COOLED SPLIT SYSTEM AIR CONDITIONING/HEAT PUMP UNITS 1) PROVIDE DUCTLESS AIR-COOLED SPLIT SYSTEM AIR CONDITIONING/HEAT PUMP UNITS CONSISTING OF WALL OR CEILING CASSETTE FAN/EVAPORATOR COIL UNITS, REMOTE OUTDOOR AIR-COOLED CONDENSING UNIT, INTERCONNECTED REFRIGERANT PIPING AND REMOTE WALL MOUNTED MICROPROCESSOR BASED WIRE THERMOSTAT. 2) INDOOR FAN COIL SHALL BE WALL MOUNTED. 3) DUCTED INDOOR FANCOIL SHALL BE CONCEALED LOW PROFILE TYPE WITH FILTER BANK AND 2" FILTER. 4) INDOOR FANCOIL UNIT SHALL INCLUDE AN INTEGRAL INTERNAL CONDENSATE SUMP. 5) SYSTEM SHALL BE CAPABLE OF OPERATION DOWN TO MINUS 0 DEGREES F (LOW AMBIENT) AND SHALL BE PROVIDED WITH ALL NECESSARY CONTROLS, OPTIONS AND ACCESSORIES INCLUDING WINTER START CONTROL, AND CRANKCASE HEATERS. 6) UNIT COMPRESSORS SHALL BE HERMETIC SCROLL TYPE INVERTER DRIVEN COMPRESSORS AND SHALL HAVE A YEAR MANUFACTURERS WARRANTY.	
I. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.		15. CONDENSATE DRAIN PIPING FURNISH FULL-OPERATING HEATER MATERIALS 1) CPVC PLASTIC, SCHEDULE 40 PIPE: ASTM F 441/F 441M. a. CPVC PLASTIC, SCHEDULE 40 FITTINGS: ASTM F 438, SOCKET TYPE. b. CPVC SOLVENT CEMENT: ASTM F 493. c. VENT AND OUTSIDE-AIR CONNECTION, GAS-FIRED EQUIPMENT: CONNECT TO EXISTING VENT MATERIAL TO ALL UNITS CONNECTIONS AND EXTEND OUTDOORS. TERMINATE VENT OUTDOORS WITH A CAP OR CONCENTRIC VENT AND IN AN ARRANGEMENT THAT WILL PROTECT AGAINST ENTRY OF WIND, INSECTS AND DIRT. d. VENT TERMINATION SCHEDULE: (1) ROOF MOUNT: 3-IN CONCENTRIC VENT SIMILAR TO DIVERSTECH CLIENT SWITCH CAP. (2) WALL MOUNT: 3-IN HORIZONTAL TERMINATION KIT SIMILAR TO DIVERSTECH HVENT-3. 18. MOTORS A. MOTORS (UNDER HVAC WORK) IN ACCORDANCE WITH NEMA, IEEE AND ANSI C 50 STANDARDS. 1) STANDARD EFFICIENCY UNLESS OTHERWISE NOTED. 2) 1.15 SERVICE FACTOR. 3) SQUIRREL CAGE INDUCTION, OPEN DRIP PROOF TYPE, 1750 RPM, NEMA TYPE B INSULATION CLASS AND CONTINUOUS DUTY, EXCEPT AS NOTED. 19. MOTOR CONTROLLERS A. PROVIDED BY HVAC CONTRACTOR AND INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR. B. NEMA ENCLOSURE, WEATHERPROOF WHERE MOUNTED OUTDOORS. C. WITH OVERLOAD PROTECTION. COORDINATE ALL MOTOR CONTROLLER TYPES AND SIZES WITH MOTOR TYPES AND SIZES. D. 1/2 HP AND SMALLER: PROVIDE MANUAL STARTER EXCEPT USE MAGNETIC TYPE WHERE AUTOMATICALLY CONTROLLED. E. 1/2 HP AND LARGER: PROVIDE MAGNETIC STARTER. 1) COMBINATION UNFUSED DISCONNECT SWITCH AND MAGNETIC STARTER EXCEPT AS NOTED. 2) OVERLOAD PROTECTION IN EACH PHASE LEG WITH RESET IN ENCLOSURE. 3) HOA SELECTOR SWITCH FOR AUTOMATICALLY OPERATED MOTORS. SAFETY CONTROLS COMMON TO BOTH CONTROLS. 4) RED, GREEN AND AMBER PILOT LIGHTS. 5) SWITCHES: HORSE-POWER RATED, EXTERNAL PADLOCKING TYPE. 6) HOLDING COILS: 10 VOLT, 120 VOLT. 7) CONTACTS: MAIN LINE AND MINIMUM (2) - NORMALLY OPEN, (2) - NORMALLY CLOSING OR INSPECTOR SHALL HAVE INSULATION REMOVABLE AND REPLACEABLE WITHOUT DAMAGE. 8) CONTROL TRANSFORMER: FOR MOTORS OVER 120 VOLTS, TO STEP DOWN CONTROL VOLTAGE TO 120 VOLTS, OF THE REQUIRED CAPACITY, WITH FUSE AND GROUND CONNECTION ON VOLTAGE SIDE. 9) FUSES: SIMILAR TO BUSSMAN. 10) RELAYS TO SUPPLEMENT AUXILIARY CONTACTS IN CONTROLLER. MINIMUM 10-WATT COIL AND TWO 10 AMP CONTACTS. 11) TERMINALS: SUITABLE FOR CONDUCTORS NOTED AND AS APPROVED. F. ACCEPTABLE MANUFACTURERS 1) CUTLER-HAMMER. 2) SQUARE D. 3) ALLEN BRADLEY.	
J. SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL.		16. REFRIGERANT PIPING 1) PIPE: COPPER ACR IN ACCORDANCE WITH ASTM B280. 2) FITTINGS: WROUGHT COPPER WITH SILVER BRAZING ALLOY SOLDER SIMILAR TO HANDY AND HARMAN EASY-FLD. 3) INSTALL REFRIGERANT PIPING ACCORDING TO ASHRAE 15. 4) INSTALL PIPING AS SHORT AND DIRECT AS POSSIBLE, WITH A MINIMUM NUMBER OF JOINTS, ELBOWS, AND FITTINGS. 5) INSTALL PIPING WITH ADEQUATE CLEARANCE BETWEEN PIPE AND ADJACENT WALLS AND HANGERS OR BETWEEN PIPES FOR INSULATION INSTALLATION. USE SLEEVES THROUGH FLOORS, WALLS, OR CEILINGS, SIZED TO PERMIT INSTALLATION OF FULL THICKNESS INSULATION. 21. AUTOMATIC CONTROLS - GENERAL REQUIREMENTS	
K. PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, LOUVERS, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND DUNNAGE STEEL AS REQUIRED.		2) AUTOMATIC CONTROLS - GENERAL REQUIREMENTS 1) INSULATE ALL NEW DUCTWORK IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED. 1) DUCTWORK INSULATION SCHEDULE a. CONCEALED SUPPLY/OUTSIDE AIR SHALL BE 1.5 IN., TYPE D-1 WITH VAPORSEAL. b. EXPOSED AND UNCONDITIONED AREAS (INCLUDING MECHANICAL EQUIPMENT ROOMS) AND OUTSIDE THE BUILDING ENVELOPE SUPPLY/RETURN/OUTSIDE AIR SHALL BE 2 IN., TYPE D-1 WITH VAPORSEAL. MINIMUM R-VALUE OF 6.3. B. NON-INSULATED DUCTWORK 1) WHERE SOUNDINGLINES IS OF MINIMUM THICKNESS AND R-VALUE SPECIFIED FOR INSULATION.	
L. ALL PRESENT MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.		2) VIBRATION ISOLATION, WIND AND SEISMIC RESTRAINTS A. GENERAL 1) PROVIDE ISOLATION FOR EQUIPMENT, PIPING AND DUCTWORK. 2) INSTALL IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. 3) PROVIDE LEVELING DEVICES AND APPROVED RESILIENT RESTRAINING DEVICES AS REQUIRED TO LIMIT EQUIPMENT AND PIPING MOTION IN EXCESS OF 1/4 IN. 4) ACCEPTABLE MANUFACTURERS a. MASON INDUSTRIES, INC. b. VIBRATION ELIMINATOR CO. c. KORBUND DYNAMICS CORP. B. CEILING-HUNG FANS AND EQUIPMENT 1) PROVIDE SPRING HANGER ROD ISOLATORS, STEEL COMPRESSION SPRING AND NEOPRENE SOUN PAD WITHIN A STEEL RETAINER BOX. SIMILAR TO MASON TYPE PCHS. 2) 1 IN. MINIMUM STATIC DEFLECTION, 1/2 IN. MINIMUM RESERVE DEFLECTION. FACTORY-PRELOADED TO 75 PERCENT OF RATED LOAD. 3) PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE EQUIPMENT OR STRUCTURE CANNOT SUPPORT POINT LOADS. C. SEISMIC RESTRAINTS 1) PROVIDE SEISMIC RESTRAINTS FOR ALL MECHANICAL EQUIPMENT AS REQUIRED BY CODE. SEISMIC RESTRAINTS SHALL BE CAPABLE OF SAFELY ACCEPTING EXTERNAL FORCES AS REQUIRED BY CODE WITHOUT FAILURE, AND SHALL MAINTAIN EQUIPMENT, PIPING, CONDUIT, DUCT AND PRESSURE RELIEFING BOXES IN A CAPTIVE POSITION. SEISMIC RESTRAINTS SHALL NOT SHORT CIRCUIT ISOLATION SYSTEMS OR TRANSMIT OBJECTIVE VIBRATION OR NOISE, AND SHALL BE PROVIDED ON ALL EQUIPMENT SCHEDULED ON DRAWINGS. D. WIND RESTRAINTS 1) ALL ROOF AND GROUND MOUNTED EQUIPMENT SHALL BE FASTENED TO STRUCTURE OR BASE PER MANUFACTURERS MOUNTING RECOMMENDATIONS. PROVIDE INSTALLATION DETAILS SPECIFIED BY LICENSED PROFESSIONAL STRUCTURAL ENGINEER TO MEET 100 MPH WIND LOADING. 14. PIPING - GENERAL REQUIREMENTS A. COMPLETE WITH PIPE, FITTINGS, VALVES, STRAINERS, MOTORIZED VALVE OPERATORS, STRAINERS, MANIFOLDS, SUPPORTS, COUPLERS, SLEEVES, AND ACCESSORIES. B. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS: 1) AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME). 2) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM). 3) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI). 4) MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSI). C. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 150 PERCENT OR 150 PERCENT OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED TEST PRESSURE ANSI B16.3 BASIS. TEST DURATION TO BE 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPERATURE CHANGE. REPAIR OR REPLACE LEAKS OR DEFECTS WITHOUT ADDITIONAL COST. D. PROVIDE DIELECTRIC FITTINGS WHERE DISSIMILAR METALS ARE TO BE JOINED. 15. CONDENSATE DRAIN PIPING A. PIPE: ASTM 888, HARD DRAWN COPPER WIRE TUBE "L". B. FITTINGS: SOLDERED JOINT FITTINGS, 95% SOLDER. C. PITCH, EXCEPT AS NOTED. 1) 1 IN. IN 4 FT. PREFERRED. 2) 1 IN. IN 8 FT. MINIMUM. D. SWING CHECK VALVES: AT CONDENSATE PUMP DISCHARGE, 300 LB WOG, BRONZE BODY SOLDER ENDS, REGINID BRONZE DISC TO BE USED WITH COPPER TUBING. JENKINS FIG. 1222. 16. REFRIGERANT PIPING 1) PIPE: COPPER ACR IN ACCORDANCE WITH ASTM B280. 2) FITTINGS: WROUGHT COPPER WITH SILVER BRAZING ALLOY SOLDER SIMILAR TO HANDY AND HARMAN EASY-FLD. 3) INSTALL REFRIGERANT PIPING ACCORDING TO ASHRAE 15. 4) INSTALL PIPING AS SHORT AND DIRECT AS POSSIBLE, WITH A MINIMUM NUMBER OF JOINTS, ELBOWS, AND FITTINGS. 5) INSTALL PIPING WITH ADEQUATE CLEARANCE BETWEEN PIPE AND ADJACENT WALLS AND HANGERS OR BETWEEN PIPES FOR INSULATION INSTALLATION. USE SLEEVES THROUGH FLOORS, WALLS, OR CEILINGS, SIZED TO PERMIT INSTALLATION OF FULL THICKNESS INSULATION. 21. AUTOMATIC CONTROLS - GENERAL REQUIREMENTS	
M. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.		2) AIR CONDITIONING RETURN AIR DUCTWORK EXPOSED IN AIR-CONDITIONED SPACES AND INSTALLED IN HUNG CEILINGS WHERE SPACE IMMEDIATELY ABOVE AND BELOW ARE BOTH AIR CONDITIONED. C. MATERIAL 1) TYPE D-1: MINIMUM 1.5-LB DENSITY FIBERGLASS BLANKET WITH FACTORY-APPLIED FOIL SRIM-KRAFT FACING SIMILAR TO JOHNS MANVILLE MICROLOTE FSK. 2) TYPE D-2: 3-LB FIBERGLASS BOARD WITH A MINIMUM DENSITY OF 3 LB. THE INSULATION SHALL BE PROVIDED WITH A FACTORY-APPLIED ALL-PURPOSE OR ALL SERVICE FACING. THE INSULATION SHALL BE EQUAL TO JOHNS MANVILLE TYPE B14 SPIN-GLAS AP. 3) TYPE D-3: MINIMUM 6-LB FIBERGLASS BOARD WITH FACTORY APPLIED ALL-PURPOSE OR ALL SERVICE FACING. SIMILAR TO JOHNS MANVILLE B17 SPIN-GLAS AP. D. INSTALLATION 1) FIBERGLASS BLANKET: 2 IN. LAP STRIPS AT ALL SEAMS. SECURE BOTTOM OF ALL DUCTS AT 14 IN. WIRE WITH MIN. 3 RODS OF WELD PINS 1/2 IN. ON CENTER. SECURE ALL SEAMS WITH FOL VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE. 2) FIBERGLASS BOARD: SEAL JOINTS AND BREAKS IN FACING WITH 1 IN. WIDE TAPE AT MATCH FACES AND ADHERE WITH VAPOR SEAL ADHESIVE. APPLY 5 IN. WIDE TAPE AT CORNERS; WELD PINS ON TOP, SIDES AND BOTTOM. 11. PIPING INSULATION A. INSULATE ALL NEW PIPING IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE NOTED. 1) PIPING INSULATION SCHEDULE a. LOW TEMP 40 TO 100 DEGREES F: UP TO 4 IN., SHALL BE 1-IN. THICK, TYPE P-1 WITH VAPORSEAL. b. LOW TEMP FITTINGS & VALVES 40 TO 100 DEGREES F: UP TO 4-IN., SHALL BE 1-IN. THICK, TYPE P-4 WITH VAPORSEAL AND F-1 FINISH. c. ALL REFRIGERANT INSULATION & SUCTION LINES SHALL BE 3/4-IN. THICK, TYPE P-6 WITH VAPORSEAL. 12. PIPING, VALVES AND FITTINGS TO BE INSULATED A. LOW TEMPERATURE PIPING SYSTEMS - 40 TO 100 F INCLUDING: 1) CONDENSATE DRAIN PIPING. B. MATERIAL 1) TYPE P-1: MINIMUM 4 LB DENSITY MOLDED FIBERGLASS, MAXIMUM 0.23 K FACTOR AT 75 DEGREES F MEAN TEMPERATURE WITH FACTORY-APPLIED FIRE-RETARDANT FOIL-SRIM-KRAFT FACING. ALL SERVICE JACKET, SIMILAR TO JOHNS MANVILLE MICRO-LOK HP. 2) TYPE P-4: 1.1 LB DENSITY FIBERGLASS FITTING INSERTS, MAXIMUM 0.28 K FACTOR AT 75 DEGREES F MEAN TEMPERATURE SIMILAR TO MANVILLE H-10 TEMP INSULATION INSERTS. 3) TYPE P-6: MINIMUM 6 LB MOLDED FOAMED PLASTIC, MAXIMUM 0.27 K FACTOR AT 75 DEGREES F MEAN TEMPERATURE. MAXIMUM 0.17 PERMEANCE. SIMILAR TO ARMSTRONG ARMAFLEX II. C. FINISH 1) TYPE F-1: FITTING COVER, MOLDED WHITE PVC JACKET, UL CLASS 1, MAXIMUM PERMEANCE 0.05 SIMILAR TO MANVILLE ZESTRON. 2) TYPE F-4: ALUMINUM JACKETING WITH MINIMUM 0.015 IN. WALL THICKNESS AND LONGITUDINAL JOINTS WITH LOCK SEAMS. D. OUTDOOR PIPING 1) FOR ALL PIPING, FITTINGS AND VALVES LOCATED OUTDOORS INCREASE CONTAMINATION THICKNESS BY A MINIMUM OF 1 IN. AND PROVIDE F-4 FINISH. PROVIDE VAPORSEAL OR ALL OUTDOOR PIPES, VALVES AND FITTINGS SUBJECT TO CONDENSATION. E. INSTALLATION 1) BEFORE APPLYING INSULATION, ALL PRESSURE AND LEAK TESTS SHALL BE COMPLETED AND APPROVED. 2) ALL INSULATION SHALL BE BUTTED FIRMLY TOGETHER. PROVIDE 2 IN. LAP STRIPS AT ALL SEAMS SECURED WITH ADHESIVE. USE VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE WHERE REQUIRED. STAPLES NOT PERMITTED. REFRIGERANT PIPING INSULATION SHALL HAVE MITERED FITTINGS. 3) EXACT LOCATION OF ALL AIR OUTLETS AS PER ARCHITECTURAL PLANS. 4) SUITABLE FOR OPERATION AT 20 PERCENT EXCESS AND 20 PERCENT LESS THAN NOTED CAPACITY FOR CONSTANT VOLUME SYSTEMS AND AT 20 PERCENT EXCESS AND 20 PERCENT LESS THAN NOTED CAPACITY FOR CONSTANT VOLUME SYSTEMS. MANUFACTURERS RESPONSIBLE FOR EXAMINING APPLICATION OF EACH OUTLET AND GUARANTEE THAT EACH WILL PROVIDE REQUIRED KC LEVELS AND COMFORT SPACE CONDITIONS WITHOUT DRAFTS THROUGHOUT OPERATING RANGE. 5) DIFFUSERS, GRILLES AND REGISTERS SHALL BE SELECTED TO ACHIEVE N 30 OR LESS WHEN INSTALLED. 6) ALL REGISTERS AND DIFFUSERS SHALL BE PROVIDED WITH OPPOSED BLADE VOLUME DAMPERS. DAMPER OPERATING LEVERS SHALL BE ACCESSIBLE AT THE FACE OF AIR OUTLETS. 7) REFER TO DRAWING SCHEDULES FOR SPECIFIC MODELS AND REQUIREMENTS. PROVIDE SCHEDULED MANUFACTURER AND MODELS OR COMPARABLE MODELS BY MANUFACTURER APPROVED BY ENGINEER. 7. NOISE CONTROL A. ALL ROOM NC LEVELS SHALL BE 35 OR LESS. B. PROVIDE SOUNDINGLINING FOR THE FOLLOWING DUCTWORK: 1) ALL DUCTWORK WITHIN MECHANICAL ROOMS AND NOT LESS THAN 10 FT. ON EACH SIDE OF ALL FANS AND AC UNITS. 2) AIR TRANSFER DUCTS. 3) ALSO, WHERE NOTED ON A DRAWING. C. SOUNDINGLINING IN DUCTWORK: FIBROUS GLASS, MINIMUM 3 LB DENSITY, 1 1/2 IN. THICKNESS, MAXIMUM 0.25 K FACTOR AT 75 DEGREES F MEAN TEMPERATURE WITH ACTIVE COATED FINISH FACTORY APPLIED EPOXY COATING AND STAPLED IN ACCORDANCE WITH NFPA 90. FLAMESPREAD SHALL BE A MAXIMUM OF 25. LINING SHALL NOT SUPPORT MICROBIAL GROWTH AND SHALL BE TESTED IN ACCORDANCE WITH ASTM C 1071, ASTM F 423 AND ASTM G21/G22. SIMILAR TO JOHNS MANVILLE UNOUSTIC-RC HP. D. ALL SOUNDINGLINING, ADHESIVES, FACES AND ACCESSORIES TO BE APPLIED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS, EXCEPT AS OTHERWISE NOTED. 8. TESTING AND BALANCING A. ALL AIR AND WATER BALANCING SHALL BE IN ACCORDANCE WITH AABC AND NEBB STANDARDS. B. AIR BALANCING SHALL BE ACCOMPLISHED BY ADJUSTMENT OF FANS AND BRANCH DAMPERS FOR MAJOR ADJUSTMENTS. ADJUSTMENT OF TERMINAL DAMPERS AND DEVICES SHALL BE FOR TRIM OR MINOR ADJUSTMENT ONLY. THIS SHALL BE DONE TO PERMIT THE LEAST NOISE GENERATION IN THE TERMINAL AREAS AND UTILIZE MINIMUM FAN ENERGY. C. UPON COMPLETION OF THE INSTALLATION, THE CONTRACTOR SHALL REBALANCE ANY EXISTING PORTIONS OF AIR DISTRIBUTION SYSTEM AND WATER DISTRIBUTION SYSTEM AFFECTED BY THE RENOVATION AND ALSO BALANCE ALL NEW WORK. 14. PIPING - GENERAL REQUIREMENTS A. COMPLETE WITH PIPE, FITTINGS, VALVES, STRAINERS, MOTORIZED VALVE OPERATORS, STRAINERS, MANIFOLDS, SUPPORTS, COUPLERS, SLEEVES, AND ACCESSORIES. B. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS: 1) AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME). 2) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM). 3) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI). 4) MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSI). C. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 150 PERCENT OR 150 PERCENT OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED TEST PRESSURE ANSI B16.3 BASIS. 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O. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PRECISED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.		2) VIBRATION ISOLATION, WIND AND SEISMIC RESTRAINTS A. GENERAL 1) PROVIDE ISOLATION FOR EQUIPMENT, PIPING AND DUCTWORK. 2) INSTALL IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. 3) PROVIDE LEVELING DEVICES AND APPROVED RESILIENT RESTRAINING DEVICES AS REQUIRED TO LIMIT EQUIPMENT AND PIPING MOTION IN EXCESS OF 1/4 IN. 4) ACCEPTABLE MANUFACTURERS a. MASON INDUSTRIES, INC. b. VIBRATION ELIMINATOR CO. c. KORBUND DYNAMICS CORP. B. CEILING-HUNG FANS AND EQUIPMENT 1) PROVIDE SPRING HANGER ROD ISOLATORS, STEEL COMPRESSION SPRING AND NEOPRENE SOUN PAD WITHIN A STEEL RETAINER BOX. SIMILAR TO MASON TYPE PCHS. 2) 1 IN. MINIMUM STATIC DEFLECTION, 1/2 IN. MINIMUM RESERVE DEFLECTION. FACTORY-PRELOADED TO 75 PERCENT OF RATED LOAD. 3) PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE EQUIPMENT OR STRUCTURE CANNOT SUPPORT POINT LOADS. C. SEISMIC RESTRAINTS 1) PROVIDE SEISMIC RESTRAINTS FOR ALL MECHANICAL EQUIPMENT AS REQUIRED BY CODE. SEISMIC RESTRAINTS SHALL BE CAPABLE OF SAFELY ACCEPTING EXTERNAL FORCES AS REQUIRED BY CODE WITHOUT FAILURE, AND SHALL MAINTAIN EQUIPMENT, PIPING, CONDUIT, DUCT AND PRESSURE RELIEFING BOXES IN A CAPTIVE POSITION. SEISMIC RESTRAINTS SHALL NOT SHORT CIRCUIT ISOLATION SYSTEMS OR TRANSMIT OBJECTIVE VIBRATION OR NOISE, AND SHALL BE PROVIDED ON ALL EQUIPMENT SCHEDULED ON DRAWINGS. D. WIND RESTRAINTS 1) ALL ROOF AND GROUND MOUNTED EQUIPMENT SHALL BE FASTENED TO STRUCTURE OR BASE PER MANUFACTURERS MOUNTING RECOMMENDATIONS. PROVIDE INSTALLATION DETAILS SPECIFIED BY LICENSED PROFESSIONAL STRUCTURAL ENGINEER TO MEET 100 MPH WIND LOADING. 14. PIPING - GENERAL REQUIREMENTS A. COMPLETE WITH PIPE, FITTINGS, VALVES, STRAINERS, MOTORIZED VALVE OPERATORS, STRAINERS, MANIFOLDS, SUPPORTS, COUPLERS, SLEEVES, AND ACCESSORIES. B. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS: 1) AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME). 2) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM). 3) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI). 4) MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSI). C. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 150 PERCENT OR 150 PERCENT OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED TEST PRESSURE ANSI B16.3 BASIS. TEST DURATION TO BE 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPERATURE CHANGE. REPAIR OR REPLACE LEAKS OR DEFECTS WITHOUT ADDITIONAL COST. D. PROVIDE DIELECTRIC FITTINGS WHERE DISSIMILAR METALS ARE TO BE JOINED. 15. CONDENSATE DRAIN PIPING A. PIPE: ASTM 888, HARD DRAWN COPPER WIRE TUBE "L". B. FITTINGS: SOLDERED JOINT FITTINGS, 95% SOLDER. C. PITCH, EXCEPT AS NOTED. 1) 1 IN. IN 4 FT. PREFERRED. 2) 1 IN. IN 8 FT. MINIMUM. D. SWING CHECK VALVES: AT CONDENSATE PUMP DISCHARGE, 300 LB WOG, BRONZE BODY SOLDER ENDS, REGINID BRONZE DISC TO BE USED WITH COPPER TUBING. JENKINS FIG. 1222. 16. REFRIGERANT PIPING 1) PIPE: COPPER ACR IN ACCORDANCE WITH ASTM B280. 2) FITTINGS: WROUGHT COPPER WITH SILVER BRAZING ALLOY SOLDER SIMILAR TO HANDY AND HARMAN EASY-FLD. 3) INSTALL REFRIGERANT PIPING ACCORDING TO ASHRAE 15. 4) INSTALL PIPING AS SHORT AND DIRECT AS POSSIBLE, WITH A MINIMUM NUMBER OF JOINTS, ELBOWS, AND FITTINGS. 5) INSTALL PIPING WITH ADEQUATE CLEARANCE BETWEEN PIPE AND ADJACENT WALLS AND HANGERS OR BETWEEN PIPES FOR INSULATION INSTALLATION. USE SLEEVES THROUGH FLOORS, WALLS, OR CEILINGS, SIZED TO PERMIT INSTALLATION OF FULL THICKNESS INSULATION. 21. AUTOMATIC CONTROLS - GENERAL REQUIREMENTS	
P. UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.		2) VIBRATION ISOLATION, WIND AND SEISMIC RESTRAINTS A. GENERAL 1) PROVIDE ISOLATION FOR EQUIPMENT, PIPING AND DUCTWORK. 2) INSTALL IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS. 3) PROVIDE LEVELING DEVICES AND APPROVED RESILIENT RESTRAINING DEVICES AS REQUIRED TO LIMIT EQUIPMENT AND PIPING MOTION IN EXCESS OF 1/4 IN. 4) ACCEPTABLE MANUFACTURERS a. MASON INDUSTRIES, INC. b. VIBRATION ELIMINATOR CO. c. KORBUND DYNAMICS CORP. B. CEILING-HUNG FANS AND EQUIPMENT 1) PROVIDE SPRING HANGER ROD ISOLATORS, STEEL COMPRESSION SPRING AND NEOPRENE SOUN PAD WITHIN A STEEL RETAINER BOX. SIMILAR TO MASON TYPE PCHS. 2) 1 IN. MINIMUM STATIC DEFLECTION, 1/2 IN. MINIMUM RESERVE DEFLECTION. FACTORY-PRELOADED TO 75 PERCENT OF RATED LOAD. 3) PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE EQUIPMENT OR STRUCTURE CANNOT SUPPORT POINT LOADS. C. SEISMIC RESTRAINTS 1) PROVIDE SEISMIC RESTRAINTS FOR ALL MECHANICAL EQUIPMENT AS REQUIRED BY CODE. SEISMIC RESTRAINTS SHALL BE CAPABLE OF SAFELY ACCEPTING EXTERNAL FORCES AS REQUIRED BY CODE WITHOUT FAILURE, AND SHALL MAINTAIN EQUIPMENT, PIPING, CONDUIT, DUCT AND PRESSURE RELIEFING BOXES IN A CAPTIVE POSITION. SEISMIC RESTRAINTS SHALL NOT SHORT CIRCUIT ISOLATION SYSTEMS OR TRANSMIT OBJECTIVE VIBRATION OR NOISE, AND SHALL BE PROVIDED ON ALL EQUIPMENT SCHEDULED ON DRAWINGS. D. WIND RESTRAINTS 1) ALL ROOF AND GROUND MOUNTED EQUIPMENT SHALL BE FASTENED TO STRUCTURE OR BASE PER MANUFACTURERS MOUNTING RECOMMENDATIONS. PROVIDE INSTALLATION DETAILS SPECIFIED BY LICENSED PROFESSIONAL STRUCTURAL ENGINEER TO MEET 100 MPH WIND LOADING. 14. PIPING - GENERAL REQUIREMENTS A. COMPLETE WITH PIPE, FITTINGS, VALVES, STRAINERS, MOTORIZED VALVE OPERATORS, STRAINERS, MANIFOLDS, SUPPORTS, COUPLERS, SLEEVES, AND ACCESSORIES. B. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS: 1) AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME). 2) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM). 3) AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI). 4) MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSI). C. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 150 PERCENT OR 150 PERCENT OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED TEST PRESSURE ANSI B16.3 BASIS. TEST DURATION TO BE 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPERATURE CHANGE. REPAIR OR REPLACE LEAKS OR DEFECTS WITHOUT ADDITIONAL COST. D. PROVIDE DIELECTRIC FITTINGS WHERE DISSIMILAR METALS ARE TO BE JOINED. 15. CONDENSATE DRAIN PIPING A. PIPE: ASTM 888, HARD DRAWN COPPER WIRE TUBE "L". B. FITTINGS: SOLDERED JOINT FITTINGS, 95% SOLDER. C. PITCH, EXCEPT AS NOTED. 1) 1 IN. IN 4 FT. PREFERRED. 2) 1 IN. IN 8 FT. MINIMUM. D. SWING CHECK VALVES: AT CONDENSATE PUMP DISCHARGE, 300 LB WOG, BRONZE BODY SOLDER ENDS, REGINID BRONZE DISC TO BE USED WITH COPPER TUBING. JENKINS FIG. 1222. 16. REFRIGERANT PIPING 1) PIPE: COPPER ACR IN ACCORDANCE WITH ASTM B280. 2) FITTINGS: WROUGHT COPPER WITH SILVER BRAZING ALLOY SOLDER SIMILAR TO HANDY AND HARMAN EASY-FLD. 3) INSTALL REFRIGERANT PIPING ACCORDING TO ASHRAE 15. 4) INSTALL PIPING AS SHORT AND DIRECT AS POSSIBLE, WITH A MINIMUM NUMBER OF JOINTS, ELBOWS, AND FITTINGS. 5) INSTALL PIPING WITH ADEQUATE CLEARANCE BETWEEN PIPE AND ADJACENT WALLS AND HANGERS OR BETWEEN PIPES FOR INSULATION INSTALLATION. USE SLEEVES THROUGH FLOORS, WALLS, OR CEILINGS, SIZED TO PERMIT INSTALLATION OF FULL THICKNESS INSULATION. 21. AUTOMATIC CONTROLS - GENERAL REQUIREMENTS	
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PROPOSED ELECTRICAL UTILITY LOCATION
SEE SINGLE LINE DIAGRAM ON DWG
E2.0 FOR ADDITIONAL INFORMATION AND
DWG E1.2 FOR LOCATION DETAIL.

