

ELECTRICAL GENERAL NOTES

- BRANCH CIRCUITS AND FEEDER CIRCUITS SHALL BE CONCEALED IN WALLS AND ABOVE CEILINGS WHERE POSSIBLE, INCLUDING HOMERUNS TO PANELBOARDS. BRANCH CIRCUITS AND FEEDERS SHALL NOT BE ROUTED IN OR UNDER SLAB UNLESS SPECIFICALLY INDICATED ON ELECTRICAL FLOOR PLANS OR DETAILS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- BRANCH CIRCUITS SHALL BE 2#12, #12G, 3/4" C, TO NEW 20A/1P CIRCUIT BREAKER IN PANEL INDICATED UNLESS NOTED OTHERWISE.
- 120V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 150' IN LENGTH SHALL BE 2#10, #10G, 3/4" C, UNLESS NOTED OTHERWISE.
- 277V, 1-PHASE, 20A BRANCH CIRCUITS EXCEEDING 250' IN LENGTH SHALL BE 2#10, #10G, 3/4" C, UNLESS NOTED OTHERWISE.
- DEVICES SHALL BE LABELED WITH SOURCE PANEL AND CIRCUIT NUMBERS.
- REFER TO ARCHITECT'S REFLECTED CEILING PLAN FOR EXACT LOCATION OF CEILING MOUNTED ELECTRICAL DEVICES. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION OF WALL MOUNTED ELECTRICAL DEVICES.
- PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS AS REQUIRED. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALLS.
- COORDINATE LOCATIONS OF ELECTRICAL DEVICES AND CONTROLS WITH RESPECT TO LOCATIONS OF CASEWORK AND EQUIPMENT PRIOR TO ROUGH-IN.
- WHEN DEVICES ARE SHOWN ON PLANS OFFSET FROM ONE ANOTHER, DEVICES SHALL BE MOUNTED IN LINE, CENTERED ON WALL.
- SHARED NEUTRAL WIRING IS NOT ACCEPTABLE, UNLESS NOTED OTHERWISE ON DRAWINGS. PROVIDE A DEDICATED NEUTRAL WIRE FOR EACH CIRCUIT, WHERE APPLICABLE.
- DRAWINGS ARE DIAGNAMATIC ONLY. DO NOT SCALE ELECTRICAL DRAWINGS. FIELD CONDITIONS AND ARCHITECTURAL ELEVATIONS AND DIMENSIONS SHALL GOVERN EXACT LOCATION AND MOUNTING HEIGHTS OF ELECTRICAL DEVICES AND RACEWAYS.
- FINISHES AND COLOR OF ELECTRICAL WIRING DEVICES, EXPOSED RACEWAY, LIGHT FIXTURES, AND OTHER ELECTRICAL DEVICES SHALL BE DETERMINED BY THE ARCHITECT.
- ELECTRICAL WORK SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE (OTHER THAN ROOF DECK).
- THE ELECTRICAL CONTRACTOR SHALL PERFORM CORES REQUIRED FOR ELECTRICAL WORK.
- BUILDING WIRE AND CABLE NOT IN RACEWAY SHALL BE PLENUM RATED.
- PROVIDE SURFACE MOUNTED RACEWAY FOR NEW DEVICES LOCATED ON EXISTING TO REMAIN CMU OR MASONRY WALLS, UNLESS OTHERWISE NOTED. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SURFACE MOUNTED RACEWAY APPLICATIONS AND WIRING METHODS.