PROPOSED POLE BARN

(3) #1/0 AWG AL, 1-1/2" C.
ASSUMING A 350' SERVICE RUN TO ATLANTIC
AVE. CONFIRM WITH UTILITY SERVICE
PROVIDER FOR FINAL SERVICE LOCATION.

ATLANTIC AVE.

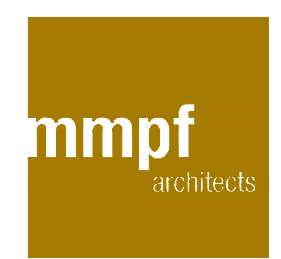
01 SITE PLAN - ELECTRICAL
SCALE: 1" = 20'-0"

Revisions		
No.	Date	Description
11/17/21		ISSUED FOR BID

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Project
NEW MAINTENANCE BUILDING FOR ATLANTIC COUNTY INSTITUTE OF TECHNOLOGY
5080 ATLANTIC AVE.
MAYS LANDING, NJ 08330

Drawing ELECTRICAL SITE PLAN			
Scale AS NOTED	Job 19033	Sheet E1.0	
Drawn PLQ	Date 11/17/21		

DRAWING NOTES

- CONNECT ALL EXIT SIGNS, INVERTERS, EMERGENCY WALL PACKS, AND EMERGENCY BATTERY BACK-UPS TO LOCAL CONSTANT HOT FEED AHEAD OF ANY SWITCHING UON.
- ALL LIGHT FIXTURES INDICATED AS EMERGENCY ARE NORMAL/EMERGENCY OPERATION VIA NORMAL POWER W/BATTERY OR INVERTER BACK UP.
- REFER TO DWG E0.0 FOR THE LIGHT FIXTURE SCHEDULE.
- REFER TO DWG E2.0 FOR THE LIGHTING CONTROL DEVICE SCHEDULE.
- CONFIRM ALL DEVICE AND EQUIPMENT LOCATIONS WITH THE ARCHITECT AND OWNER PRIOR TO ANY PURCHASE OR ROUGH-IN.
- CONTRACTOR SHALL CLOSELY COORDINATE AND ADJUST ALL HVAC EQUIPMENT LOCATIONS WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN SUCH THAT LIGHTING LAYOUT REMAINS AS INDICATED.
- CONFIRM ALL POWER OVERCURRENT PROTECTION, WIRING AND DEVICE/DISCONNECT REQUIREMENTS FOR ALL EQUIPMENT PRIOR TO ROUGH-IN AND REPORT ANY DISCREPANCY WITH THE DESIGN TO THE ARCHITECT AND OWNER FOR RESOLUTION.
- PRE-MANUFACTURED METAL-CLAD CABLE (MC) SHALL BE UTILIZED FOR ALL NORMAL BRANCH CIRCUITS IN DRY HOLLOW STUD WALL LOCATIONS, ABOVE ACCESSIBLE CEILINGS AND WHERE PERMITTED BY ARTICLE #330 OF THE NATIONAL ELECTRICAL CODE ONLY. MINIMUM CONDUCTOR SIZE SHALL BE NO. 12 AWG COPPER WITH INTEGRAL GREEN INSULATED CONTINUOUS GROUND CONDUCTOR AND BARE BONDING CONDUCTOR IN DIRECT CONTACT WITH OUTER METAL JACKET.
- COORDINATE ROUTING OF ALL CONDUIT, CABLING, ETC. THROUGH CASEWORK W/CASEWORK INSTALLER PRIOR TO ANY PURCHASE OR ROUGH-IN.
- EC SHALL FIRE CAULK ALL EXISTING AND NEW CONDUIT PENETRATIONS IN FIRE WALLS WITHIN CONTRACT AREA TO MAINTAIN FIRE WALL RATING.
- LIGHTING CONTROLS SHALL BE TESTED BY THE EC IN ACCORDANCE WITH ASHRAE 90.1 SECTION 9.4.3
- ALL CONDUITS TRAVELING FROM OUTDOORS TO INDOORS AND FROM A WARM ENVIRONMENT TO COLD SHALL BE WIPOR SEALED TO PREVENT CONDENSATION BUILDUP. THE SEAL SHALL BE A CONDUIT BODY OR JUNCTION BOX LOCATED ON THE HIGH TEMPERATURE SIDE OF THE TRANSITION SEALED WITH ELECTRICAL DUST SEAL OR A NON-LATEX, CLOSED-CELL, EXPANDING FOAM SEALANT LISTED FOR THE PURPOSE, INSTALLED IN THE CONDUIT ENTERING THE COLDER SPACE.
- OCCUPANCY SENSORS LOCATED IN THE LARGE STORAGE AREA AND MEZZANINE AREA SHALL BE PENDANT MOUNTED SUCH THAT THE SENSOR IS AT THE SAME HEIGHT ABOVE FINISHED FLOOR AS THE LIGHT FIXTURES IN THESE AREAS.

KEY NOTES

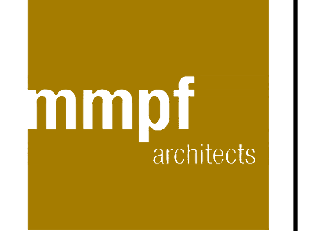
- DIMMING EMERGENCY LIGHTING CONTROL UNIT (FOR EMERGENCY LIGHTS ONLY) SHALL WORK IN TANDEN WITH NORMAL DIMMING ROOM CONTROLLER (FOR NORMAL LIGHTS ONLY) UTILIZING THE SAME SENSORS. ALL STORAGE AND MEZZANINE LIGHT FIXTURES SHALL BE ON THE SAME SWITCH LEG. FEED (2) #12 + (1) #12G VIA 3/4" C FROM THE NORMAL ROOM CONTROLLER'S LINE-SIDE TO THE NORMAL(SENSE) LINES TO THE EMERGENCY LIGHTING CONTROL UNIT.
- PROGRAM OCCUPANCY SENSORS TO AUTOMATIC 50% DIMMING WHEN OCCUPANCY IS DETECTED WITH MANUAL CONTROL TO PROVIDE 100%.
- MOUNT EXIT SIGN ON THE BOTTOM CHORD OF THE TRUSS.
- PROVIDE EMERGENCY 2,000VA LIGHTING INVERTER BY IOTA MFR#ISM-2000-277IN-277OUT. FEED DESIGNATED LIGHT FIXTURES THROUGH EMERGENCY LIGHTING CONTROLS FROM INVERTER.

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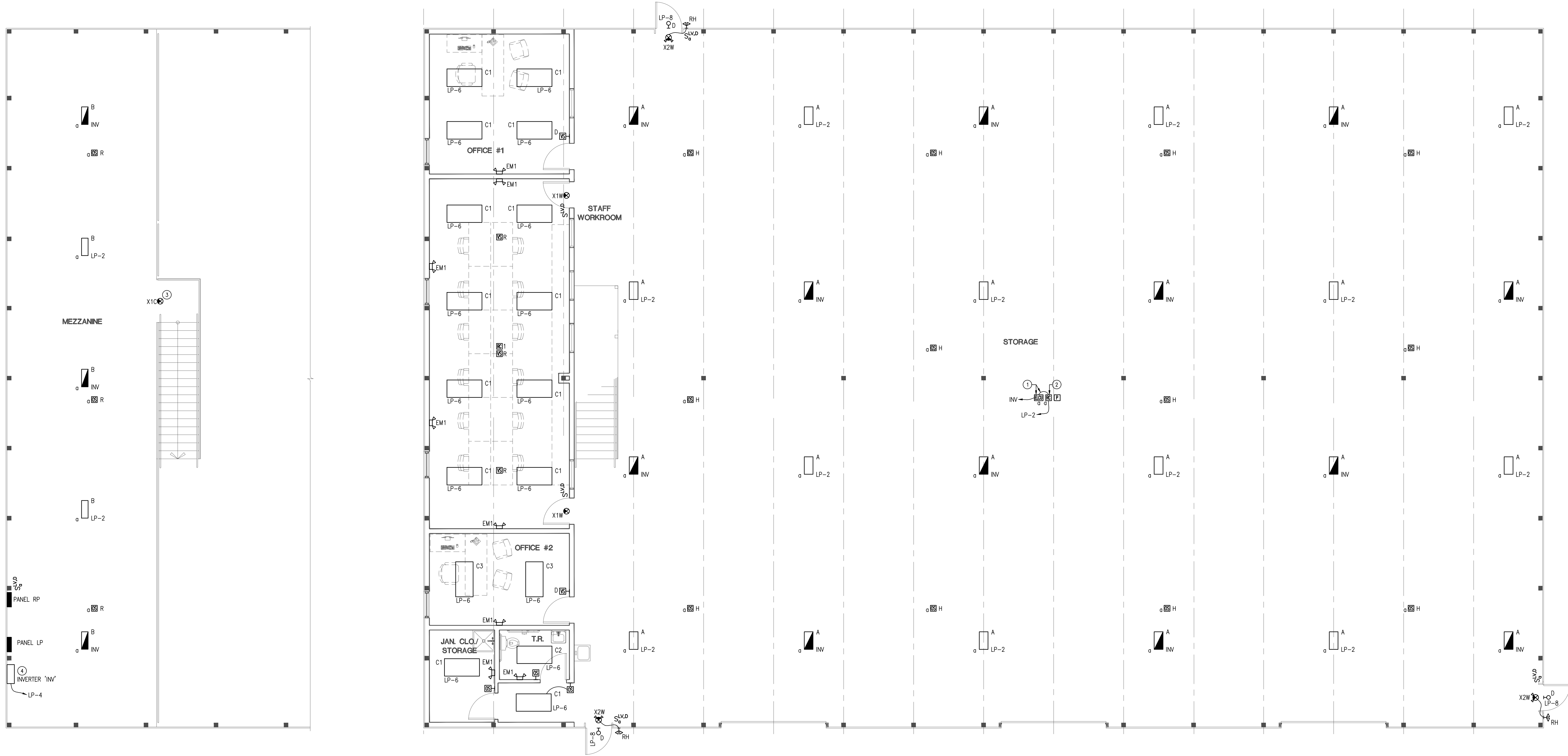
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5080 ATLANTIC AVE.
MAYS LANDING, NJ 08330

Drawing ELECTRICAL LIGHTING FLOOR PLANS		
Scale AS NOTED	Job 19033	Sheet E.11
Drawn PLQ	Date 11/17/21	



02 ELECTRICAL MEZZANINE PLAN - LIGHTING
SCALE: 3/16" = 1'-0"

01 ELECTRICAL FLOOR PLAN - LIGHTING
SCALE: 3/16" = 1'-0"

DRAWING NOTES

1. A 24" MINIMUM SEPARATION SHALL BE MAINTAINED BETWEEN SINGLE AND TWO-GANG OUTLET AND SWITCH BOXES INSTALLED ON OPPOSITE SIDES OF ANY 2-HOUR (MAXIMUM) FIRE-RATED WALL/PARTITION. PROVIDE FIREPROOFING PUTTY PACKS OR OTHER FIREPROOFING LISTED FOR THIS PURPOSE WHERE REQUIRED BY SECTION 713.3.2 OF THE INTERNATIONAL BUILDING CODE. DO NOT INSTALL PANELBOARD BACK BOXES IN FIRE RATED WALLS. ALL EQUIPMENT AND DEVICES ARE NEW UNLESS OTHERWISE NOTED.
2. CONFIRM ALL DEVICE AND EQUIPMENT LOCATIONS WITH THE ARCHITECT AND OWNER PRIOR TO ANY PURCHASE OR ROUGH-IN.
3. CONFIRM ALL POWER OVERCURRENT PROTECTION, WIRING AND DISCONNECT REQUIREMENTS FOR ALL EQUIPMENT PRIOR TO ROUGH-IN AND REPORT ANY DISCREPANCY WITH THE DESIGN TO THE ARCHITECT AND OWNER FOR RESOLUTION.
4. PROVIDE ALL DISCONNECT SWITCHES AS HEAVY-DUTY TYPE RATED WITH VOLTAGE AS REQUIRED AND AMPS, FUSING AND POLES AS INDICATED. DISCONNECT SWITCHES FOR INTERIOR EQUIPMENT SHALL BE NEMA 1 RATED UON. DISCONNECT SWITCHES FOR EXTERIOR EQUIPMENT SHALL BE WEATHERPROOF LOCKABLE HEAVY DUTY TYPE, NEMA 3R UON.
5. COORDINATE ALL MECHANICAL AND PLUMBING EQUIPMENT LOCATIONS AND CONNECTIONS PRIOR TO ANY PURCHASE OR ROUGH-IN.
6. CONTRACTOR SHALL CLOSELY COORDINATE AND ADJUST ALL HVAC EQUIPMENT LOCATIONS WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN SUCH THAT LIGHTING LAYOUT REMAINS AS INDICATED.
7. PRE-MANUFACTURED METAL-CLAD CABLE (MC) SHALL BE UTILIZED FOR ALL NORMAL BRANCH CIRCUITS IN DRY HOLLOW STUD WALL LOCATIONS, ABOVE ACCESSIBLE CEILING AND WHERE PERMITTED BY ARTICLE #330 OF THE NATIONAL ELECTRICAL CODE ONLY. MINIMUM CONDUCTOR SIZE SHALL BE NO. 12 AWG COPPER WITH INTEGRAL GREEN INSULATED CONTINUOUS GROUND CONDUCTOR AND BARE BONDING CONDUCTOR IN DIRECT CONTACT WITH OUTER METAL JACKET.
8. COORDINATE ROUTING OF ALL CONDUIT, CABLING, ETC. THROUGH CASEWORK W/CASEWORK INSTALLER PRIOR TO ANY PURCHASE OR ROUGH-IN.

9. EC SHALL FIRE CAULK ALL EXISTING AND NEW CONDUIT PENETRATIONS IN FIRE WALLS WITHIN CONTRACT AREA TO MAINTAIN FIRE WALL RATING.
10. COORDINATE FINAL LOCATIONS OF ALL TELECOM OUTLETS AND RECEPTACLES FOR DESKS WITH ARCH. OWNER AND OWNERS FURNITURE PACKAGE PROVIDER PRIOR TO PURCHASE OR ROUGH-IN.
11. PROVIDE LOCKABLE IN-USE WEATHERPROOF (WP) EXTRA DUTY COVER FOR ALL EXTERIOR RECEPTACLES.
12. ALL CONDUITS TRAVELING FROM OUTDOORS TO INDOORS AND FROM A WARM ENVIRONMENT TO COLD SHALL BE VAPOR SEALED TO PREVENT CONDENSATION BUILDUP. THE SEAL SHALL BE A CONDUIT BODY OR JUNCTION BOX LOCATED ON THE HIGH TEMPERATURE SIDE OF THE TRANSITION SEALED WITH ELECTRICAL DUCT SEAL OR A NON-LATEX CLOSED CELL EXPANDING FOAM SEALANT LISTED FOR THE PURPOSE. INSTALLED IN THE CONDUIT ENTERING THE COLDER SPACE.

KEY NOTES

- ① EC SHALL PROVIDE DISCONNECT SWITCH AND ALL WIRING AND APPURTENANCES FOR A FULLY FUNCTIONING OVERHEAD DOOR IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COORDINATE WITH GC AND OWNER TO CONFIRM DISCONNECT SIZE, POWER REQUIREMENTS, WIRING, AND OVERCURRENT PROTECTION PRIOR TO ANY PURCHASE OR ROUGH-IN.
- ② EC SHALL PROVIDE POWER FOR MOTORIZED DAMPERS, HVAC CONTROLS AND TRANSFORMERS - COORDINATE W/M/C.
- ③ PLYWOOD BACKBOARD W/FIRE RETARDANT PAINT FOR TELECOM SERVICE DISTRIBUTION. COORDINATE LOCATION AND SIZE WITH GC AND OWNER PRIOR TO ANY ROUGH-IN.
- ④ EC SHALL PROVIDE LEGRAND TELE-POWER POLE #30TP-4WH OR EQUIVALENT WITH TWO DUPLEX RECEPTACLES AND TWO VOICE/DATA OUTLETS. COORDINATE COLOR AND TRIM WITH ARCHITECT AND OWNER PRIOR TO PURCHASE. INSTALL PER MANUFACTURER'S INSTRUCTIONS.

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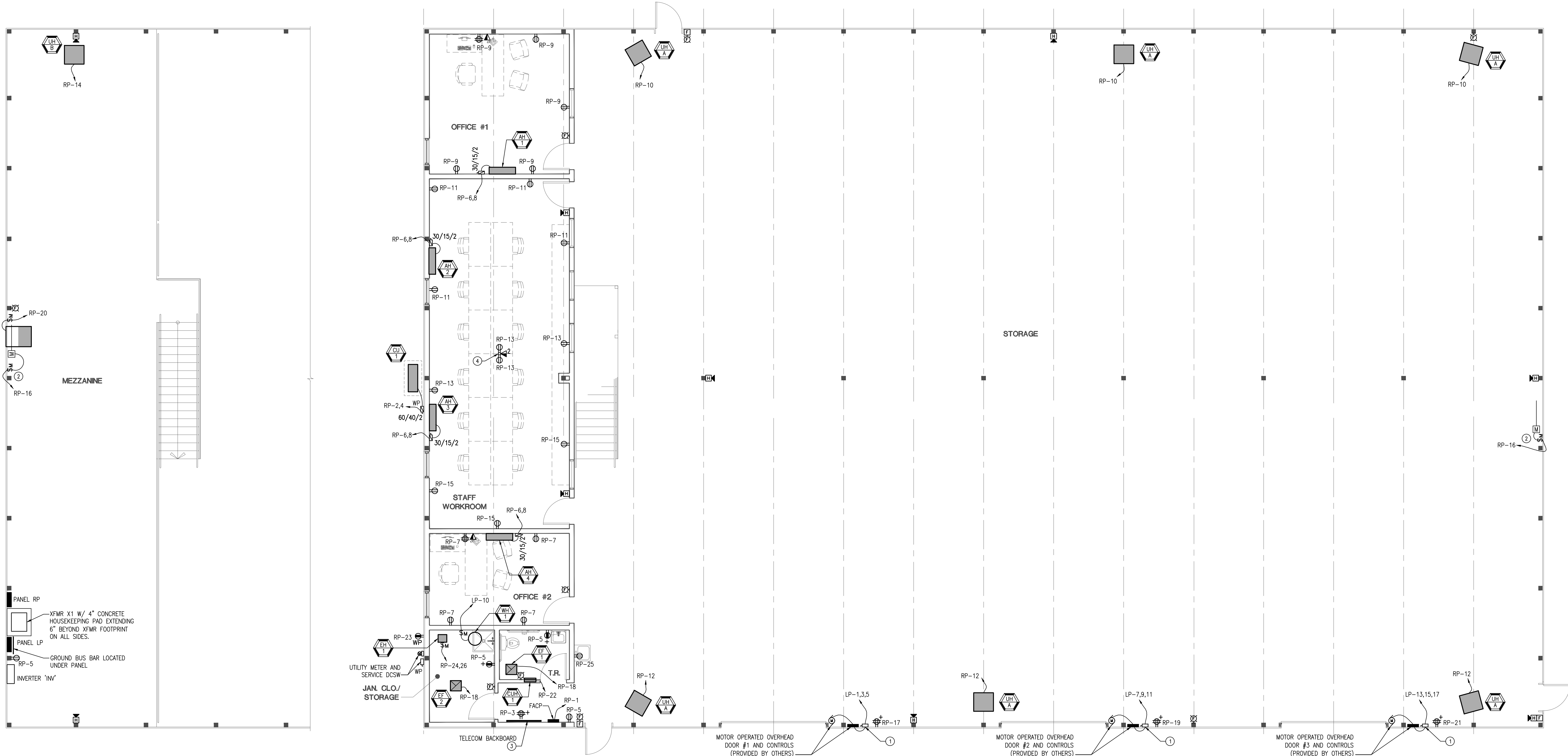
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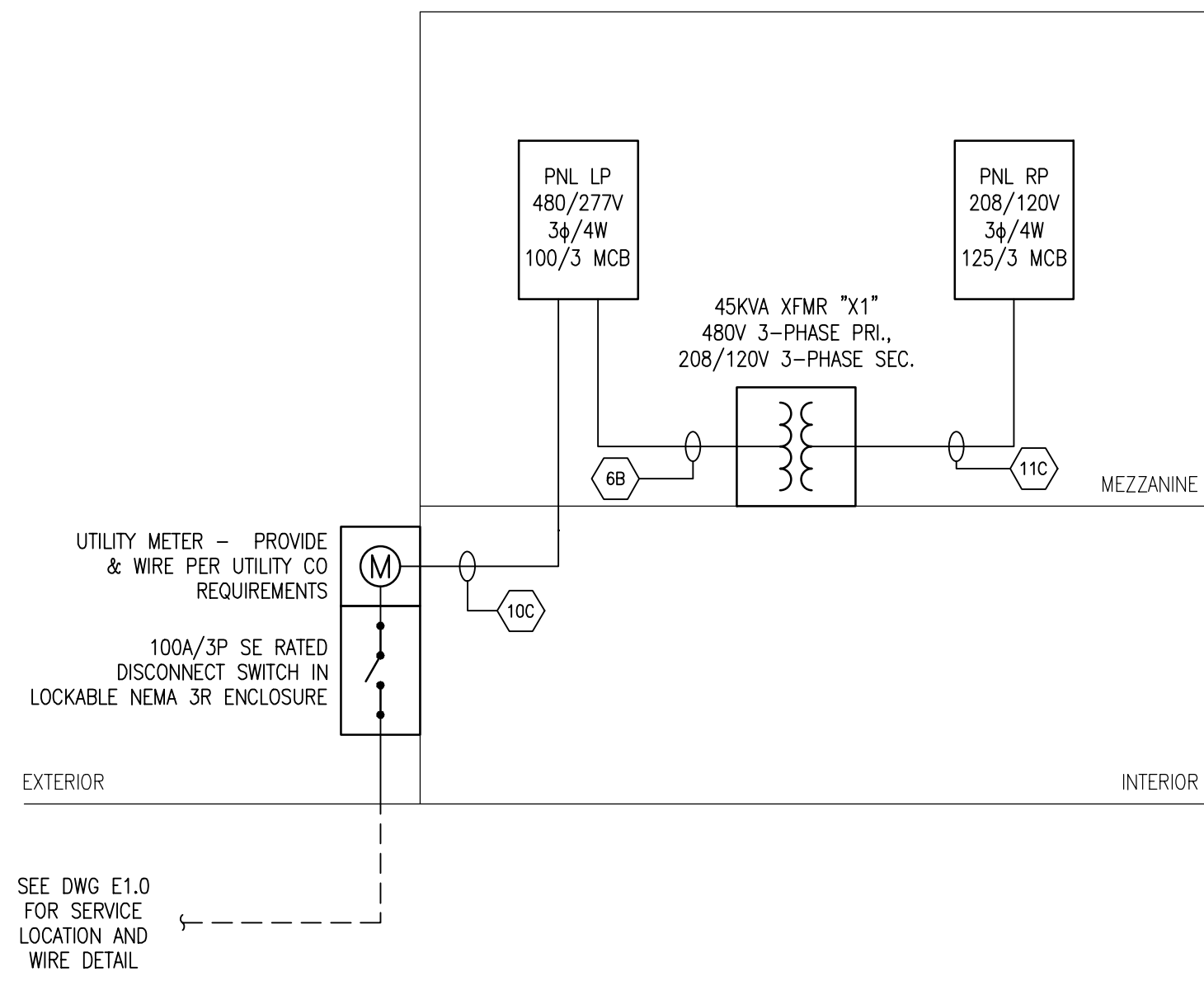
Project
NEW MAINTENANCE BUILDING FOR ATLANTIC COUNTY INSTITUTE OF TECHNOLOGY
5080 ATLANTIC AVE.
MAYS LANDING, NJ 08330

Drawing		
ELECTRICAL POWER FLOOR PLANS		
Scale	Job	Sheet
AS NOTED	19033	E1.2
Drawn	Date	
PLQ	11/17/21	

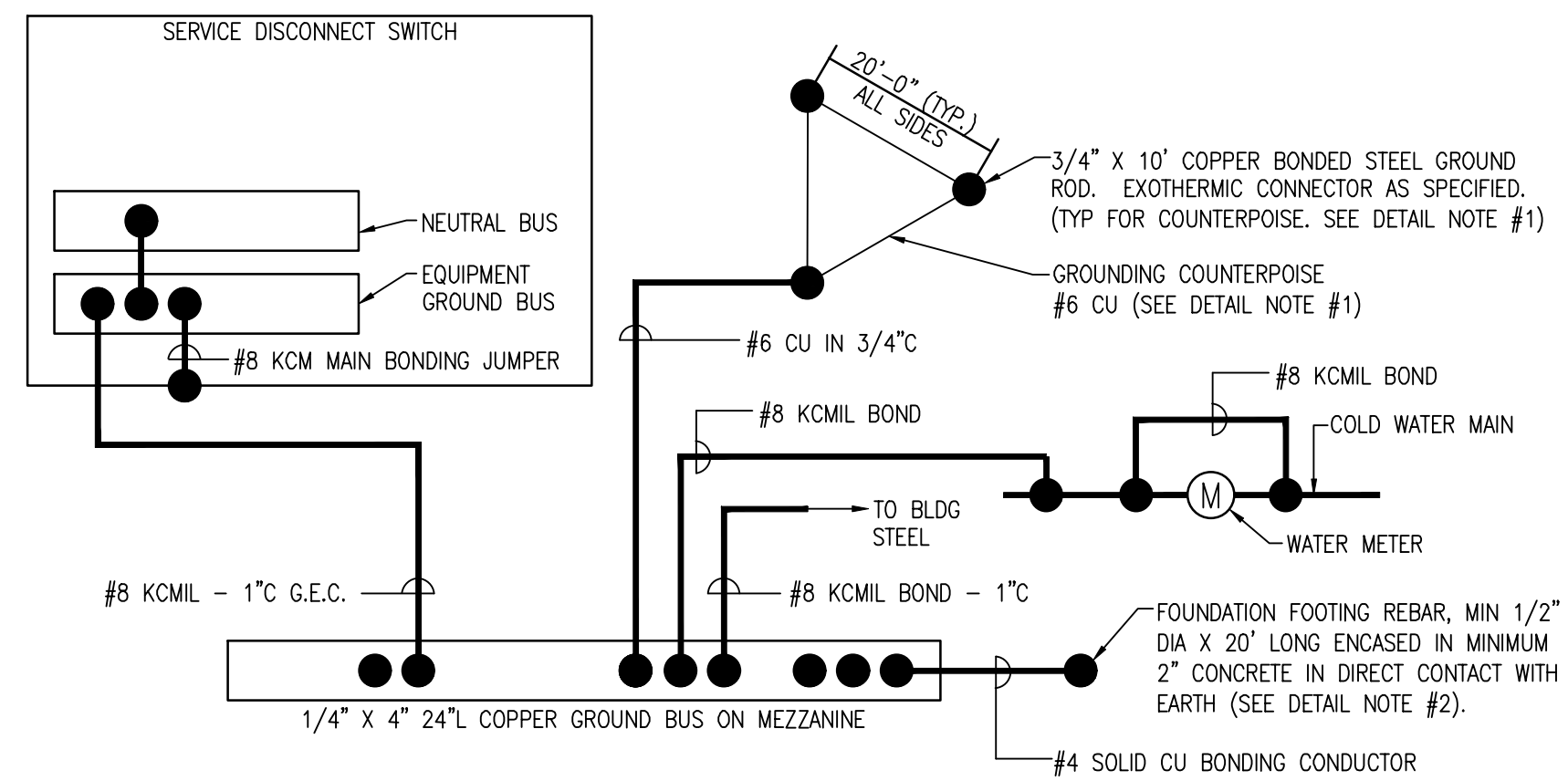


02 ELECTRICAL MEZZANINE PLAN - POWER
SCALE: 3/16" = 1'-0"

01 ELECTRICAL FLOOR PLAN - POWER
SCALE: 3/16" = 1'-0"



01 ELECTRICAL SINGLE LINE DIAGRAM
SCALE: NTS



DETAIL NOTES:

1. PROVIDE MULTIPLE GROUND RODS ONLY AS REQUIRED TO ACHIEVE 25 OHMS OR LESS RESISTANCE TO EARTH. TO PREVENT MUSHROOMING USE ROD DRIVE SLEEVE FOR INSTALLATION.
2. BOND FOUNDATION REBAR TO GROUNDING ELECTRODE SYSTEM PER NEW JERSEY DCA BULLETIN NO 02-2 USING A CLAMP LISTED FOR THE PURPOSE (BLACKBURN #40) OR APPROVED LISTED EQUAL. THE BONDING POINT SHALL REMAIN EXPOSED UNTIL INSTALLATION IS INSPECTED AND APPROVED BY THE BUILDING CODE OFFICIAL.

02 ELECTRICAL GROUNDING DETAIL
SCALE: NTS

PANEL:		480/277 VOLTS, 3 PHASE, 4 WIRE		MAIN BUS						
LOCATION:		MOUNTING:		MAIN BRK						
BUILDING:		BUS		NEUTRAL						
FED FROM:		GROUND BUS		LUGS ONLY						
FEEDER SIZE:		ISOL. GND. BUS		LUGS ONLY						
OKT NO	TRIP	DESCRIPTION OF LOAD	MIN WIRE & COND SIZE	LOAD (VA)	PER PHASE (VA)	LOAD (VA)	MIN WIRE & COND SIZE	DESCRIPTION OF LOAD	TRIP	OKT NO
1	20A	GARAGE DOOR#1	2C	582	2129.97	1548	2A	LTG STORAGE & MEZZANINE	20A	1
3				582	2207.969	1626	2A	EMLTG INVERTER - STOR & MEZZ	20A	4
5				582	1289.97	708	2A	LTG OFFICE AREAS & EXTERIOR	20A	6
7	20A	GARAGE DOOR#2	2C	582	641.969	60	2A	LTG SITE	20A	8
9				582	3581.969	3000	2A	WH-1	20A	10
11				582	581.969	0		SPACE		12
13	20A	GARAGE DOOR#3	2C	582	581.969	0		SPACE		14
15				582	581.969	0		SPACE		16
17				582	581.969	0		SPACE		18
19				0	0	0		SPACE		20
21				0	0	0		SPACE		22
23				0	0	0		SPACE		24
25				0	8061.47	8061	NOTE 1	45KVA XFMR 'X1' TO PNL 'RP'	60A	26
27				0	8061.47	8061				28
29				0	8061.47	8061				30
TOTAL LTG				3942.0	1.25	4827.6	SPARE = 50%			
TOTAL CONT.				3000.0	1.25	3750.0	TOTAL DEMAND LOAD = 48489 VA			
TOTAL NON-C				8337.7	1.00	8237.7	TOTAL AMPS = 58.32 AMPS			
TOTAL REC				5940.0	Per NEC	5940.0				
TOTAL A/C				8470.8	1.00	8470.8				
TOTAL HTG				5773.6	0.00	0.0				
TOTAL				36364.1		32328.0				

- NOTES:
1. SEE SINGLE LINE DIAGRAM, DETAIL #01 ON THIS DRAWING, FOR ADDITIONAL INFORMATION.

PANEL:		208/120 VOLTS, 3 PHASE, 4 WIRE		MAIN BUS						
LOCATION:		MOUNTING:		MAIN BRK						
BUILDING:		BUS		NEUTRAL						
FED FROM:		GROUND BUS		LUGS ONLY						
FEEDER SIZE:		ISOL. GND. BUS		LUGS ONLY						
OKT NO	TRIP	DESCRIPTION OF LOAD	MIN WIRE & COND SIZE	LOAD (VA)	PER PHASE (VA)	LOAD (VA)	MIN WIRE & COND SIZE	DESCRIPTION OF LOAD	TRIP	OKT NO
1	20A	FACP	2A	1500	5244	3744	4B	CU-1	40A	2
3	20A	REC - TELECOM	2A	1000	4744	3744	4B		4	
5	20A	REC - TRADING	2A	720	125	844.8	125	2A	AH-1,2,3,4	15A
7	20A	REC - OFFICE#2	2A	900	1024.8	125	2A		6	
9	20A	REC - OFFICE#1	2A	1080	2412	1332	3A	(3) LHA (WEST)	20A	10
11	20A	REC - WORKROOM	2A	720	2052	1332	3A	(3) LHA (EAST)	20A	12
13	20A	REC - WORKROOM	2A	720	948	228	2A	(1) LHB (MEZZANINE)	20A	14
15	20A	REC - WORKROOM	2A	540	1040	500	2A	LOUVERS	20A	16
17	20A	REC - DOOR#1	2A	360	386.8	27	2A	EF-1 & EF-2	20A	18
19	20A	REC - DOOR#2	2A	360	1566.4	1206	2A	EF-3	20A	20
21	20A	REC - DOOR#3	2A	360	912	582	2A	CUH-1	20A	22
23	20A	REC - EXTERIOR	2A	180	1344.8	1165	2A	EH-1	20A	24
25	20A	ELECTRIC WATER COOLER	2A	500	1664.8	1165			20A	26
27	20A	SPARE		0	0	0		SPARE	20A	28
29	20A	SPARE		0	0	0		SPARE	20A	30
31	20A	SPARE		0	0	0		SPARE	20A	32
33	20A	SPARE		0	0	0		SPARE	20A	34
35	20A	SPARE		0	0	0		SPARE	20A	36
37	20A	SPARE		0	0	0		SPARE	20A	38
39	20A	SPARE		0	0	0		SPARE	20A	40
41	20A	SPARE		0	0	0		SPARE	20A	42
TOTAL LTG				0.0	0.0	0.0	SPARE = 40%			
TOTAL CONT.				0.0	1.25	0.0	TOTAL DEMAND LOAD = 25775 VA			
TOTAL NON-C				3000.0	1.00	3000.0	TOTAL AMPS = 71.54 AMPS			
TOTAL REC				5940.0	Per NEC	5940.0				
TOTAL A/C				8470.8	1.00	8470.8				
TOTAL HTG				5773.6	0.00	0.0				
TOTAL				24184.4		18410.8				

- NOTES:
1. PROVIDE WITH HANDLE LOCK ACCESSORY.
2. PROVIDE WITH GFCI TYPE CIRCUIT BREAKER.

WIRE AND CONDUIT SIZING SCHEDULE (COPPER)									
AMPS	TAGS	WIRE SIZE (AWG/KCMIL)		NO. OF WIRES & CONDUIT SIZE IN INCHES					
		CONDUCTOR PHASE & NEUTRAL	GROUND	A 1PH, 2W+G	B 1PH/3PH, 3W+G	C 3PH, 4W+G			
15	1	14	14	3/4	3/4	3/4			
20	2	12	12	3/4	3/4	3/4			
30	3	10	10	3/4	3/4	3/4			
40	4	8	10	3/4	3/4	3/4			
50	5	6	10	3/4	3/4	1			
60	6	4	10	3/4	1	1 1/4			
70	7	4	8	3/4	1	1 1/4			
80	8	3	8	1	1	1 1/4			
90	9	2	8	1	1 1/4	1 1/4			
100	10	1	8	1 1/4	1 1/4	1 1/2			
125	11	1	8	1 1/4	1 1/4	1 1/2			
150	12	1/0	6	1 1/4	1 1/2	1 1/2			
175	13	2/0	6	1 1/4	1 1/2	2			
200	14	3/0	6	1 1/4	2	2			
225	15	4/0	4	1 1/4	2	2 1/2			
250	16	250	4	2	2	2 1/2			
275	17	300	4	2	2 1/2	2 1/2			
300	18	350	4	2	2 1/2	3			
350	19	400	3	2	2 1/2	3			
400	20	500	3	2 1/2	3	3			
450	21	(2) 4/0	(2) 2	(2) 2	(2) 2 1/2	(2) 2 1/2			
500	22	(2) 250	(2) 2	(2) 2	(2) 2 1/2	(2) 2 1/2			
600	23	(2) 350	(2) 1	(2) 2 1/2	(2) 3	(2) 3			
700	24	(2) 500	(2) 1/0	(2) 4	(2) 4	(2) 4			
800	25	(2) 500	(2) 1/0	(2) 4	(2) 4	(2) 4			
1000	26	(3) 400	(3) 2/0	(3) 3	(3) 4	(3) 4			
1100	27	(3) 500	(3) 3/0	(3) 3	(3) 3	(3) 4			
1200	28	(4) 350	(4) 3/0	(4) 3	(4) 3	(4) 4			
1500	29	(4) 500	(4) 4/0	(4) 3	(4) 3	(4) 4			
1600	30	(5) 400	(5) 4/0	(5) 3	(5) 3	(5) 4			
1900	31	(5) 500	(5) 250	(5) 3	(5) 3	(5) 4			
2000	32	(6) 400	(6) 250	(6) 3	(6) 3	(6) 4			
2500	33	(7) 500	(7) 350	(7) 3	(7) 3	(7) 4			
3000	34	(8) 500	(8) 400	(8) 3	(8) 3	(8) 4			

- NOTE:
THE ABOVE SCHEDULE IS BASED ON 600 VOLT CU WIRE, TYPE THHN/XHHW AND EMT/RGS CONDUIT.
EX: (2A) = 2#12+1#12C, 3/4" C.

LIGHTING CONTROL DEVICE SCHEDULE

SYMBOL	ACUITY CAT #	NOTES
WSX PDT	WSX PDT	LINE-VOLTAGE WALL-MTD DUAL TECHNOLOGY W/MANUAL CONTROL BUTTON. COLOR BY ARCHITECT
WSX PDT D	WSX PDT D	LINE-VOLTAGE WALL-MTD DUAL TECHNOLOGY W/MANUAL CONTROL BUTTON AND 0-10V DIMMING CAPABILITIES. COLOR BY ARCHITECT
WSX PDT 2P	WSX PDT 2P	DUAL-RELAY LINE-VOLTAGE WALL-MTD DUAL TECHNOLOGY W/MANUAL CONTROL BUTTON. COLOR BY ARCHITECT
NWSX PDT	NWSX PDT	LOW-VOLTAGE WALL-MTD DUAL TECHNOLOGY W/MANUAL CONTROL BUTTON. COLOR BY ARCHITECT
CMR PDT [9] OR [10]	CMR PDT [9] OR [10]	LINE VOLTAGE CLG MTD, DUAL-TECH. SENSOR. COLOR BY ARCHITECT
CM PDT [9] OR [10]	CM PDT [9] OR [10]	LOW VOLTAGE CLG MTD, DUAL-TECH. SENSOR. COLOR BY ARCHITECT
WSX PDT 5A	WSX PDT 5A	LINE-VOLTAGE WALL-MTD DUAL TECHNOLOGY W/MANUAL CONTROL BUTTON. COLOR BY ARCHITECT. ADJUST DIP SWITCH FOR MANUAL ON "VACANCY" OPERATION
WSX PDT D 5A	WSX PDT D 5A	LINE-VOLTAGE WALL-MTD DUAL TECHNOLOGY W/MANUAL CONTROL BUTTON AND 0-10V DIMMING CAPABILITIES. COLOR BY ARCHITECT. ADJUST DIP SWITCH FOR MANUAL ON "VACANCY" OPERATION
CM PDT [9] OR [10]	CM PDT [9] OR [10]	LOW VOLTAGE CLG MTD, DUAL-TECH. SENSOR. COLOR BY ARCHITECT
PP20	PP20	UNIVERSAL POWER PACK TO FEED LOW-VOLTAGE VACANCY SENSORS. SET POWER PACK TO MANUAL ON OPERATION
NPP160	NPP160	SINGLE RELAY 0-10V CEILING MOUNTED DIMMING ROOM CONTROLLER
NCM PDT [9] OR [10]	NCM PDT [9] OR [10]	LOW VOLTAGE CLG MTD, DUAL-TECH. ROOM CONTROLLER SENSOR. SET FOR MANUAL-ON OPERATION COLOR BY ARCHITECT
NCM PDT 10	NCM PDT 10	LOW VOLTAGE CLG MTD, DUAL-TECH. ROOM CONTROLLER SENSOR. COLOR BY ARCHITECT.
NCM PDT 6	NCM PDT 6	LOW VOLTAGE HIGH BAY MTD, DUAL-TECH. ROOM CONTROLLER SENSOR. COLOR BY ARCHITECT.
NPS 80	NPS 80	NIGHT SYSTEM ADDITIONAL POWER SUPPLY
SPDOM	SPDOM	LOW VOLTAGE SWITCH FOR CONTROL OF POWER PACK PP20
NPODM	NPODM	ROOM CONTROLLER SWITCH FOR CONTROL OF ROOM CONTROLLER. PROVIDE # OF BUTTONS AS REQUIRED
NPODM DX	NPODM DX	DIMMING LOW VOLTAGE SWITCH FOR CONTROL OF ROOM CONTROLLER
NPP16 D ER	NPP16 D ER	EMERGENCY LIGHTING CONTROL UNIT WITH DIMMING
NCM ADCX	NCM ADCX	SINGLE ZONE DIMMING CLOSED LOOP ROOM CONTROLLER. PHOTOSENSOR FOR CONTROL OF ROOM CONTROLLER.

- NOTES: WIRE ALL LIGHTING CONTROL DEVICES & POWER PACKS PER MANUFACTURER'S INSTRUCTIONS. MAKE ALL SETTING ADJUSTMENTS TO OCCUPANCY/VACANCY SENSORS NECESSARY FOR PROPER OPERATION PER MANUFACTURER'S INSTRUCTIONS AND OWNER'S PREFERENCES.

Revisions	
No.	Description
11/17/21	ISSUED FOR BID

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Project
NEW MAINTENANCE BUILDING FOR ATLANTIC COUNTY INSTITUTE OF TECHNOLOGY
5080 ATLANTIC AVE.
MAYS LANDING, NJ 08330