PLUMBING GENERAL ABBREVIATIONS

- AD ACCESS DOOR
ADJ ADJUSTABLE
AFF ABOVE FINISHED FLOOR
ALT ALTERNATE
AUJ AUTHORITY HAVING JURISDICTION
AP ACCESS PANEL
BAS BUILDING AUTOMATIC SYSTEM
BTU BRITISH THERMAL UNIT
BTU/HOUR BTU/HOUR
BTH BOTTOM OF PIPE
CD CONDENSATE DRAIN
KWH CUBIC FEET PER HOUR
CAF CAST IRON
COW CLEANOUT
CW COLD WATER
DIA DIAMETER
DN DOWN
DSN DOWN SPOUT NOZZLE
DIE DIRECT WASTE
ELEC ELECTRICAL
F FAN
FDC DEGREES FAHRENHEIT
FCO FLOOR CLEANOUT
FTE FINISHED FLOOR ELEVATION
FGO FINISHED GRADE CLEANOUT
FLD FULL LOAD AMPS
FLO FLOOR DRAIN
FSD FLOOR SINK
FT FEET
FT WG FEET WATER GAUGE
FV FEET VENT
GALL GALLONS
GPH GALLONS PER HOUR
GPM GALLONS PER MINUTE
GSO GAS SOLENOID VALVE
HSE HOSE BIB
HB HOT WATER
HD HEAD
HP HORSEPOWER
HZ HERTZ
HWIR HOT WATER RECIRCULATION
INT INTERCEPTOR
INW INDIRECT WASTE
INW ELEV INCHES WATER
KW KILOWATT
LAV LAVATORY
LAV MAX MAXIMUM
MECH MECHANICAL
MBH MINIMUM CIRCUIT AMPACITY
MCA MINIMUM
NG NATURAL GAS
NTS NOT IN CONTRACT
NTO NOT TO SCALE
PDC PUMPED CONDENSATE DRAIN
PLGB PLUMBING
PSIG POUNDS PER SQUARE INCH GAUGE
QTY QUANTITY
RPPB REDUCED PRESSURE BACKFLOW PREVENTER
RPPB ROOFTOP UNIT
SAN SANITARY
SF SQUARE FEET
SF TEMP TEMPERATURE
TW TEMPERED WATER
TYP TYPICAL
V VENT
VTS VENT THRU ROOF
W WASTE
WST WASTE STACK
WWS WASTE AND WENT

PLUMBING GENERAL NOTES

- GENERAL
- GENERAL NOTES, SYMBOLS AND DETAILS ARE APPLICABLE TO ALL DRAWINGS WITHIN DIVISION 22.
 - DRAWINGS ARE DIAGNAMATIC AND ARE INTENDED TO INDICATE CAPACITY, SIZE, APPROXIMATE LOCATION AND GENERAL ARRANGEMENT. DETERMINE EXACT LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
 - REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
 - PROVIDE INFORMATION AND HARDWARE AS NECESSARY TO COORDINATE CONCRETE PADS AND STEEL PLATFORMS REQUIRED FOR PLUMBING WORK.
 - COORDINATE AND WALL PENETRATIONS WITH WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. COORDINATE SLAB PENETRATIONS WITH WORK OF OTHER SECTIONS.
 - RUN PIPING CONCEALED, UNLESS SPECIFIED OTHERWISE, AND CLEAR OF CEILING INSERTS.
 - COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS AND WITH ALL TRADES INVOLVED. PROVIDE OFFSETS IN PIPING AROUND OBSTRUCTIONS.
 - NOT ALL ACCESS DOORS HAVE BEEN SHOWN ON THE PLANS FOR CLARITY. PROVIDE ACCESS PANELS THROUGH BUILDING ASSEMBLIES TO SERVICE AND MAINTAIN EQUIPMENT UNLESS SUCH EQUIPMENT IS INSTALLED ON EXPOSED LOCATIONS OR ABOVE LAV IN CEILINGS. COORDINATE THE LOCATION OF ACCESS DOORS AND PANELS AND VERIFY THE EXACT QUANTITY, SIZE, AND LOCATIONS AFTER THE SYSTEMS AND EQUIPMENT REQUIRING ACCESS HAVE BEEN INSTALLED AND PRIOR TO THE CLOSURE OF THE AFFECTED CEILINGS AND BUILDING ASSEMBLIES. OBTAIN APPROVAL FOR ALL PANEL LOCATIONS FROM ARCHITECT.
 - AT SUBSTANTIAL COMPLETION, THE FOLLOWING ITEMS, NEW OR EXISTING, SHALL BE FULLY AND REASONABLY ACCESSIBLE: CONTROL BOXES, JUNCTION BOXES, VALVES, DDC CONTROL BOXES, ELECTRICAL PANELS, CLEAN OUTS, DISCONNECT SWITCHES AND ELEMENTS OF EQUIPMENT REQUIRING MAINTENANCE. FULLY AND REASONABLY ACCESSIBLE SHALL BE DEFINED AS NATIONAL ELECTRIC CODE REQUIRED CLEARANCE FOR POWERED EQUIPMENT AND CAPABLE OF BEING ACCESSED OR SERVICED WITHOUT REMOVING, MODIFYING OR DISTORTING OTHER COMPONENTS OF THE WORK. PROVIDE MANUFACTURERS' RECOMMENDED CLEARANCE FOR ALL EQUIPMENT.
 - VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. VERIFY ELEVATION, FITTINGS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
 - IN COMPLIANCE WITH THE FEDERAL SAFE WATER DRINKING ACT (SWDA), THE CONTRACTOR SHALL NOT PROVIDE ANY COMPONENTS IN THE DOMESTIC WATER SYSTEM THAT CONTAIN MORE THAN 0.2% LEAD OR ANY WETTED PARTS. THE CONTRACTOR SHALL PROVIDE THE LEAD FREE EQUIVALENT OF ANY EQUIPMENT SPECIFIED AND PROVIDE A LETTER CERTIFYING THAT ALL PLUMBING PRODUCTS PROVIDED MEET THIS REGULATION.
 - ALL PLUMBING WORK SHALL BE DONE IN ACCORDANCE WITH THE STATE PLUMBING AND FUEL GAS CODE. THE CONTRACTOR SHALL COORDINATE WITH THE INSPECTOR FOR ALL PLUMBING INSPECTIONS.
 - IN THE EVENT THAT THERE ARE DISCREPANCIES BETWEEN PIPE SIZES SHOWN ON THE PLANS, DETAILS AND DIAGRAMS, THE LARGER PIPE SIZE SHALL BE FOLLOWED.