Drawing
ELECTRICAL SINGLE LINE DIAGRAM AND SCHEDULES

Scale
AS NOTED

Job
19033

Sheet
E2.0

Drawn
PLQ

Date
11/17/21

ELECTRICAL SPECIFICATIONS	
1. GENERAL	<p>A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AS DOCUMENT A201, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.</p> <p>B. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS. ANY PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIAL WHICH VIOLATES ANY OF THE CODES AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.</p> <p>C. INVESTIGATE EACH SPACE THROUGH WHICH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES DAY OF EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.</p> <p>D. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND EQUIPMENT. DIMENSIONS ARE SHOWN DIMENSIONALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, IS REQUIRED. MAINTAIN HEADROOM AND SPACE CONDITIONS.</p> <p>E. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMMODATE THIS, BUT CHANGES, WHICH INVOLVE EXTRA COST, SHALL NOT BE MADE WITHOUT APPROVAL.</p> <p>F. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK MAY BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES AND CHARGES IN MAKING UP THE WORK PROPOSAL.</p> <p>G. CONNECTIONS TO EXISTING WORK: INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS OF EXISTING SERVICES SHALL BE PERFORMED AT NO ADDITIONAL CHARGES, AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION OF EXISTING FACILITIES AND ONLY WITH WRITTEN CONSENT OF OWNER. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED AND WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND ACCEPTABLE MANNER. RESTORE EXISTING DISTURBED WORK TO ORIGINAL CONDITION, INCLUDING MAINTENANCE OF WIRING CONTINUITY AS REQUIRED.</p> <p>H. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR EQUIPMENT FOR PROPER INSTALLATION OF NEW WORK.</p> <p>I. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE REMOVED OR ACCUMULATED EITHER ON THE INTERIOR OR THE EXTERIOR.</p> <p>J. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NON-COMBUSTIBLE MATERIAL. ALL PENETRATIONS THROUGH NEW AND EXISTING RAISED FLOOR AND SMOKE PARTITIONS AND/OR FLOORS SHALL BE COMPLETELY SEALED USING MATERIALS AND METHODS DESCRIBED IN SUBSECTION "FIRE STOPPING" OF THESE SPECIFICATIONS.</p> <p>K. PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THE BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF CONDUIT AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AS REQUIRED.</p> <p>L. ALL EXISTING MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED FROM THE PROJECT. CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR OWNER. AS NOTED TO BE RELOCATED OR THE DRAWINGS, REMOVE EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.</p> <p>M. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.</p> <p>N. ALL WORK SHALL BE PERFORMED AND INSTALLED IN A NEAT AND WORKMANLIKE MANNER IN ACCORDANCE WITH THE GUIDELINES OF NECA STANDARD 1-2015 "GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION".</p> <p>O. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. RATING SHALL BE PERMANENTLY AFFIXED TO THE COVER OF SPD. THE CONTRACTOR SHALL INSTALL WORK DURING OVERTIME HOURS AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.</p> <p>P. UNLESS OTHERWISE SPECIFICALLY NOTED OR SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN EXISTING BUILDINGS. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.</p> <p>Q. ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.</p> <p>R. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC. WHICH AFFECT THE WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THIS WORK. THE CONTRACTOR IS RESPONSIBLE TO INDICATE ANY DISCREPANCIES BETWEEN THE CONTRACT DRAWINGS AND ACTUAL FIELD CONDITIONS PRIOR TO SUBMITTAL OF BID. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING CONDUIT (SIZES, CLEARANCES, ETC.) AND CONDITIONS.</p> <p>S. INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.</p> <p>T. THE FINAL ACCEPTANCE SHALL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, TESTED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE CONTRACT DRAWINGS, AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.</p>
2. SCOPE OF WORK	<p>A. SCOPE OF WORK SHALL CONSIST OF PROVIDING LABOR, MATERIALS, EQUIPMENT, SERVICES AND FEES NECESSARY FOR COMPLETE AND SAFE INSTALLATION IN CONFORMITY WITH THE NATIONAL ELECTRICAL CODE (NEC) AND ALL OTHER APPLICABLE INDUSTRY, NATIONAL AND LOCAL CODES, UTILITY REQUIREMENTS AND AUTHORITIES HAVING JURISDICTION, AS INDICATED ON DRAWINGS AND HEREIN SPECIFIED.</p> <p>B. ALL DRAWINGS, PLANS, DETAILS, SPECIFICATIONS AND MODIFICATION ADDENDA ARE MADE PART OF THIS CONTRACT AND SHALL APPLY TO ALL WORK UNDER THE CONTRACT UNLESS OTHERWISE AMENDED, SPECIFIED, SUPPLEMENTED OR SPECIFIED HERIN.</p> <p>C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OF ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME THE RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.</p> <p>D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH ALL DEPARTMENTS HAVING JURISDICTION AND UTILITY COMPANIES, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFOR. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR PARTS OF THE WORK AS REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.</p>
3. SHOP DRAWINGS	<p>A. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT, CONTRACTOR SHALL PROVIDE COMPLETE SETS OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, INCLUDING CAPACITY, DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.</p> <p>B. INDICATE ON EACH SHOP DRAWINGS SUBMITTED:</p> <ol style="list-style-type: none"> 1) PROJECT NAME AND LOCATION 2) NAME OF ARCHITECT AND ENGINEER 3) ITEM IDENTIFICATION 4) APPROVAL STAMP OF PRIME CONTRACTOR <p>C. SUBMISSIONS</p>
1) SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG OUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND TWO COPIES. OTHERWISE, HE SHALL SUBMIT THREE COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.	
2) SUBMISSIONS LARGER THAN 11 IN. X 17 IN.: SUBMIT THREE PRINTS TO THE ARCHITECT. THE ARCHITECT WILL FORWARD TWO PRINTS TO THE ENGINEER.	
D. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:	
1) DISCONNECT SWITCHES	
2) FUSES	
3) CIRCUIT BREAKERS	
4) PANELBOARDS (INCLUDING DIMENSIONS, SCHEDULES, AND CATALOG CUTS)	
5) TRANSFORMERS	
6) SURGE PROTECTION DEVICES	
7) RACEWAYS	
8) WIRE AND CABLE	
9) CONDUIT AND FITTINGS	
10) WALL SWITCHES	
11) INSERTION RECEPTACLES	
12) TIME SWITCHES	
13) LIGHTING CONTROLS	
14) SURFACE METAL RACEWAY	
15) LIGHTING FIXTURES	
16) ADDRESSABLE FIRE ALARM SYSTEM (PER 2018 IFC 907.1.2)	
E. COORDINATION	
1) THE CONTRACTOR SHALL ASSURE FULL COOPERATION OF ALL TRADES AND SHALL FURNISH IN WRITING ALL INFORMATION NECESSARY TO PERMIT THE WORK OF ALL TRADES TO BE INSTALLED SATISFACTORILY AND WITH LEAST POSSIBLE INTERFERENCE OR DELAY.	
2) PREPARE COORDINATED COMPOSITE DRAWINGS AT A SUITABLE SCALE NOT LESS THAN 1/4-INCH EQUALS ONE FOOT, ZERO INCHES, CLEARLY SHOWING HOW THE WORK IS TO BE INSTALLED IN RELATION TO THE WORK OF ALL TRADES. ANY WORK INSTALLED IN CONFLICT WITH THE WORK OF OTHER TRADES SHALL BE CORRECTED AT NO ADDITIONAL COST TO THE OWNER.	
3) THE CONTRACTOR MAY, SUBJECT TO THE ACCEPTANCE OF THE ARCHITECT AND WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH THE WORK OF ALL TRADES OR FOR THE PROPER EXECUTION OF THE WORK.	
4) SEE TYPICAL DEVICE MOUNTING HEIGHT DETAIL ON DRAWINGS.	
b. EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.	
c. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND CONFIRMING ALL MOUNTING HEIGHTS WITH ARCHITECT AND ARCHITECTURAL DRAWINGS.	
F. PRODUCT DELIVERY, STORAGE AND HANDLING	
1) MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CARTED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE SPACES.	
2) ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR, MINOR DEVIATIONS SHALL BE PERMITTED, CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE WITHOUT REVIEW OF THE CONTRACTOR. WHERE SPACE CONDITIONS REQUIRE, EQUIPMENT EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.	
G. MATERIALS	
1) NAMEPLATES: PROVIDE BLACK LAMINATED SHEET WITH 3/4 IN. WHITE LETTERING, FASTENED WITH EPOXY GELMENT FOR EACH DISCONNECT SWITCH, CIRCUIT BREAKER, PANEL, CABINET, TRANSFORMER, ENCLOSURE, MOTOR CONTROLLER AND THE LIKE. NAMEPLATES SHALL DESCRIBE THE NAME AND NUMBER OF EACH COMPONENT.	
2) CABLE TAGS: TAG EACH CONDUCTOR PASSING THROUGH SPLICE OR PULLBOX WITH A WHITE LINEN TAG, INDICATING POINT OF ORIGIN AND TERMINATION OF THE CIRCUIT.	
3) INSERTS AND SUPPORTS	
a. INSERTS: STEEL, SLOTTED TYPE, FACTORY PAINTED.	
(1) SINGLE ROD: SIMILAR TO ORNELL FIG. 281.	
(2) MULTI-ROD: SIMILAR TO FEE AND MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS.	
(3) CLIP FURN NAILS FLUSH WITH INSERTS.	
(4) MAXIMUM LOADING 75 PERCENT OF RATING.	
b. STRUT: GALVANIZED U-CHEANNEL (SIMILAR TO UNISTRUT OR KINDRUP)	
(1) COLD FORMED FROM LOW-CARBON STEEL WITH HOT-DIPPED GALVANIZED FINISH (ASTM 653 33)	
(2) MAXIMUM LOADING 75 PERCENT OF RATING	
(3) ASSOCIATED FITTINGS (SPRING NUTS, PIPE STRAPS, ETC.) SHALL BE BY SAME MANUFACTURER AS STRUT.	
(4) FILE ALL CUT ENDS SMOOTH AND APPLY COLD GALVANIZING COMPOUND SPRAY (ZRC COLD GALVANIZING COMPOUND SPRAY OR EQUAL)	
c. SUPPORTS FROM BUILDING CONSTRUCTION: INSERTS, BEAM CLAMPS, TIE TEMPLATES (ON CONCRETE FILL ONLY), CANTILEVER BRACKETS OR OTHER MEANS. SUBJECT FOR REVIEW.	
d. GROUPED LINES AND SERVICES: TRAPEZE HANGERS OF BOLTED ANGLES OR CHANNELS.	
e. WHERE BUILDING CONSTRUCTION IS INADEQUATE: PROVIDE ADDITIONAL FRAMING. SUBMIT FOR REVIEW.	
H. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALS UNOPENED AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL AS SELECTED BY ARCHITECT OR ENGINEER. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES, AND FINISH WITH COLORED SUPPORT CHANNELS. IN MASONRY AND POURED CONCRETE, RUN VERTICALLY ONLY.	
I. MAINTAIN REQUIRED DEDICATED WORKING SPACE AROUND AND IN FRONT OF SERVICE EQUIPMENT.	
10. SPD	
A. THE INDIVIDUAL SURGE PROTECTION DEVICE (SPD) UNITS SHALL BE UL LISTED UNDER UL1449 STANDARD FOR TRANSIENT VOLTAGE SURGE SUPPRESSIONS AND THE SURGE RATINGS AND SHORT CIRCUIT CAPACITY RATING SHALL BE PERMANENTLY AFFIXED TO THE COVER OF SPD. THE UNIT SHALL ALSO BE COMPLIMENTARILY LISTED TO UL 1283 STANDARD EM/RFI FACILITY FILTERS.	
B. SYSTEM DESCRIPTION	
(1) THE SPD/FILTER SHALL BE CONSTRUCTED USING MULTIPLE SURGE CURRENT DIVERSION ARRAYS OF METAL OXIDE VARISTORS (MOV), MATCHED TO 1 PERCENT VARIANCE. THE ARRAY SHALL CONSIST OF MULTIPLE GAP-LESS METAL OXIDE VARISTORS, WITH EACH INDIVIDUALLY FUSED. THE ARRAYS SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER, WHICH ENSURES MOV SURGE CURRENT ACCEPTANCE. NO GAS TUBES, SILICON ARCADES OR SILICON PIPES/RECTIFIERS SHALL BE USED. THE STATUS OF EACH ARRAY SHALL BE CONTINUOUSLY MONITORED AND A GREEN LED SHALL BE ILLUMINATED IF THE ARRAY IS IN FULL WORKING ORDER. ALL PROTECTION MODES, INCLUDING A-G, SHALL BE CLOSELY MONITORED AND INTERNALLY FUSED, FOR COMPLIANCE TO NEC ARTICLE 110.9, 110.10 AND 280.22.	
2) BASIS OF DESIGN (MINIMUM DISCHARGE RATING SHALL BE 20 KA – L–L, 20 KA – L–G, 20 KA – L–N):	
1) EMERSON STANDARD NOS.	
a. SERVICE ENTRANCE SERIES 570	
b. DISTRIBUTION PANEL SERIES 560	
c. BRANCH PANEL SERIES 510	
D. WARRANTY	
1) THE MANUFACTURER SHALL PROVIDE A LIMITED FIVE (5) YEAR WARRANTY FROM THE DATE OF SHIPPING AGAINST FAILURE WHEN INSTALLED IN COMPLIANCE WITH MANUFACTURER'S WRITTEN INSTRUCTION, UL LISTING REQUIREMENTS, AND ANY APPLICABLE NATIONAL OR LOCAL ELECTRICAL CODES. THE MANUFACTURER SHALL MAKE AVAILABLE FOR CONSULTATION, (LOCAL, NATIONAL) ENGINEERING SERVICE SUPPORT.	
E. MANUFACTURER	
1) EMERSON 500 SERIES OR APPROVED EQUAL, BY THOMAS AND BETTS – CURRENT TECHNOLOGY OR EATON – INNOVATIVE TECHNOLOGY.	
F. ACCESSORIES	
1) UNIT STATUS INDICATORS	
a. THE UNIT SHALL HAVE AN INTEGRAL STATUS CIRCUIT THAT MONITORS THE OPERATIONAL STATUS OF ALL MODES OF PROTECTION, INCLUDING LINE TO NEUTRAL, LINE TO GROUND AND NEUTRAL TO GROUND. NO MANUAL TESTING IS REQUIRED TO CONFIRM THE INTEGRITY OF THE SUPPRESSION AND FILTER SYSTEMS. IF THE SYSTEM DOES FAIL, THE GREEN LED LIGHT WILL GO OUT AND THE RED LED LIGHT WILL BE LIT.	
6. CUTTING AND PATCHING	
A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF THE EXISTING AND NEW CONSTRUCTION WORK, WHICH MAY BE REQUIRED FOR THE PROPER INSTALLATION OF THE ELECTRICAL WORK. ALL PATCHING SHALL BE DONE BY THE SAME TRADESMAN, FINISH, AND SHALL ACCURATELY MATCH ALL SURROUNDING WORK.	
B. CORE BORING OF CONCRETE FLOORS AND/OR WALLS IF REQUIRED, IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.	
7. COORDINATION	
A. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EQUIPMENT WITH ARCHITECTURAL DRAWINGS. IN CENTERING OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS, AND MECHANICAL EQUIPMENT. VARIATIONS IN FIRE PROOFING AND PLASTERING, AND DOOR TRIM, PANELING, HUNG CEILING, AND THE LIKE, AND CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSES TO THE OWNER.	
9. LOW-VOLTAGE DISTRIBUTION EQUIPMENT	
A. PROVIDE COMPLETE EQUIPMENT INCLUDING: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS.	
B. ALL EQUIPMENT SHALL CONFORM TO NEMA, ANSI AND IEEE STANDARDS.	
8. EQUIPMENT FURNISHED BY OTHERS	
A. THE CONTRACTOR SHALL FURNISH AND INSTALL WIRING FOR EQUIPMENT FURNISHED BY OTHERS, AS SHOWN ON DRAWINGS. COORDINATE WITH ALL OTHER TRADES OR DETAILS FOR INSTALLATION. THE TERM "WIRING" AS USED HERE-IN, INCLUDES, BUT IS NOT LIMITED TO, FURNISHING AND INSTALLING CONDUIT, WIRE, JUNCTION BOXES, DISCONNECTS AND MAKING CONNECTIONS. CONTRACTOR SHALL VERIFY ARCHITECTURAL, MECHANICAL, AND PLUMBING DRAWINGS AND SPECIFICATIONS FOR EQUIPMENT TO BE INSTALLED BY OTHERS. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER OUTLET LOCATIONS IN FINISHED SPACES AND EQUIPMENT TO CONFORM TO SPECIFIED REQUIREMENTS OF THE EQUIPMENT.	
9. LOW-VOLTAGE DISTRIBUTION EQUIPMENT	
A. PROVIDE COMPLETE EQUIPMENT INCLUDING: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS.	
B. ALL EQUIPMENT SHALL CONFORM TO NEMA, ANSI AND IEEE STANDARDS.	
C. DISCONNECT SWITCHES SHALL BE FUSED OR NON-FUSED AS NOTED. VOLTAGE SHALL BE AS REQUIRED. SWITCHES SHALL BE HEAVY DUTY. EXCEPT AS NOTED, AND HORSPOUNDER RATED FOR 100 AMP. TOGGLE TYPE SWITCHES SHALL BE NON-FUSED, LOAD BREAK, HAVING MAXIMUM RATINGS OF 30 AMP AT 600 VOLTS IN AN ALUMINUM NEMA 1 ENCLOSURE. NON-TWO-POLE SWITCHES SHALL BE SIMILAR TO HUBBELL #HBL1570. THREE-POLE SWITCHES SHALL BE SIMILAR TO HUBBELL #HBL1570D.	
1) KNIFE-BLADE TYPE SWITCHES SHALL BE LOAD BREAK, QUICK-MAKE-QUICK-BREAK, UL CLASS R UP TO 600 AMP. MAXIMUM RATING EXCEPT AS NOTED SHALL BE 800 AMP. ARC QUENCHERS SHALL BE PROVIDED. SWITCHES SHALL BE SIMILAR TO SQUARE D CLASS 3110. APPROVED EQUALS ARE PERMITTED. D AND ALLEN-BRADLEY, ALL SWITCH ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED.	
D. FUSES: DUAL ELEMENT FUSES FOR MOTOR LOADS SHALL BE TIME DELAY AND SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES DAY OF EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.	
1) QUALITY AND GAUGE OF MATERIALS: NEW, BEST OF THEIR RESPECTIVE KINDS, FREE FROM DEFECTS AND LISTED BY UNDERWRITERS LABORATORIES, INC., OR OTHER NATIONALLY RECOGNIZED TESTING LABORATORIES AND BEARING THEIR LABEL. MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.	
2) ON COMPLETION OF THE WORK, THE ENTIRE WIRING SYSTEM SHALL BE ENTIRELY FREE FROM GROUNDS, SHORT CIRCUITS, OPENINGS, OVERLOADS AND IMPROPER VOLTAGES AND THROUGH TEST SHALL BE MADE. FURNISH ALL LABOR AND MATERIALS AND INSTRUMENTS.	
3) GUARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE.	
4) VOLTAGE CHARACTERISTICS	
a. SERVICE: 277/480 VOLT (AND 120/208 VOLT), 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDING NEUTRAL.	
b. DISTRIBUTION: 277/480 VOLT (AND 120/208 VOLT), 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDING NEUTRAL.	
5) HEIGHTS OF OUTLETS	
a. SEE TYPICAL DEVICE MOUNTING HEIGHT DETAIL ON DRAWINGS.	
b. EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.	
c. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND CONFIRMING ALL MOUNTING HEIGHTS WITH ARCHITECT AND ARCHITECTURAL DRAWINGS.	
F. DISTRIBUTION PANELS: SWITCHING UNITS SHALL BE 3 PHASE, 4 WIRE CIRCUIT-BREAKER TYPE UNLESS OTHERWISE NOTED ON PANEL SCHEDULES. BUS BARS SHALL BE HARD DRAWN COPPER, MINIMUM 96 PERCENT CONDUCTIVITY, SILVER OR TIN-PLATED JUNCTIONS. CABINETS SHALL BE GALVANIZED SHEET STEEL BOX, WITH DOOR AND TRIM AND LAPPED AND WELDED CORNERS. HARDWARE SHALL BE CHROME-PLATED WITH FLUSH LOCK/LATCH HANDLE ASSEMBLY (UP TO 48 IN. HIGH DOORS) OR VAULT HANDLE, LOCK AND 3-POINT CATCH (LARGER THAN 48 IN. HIGH DOORS). HINGES SHALL BE SEMI-CONCEALED, 5-KNUCKLE STEEL WITH NONFERROUS 180-DEGREE OPENING. PROVIDE A MAXIMUM 28 IN. ON CENTERS. PROVIDE DOOR-IN-DOOR CONSTRUCTION. MINIMUM GUTTER SPACES FOR LIGHTING PANELS SHALL BE 5-3/4 IN. SIDES, TOP AND BOTTOM. DIRECTORY HOLDER SHALL BE METAL FRAME WITH CLEAR PLASTIC TRANSPARENT COVER. A TYPEWRITEN INDICATING FEEDER CABLE AND CONDUIT SIZE, CIRCUIT NUMBERS, OUTLETS SUPPLIED AND THEIR LOCATIONS SHALL BE PROVIDED.	
G. TRANSFORMERS SHALL BE NEMA TP1 COMPLIANT, OPEN-VENTILATED, DRY TYPE, CLASS H (220 DEGREES C) INSULATION, 115 DEGREES C TEMPERATURE RISE AND WINDINGS SHALL BE COPPER. PRIMARY AND SECONDARY VOLTAGES SHALL BE NOTED. PRIMARY TAPS (6 – 2-1/2 PERCENT TAPS, 2 ABOVE AND 4 BELOW RATED VOLTAGE) SHALL BE PROVIDED. ADJUST FOR REQUIRED VOLTAGE. PROVIDE K RATING AND SHELLING AS SHOWN ON DRAWINGS.	
H. BALANCE THE LOAD OVER PHASES WHEN NEW CIRCUITS ARE ADDED TO NEW OR EXISTING PANELS. PROVIDE MULTI-CABLE LUGS WHERE REQUIRED. DOUBLE LUGGING SHALL NOT BE PERMITTED. MOUNTING HEIGHT SHALL BE A MAXIMUM OF 6 FT. 6 IN. FROM FLOOR TO CENTER OF EACH CIRCUIT BREAKER ON EXISTING PANELBOARDS WHERE CIRCUITING IS CHANGED.	
I. TESTS: OPEN AND CLOSE LOAD BREAK SWITCHING DEVICES UNDER LOAD.	
J. MAINTAIN REQUIRED DEDICATED WORKING SPACE AROUND AND IN FRONT OF SERVICE EQUIPMENT.	
11. GROUNDING	
A. AN EQUIPMENT-GROUNDING CONDUCTOR, COMMONLY DESCRIBED AS A "GREEN" CONDUCTOR SHALL BE PROVIDED FOR ALL BRANCH CIRCUITS PROTECTED BY OVERCURRENT DEVICES. "GREEN" WIRE SHALL ALSO BE PROVIDED FOR FLEXIBLE CONDUIT AND MOTOR CIRCUITS.	
B. LIGHTING CIRCUITS INCLUDING WHERE REQUIRED AT SWITCH LOCATIONS FOR PROPER LIGHTING CONTROLS OPERATION.	
12. RACEWAYS	
A. PROVIDE RACEWAYS COMPLETE WITH BOXES, FITTINGS AND ACCESSORIES. CONDUIT OR TUBING SIZES REFERRED TO IN SPECIFICATIONS AND ON DRAWINGS ARE NOMINAL DIAMETERS. MINIMUM DIAMETER SHALL BE 3/4 IN.	
B. MATERIALS	
1) RACEWAYS	
a. RIGID STEEL CONDUIT: FULL-WEIGHT PIPE, GALVANIZED, THREADED.	
b. ELECTROMETALLIC TUBING (EMT): THIN WALL PIPE, GALVANIZED, THREADED.	
c. RIGID NON-METALLIC CONDUIT (PVC): POLYVINYL CHLORIDE, SCHEDULE 40 OR 80, UL STANDARD ANSI/UL 651	
d. FLEXIBLE STEEL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.	
e. LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT: GALVANIZED LOW CARBON STEEL CORE WITH UL BONDED STRIP, WITH A FLAME RETARDANT, SUNLIGHT RESISTANT PVC JACKET. UL LISTED AS LIQUIDTIGHT.	
f. WIREWAYS: DIMENSIONS AS NOTED, MINIMUM NO. 16 GAUGE STEEL WITH GROUNDING CHANNEL. FINISH SHALL BE ENAMEL. COVERS SHALL BE SCREW-ON.	
2) FITTINGS AND ACCESSORIES	
a. RIGID STEEL: NONSPRIT, THREADED, STEEL OR MALLEABLE IRON. ZINC-PLATED STEEL ONLY – ZINC DIE CAST NOT PERMITTED.	
b. ELECTROMETALLIC TUBING: COMPRESSION TYPE 2 IN. AND UNDER. SET SCREW TYPE 2-1/2 IN. AND LARGER. GALVANIZED RIGID STEEL ELBOWS: 2 IN. OR LARGER. ZINC-PLATED STEEL ONLY – ZINC DIE CAST NOT PERMITTED. EXTERIOR EMT FITTINGS SHALL BE RAIN-TIGHT TYPE.	
c. PVC: SLP-ON-NO. UL CATEGORY DWT, INSTALLED WITH MANUFACTURER'S APPROVED RECOMMENDED SCHEDULE NO.	
d. FLEXIBLE METALLIC CONDUIT: SQUEEZE TYPE COMPRESSION FITTING WITH INSULATED THROAT. ZINC-PLATED STEEL ONLY – ZINC DIE CAST NOT PERMITTED.	
e. LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT: THREADED GASKETED MALLEABLE IRON, STEEL OR ALUMINUM WITH INSULATED THROAT. UL LISTED FOR WET LOCATIONS.	
f. BUSHINGS: METALLIC INSULATED TYPE.	
3) BOXES	
a. OUTLET BOXES: EXCEPT AS OTHERWISE REQUIRED BY CONSTRUCTION, DEVICES OR WIRING, BOXES SHALL BE GALVANIZED THREADED TYPE, 2-1/2 IN. AND LARGER. STAMPED STEEL, 4 IN. SQUARE OR OCTAGON FOR FIXTURES, BOXES ABOVE CEILING SHALL BE 1-1/2 IN. DEEP. BOXES IN CEILING OR SLAB SHALL BE 3 IN. DEEP. BOXES IN WALL OR FIXTURES SHALL BE 2-3/4 IN. DEEP. BOXES IN WALL FOR RECEPTABLES AND SWITCHES SHALL BE 1-1/2 IN. DEEP. FURNISH WITH RAISED COVERS AND FIXTURE STUDS WHERE REQUIRED.	
(1) WITHOUT FIXTURE OR DEVICE: FURNISH BLACK COVER. OPEN END BACK-TO-BACK OUTLETS WITH MINIMUM 6 IN. SEPARATION.	
(2) ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRON OR GROUT IN WITH MASONRY. VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES FOR VOLTAGES EXCEEDING 150 VOLTS TO GROUND.	
(3) OUTLET BOXES FOR LIGHTING FIXTURES: SUITABLE GALVANIZED THREADED TYPE, 2-1/2 IN. AND LARGER. REQUIRED, INSTALLED IN OR ON VERTICAL SURFACES FOR SUPPORT OF A LUMINAIRE OVER 6 POUNDS. MARKED INDICATING BOX IS SUITABLE FOR INSTALLATION OF A LUMINAIRE. INSTALLED IN CEILING INTENDED FOR SUPPORT OF LIGHTING LUMINAIRE OVER 50 POUNDS BE MARKED ON THE INTERIOR WITH THE WEIGHT OF THE LUMINAIRE. IT CAN SUPPORT AND INSTALLED CONCEALED IN CEILING OR WALLS PROVIDED WITH PROPER EXTENSION RINGS AND/OR PLASTER COVERS LISTED FOR THE APPLICATION.	
b. JUNCTION AND PULL BOXES: GALVANIZED SHEET STEEL WITH SCREW-ON COVERS, EXCEPT AS NOTED. FURNISH WITH INSULATED SUPPORTS FOR CABLES. LOCATIONS SHALL BE AS NOTED OR REQUIRED AND ACCESSIBLE. PROVIDE BARRIERS IN RENOVATED BOXES BETWEEN 120/208 VOLT AND 277/480 VOLT WIRING AND BETWEEN EMERGENCY AND NORMAL WIRING.	
c. PANEL, JUNCTION AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONFORMANCE. BOXES SHALL BE ACCESSIBLE. SUPPORT BOXES FROM BUILDING STRUCTURE, INDEPENDENT OF CONDUIT. PROVIDE CONDUIT-CEILING CHANNELS FOR CONDUIT FROM DRYWALL AND LIGHTWEIGHT CONSTRUCTION. OUTLET BOXES FOR FIXTURES RECESSED IN HUNG CEILING SHALL BE ACCESSIBLE THROUGH OPENING CREATED BY REMOVAL OF FIXTURE. SECURE TO BLACK IRON OR GALVANIZED STEEL CHANNEL SUPPORT. MOTOR TERMINAL BOXES: COORDINATE WITH MOTOR BRANCH CIRCUIT CONDUIT AND WIRING; ADD BOX VOLUME WHERE REQUIRED.	
M. TESTS: OPEN AND CLOSE LOAD BREAK SWITCHING DEVICES UNDER LOAD.	
J. MAINTAIN REQUIRED DEDICATED WORKING SPACE AROUND AND IN FRONT OF SERVICE EQUIPMENT.	
10. SPD	
A. THE INDIVIDUAL SURGE PROTECTION DEVICE (SPD) UNITS SHALL BE UL LISTED UNDER UL1449 STANDARD FOR TRANSIENT VOLTAGE SURGE SUPPRESSIONS AND THE SURGE RATINGS AND SHORT CIRCUIT CAPACITY RATING SHALL BE PERMANENTLY AFFIXED TO THE COVER OF SPD. THE UNIT SHALL ALSO BE COMPLIMENTARILY LISTED TO UL 1283 STANDARD EM/RFI FACILITY FILTERS.	
B. SYSTEM DESCRIPTION	
(1) THE SPD/FILTER SHALL BE CONSTRUCTED USING MULTIPLE SURGE CURRENT DIVERSION ARRAYS OF METAL OXIDE VARISTORS (MOV), MATCHED TO 1 PERCENT VARIANCE. THE ARRAY SHALL CONSIST OF MULTIPLE GAP-LESS METAL OXIDE VARISTORS, WITH EACH INDIVIDUALLY FUSED. THE ARRAYS SHALL BE DESIGNED AND CONSTRUCTED IN A MANNER, WHICH ENSURES MOV SURGE CURRENT ACCEPTANCE. NO GAS TUBES, SILICON ARCADES OR SILICON PIPES/RECTIFIERS SHALL BE USED. THE STATUS OF EACH ARRAY SHALL BE CONTINUOUSLY MONITORED AND A GREEN LED SHALL BE ILLUMINATED IF THE ARRAY IS IN FULL WORKING ORDER. ALL PROTECTION MODES, INCLUDING A-G, SHALL BE CLOSELY MONITORED AND INTERNALLY FUSED, FOR COMPLIANCE TO NEC ARTICLE 110.9, 110.10 AND 280.22.	
2) BASIS OF DESIGN (MINIMUM DISCHARGE RATING SHALL BE 20 KA – L–L, 20 KA – L–G, 20 KA – L–N):	
1) EMERSON STANDARD NOS.	
a. SERVICE ENTRANCE SERIES 570	
b. DISTRIBUTION PANEL SERIES 560	
c. BRANCH PANEL SERIES 510	
D. WARRANTY	
1) THE MANUFACTURER SHALL PROVIDE A LIMITED FIVE (5) YEAR WARRANTY FROM THE DATE OF SHIPPING AGAINST FAILURE WHEN INSTALLED IN COMPLIANCE WITH MANUFACTURER'S WRITTEN INSTRUCTION, UL LISTING REQUIREMENTS, AND ANY APPLICABLE NATIONAL OR LOCAL ELECTRICAL CODES. THE MANUFACTURER SHALL MAKE AVAILABLE FOR CONSULTATION, (LOCAL, NATIONAL) ENGINEERING SERVICE SUPPORT.	
E. MANUFACTURER	
1) EMERSON 500 SERIES OR APPROVED EQUAL, BY THOMAS AND BETTS – CURRENT TECHNOLOGY OR EATON – INNOVATIVE TECHNOLOGY.	
F. ACCESSORIES	
1) UNIT STATUS INDICATORS	
a. THE UNIT SHALL HAVE AN INTEGRAL STATUS CIRCUIT THAT MONITORS THE OPERATIONAL STATUS OF ALL MODES OF PROTECTION, INCLUDING LINE TO NEUTRAL, LINE TO GROUND AND NEUTRAL TO GROUND. NO MANUAL TESTING IS REQUIRED TO CONFIRM THE INTEGRITY OF THE SUPPRESSION AND FILTER SYSTEMS. IF THE SYSTEM DOES FAIL, THE GREEN LED LIGHT WILL GO OUT AND THE RED LED LIGHT WILL BE LIT.	
6. CUTTING AND PATCHING	
A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF THE EXISTING AND NEW CONSTRUCTION WORK, WHICH MAY BE REQUIRED FOR THE PROPER INSTALLATION OF THE ELECTRICAL WORK. ALL PATCHING SHALL BE DONE BY THE SAME TRADESMAN, FINISH, AND SHALL ACCURATELY MATCH ALL SURROUNDING WORK.	
B. CORE BORING OF CONCRETE FLOORS AND/OR WALLS IF REQUIRED, IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.	
7. COORDINATION	
A. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EQUIPMENT WITH ARCHITECTURAL DRAWINGS. IN CENTERING OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS, AND MECHANICAL EQUIPMENT. VARIATIONS IN FIRE PROOFING AND PLASTERING, AND DOOR TRIM, PANELING, HUNG CEILING, AND THE LIKE, AND CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSES TO THE OWNER.	
9. LOW-VOLTAGE DISTRIBUTION EQUIPMENT	
A. PROVIDE COMPLETE EQUIPMENT INCLUDING: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS.	
B. ALL EQUIPMENT SHALL CONFORM TO NEMA, ANSI AND IEEE STANDARDS.	
C. DISCONNECT SWITCHES SHALL BE FUSED OR NON-FUSED AS NOTED. VOLTAGE SHALL BE AS REQUIRED. SWITCHES SHALL BE HEAVY DUTY. EXCEPT AS NOTED, AND HORSPOUNDER RATED FOR 100 AMP. TOGGLE TYPE SWITCHES SHALL BE NON-FUSED, LOAD BREAK, HAVING MAXIMUM RATINGS OF 30 AMP AT 600 VOLTS IN AN ALUMINUM NEMA 1 ENCLOSURE. NON-TWO-POLE SWITCHES SHALL BE SIMILAR TO HUBBELL #HBL1570. THREE-POLE SWITCHES SHALL BE SIMILAR TO HUBBELL #HBL1570D.	
1) KNIFE-BLADE TYPE SWITCHES SHALL BE LOAD BREAK, QUICK-MAKE-QUICK-BREAK, UL CLASS R UP TO 600 AMP. MAXIMUM RATING EXCEPT AS NOTED SHALL BE 800 AMP. ARC QUENCHERS SHALL BE PROVIDED. SWITCHES SHALL BE SIMILAR TO SQUARE D CLASS 3110. APPROVED EQUALS ARE PERMITTED. D AND ALLEN-BRADLEY, ALL SWITCH ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED.	
D. FUSES: DUAL ELEMENT FUSES FOR MOTOR LOADS SHALL BE TIME DELAY AND SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES DAY OF EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.	
1) QUALITY AND GAUGE OF MATERIALS: NEW, BEST OF THEIR RESPECTIVE KINDS, FREE FROM DEFECTS AND LISTED BY UNDERWRITERS LABORATORIES, INC., OR OTHER NATIONALLY RECOGNIZED TESTING LABORATORIES AND BEARING THEIR LABEL. MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.	
2) ON COMPLETION OF THE WORK, THE ENTIRE WIRING SYSTEM SHALL BE ENTIRELY FREE FROM GROUNDS, SHORT CIRCUITS, OPENINGS, OVERLOADS AND IMPROPER VOLTAGES AND THROUGH TEST SHALL BE MADE. FURNISH ALL LABOR AND MATERIALS AND INSTRUMENTS.	
3) GUARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE.	
4) VOLTAGE CHARACTERISTICS	
a. SERVICE: 277/480 VOLT (AND 120/208 VOLT), 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDING NEUTRAL.	
b. DISTRIBUTION: 277/480 VOLT (AND 120/208 VOLT), 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDING NEUTRAL.	
5) HEIGHTS OF OUTLETS	
a. SEE TYPICAL DEVICE MOUNTING HEIGHT DETAIL ON DRAWINGS.	
b. EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.	
c. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND CONFIRMING ALL MOUNTING HEIGHTS WITH ARCHITECT AND ARCHITECTURAL DRAWINGS.	
F. DISTRIBUTION PANELS: SWITCHING UNITS SHALL BE 3 PHASE, 4 WIRE CIRCUIT-BREAKER TYPE UNLESS OTHERWISE NOTED ON PANEL SCHEDULES. BUS BARS SHALL BE HARD DRAWN COPPER, MINIMUM 96 PERCENT CONDUCTIVITY, SILVER OR TIN-PLATED JUNCTIONS. CABINETS SHALL BE GALVANIZED SHEET STEEL BOX, WITH DOOR AND TRIM AND LAPPED AND WELDED CORNERS. HARDWARE SHALL BE CHROME-PLATED WITH FLUSH LOCK/LATCH HANDLE ASSEMBLY (UP TO 48 IN. HIGH DOORS) OR VAULT HANDLE, LOCK AND 3-POINT CATCH (LARGER THAN 48 IN. HIGH DOORS). HINGES SHALL BE SEMI-CONCEALED, 5-KNUCKLE STEEL WITH NONFERROUS 180-DEGREE OPENING. PROVIDE A MAXIMUM 28 IN. ON CENTERS. PROVIDE DOOR-IN-DOOR CONSTRUCTION. MINIMUM GUTTER SPACES FOR LIGHTING PANELS SHALL BE 5-3/4 IN. SIDES, TOP AND BOTTOM. DIRECTORY HOLDER SHALL BE METAL FRAME WITH CLEAR PLASTIC TRANSPARENT COVER. A TYPEWRITEN INDICATING FEEDER CABLE AND CONDUIT SIZE, CIRCUIT NUMBERS, OUTLETS SUPPLIED AND THEIR LOCATIONS SHALL BE PROVIDED.	
G. TRANSFORMERS SHALL BE NEMA TP1 COMPLIANT, OPEN-VENTILATED, DRY TYPE, CLASS H (220 DEGREES C) INSULATION, 115 DEGREES C TEMPERATURE RISE AND WINDINGS SHALL BE COPPER. PRIMARY AND SECONDARY VOLTAGES SHALL BE NOTED. PRIMARY TAPS (6 – 2-1/2 PERCENT TAPS, 2 ABOVE AND 4 BELOW RATED VOLTAGE) SHALL BE PROVIDED. ADJUST FOR REQUIRED VOLTAGE. PROVIDE K RATING AND SHELLING AS SHOWN ON DRAWINGS.	
H. BALANCE THE LOAD OVER PHASES WHEN NEW CIRCUITS ARE ADDED TO NEW OR EXISTING PANELS. PROVIDE MULTI-CABLE LUGS WHERE REQUIRED. DOUBLE LUGGING SHALL NOT BE PERMITTED. MOUNTING HEIGHT SHALL BE A MAXIMUM OF 6 FT. 6 IN. FROM FLOOR TO CENTER OF EACH CIRCUIT BREAKER ON EXISTING PANELBOARDS WHERE CIRCUITING IS CHANGED.	
I. TESTS: OPEN AND CLOSE LOAD BREAK SWITCHING DEVICES UNDER LOAD.	
J. MAINTAIN REQUIRED DEDICATED WORKING SPACE AROUND AND IN FRONT OF SERVICE EQUIPMENT.	

PLUMBING BASIC SYMBOLS

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

	EXISTING PIPING
	EXISTING PIPING TO BE REMOVED
	PIPING TO BE ABANDONED
	NEW SOIL, WASTE OR SANITARY PIPING
	VENT PIPING (SANITARY)
	PIPING BELOW SLAB
	DOMESTIC COLD WATER PIPING
	DOMESTIC HOT WATER PIPING (120°)
	DOMESTIC HOT WATER CIRCULATION PIPING
	PIPING w/FREEZE PROTECTION CABLE & INSULATION
	ARROW INDICATES DIRECTION OF FLOW
	COMPRESSED AIR PIPING
	GAS PIPING
	EJECTOR DISCHARGE PIPING
	INDIRECT WASTE PIPING
	PUMP DISCHARGE PIPING
	SUMP PUMP DISCHARGE PIPING
	STORM WATER DRAINAGE PIPING
	TEMPERED WATER PIPING
	DISCONNECT FROM EXISTING
	CONNECT TO EXISTING
	SHOCK ARRESTER
	FLEXIBLE CONNECTION
	EXPANSION LOOP SIZE
	HOSE BIBB
	WALL HYDRANT (EXIST./NEW)
	FRESH AIR INLET
	CLEAN OUT/PLUGGED OUTLET
	GREASE WASTE
	CAPPED OUTLET
	CLEAN-OUT DECK PLATE
	P-TRAP
	VACUUM BREAKER
	BOTTOM PIPE CONNECTION
	TOP PIPE CONNECTION
	SIDE CONNECTION
	PIPE DOWN/DROP
	PIPE RISE/UP
	PIPE SLOPE
	VALVE IN VERTICAL
	UNION
	REDUCER
	WATER PROOF SLEEVE
	SLEEVE
	PRESSURE GAUGE w/GAUGE COCK
	TEMPERATURE GAUGE
	FLOOR DRAIN
	ROOF DRAIN
	PUMP
	WATER METER
	AUTOMATIC BALL DRIP
	VENT THRU ROOF
	TRAP
	EXIST. NEW
	TEMPERATURE AND PRESSURE RELIEF VALVE
	PLUG VALVE
	MIXING VALVE
	RELIEF VALVE
	BALL VALVE
	BALL VALVE w/LOCK SHIELD
	GATE VALVE
	GLOBE VALVE
	OUTSIDE SCREW & YOKE (OS & Y) VALVE
	CHECK VALVE
	PRESSURE REDUCING VALVE (PRV)
	SOLENOID VALVE
	FLOAT VALVE
	Y STRAINER w/BLOW-OFF VALVE
	REDUCED PRESSURE ZONE BACKFLOW PREVENTER ASSEMBLY
	DOUBLE CHECK VALVE BACKFLOW PREVENTER ASSEMBLY
	BALANCING VALVE ASSEMBLY
	RISER DESIGNATION
	RISER SERVICE
	RISER NUMBER

PLUMBING ABBREVIATIONS

(NOT ALL ABBREVS. ARE NECESSARILY USED ON THIS PROJECT)

AD	AREA DRAIN
AFF	ABOVE FINISHED FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
BLDG	BUILDING
BOP	BOTTOM OF PIPE
CO	CLEANOUT
COOP	CLEANOUT DECK PLATE
CM	COFFEE MAKER
CV	CHECK VALVE
CVO	CAPPED AND VALVED OUTLET
CW	COLD WATER
CLG	CEILING
CONN	CONNECT
CONT	CONTINUATION
DIA	DIAMETER
DN	DOWN (PENETRATES FLOOR SLAB)
DR	DRAIN
DWG	DRAWING
SD	SUMP PUMP DISCHARGE PIPING
(E)	EXISTING
(ER)	EXISTING TO BE REMOVED
(ERR)	EXISTING TO BE REMOVED & RELOCATED
EJ DIS	EJECTOR DISCHARGE
EL	ELEVATION
EWC	ELECTRIC WATER COOLER
FAI	FRESH AIR INLET
FD	FLOOR DRAIN
FU	FIXTURE UNIT
FL	FLOOR
FLH	FLOOR HYDRANT
FT	FEET
GC	GENERAL CONTRACTOR
GAL	GALLONS
GPM	GALLONS PER MINUTE
GW	GREASE WASTE
HB	HOSE BIBB
HCLG	HUNG CEILING
HW	HOT WATER
HWR	HOT WATER RETURN
ID	INSIDE DIAMETER
IW	INDIRECT WASTE
IN	INCH
JS	JANITOR'S SINK
LAV	LAVATORY
MAP	MEDICAL GAS ALARM PANEL
MAX	MAXIMUM
MIN	MINIMUM
MR	MOP RECEPTOR
(N)	NEW
NC	NORMALLY CLOSED
NIC	NOT IN THIS CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
OS&Y	OUTSIDE SCREW & YOKE GATE VALVE
PC	PLUMBING CONTRACTOR
PD	PUMP DISCHARGE
PO	PLUGGED OUTLET
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH (GAUGE)
RD	ROOF DRAIN
(RE)	RELOCATED EXISTING
(RRR)	EXISTING TO BE REMOVED AND RETURN TO OWNER
SA	SHOCK ARRESTER
SAN	SANITARY
SD	STORM DRAIN
SH	SHOWER
SK	SINK
SLV	SLEEVE
SO FT	SQUARE FOOT
ST	STORM
TYP	TYPICAL
UN	UNLESS OTHERWISE NOTED
UP	(PENETRATES FLOOR SLAB)
UR	URINAL
V	VENT
VB	VACUUM BREAKER
VTR	VENT THROUGH ROOF
W	WASTE
WC	WATER CLOSET
WCO	WALL CLEANOUT
WH	WALL HYDRANT
ZCVB	ZONE CONTROL VALVE BOX

PLUMBING GENERAL NOTES

- CONTRACTOR SHALL PROVIDE AND PAY ALL FEES AND PERMITS ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST INTERNATIONAL MECHANICAL CODE, INTERNATIONAL FUEL GAS CODE, NATIONAL STANDARD PLUMBING CODE, NEC CODE AND ALL OTHER STATE AND LOCAL AUTHORITIES HAVING JURISDICTION.
- CONTRACTOR SHALL VISIT THE JOB SITE AND OBSERVE ALL EXISTING CONDITIONS. PRIOR TO SUBMITTING A BID.
- DRAWINGS ARE DIAGRAMMATIC AND INTENDED TO SHOW APPROXIMATE LOCATIONS. CONTRACTOR SHALL INSTALL ALL WORK WITHOUT CONFLICT WITH OTHER TRADES AND MAKE ALTERATIONS AS REQUIRED WITHOUT ADDITIONAL COST TO OWNER. CONTRACTOR SHALL INCLUDE ALL NEEDED OFFSETS, CHANGES IN DIRECTION, TRANSITIONS, COLLARS, FITTINGS, ETC. NEEDED FOR COMPLETE AND OPERATIONAL SYSTEMS.
- ALL COMPONENTS OF THE DOMESTIC WATER SYSTEM SHALL CONFORM TO THE FEDERAL "REDUCTION OF LEAD IN DRINKING WATER ACT" AS DEFINED PER SDWA IN SECTION 1417(D). THE WETTED AREA EXPOSED TO DRINKING WATER SHALL BE LEAD FREE.
- COORDINATE WORK WITH OTHER TRADES SO THAT ALL COMPONENTS SHALL BE INSTALLED IN THE PROPER PLACE AT THE PROPER TIME.
- SANITARY PIPING SHALL BE SLOPED ON A DOWNWARD PITCH AT A MINIMUM 1/4" PER FOOT FOR 2" SIZES AND LESS. PIPING 3" AND LARGER SHALL BE SLOPED AT 1/8" PER FOOT, AND IN ALL CASES CONFORMING TO JURISDICTIONAL CODE REQUIREMENTS.
- PROVIDE ACCESSIBLE DRAINAGE SYSTEM CLEANOUTS, EFFECTIVELY PLACED FOR EACH TRAP, STACK, BASE, AND AT CHANGE IN DIRECTION AND SPACING AS REQUIRED BY CODE. WHETHER INDICATED ON PLANS OR NOT. PROVIDE ALL ADDITIONAL SYSTEM CLEANOUTS REQUIRED FOR THOROUGH CLEANING.
- FOR SOLDERED JOINTS, CLEAN THE ENDS OF ALL COPPER TUBING BEFORE ASSEMBLY. APPLY FLUX AND TIN THE ENDS OF TUBING 2 INCHES AND LARGER.
- BALL TYPE CONTROL VALVES SHALL BE INSTALLED ON EACH BRANCH FROM THE DOMESTIC WATER SUPPLY MAINS AND ON EACH ISOLATED FIXTURE BRANCH.
- PUBLIC USE HAND WASHING FACILITIES: WATER DISCHARGED FROM PUBLIC-USE HAND WASHING FACILITIES SHALL BE LIMITED TO A MAXIMUM TEMPERATURE OF 110°F USING A WATER TEMPERATURE LIMITING DEVICE COMPLYING WITH ASSE 107.
- FLUSH CONTROLS FOR WATER CLOSETS MUST BE LOCATED ON THE "APPROACH" OR OPEN SIDE OF THE TANK, TO COMPLY WITH UFAS SECTION 4.16.5.
- ALL PIPING ON EXTERIOR WALLS SHALL BE PROTECTED FROM FREEZING.
- PROVIDE DIELECTRIC FITTINGS WHEN JOINING DISSIMILAR METALS.
- EXPOSED PIPING AND FITTINGS AT FIXTURES SHALL BE CHROME PLATED I.P.S. BRASS.
- ESCUTCHEON PLATES SHALL BE PROVIDED ON ALL PIPE WHICH PASS THROUGH WALLS, PARTITIONS, FLOORS OR CEILINGS AND SHALL BE THE SPLIT RING TYPE, STEEL CONSTRUCTION.
- SLEEVES SHALL BE SCHEDULE 40 STEEL AND SHALL BE TWO PIPE SIZES LARGER THAN THE SYSTEM PIPE. SLEEVES SHALL BE LOCATED WHERE PIPE PASSES THROUGH WALLS, FLOORS OR PARTITIONS. ANNUAL SPACE BETWEEN SLEEVE AND PIPE SHALL BE SEALED WATER TIGHT AND FIRE STOPPED (IF APPLICABLE) TO ACHIEVE AN HOURLY RATING EQUAL OR GREATER TO THAT OF THE ASSEMBLY BEING PENETRATED.
- ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND DETAILS.
- ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE BEST PRACTICES OF THE TRADE AND THE LATEST CODE REQUIREMENTS. SYSTEM MATERIALS SHALL BE UNIFORM THROUGHOUT THE BUILDING.
- ALL PIPING SHALL BE KEPT AS HIGH AS POSSIBLE, CONSISTENT WITH THE PROPER PITCH TO MAINTAIN MAXIMUM HEADROOM. PIPING SHALL BE ACCURATELY CUT TO MEASUREMENTS ESTABLISHED AT THE BUILDING. PIPING SHALL BE WORKED INTO PLACE WITHOUT SPRINGING, FORCING OR CUTTING OF THE BUILDING STRUCTURE, AND SHALL BE INSTALLED AS DIRECTLY AS POSSIBLE BETWEEN CONNECTING POINTS PARALLEL WITH OR AT RIGHT ANGLES TO BUILDING CONSTRUCTION, EXCEPT AS REQUIRED TO OBTAIN PITCH.
- ALL EQUIPMENT AND MATERIALS SHALL, AS A MINIMUM, HAVE A WORKING PRESSURE AS DETERMINED BY CODES, ASME (OR SIMILAR OTHER BODY) AND OF NOT LESS THAN 125 PSI.
- CLEAN ALL PIPE BEFORE ERECTION. REAM ALL PIPE ENDS AFTER CUTTING.
- FOR SCREWED JOINTS APPLY NON-CORROSIVE, NON-HARDENING TEFLOON PIPE TAPE OR SUITABLE COMPOUND TO MALE THREADS ONLY. CAULKING AND PACKING OF THREADS IS PROHIBITED.
- INSTALL EXPOSED PIPE LINES PARALLEL WITH BUILDING WALLS OR STRUCTURE. DO NOT EMBED PIPING IN CINDER FILL, NOR INSTALL WHERE THERE IS A POSSIBILITY OF FREEZING.
- PITCH PIPING TO PERMIT AIR VENTING THROUGH THE FIXTURES - ALLOW FOR EXPANSION AND COMPLETE LOW POINT DRAINAGE.
- IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO REVIEW THESE PLANS AND SPECIFICATIONS, AS WELL AS THE RELATED HVAC, FIRE PROTECTION, ELECTRICAL, STRUCTURAL, ARCHITECTURAL, INTERIOR DECOR AND SITE ENGINEERING DRAWING TO BECOME FAMILIAR WITH THE FULL PROJECT SCOPE. IN ADDITION, THIS CONTRACTOR MUST COORDINATE WITH AN OWNER REPRESENTATIVE TO FULLY UNDERSTAND ALL REQUIREMENTS WHICH MAY NOT BE SPECIFIED HEREIN AND WHICH THE OWNER MAY CONSIDER PART OF THIS CONTRACT. DURING THE COURSE OF CONSTRUCTION COORDINATION AND ACTUAL CONSTRUCTION, IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO WORK CLOSELY WITH ALL ACCOMPANYING CONTRACTORS AND TRADESMEN IN ORDER TO ENSURE A SMOOTH RUNNING AND CAREFULLY COORDINATED INSTALLATION.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS INCLUDING BUT NOT LIMITED TO NATIONAL, CITY, STATE, LOCAL CODES AND ORDINANCES WHICH MAY BE IN EFFECT. ALL PLUMBING MATERIALS, INSTALLATION PROCEDURES AND SYSTEM LAYOUTS SHALL BE APPROVED BY ALL APPLICABLE CODE ENFORCEMENT AUTHORITIES WITHIN JURISDICTION, AND IT SHALL BE THE PLUMBING CONTRACTOR'S RESPONSIBILITY TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND APPROVALS FOR THIS INSTALLATION.
- THE PLUMBING CONTRACTOR SHALL VISIT THE SITE AND NOTE ALL EXISTING CONDITIONS AS WELL AS ALL CONDITIONS TO BE MET, PRIOR TO BID SUBMISSION. LACK OF A THOROUGH UNDERSTANDING OF THE PROJECT SCOPE AND CONDITIONS SHALL NOT CONSTITUTE AN EXCUSE FOR ERRORS OR OMISSIONS, NOR FOR A REQUEST FOR EXTRA COMPENSATION.
- IT IS CRITICAL THAT THE PLUMBING CONTRACTOR FIELD VERIFIES ALL INVERTS PRIOR TO BID SUBMISSION. IF ANY CONFLICTS EXIST BETWEEN THE NEW PLUMBING SYSTEMS AND THE EXISTING SITE LEVEL SYSTEMS, THEY SHOULD BE BROUGHT TO THE ATTENTION OF OWNER'S REPRESENTATIVE AND THE ENGINEER PRIOR TO BID SUBMISSION. EXTRA COMPENSATION SHALL NOT BE ALLOWED FOR ANY EXTRA WORK WHICH RESULTS FROM AN

- INABILITY TO MEET THE INVERTS OF THE EXISTING SITE LEVEL PIPING SYSTEMS.
- THE PLUMBING CONTRACTOR SHALL PROVIDE A COMPLETE SET OF RECORD "AS-BUILT" DRAWINGS INDICATING THE PRECISE LOCATION OF ALL SYSTEMS, EQUIPMENT CONCEALED OR EMBEDDED PIPING, PIPING CONNECTIONS AND ACCESS DOORS. THESE DRAWINGS SHALL ALSO INCLUDE ALL CHANGES AND DEVIATIONS FROM BID DOCUMENTS.
- RUN ALL DOMESTIC, WASTE, VENT AND GAS PIPING AS HIGH AS POSSIBLE THROUGHOUT ENTIRE BUILDING. INSTALL LONG RUNS OF PIPING WITHIN STEEL (JOIST) SPACE AND OTHER PIPING TIGHT TO BOTTOM OF STEEL. COORDINATE AND VERIFY WITH OTHER CONTRACTORS AS NOT TO INTERFERE WITH DUCTWORK, FIRE PROTECTION PIPING, LIGHTING SYSTEMS, ETC.
- ALL EXPOSED HORIZONTAL AND VERTICAL PIPING SHALL BE INSTALLED IN A NEAT ARRANGEMENT IN LOCATIONS WHICH ARE THE MOST INCONSPICUOUS. VERTICAL DROP FINAL LOCATIONS SHALL BE COORDINATED AND RUN WITHIN CHASES, WALLS, SOFFITS WITH OTHER MECHANICAL / ELECTRICAL FEEDS. ALL SUCH LOCATIONS ARE TO BE REVIEWED WITH AN OWNER REPRESENTATIVE AND ARCHITECT PRIOR TO INSTALLATION.
- FINAL CONNECTIONS TO ALL GAS FIRED APPLIANCES TO BE BY THE PLUMBING CONTRACTOR, REGARDLESS OF WHO PROVIDES APPLIANCE. THIS SHALL INCLUDE BUT NOT BE LIMITED TO HVAC EQUIPMENT, COOKING EQUIPMENT, EMERGENCY GENERATORS AND DOMESTIC HOT WATER HEATERS. EACH PIECE OF EQUIPMENT SHALL BE PROVIDED WITH A DIRT LEG, LUBRICATED PLUG VALVE, UNION, GAS SHUT-OFF VALVE AND A FLEXIBLE STAINLESS STEEL CONNECTION.
- ALL PLUMBING FIXTURES / APPLIANCES SHALL HAVE THEIR OWN INDEPENDENT SHUT-OFF VALVES, INSTALLED IN AN EASILY ACCESSIBLE AND CONVENIENT LOCATION.
- ALL DOMESTIC WATER BRANCH LINES SHALL HAVE THEIR OWN RESPECTIVE SHUT-OFF VALVES.
- DOMESTIC WATER HEATER TEMPERATURE / PRESSURE RELIEF VALVES SHALL BE PIPED FULL SIZE TO THE NEAREST APPROVED STANDPIPE OR FLOOR DRAIN. THIS REQUIREMENT SHALL BE APPLICABLE TO ALL DOMESTIC WATER HEATERS.
- ALL HAND SINKS SHALL HAVE IN-LINE WATER TEMPERING VALVES INSTALLED SO AS TO BE EASILY ACCESSIBLE. THESE TEMPERING VALVES SHALL BE SET TO DELIVER HOT WATER AT 105°F.
- WHERE APPLICABLE, DO NOT RUN VENTS THROUGH ROOF AT PRE-FINISH METAL ROOFING SYSTEMS. INSTEAD DIVERT VENT PIPING TO RUN UP THROUGH FLAT MEMBRANE ROOF. VENTS THROUGH ROOF SHALL NOT BE VISIBLE TO THE PUBLIC AND NOT LOCATED CLOSER THAN 10'-0" OF ROOFTOP EQUIPMENT.
- THE PLUMBING CONTRACTOR SHALL RUN OUT ALL BUILDING DRAINAGE AND WASTE LINES AND MAKE ALL CONNECTIONS TO SITE LEVEL SYSTEMS AS INDICATED ON BID DOCUMENTS.
- THE PLUMBING CONTRACTOR SHALL FIELD VERIFY THE EXACT LOCATIONS AND CONNECTIONS OF THE HOSE BIBB. PLUMBER TO FURNISH AND INSTALL ALL PIPING AND EQUIPMENT AS PER MANUFACTURER'S INSTRUCTIONS. FURNISH AND INSTALL AN ACCESSIBLE SHUT-OFF VALVE FOR THE HOSE BIBB BRANCH SUPPLY. FINAL CONNECTION & INSTALLATION BY PLUMBING CONTRACTOR.
- PRIOR TO INSTALLING SYSTEMS, THE PLUMBING CONTRACTOR SHALL MEET WITH AN OWNER'S REPRESENTATIVE TO FIELD VERIFY THE EXACT LOCATION OF ALL PROPOSED EQUIPMENT WHICH MAY NOT BE CLEARLY INDICATED ON THE DRAWINGS.
- THE PLUMBING CONTRACTOR SHALL COORDINATE THE ENTIRE UNDERGROUND PLUMBING PIPING SYSTEM LOCATIONS AND INVERTS WITH THE GRADE BEAMS INCLUDING TRENCH DRAINS AS WELL AS ALL OTHER UNDERGROUND SYSTEMS.
- RUN ALL INTERIOR PIPING (GAS, WATER, VENTS AND WASTE) AS TIGHT TO STEEL AS POSSIBLE.
- PROVIDE TRAP PRIMERS TO ALL DRAINS ONLY WHEN REQUIRED BY CODE. VERIFY PRIOR TO SUBMITTING BID.
- REFER TO ARCHITECTURAL PLANS FOR LOCATIONS OF FIRE WALLS AND WALLS WHICH REQUIRE SEALING. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR SEALING ALL FLOOR AND WALL PENETRATIONS WITH FIRE RATED SEALANT BEFORE FINAL PAYMENT.
- PLUMBING CONTRACTOR SHALL PROVIDE AND INSTALL ALL INDIRECT WASTE PIPING - SHALL BE COPPER WITH SOLDER JOINTS.
- PLUMBING CONTRACTOR SHALL RUN ALL PIPING TO AVOID REINFORCING AT ALL COLUMN LINES.
- FOR MOUNTING HEIGHTS OF ALL PLUMBING FIXTURES, SEE ARCHITECTURAL DRAWINGS.
- ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN-LIKE MANNER IN ACCORDANCE WITH LOCAL CODES AND ALL AUTHORITIES HAVING JURISDICTION.
- VALVES SHALL NOT BE INSTALLED WITH THE OPERATING HANDLE POINTING DOWNWARD. RUN PIPING GENERALLY PARALLEL TO THE AXIS OF THE BUILDING, ARRANGED TO CONFORM TO THE BUILDING REQUIREMENTS AND TO SUIT THE NECESSITIES OF CLEARANCE OF DUCTS, FLUES, CONDUITS AND WORK OF OTHER TRADES AND CLOSE TO CEILING OR OTHER CONSTRUCTION AS PRACTICAL, FREE OF TRAPS OR BENDS.
- PLUMBING CONTRACTOR SHALL MAKE ALL FINAL CONNECTIONS TO WATER, STORM AND SANITARY LATERALS INSTALLED BY SITE CONTRACTOR.
- ALL PIPES, DUCT, CONDUIT AND OTHER PENETRATIONS OF RETURN AIR PLENUM, INCLUDING HANGERS AND SUPPORT SYSTEM PENETRATIONS OF TOP HORIZONTAL SHALL BE SEALED AIRTIGHT; DUCT PENETRATIONS SHALL BE NEATLY FRAMED WITH SHEETMETAL.
- PLUMBING CONTRACTOR SHALL REPLACE ANY PIPING SYSTEM AND COMPONENTS WHICH DO NOT PASS TESTING PROCEDURES SPECIFIED AND RETEST REPAIRED PORTIONS OF THE SYSTEM.
- PLUMBING CONTRACTOR SHALL MAKE FINAL CONNECTIONS TO ALL PLUMBING EQUIPMENT, EQUIPMENT SUPPLIED BY OTHERS, INCLUDING REQUIRED FAUCETS, STOPS, VALVES, FITTINGS, TRAPS, ETC.
- PLUMBING CONTRACTOR SHALL INSTALL PIPING SO AS NOT TO ENCRONCH ON REQUIRED CLEARANCES ABOVE ANY ELECTRIC PANEL. NO PIPING SHALL BE INSTALLED DIRECTLY OVER ELECTRICAL PANELS AND NO PIPING SHALL BE INSTALLED WITH THE BOTTOM AT LESS THAN 6" ABOVE THE 4'-0" SPACE DIRECTLY IN FRONT OF ANY ELECTRIC PANELS.
- PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL AIR CHARGERS PER NATIONAL STANDARD PLUMBING CODE ON ALL WATER SUPPLIES TO PLUMBING FIXTURES WITH QUICK CLOSING VALVES.
- PLUMBING CONTRACTOR SHALL ARRANGE FOR AND SHALL PAY ALL COSTS INCURRED FOR THE NEW GAS SERVICE AND METER.
- PIPING HANGERS SHALL BE SPACED SO AS TO PREVENT SAG AND PERMIT PROPER DRAINAGE AND SHALL NOT BE SPACED MORE THAN EIGHT FEET APART UNLESS A GREATER SPACING IS DEFINITELY INDICATED ON THE DRAWINGS. A HANGER SHALL BE PLACED WITHIN (1) FOOT OF EACH HORIZONTAL ELBOW. HANGERS SHALL BE SIZED TO FIT OVER INSULATION AND BE PROVIDED WITH AN INSULATION SHIELDS.

- THE INSTALLATION OF ALL INSULATION SHALL BE LEVEL. PIPING SYSTEMS.
- THE PLUMBING CONTRACTOR SHALL PROVIDE A COMPLETE SET OF RECORD "AS-BUILT" DRAWINGS INDICATING THE PRECISE LOCATION OF ALL SYSTEMS, EQUIPMENT CONCEALED OR EMBEDDED PIPING, PIPING CONNECTIONS AND ACCESS DOORS. THESE DRAWINGS SHALL ALSO INCLUDE ALL CHANGES AND DEVIATIONS FROM BID DOCUMENTS.
- ALL MATERIALS OF INSULATION SHALL BE OF THE TYPE AND QUALITY AS MANUFACTURED BY ARMSTRONG, CERTAINTED, OWENS-CORNING OR SCHUELER.
- ALL MATERIAL AND EQUIPMENT SPECIFIED TO BE INSULATED SHALL BE THOROUGHLY TESTED AND APPROVED PRIOR TO APPLYING THE INSULATION.
- PLUMBING CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR TO ASSURE DOMESTIC WATER AND ELECTRICAL WIRING ARE NOT INSTALLED IN SAME STUD BAY IN WALLS AND CEILINGS.
- ALL PIPING IN RETURN AIR PLENUMS SHALL BE CAST IRON OR CPVC. PVC PIPING IS PROHIBITED IN RETURN AIR PLENUMS.
- DRAINAGE SYSTEM TEST
 - A WATER TEST: THE ENTIRE DRAINAGE AND VENTING SYSTEM SHALL HAVE ALL NECESSARY OPENINGS PLUGGED TO PREVENT THE ENTIRE SYSTEM TO BE FILLED WITH WATER TO THE LEVEL OF THE HIGHEST VENT STACK ABOVE THE ROOF. THE SYSTEM SHALL HOLD THIS WATER FOR 30 MINUTES WITHOUT LEAKAGE. WHERE A "PORTION" OF THE SYSTEM IS TO BE TESTED, THE TEST SHALL BE CONDUCTED IN THE SAME MANNER, EXCEPT THAT A VERTICAL STACK 10 FEET ABOVE THE HIGHEST HORIZONTAL LINE TO BE TESTED SHALL BE INSTALLED AND FILLED WITH WATER TO MAINTAIN SUFFICIENT PRESSURE, OR A PUMP MAY BE USED TO SUPPLY THE PRESSURE. THE PRESSURE SHALL BE MAINTAINED FOR 30 MINUTES.
 - AIR TEST: IF TEST IS DONE WITH AIR, A PRESSURE OF 5 PSIG SHALL BE APPLIED WITH A FORCE PUMP AND MAINTAINED AT LEAST 15 MINUTES WITHOUT LEAKAGE. A MERCURY-COLUMN GAGE REGISTERING 10" IN HEIGHT SHALL BE USED IN THE AIR TEST. AIR TESTS SHALL NOT BE USED EXCEPT WHERE PERMITTED BY CODES AND WHEN AMBIENT TEMPERATURES ARE LESS THAN 32 DEGREES FAHRENHEIT FOR 30 MINUTES.
- DOMESTIC WATER PIPING SYSTEM

UPON COMPLETION OF THE ROUGH-IN AND BEFORE INSULATION OR SETTING OF FIXTURES, DOMESTIC HOT AND COLD WATER PIPING SYSTEMS SHALL BE TESTED AT A HYDROSTATIC PRESSURE OF 1-1/2 TIMES THE ACTUAL WATER PRESSURE BUT NOT LESS THAN 100 PSIG AND PROVEN TIGHT AT THIS PRESSURE FOR NOT LESS THAN 3 HOURS.
- CLEANING OF PIPING SYSTEMS

FOLLOWING THE COMPLETION OF SYSTEM TESTS, ALL PIPING SYSTEMS SHALL BE THOROUGHLY CLEANED BY THE CONTRACTOR BY FLUSHING WITH WATER OR AS OTHERWISE SPECIFIED. ALL DIRT, SCALE, OIL, GREASE AND FOREIGN SUBSTANCES WHICH MAY HAVE ACCUMULATED IN THE SYSTEMS DURING INSTALLATION SHALL BE COMPLETELY REMOVED.
- STERILIZATION OF POTABLE WATER SYSTEMS
 - BEFORE BEING PLACED IN SERVICE, THE COMPLETE DOMESTIC HOT AND COLD WATER PIPING WITHIN THE BUILDING SHALL BE STERILIZED IN ACCORDANCE WITH THE LATEST ISSUE OF AWWA SPECIFICATION C-651 AND PER NATIONAL STANDARD PLUMBING CODE SECTION 10.9. THE PIPING SHALL BE FILLED WITH A WATER-CHLORINE SOLUTION CONTAINING AT LEAST 50 PARTS PER MILLION OF CHLORINE AND SHALL BE VALVED OFF FOR 24 HOURS OR FILLED WITH A WATER-CHLORINE SOLUTION CONTAINING AT LEAST 200 PARTS PER MILLION OF CHLORINE AND ALLOWED TO STAND FOR AT LEAST 3 HOURS. FOLLOWING THE ALLOWED STANDING TIME, THE SYSTEM SHALL BE FLUSHED WITH POTABLE WATER UNTIL NO CHLORINE REMAINS IN THE SYSTEM.
 - PRIOR TO STERILIZATION, SYSTEMS SHALL BE LEAK TESTED AND ALL DIRT AND FOREIGN MATTER SHALL BE REMOVED BY A THOROUGH FLUSHING WITH WATER.
- ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO PERFORM STARTUP SERVICES. COMPLETE INSTALLATION AND STARTUP CHECKS SHALL BE ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND STARTUP REPORTS SHALL BE PROVIDED TO ARCHITECT/ENGINEER FOLLOWING COMPLETION. STARTUP SHALL BE PROVIDED FOR ALL EQUIPMENT SUPPLIED OR INSTALLED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
 - A. WATER HEATERS
 - B. PUMPS
 - C. COMPRESSORS
 - D. CONTROLS

Revisions	
No.	Description
11/17/21	ISSUED FOR BID

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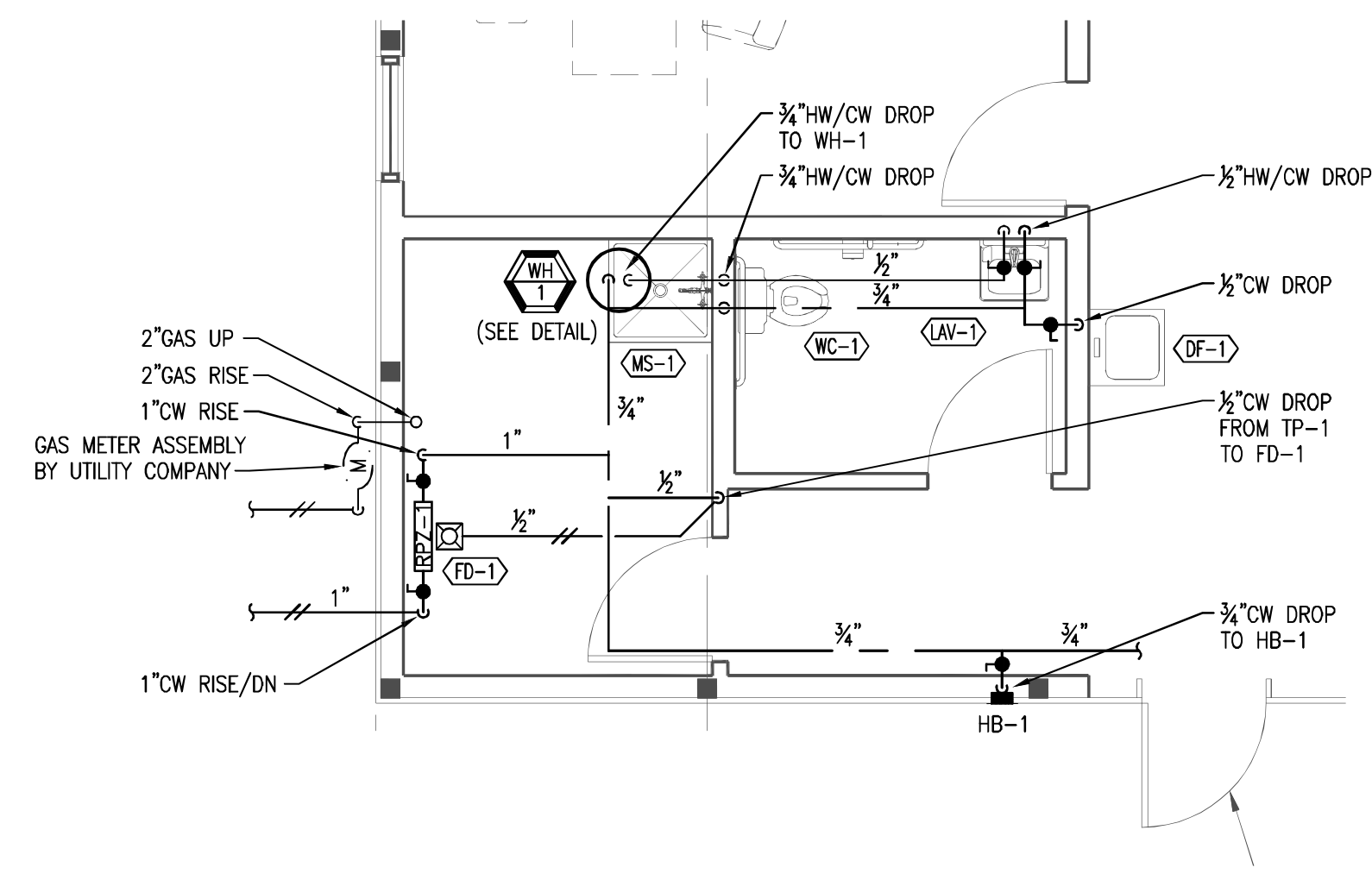
David G. Manders AIA A-07220
Lawrence J. Merighi AIA A-01973
Ronald P. Portadin AIA A-19058
Peter W. Farrell AIA A-19616

Project
NEW MAINTENANCE BUILDING
FOR
ATLANTIC COUNTY
INSTITUTE OF TECHNOLOGY
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MAYS LANDING, NJ 08330

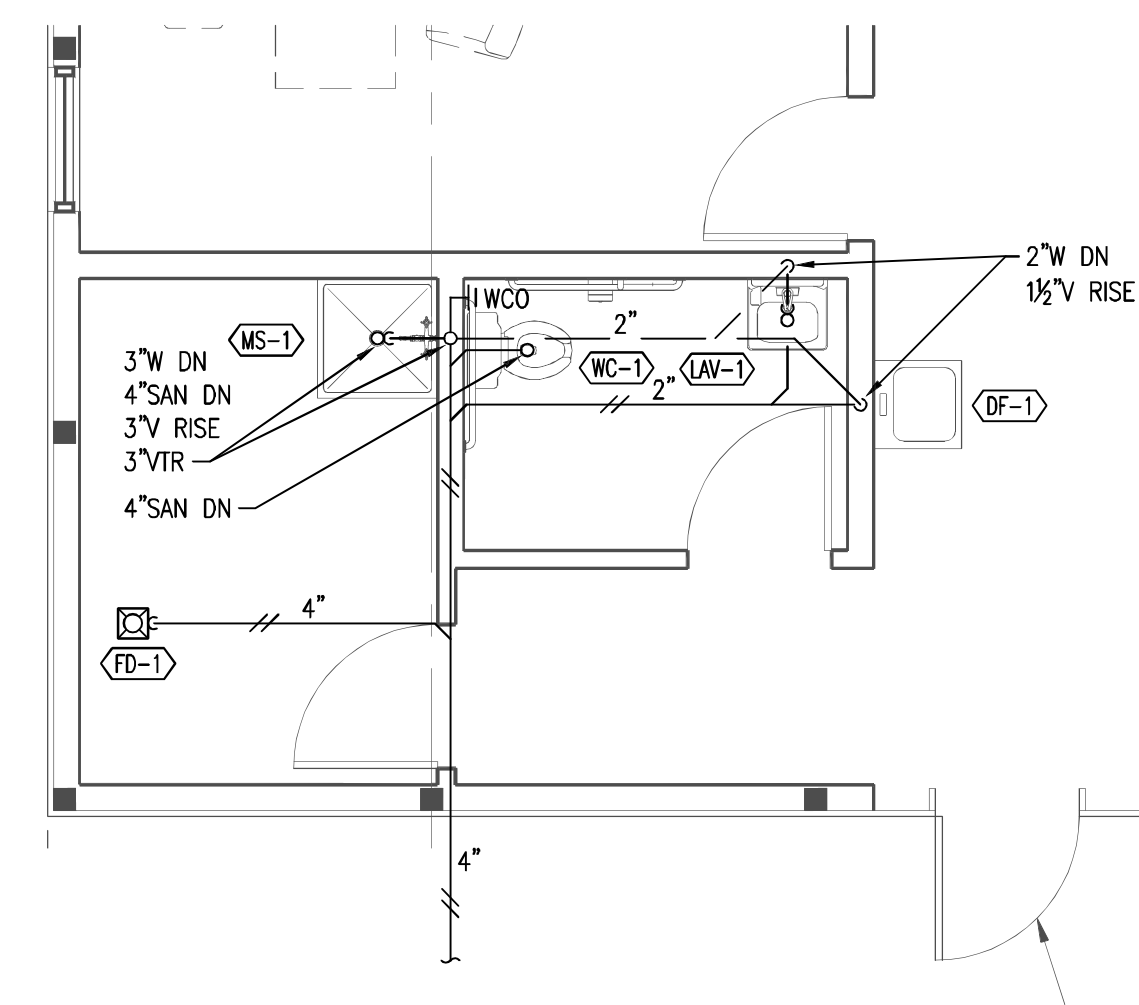
Drawing		
PLUMBING COVER SHEET		
Scale	Job	Sheet
AS NOTED	19033	P0.0
Drawn	Date	
WC	11/17/21	

GENERAL FIRESTOPPING NOTE

CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING OR EXCEEDING WALL/CEILING/FLOOR ASSEMBLY RATINGS FOR ALL PENETRATIONS. CONTRACTOR SHALL VERIFY LOCATION AND RATING OF ALL FIRE ASSEMBLIES AND PROVIDE INTUMESCENT COLLARS AT ALL PENETRATIONS AND FIRE RATED CAULKING AS REQUIRED.



03 PARTIAL FLOOR PLAN - SERVICES
SCALE: 1/4" = 1'-0"

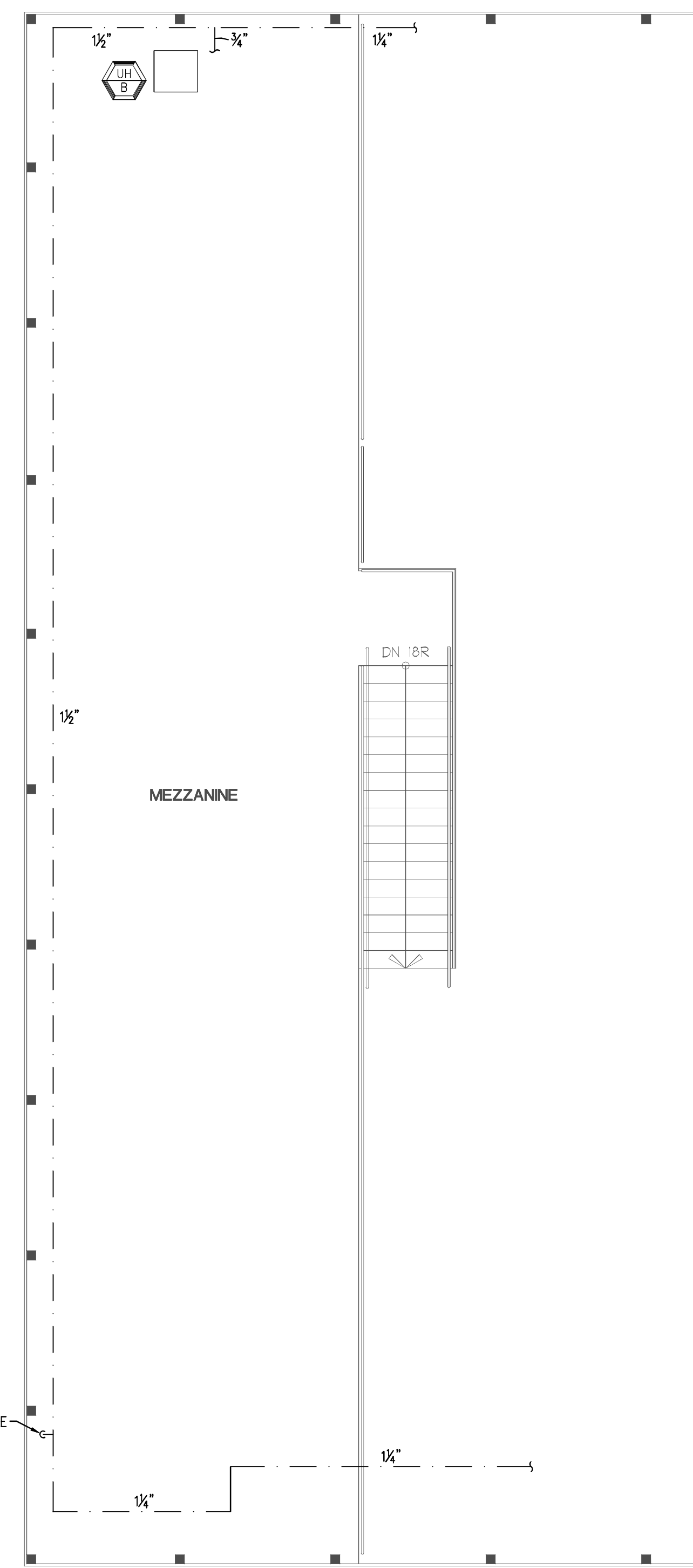


04 PARTIAL FLOOR PLAN - SANITARY
SCALE: 1/4" = 1'-0"

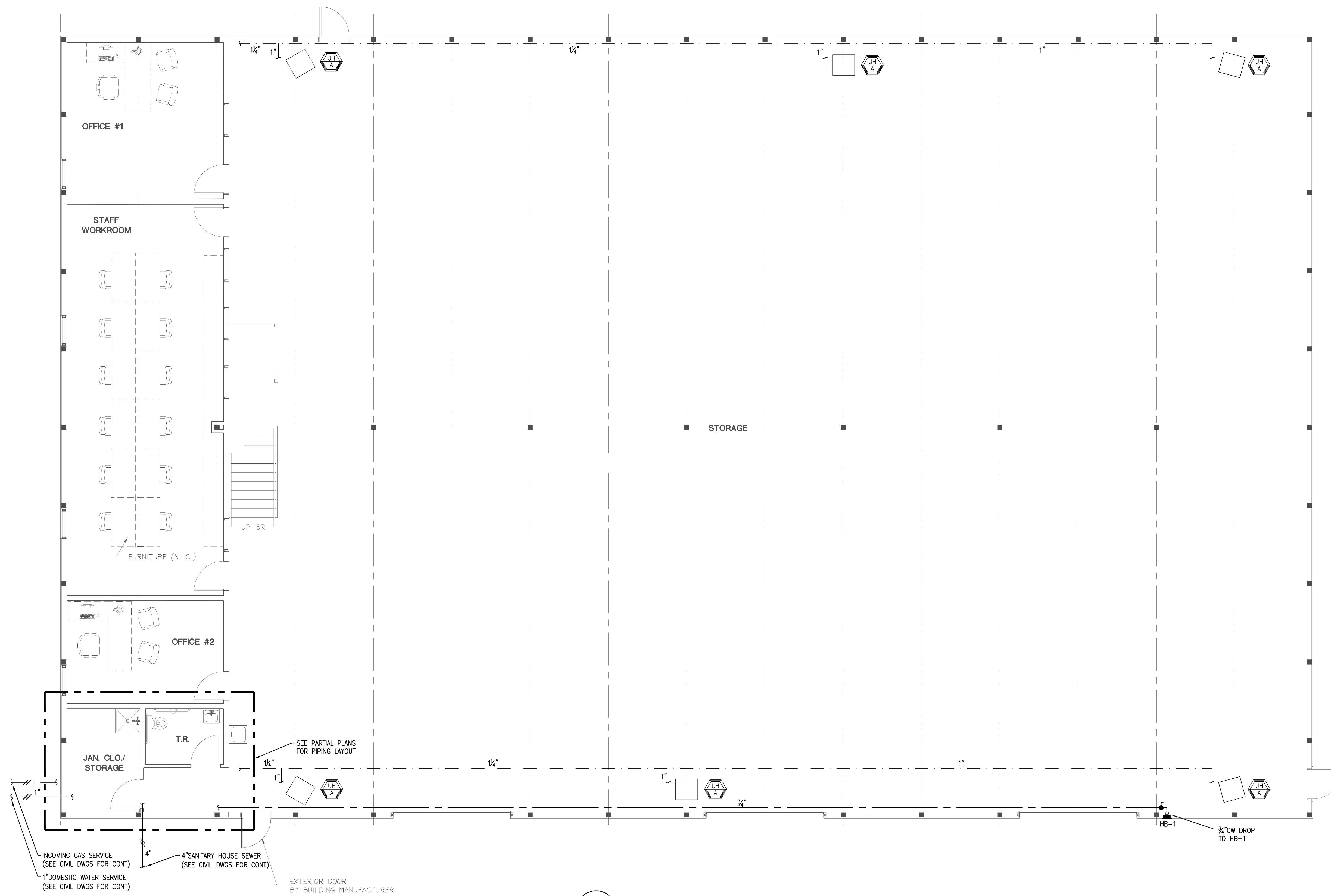
- DRAWING NOTES:
- DRAWINGS ARE DIAGRAMMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOID INTERFERENCES ENCOUNTERED.
 - CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.
 - SEE RISER DIAGRAMS FOR ADDITIONAL INFORMATION.

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02 MEZZANINE FLOOR PLAN - PLUMBING
SCALE: 3/16" = 1'-0"



01 FLOOR PLAN - PLUMBING
SCALE: 3/16" = 1'-0"

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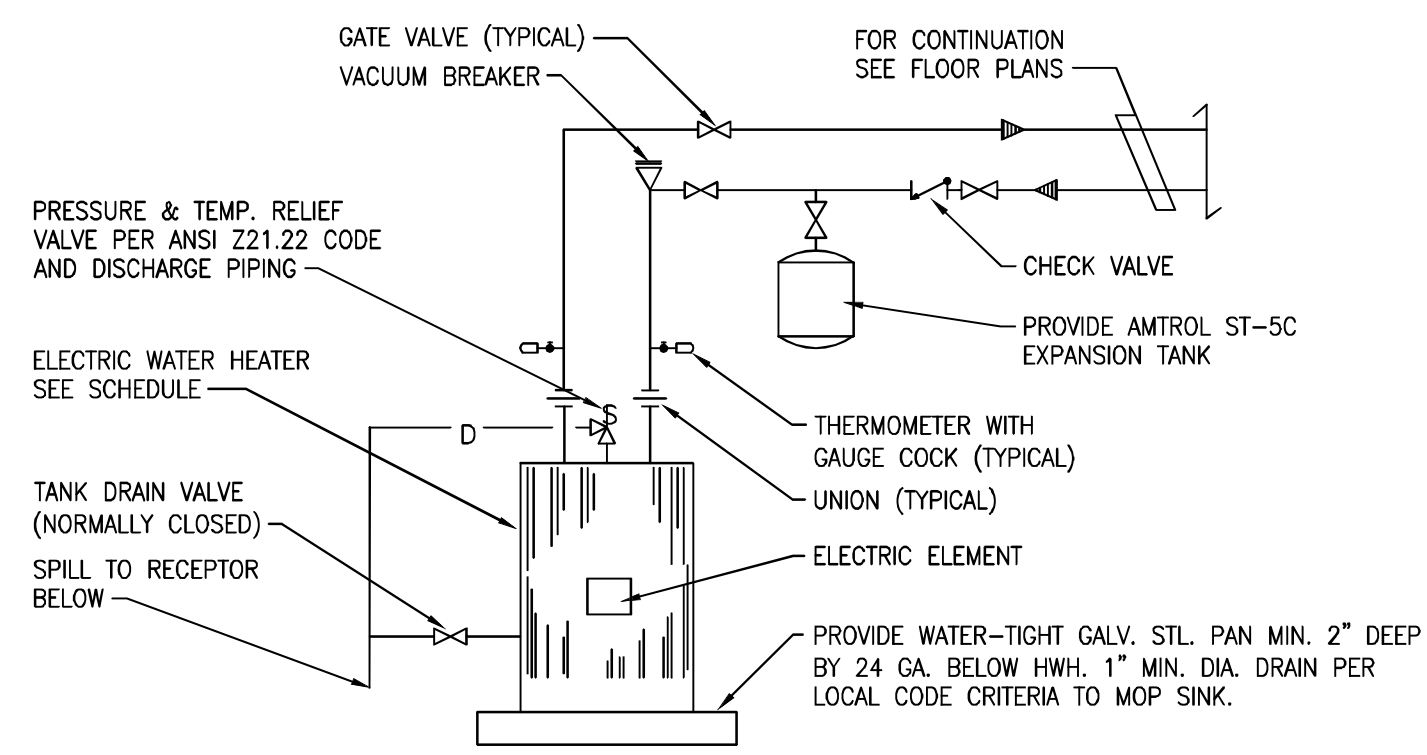
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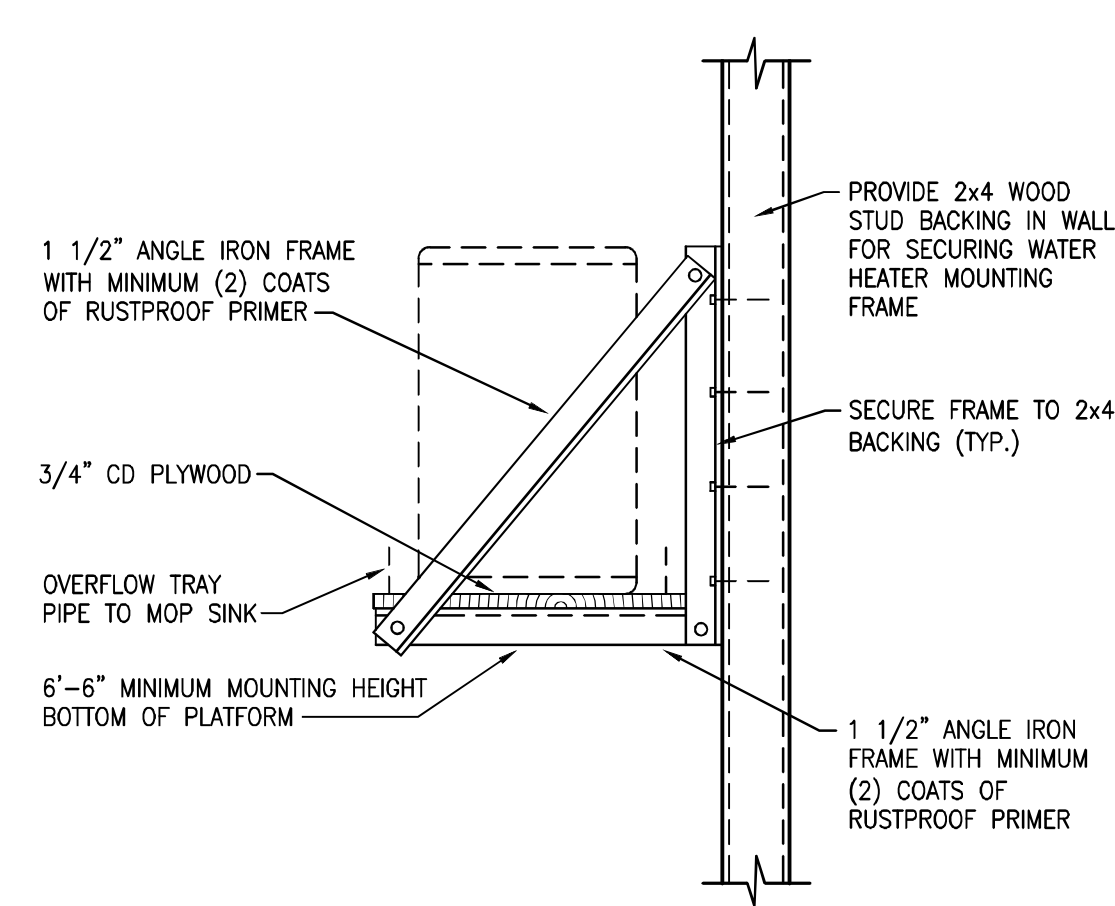
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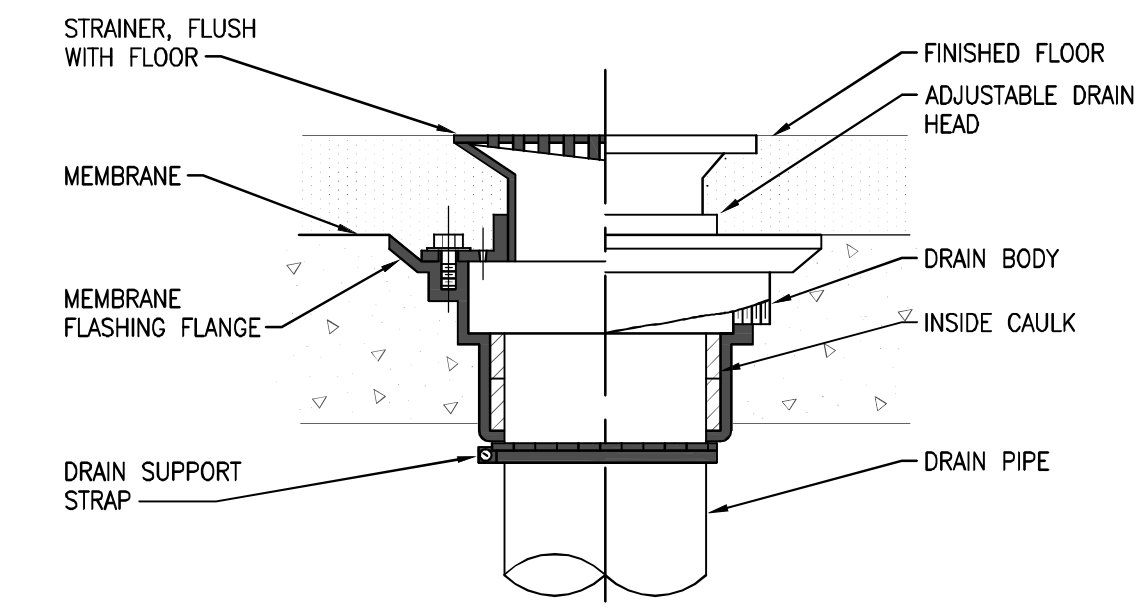
Drawing		
PLUMBING FLOOR PLANS		
Scale	Job	Sheet
AS NOTED	19033	P1.0
Drawn	Date	
WC	11/17/21	



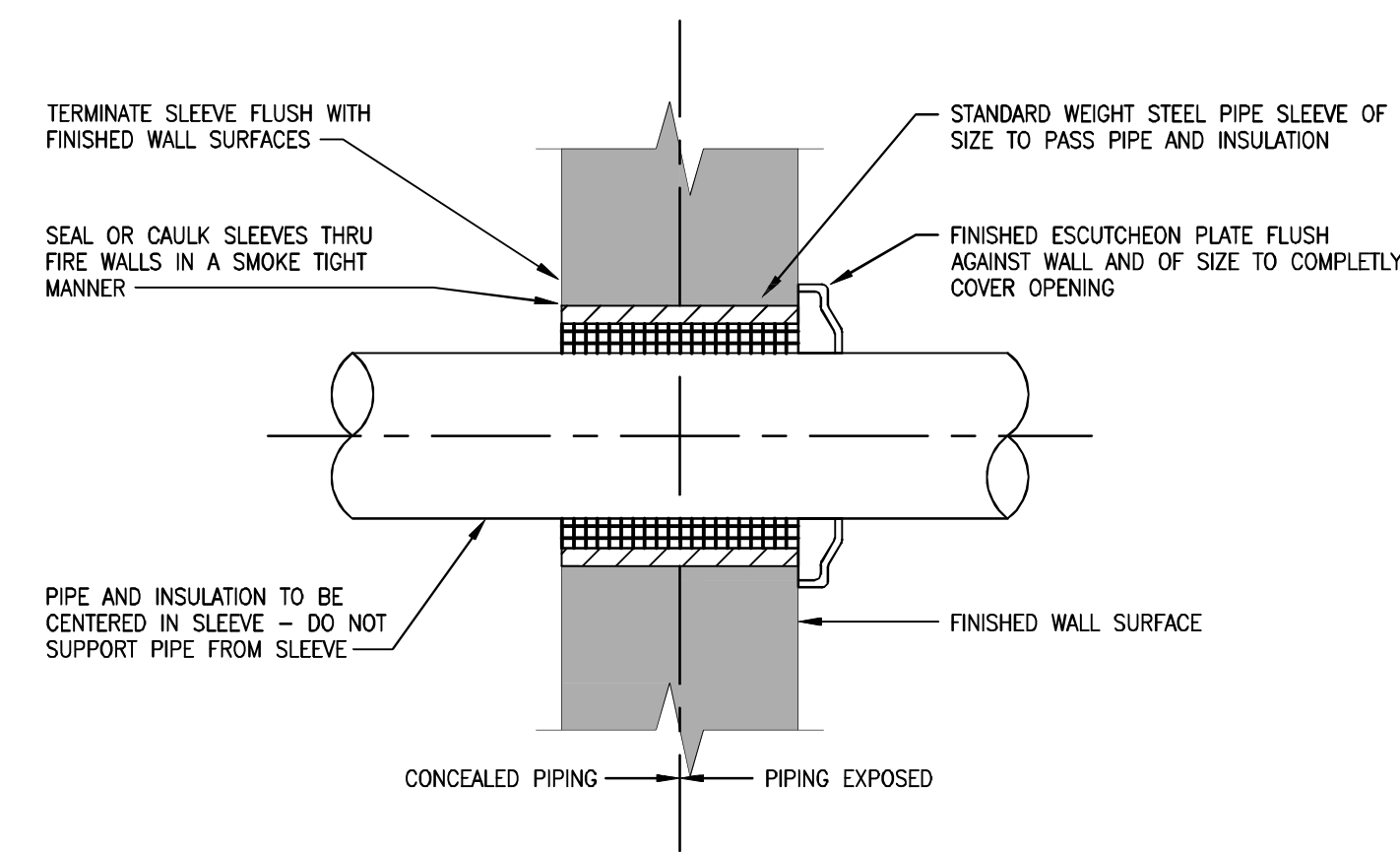
01 WALL HUNG ELECTRIC WATER HEATER DETAIL
SCALE: N.T.S.



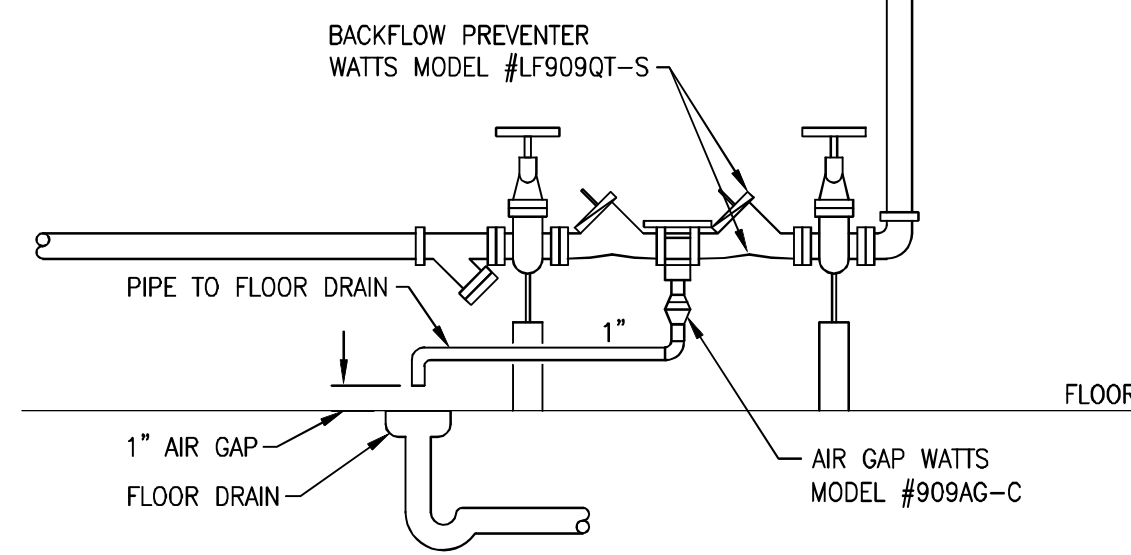
02 GAS PIPING EQUIPMENT CONNECTION DETAIL
SCALE: N.T.S.



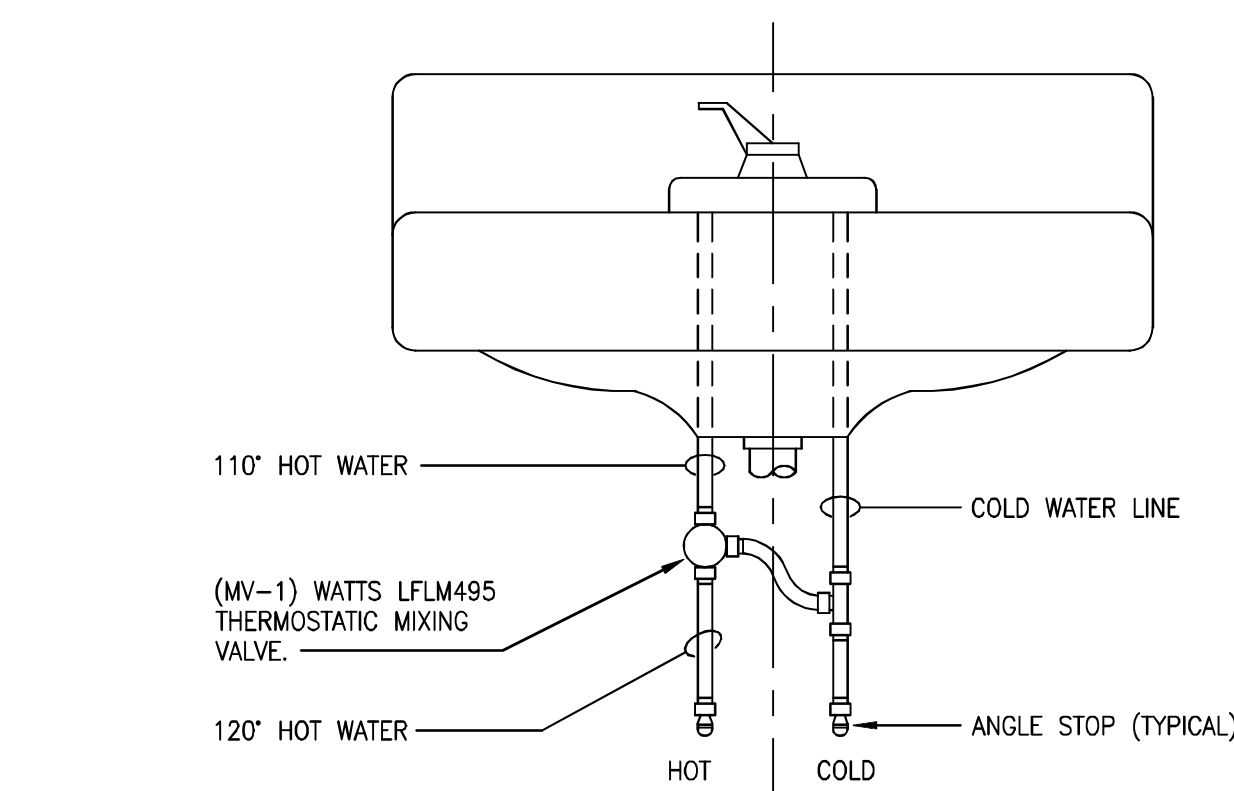
03 FLOOR DRAIN DETAIL
SCALE: N.T.S.



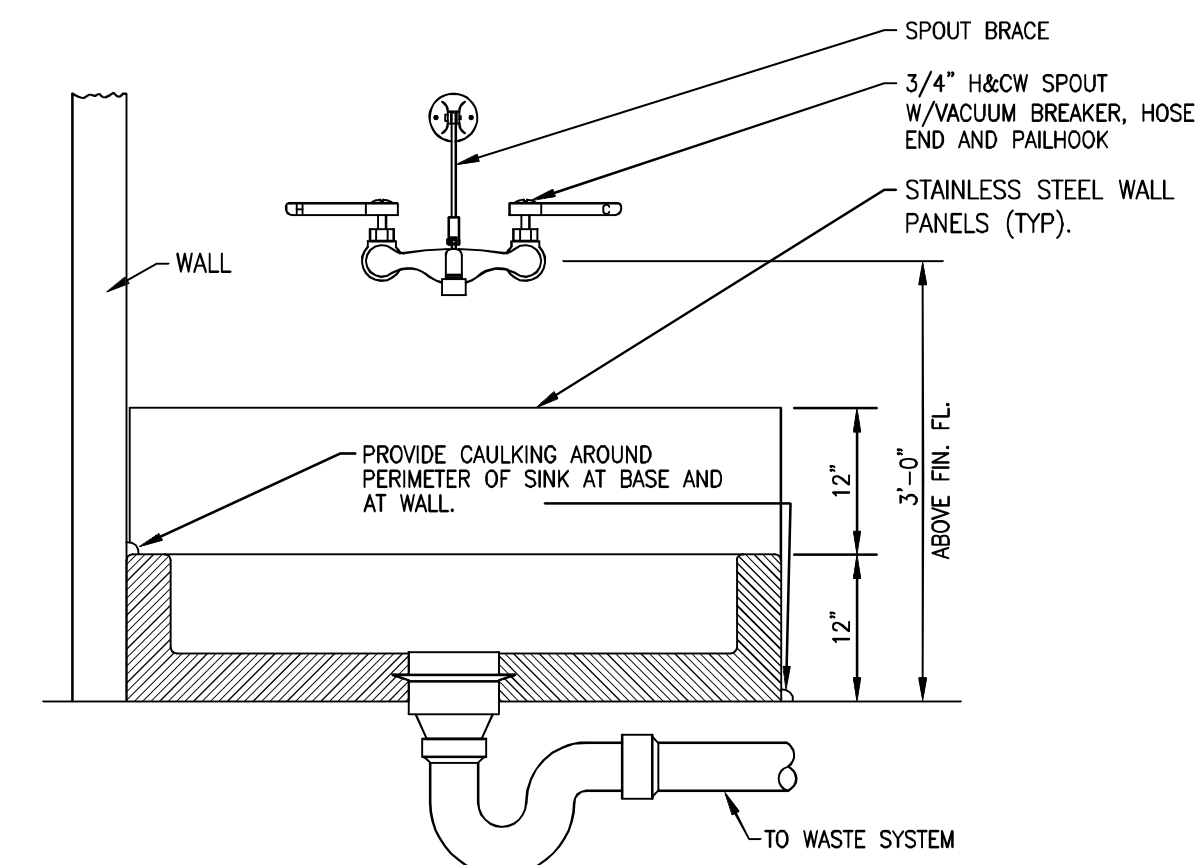
04 PIPE SLEEVE THRU WALL DETAIL
SCALE: N.T.S.



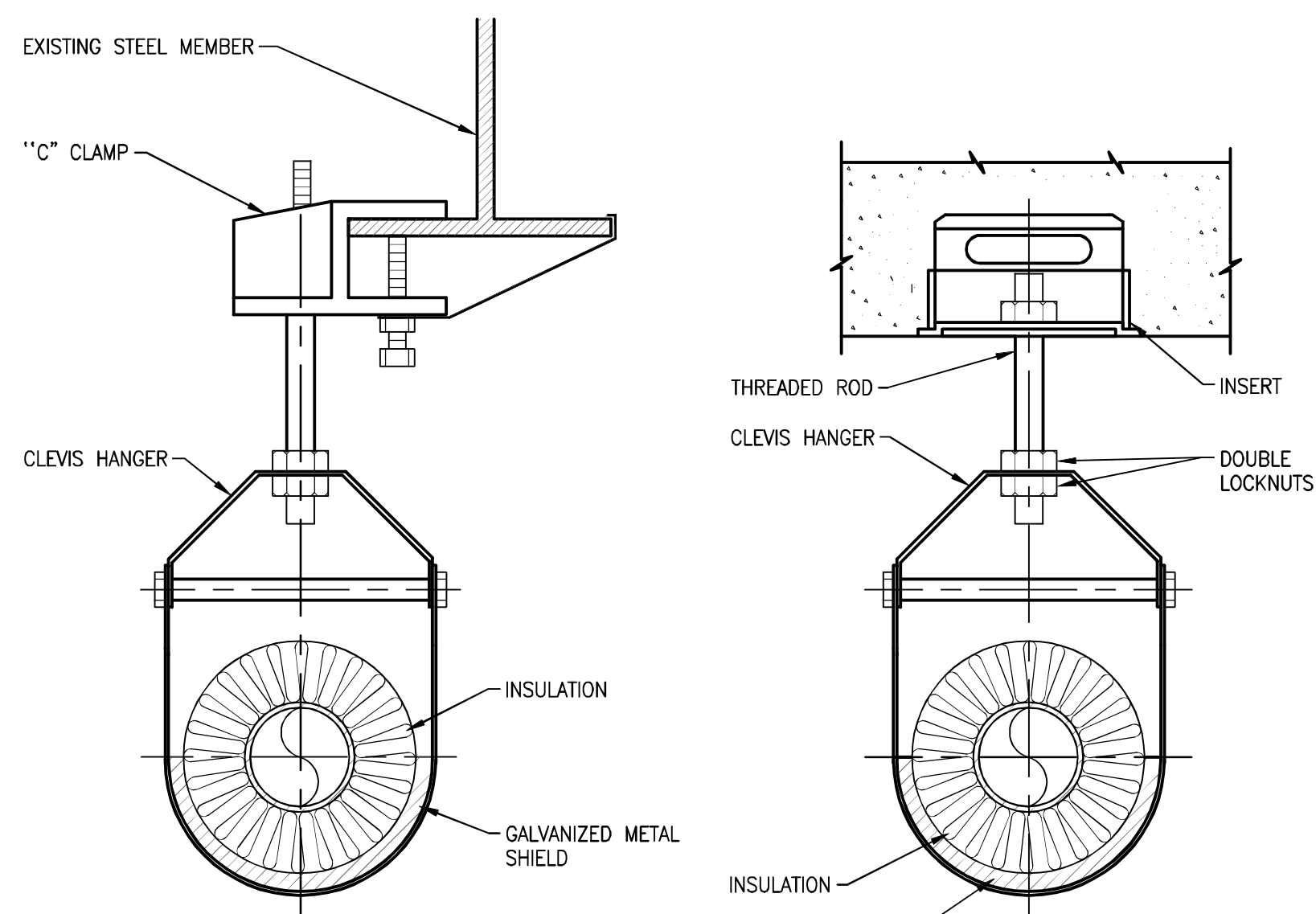
05 BACKFLOW PREVENTER DETAIL
SCALE: N.T.S.



06 MIXING VALVE BELOW SINK DETAIL
SCALE: N.T.S.



07 MOP SINK DETAIL
SCALE: N.T.S.

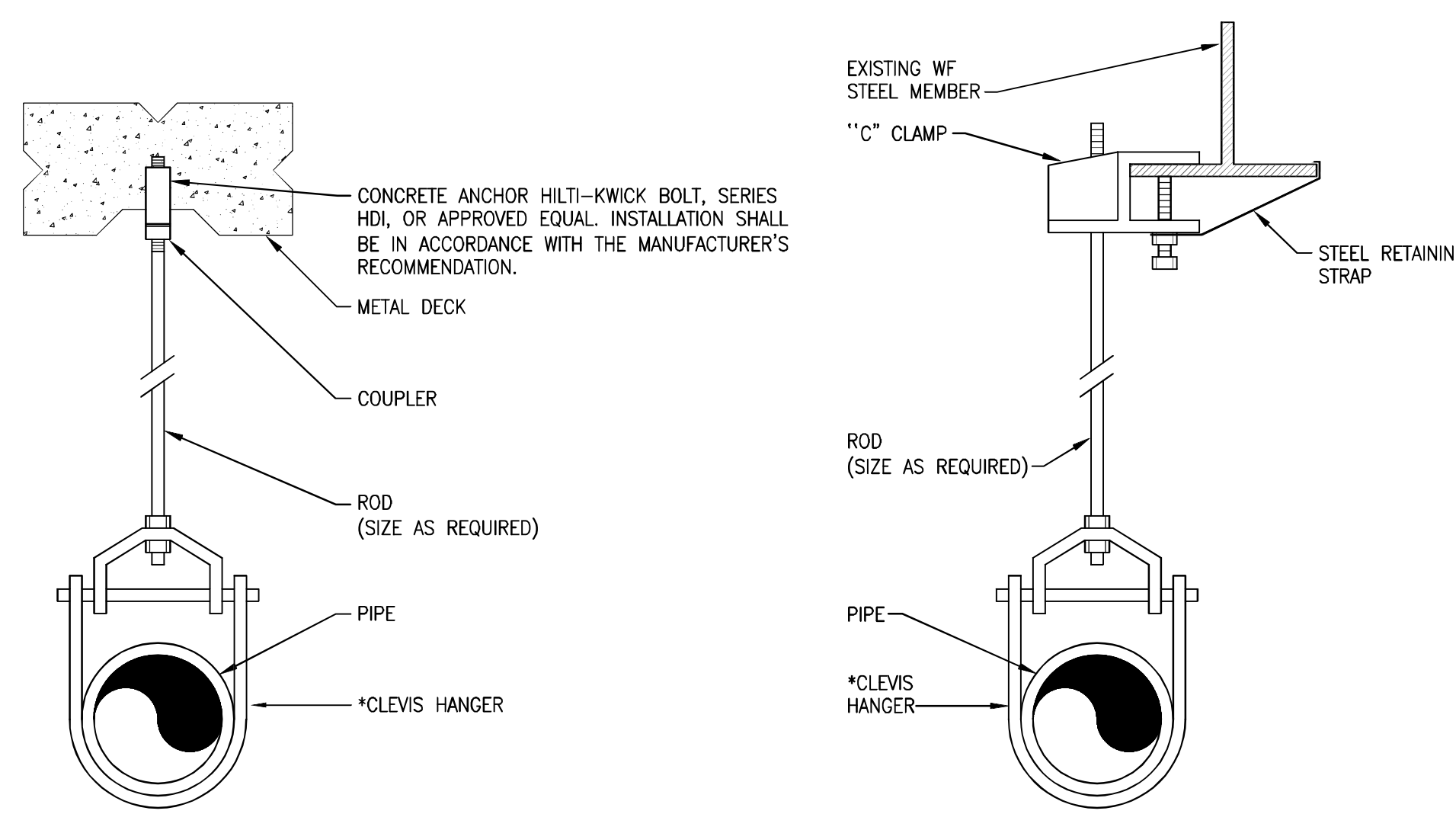


08 TYPICAL INSULATED PIPING SUPPORT DETAIL
SCALE: N.T.S.

WITH INCOMPRESSIBLE INSULATING BLOCK AT HANGER		
PIPE DIAMETER	SHIELD LENGTH	SHIELD THICKNESS USSG
UP TO 3"	6"	18
4" TO 6"	8"	16
8" & LARGER	12"	16

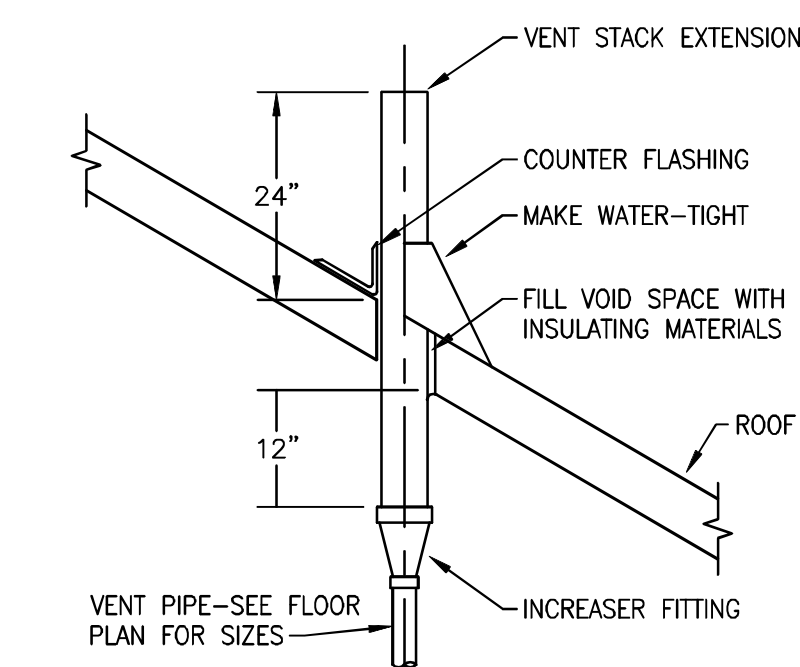
WITHOUT INCOMPRESSIBLE INSULATING BLOCK AT HANGER		
PIPE DIAMETER	SHIELD LENGTH	SHIELD THICKNESS USSG
UP TO 3"	12"	18
4"	15"	16
5"	18"	16
6"	21"	16
8" & LARGER	24"	14

NOTE:
HANGER, ROD & INSERT SHALL BE DIPPED IN ZINC CHROMATE PRIMER PRIOR TO INSTALLATION



09 TYPICAL HANGER DETAIL
SCALE: N.T.S.

*CLEVIS HANGERS REQUIRED ON PIPING 1-1/4" OR LARGER. GENERAL PURPOSE HANGERS MAY BE USED ON PIPING 1" OR SMALLER.



- NOTES:
- MINIMUM SIZE OF VENT EXTENSION THROUGH ROOF TO BE 3", CHANGE OF DIAMETER TO BE MADE AT LEAST 12" BELOW ROOF.
 - VENT PIPE TO EXTEND 24" ABOVE ROOF AND TO BE SEALED WATERTIGHT BY PROPER FLASHING.
 - ALL VENT RISERS SHALL BE OFFSET AS REQUIRED TO CLEAR ROOF STRUCTURE DUCTWORK OR MECH. ROOFTOP UNITS.
 - PLUMBING CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES.
 - ROOFING CONTRACTOR SHALL SUPPLY BOOT FLASHING FOR RUBBER ROOF SYSTEMS.
 - VENT STACK OUTLET TO BE 10 FT. (MIN) FROM ANY INTAKES, WINDOWS, WALL OR STRUCTURE OR 2 FT. ABOVE STRUCTURE.
 - PROVIDE PROTECTION FOR PVC PIPING EXPOSED TO UV PER MANUFACTURERS DIRECTION, ARCHITECT TO SELECT COLOR.

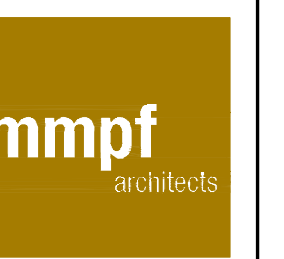
10 VENT THRU ROOF DETAIL
SCALE: N.T.S.

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MAYS LANDING, NJ 08330

Drawing
PLUMBING DETAILS

Scale AS NOTED
Job 19033
Sheet **P3.0**
Drawn WC
Date 11/17/21

PLUMBING SPECIFICATIONS

1. GENERAL

A. THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," "AIA DOCUMENT A001, LATEST EDITION," AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.

B. ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIAL WHICH VIOLATES ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.

C. INVESTIGATE EACH SPACE THROUGH WHICH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES OF DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.

D. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. PIPE ROUTING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF PIPE TO AVOID OBSTRUCTIONS. COORDINATION WITH THE EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES IS REQUIRED. MAINTAIN HEADROOM AND SPACE CONDITIONS.

E. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES, WHICH INVOLVE EXTRA COST, SHALL NOT BE MADE WITHOUT APPROVAL.

F. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.

G. CONNECTIONS TO EXISTING WORK: INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS OF EXISTING SERVICES SHALL BE PERFORMED AT NO ADDITIONAL CHARGES, AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION OF EXISTING FACILITIES AND ONLY WITH WRITTEN CONSENT OF OWNER. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND ACCEPTABLE MANNER. RESTORE EXISTING DISTURBED WORK TO ORIGINAL CONDITION.

H. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.

I. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.

J. THE LOCATIONS OF THE EXISTING SERVICES ARE BELIEVED TO BE AS INDICATED ON THE DRAWINGS. THE CONTRACTOR SHALL VERIFY THE ACTUAL LOCATION OF THESE SERVICES AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO COMMENCING ANY WORK.

K. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH AN APPROVED NON-SHRINKING FIRE PROOF CAULKING OR OTHER APPROVED NONCOMBUSTIBLE MATERIAL.

L. PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPING AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AS REQUIRED.

M. ALL PRESENT MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS. REMOVED EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.

N. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.

O. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.

P. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFOR SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.

Q. UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.

R. ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.

S. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. THE CONTRACTOR IS RESPONSIBLE TO INDICATE ANY DISCREPANCIES BETWEEN THE CONTRACT DRAWINGS AND ACTUAL FIELD CONDITIONS PRIOR TO SUBMITTAL OF BID. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING PIPE SIZES, CLEARANCES, ETC. AND CONDITIONS.

T. INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.

U. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, TESTED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.

V. PROVIDE ALL REQUIRED CUTTING, PATCHING, EXCAVATING AND BACKFILL.

C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OF ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER INCLUDED UNDER THE VARIOUS PARTS OF THE WORK. WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.

D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH THE DEPARTMENT HAVING JURISDICTION, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFOR. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.

3. SHOP DRAWINGS

A. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT PROVIDE COMPLETE SET OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, INDICATING CAPACITY DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.

B. INDICATE ON EACH SHOP DRAWINGS SUBMITTED

- PROJECT NAME AND LOCATION
- NAME OF ARCHITECT AND ENGINEER
- ITEM IDENTIFICATION
- APPROVAL STAMP OF PRIME CONTRACTOR

C. SUBMISSIONS

- SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND TWO COPIES. OTHERWISE, HE SHALL SUBMIT THREE COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.
- SUBMISSIONS LARGER THAN 11 IN. X 17 IN.: SUBMIT TWO PRINTS AND ONE PAPER SEPIA TO THE ARCHITECT. THE ARCHITECT WILL FORWARD ONE PRINT AND THE PAPER SEPIA TO THE ENGINEER.

D. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:

- PIPE AND FITTINGS
- VALVES
- PLUMBING FIXTURES AND TRIM
- PIPING LAYOUTS
- SUPPORTS, HANGERS AND GUIDES
- INSULATION
- WATER HEATERS
- FLOOR DRAINS

E. COORDINATION

- THE CONTRACTOR SHALL ASSURE FULL COOPERATION OF ALL TRADES AND SHALL FURNISH IN WRITING ALL INFORMATION NECESSARY TO PERMIT THE WORK OF ALL TRADES TO BE INSTALLED SATISFACTORILY AND WITH LEAST POSSIBLE INTERFERENCE OR DELAY.
- PREPARE COORDINATED COMPOSITE DRAWINGS AT A SUITABLE SCALE (NOT LESS THAN 1/4-INCH EQUALS ONE FOOT, ZERO INCHES, CLEARLY SHOWING HOW THE WORK OF THIS DIVISION IS TO BE INSTALLED IN RELATION TO THE WORK OF ALL TRADES. ANY WORK INSTALLED IN CONFLICT WITH THE WORK OF OTHER TRADES SHALL BE CORRECTED AT NO ADDITIONAL COST TO THE OWNER.
- THE CONTRACTOR MAY, SUBJECT TO THE ACCEPTANCE OF THE ARCHITECT AND WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF ALL TRADES OR FOR THE PROPER EXECUTION OF THE WORK.
- PLUMBING DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT. COORDINATE WITH THE ARCHITECTURAL DRAWINGS AND DETAILS FOR EXACT LOCATION OF DUCTWORK, PIPING AND EQUIPMENT.
- THE CONTRACTOR SHALL FOLLOW DRAWINGS IN LAYOUT WORK AND SHALL COORDINATE ALL TRADES TO VERIFY SPACES IN WHICH WORK SHALL BE INSTALLED. MAINTAIN MAXIMUM HEADROOM OR SPACE CONDITIONS, WHERE SPACE CONDITIONS APPEAR INADEQUATE, THE ARCHITECT SHALL BE NOTIFIED BEFORE INSTALLATION. DO NOT PROCEED WITH THE INSTALLATION UNTIL RECEIVING CLARIFYING INSTRUCTIONS.

4. AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS

A. UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.

B. THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE RING BINDERS WITH CLEAR ACETATE COVERS. CONTRACTOR SHALL GIVE TO THE ARCHITECT AND INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.

C. THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.

D. REPRODUCIBLE "AS-BUILT" DRAWINGS SHALL BE PROVIDED INDICATING THE AS INSTALLED CONDITIONS OF THE WORK. "AS-BUILT" DRAWINGS SHALL BE PROVIDED TO THE ARCHITECT AFTER COMPLETION OF THE INSTALLATION.

5. GENERAL PROVISIONS FOR PLUMBING WORK

A. SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.

B. DEFINITIONS

- "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
- "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
- "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.

4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.

5) "WIRING": RACEWAY, FITTINGS, WIRE, BOXES AND RELATED ITEMS.

6) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.

7) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.

8) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

C. QUALITY ASSURANCE

- QUALITY AND GAUGE OF MATERIALS: NEW, BEST OF THEIR RESPECTIVE KINDS, FREE FROM DEFECTS AND LISTED BY UNDERWRITERS LABORATORIES, INC. OR BEARING THEIR LABEL. MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.
- GUARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE OF WORK.

D. PRODUCT DELIVERY, STORAGE AND HANDLING

- MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CARTED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE SPACES.
- ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS SHALL BE PERMITTED. CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE WITHOUT REVIEW. GROUP CONCEALED ELECTRICAL EQUIPMENT REQUIRING ACCESS WITH EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.

E. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALED CONTAINERS AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL BE AS SELECTED. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES. AFTER FABRICATION, UTILIZE HOT DIPPED GALVANIZED OR DIPPED IN ZINC CHROMATE FOR OUTLET BOXES, JUNCTION BOXES, CONDUIT HANGERS, RODS, INSERTS AND SUPPORTS. RED LEAD OR ZINC CHROMATE WITH FINISH TO MATCH SURROUNDINGS SHALL BE USED FOR MARRED SURFACES OF STEEL EQUIPMENT AND RACEWAYS. A FIELD-APPLIED ZINC CHROMATE PRIME COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.

F. BRUSH AND CLEAN WORK PRIOR TO CONCEALING, PAINTING AND ACCEPTANCE. PAINTED EXPOSED WORK SOILED OR DAMAGED, CLEAN AND REPAIR TO MATCH ADJOINING WORK BEFORE FINAL ACCEPTANCE. REMOVE DEBRIS FROM INSIDE AND OUTSIDE OF MATERIAL AND EQUIPMENT.

G. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL PLUMBING FIXTURES SHALL BE VERIFIED BY ARCHITECT.

H. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.

6. PIPE AND FITTINGS

A. SANITARY DRAINAGE AND VENT

- SERVICE WEIGHT HUB AND SPOOT CAST IRON SOIL PIPE AND FITTINGS WITH LEAD AND SPOUT JOINTS.
- HURBLESS CAST IRON SOIL PIPE AND FITTINGS WITH EXTRA WIDE HEAVY-DUTY GASKETED HUBLESS COUPLINGS FOR FOOD SERVICE APPLICATIONS.
- PVC PIPE: ASTM D 2665, SOLID-WALL DRAIN, WASTE, AND VENT.
 - PVC SOCKET FITTINGS, ASTM D 2665, SOCKET TYPE, MADE TO ASTM D 3311, DRAIN, WASTE, AND VENT PATTERNS.
 - PROVIDE ALL LONG RADIUS FITTINGS FOR ALL SANITARY TIED INTO PROCESSING SYSTEM.
 - PERMITTED IN NON-AIR PLENUM APPLICATIONS OR LOCATIONS.

B. DOMESTIC WATER

- TYPE L HARD COPPER TUBING WITH CAST BRONZE OR WROUGHT COPPER FITTINGS AND 95/5 TIN ANTIMONY SOLDER JOINTS.
- STANDARD WEIGHT RED BRASS PIPE WITH STANDARD WEIGHT CAST BRONZE THREADED FITTINGS.
- CROSSLINKED POLYETHYLENE (PEX)
 - ZURN, WATTS OR VIEGA
 - FITTINGS: BRASS COMPRESSION CONNECTION.
 - MANIFOLD: MANIFOLD DISTRIBUTION
 - ALL PIPING, VALVES AND FITTINGS SHALL BE LEAD FREE.

C. ALL EXPOSED PIPE AND FITTINGS SHALL BE CHROME-PLATED BRASS.

D. ALL EXPOSED PIPING PASSING THROUGH WALLS, FLOORS, CEILINGS, AND PARTITIONS SHALL BE PROVIDED WITH CHROME PLATED CAST BRASS ESCUTCHEONS HELD IN PLACE WITH SET SCREWS.

E. FUEL GAS

- STEEL PIPE: ASTM A 53, TYPE E OR S; GRADE B; SCHEDULE 40; BLACK.
 - MALLEABLE-IRON THREADED FITTINGS: ASTM B16.3, CLASS 150, STANDARD PATTERN, WITH THREADED ENDS ACCORDING TO ASTM B120.1.
 - UNIONS: ASTM B16.39, CLASS 150, MALLEABLE IRON WITH BRASS-TO-IRON SEAT, GROUND JOINT, AND THREADED ENDS ACCORDING TO ASTM B120.1.
 - CAST-IRON FLANGES AND FLANGED FITTINGS: ASTM B16.1, CLASS 125.
- INSTALL MECHANICAL SLEEVE SEAL AT EACH PENETRATION THROUGH FOUNDATION WALL AND BETWEEN REFRIGERATED AND NON-REFRIGERATED SPACES. SELECT NUMBER OF INTERLOCKING RUBBER LINKS REQUIRED TO MAKE INSTALLATION WATER TIGHT.

G. CONDENSING GAS-FIRED FURNACE AND WATER HEATER VENT MATERIALS

- CPVC PLASTIC, SCHEDULE 40 PIPE: ASTM F 441/F 441M.
 - CPVC PLASTIC, SCHEDULE 40 FITTINGS: ASTM F 438, SOCKET TYPE.
 - CPVC SOLVENT CEMENT: ASTM F 493.
 - VENT AND OUTSIDE-AIR CONNECTION, GAS-FIRED EQUIPMENT: CONNECT PLASTIC PIPING VENT MATERIAL TO UNITS CONNECTIONS AND EXTEND OUTDOORS. TERMINATE VENT OUTDOORS WITH A CAP OR CONCENTRIC VENT AND IN AN ARRANGEMENT THAT WILL PROTECT AGAINST ENTRY OF BIRDS, INSECTS, AND DIRT.
 - VENT TERMINATION SCHEDULE:
 - ROOF MOUNT: 3-IN CONCENTRIC VENT SIMILAR TO DIVERSITECH CVENT-3MTH CAP.
 - WALL MOUNT: 3-IN HORIZONTAL TERMINATION KIT SIMILAR TO DIVERSITECH HVENT-3.

7. VALVES

A. GATE VALVES

- BRONZE RISING STEM, CLASS 150 RISING STEM, UNION BONNET, SOLID WEDGE AND MANUFACTURED IN ACCORDANCE WITH MSS-SP80. MODEL NO. T134 AS MANUFACTURED BY NIBCO.

B. BALL VALVES

- TWO-PIECE, BRONZE, END ENTRY, 600 PSI WWP, SIMILAR TO NIBCO #1585-70.
- THREE-PIECE, STAINLESS STEEL, BUTT WELD, 2,000 PSI WWP; SIMILAR TO NIBCO #BM-590-56-R-66-FS-LL.

C. CHECK VALVES

- BRONZE, THREADED CAP, TEFLON DISC; SIMILAR TO NIBCO #1433-Y.

D. APPLIANCE CONNECTOR VALVES: ANSI Z21.15 AND IAS LISTED.

E. GAS STOPS: BRONZE BODY WITH AGA STAMP, PLUG TYPE WITH CHROME-PLATED BRASS BALL AND LEVER HANDLE, OR BUTTERFLY VALVE WITH STAINLESS-STEEL DISC AND FLUOROCARBON ELASTOMER SEAL AND LEVER HANDLE; 2-PSIG MINIMUM PRESSURE RATING.

F. GAS VALVES, NPS 2 AND SMALLER: ASME B16.33 AND IAS-LISTED BRONZE BODY AND 125-PSIG PRESSURE RATING.

G. PLUG VALVES, NPS 2-1/2 AND LARGER: ASME B16.38 AND MSS SP-78 CAST-IRON, LUBRICATED PLUG VALVES, WITH 125-PSIG PRESSURE RATING.

8. INSULATION

A. ALL INSULATION (INCLUDING JACKET, FACING AND ADHESIVE) SHALL HAVE COMPOSITE FIRE AND SMOKE HAZARD RATINGS AS TESTED BY PROCEDURES LISTED IN ASTM E-84, NFPA 255 AND UL 273; NOT EXCEEDING A FLOOR SPREAD OF 25 AND A SMOKE DEVELOPED OF 50.

B. PIPING SHALL HAVE A MINIMUM 4 LB DENSITY MOLDED FIBERGLASS, MAXIMUM 0.23 K-FACTOR AT 75 DEGREES F MEAN TEMPERATURE WITH FACTORY-APPLIED FIRE-RETARDANT FOIL-SKIM-KRAFT FACING. ALL SERVICE JACKET SIMILAR TO JOHNS MANVILLE MICRO-LOK HP

C. FITTING COVER, MOLDED WHITE PVC JACKET, UL CLASS 1, MAXIMUM PERMEANCE 0.05 SIMILAR TO MANVILLE ZESTRON

D. ON VALVES AND FITTINGS PROVIDE PRE-MOLDED FIBERGLASS FITTINGS. VAPOR SEAL INSULATION ON "CW".

E. "CW" PIPING: PROVIDE 1/2 IN. THICK FIBERGLASS SECTIONAL PIPE COVERING WITH VAPOR BARRIER JACKET.

F. "HW" PIPING: PROVIDE 1 IN. THICK FIBERGLASS SECTIONAL PIPE COVERING.

G. PEX PIPING TO BE PRE-INSULATED OR INSTALLED WITH INSULATION WITH AN R-VALUE OF 3.3 OR GREATER.

9. PLUMBING FIXTURES

A. PROVIDE ALL FIXTURES WITH STOP VALVES AND SUPPLIES AND FIXTURE TRAPS AS REQUIRED.

B. ALL FIXTURES SHALL BE AS INDICATED ON THE ARCHITECTURAL AND PLUMBING DOCUMENTS.

10. PIPING SUPPORTS

A. SUPPORT ALL PIPING FROM BUILDING CONSTRUCTION BY PROVIDING INSERTS, BEAM CLAMPS, STEEL FISHPLATES (IN CONCRETE FIB ONLY), AND ACCEPTABLE BRACKETS. SUBMIT ALL METHODS FOR REVIEW.

B. PROVIDE TRAPEZE HANGERS OF BOLTED ANGLES OR CHANNELS FOR GROUPED LINES AND SERVICES.

C. PROVIDE ADDITIONAL FRAMING WHERE BUILDING CONSTRUCTION IS INADEQUATE. SUBMIT FOR REVIEW.

D. SUSPENDED HORIZONTAL PIPING

- SUPPORT ALL PIPING IN PROCESS AREAS INDEPENDENTLY FROM STRUCTURE USING FRP TYPE HANGERS, SIMILAR TO CENTURY COMPOSITES CO-HANGERS.
- SUPPORT ALL PIPING INDEPENDENTLY FROM STRUCTURE USING HEAVY IRON-HINGED TYPE HANGERS, SIMILAR TO GRINNELL CLEVIS NO. 260.
- PROVIDE ELECTROPLATED SOLID-BAND HANGERS SIMILAR TO AUTO-GRIP, FOR TWO-INCH AND SMALLER PIPE.
- PROVIDE WALL BRACKETS FOR WALL-SUPPORTED PIPING, AND PROVIDE PIPE SADDLES FOR FLOOR-MOUNTED PIPING.
- PROVIDE SUPPORTS WITH COPPER LINING FOR UNINSULATED COPPER PIPING.
- SUSPEND PIPING FROM INSERTS, USING BEAM CLAMPS WITH RETAINING CLAMP OR LOCKNUT, STEEL FISH PLATES, CANTILEVER BRACKETS OR OTHER ACCEPTED MEANS. BEAM CLAMPS SHALL BE SIMILAR TO GRINNELL FIGURES 61, 67, 131, OR 225.
- SUSPEND PIPING BY RODS WITH DOUBLE NUTS.
- PROVIDE ADDITIONAL STEEL FRAMING AS REQUIRED AND ACCEPTED WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING HANGER RODS IN REQUIRED LOCATIONS.
- SUPPORT BRANCH FIXTURE WATER PIPING IN CHASES WITH COPPER-PLATED METAL BRACKETS, SECURED TO STUDS, SIMILAR TO HOLDRITE NOS. 102-18, 107-18, 102-26, OR 101-26.

E. PROVIDE 180-DEGREE ARC GALVANIZED METAL COVERING SHIELDS ON HANGERS FOR INSULATED PIPING WITHOUT INCOMPRESSIBLE INSULATING BLOCK IN INSULATION AT HANGERS.

F. MAXIMUM HANGER SPACING AS INDICATED

- PIPE 1 INCH AND SMALLER SHALL BE EVERY 8 FEET.
- PIPE 1-1/4 INCH AND LARGER SHALL BE EVERY 10 FEET.
- COPPER TUBING 1-1/4 INCH AND SMALLER SHALL BE EVERY 6 FEET.
- COPPER TUBING 1-1/2 INCH AND LARGER SHALL BE EVERY 10 FEET.
- CAST IRON: EVERY 5 FEET AND AT EVERY FITTING OR JOINT.

G. VERTICAL PIPING

- PROVIDE EXTENSION PIPE CLAMPS BOLTED TO BARE PIPE ON EACH SIDE AND BEARING EQUALLY ON STRUCTURE OR WELDED TO BEAM.
- PROVIDE SPACING AS INDICATED
 - THREADED PIPING SHALL BE EVERY OTHER FLOOR LEVEL, AT A MAXIMUM OF 25 FEET ON CENTERS.
 - CAST IRON PIPING SHALL BE EVERY FLOOR LEVEL, MAXIMUM 20 FEET ON CENTERS; HUBLESS PIPE IS THE EXCEPTION, REQUIRING A MAXIMUM OF 10 FEET ON CENTERS.
 - TUBING SHALL BE EVERY FLOOR LEVEL MAXIMUM 10 FEET ON CENTERS.

11. TESTS

A. DOMESTIC WATER PIPING

- TEST PIPING HYDROSTATICALLY AT A PRESSURE OF 125 PSI.
- DURATION OF TEST SHALL BE 2 HOURS WITHOUT A LOSS IN PRESSURE.

B. DRAINAGE AND VENT PIPING

- CAP ALL OUTLETS AND FILL PIPING SYSTEM TO OVERFLOWING FROM A POINT AT LEAST 10 FEET ABOVE THE FLOOR.
- THE WATER LEVEL SHALL REMAIN CONSTANT THROUGHOUT THE TEST DURATION OF 2 HOURS.

C. ARRANGE AND COORDINATE TESTS WITH OWNER 48 HOURS IN ADVANCE. NOTIFY ENGINEER AND ARCHITECT OF TEST DATE AND TIME.

D. DEFECTS DISCLOSED BY THE TESTS SHALL BE REPAIRED OR REPLACED. TESTS SHALL BE REPEATED AS DIRECTED UNTIL ALL WORK IS PROVEN SATISFACTORY.

E. TAKE ALL PRECAUTIONS NECESSARY TO PREVENT DAMAGE TO THE BUILDING AND ITS CONTENTS AS A RESULT OF SUCH TESTS. REPAIR ANY DAMAGE CAUSED.

Revisions	
No.	Description
11/17/21	ISSUED FOR BID



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Project
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Drawing	PLUMBING SPECIFICATIONS	
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