PIPING SYSTEM SPECIFIC NOTES:

- PROVIDE ESCUTCHEONS AT EXPOSED PIPE PENETRATIONS OF CEILINGS AND WALLS.
- TOPS OF FLOOR DRAINS SHALL BE FLUSH WITH FINISHED FLOOR.
- PROVIDE SHUT-OFF VALVES ON ALL BRANCH PIPING AND ON ALL SUPPLIES TO INDIVIDUAL FIXTURES AND EQUIPMENT.
- SUPPORT PIPING FROM STRUCTURE. PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING.
- PROVIDE DRAIN WITH BALL VALVE, HOSE END VACUUM BREAKER, CAP AND CHAIN AT DOMESTIC WATER LOW POINTS AND PITCH PIPING TO DRAIN.
- PROVIDE ACCESSIBLE CLEANOUTS AT THE BASE OF ALL STACKS.
- ALL PLUMBING PIPING AND DRAINS SHALL BE PROTECTED FROM DEBRIS AND KEPT CLEAR OF BLOCKAGE DURING CONSTRUCTION.
- PROVIDE DIELECTRIC FITTINGS WHEN JOINING PIPES OF DISSIMILAR METALS.

FIRESTOPPING NOTES:

- PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF ALL PENETRATIONS THROUGH FIRE WALLS OR SMOKE BARRIERS INCLUDING BOTH EMPTY OPENINGS AND OPENINGS CONTAINING CABLES, PIPES, DUCTS, CONDUITS AND OTHER PENETRATING ITEMS. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALL RATINGS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

FIRE PROTECTION SYMBOL LEGEND

SYMBOL	DESCRIPTION
FP-WET	SPRINKLER MAIN (WET)
ANGLE VALVE	ANGLE VALVE
90° FLOW DOWN	90° FLOW DOWN
90° ELBOW UP	90° ELBOW UP
TEE UP	TEE UP
TEE DOWN	TEE DOWN
DROP AND RUN	DROP AND RUN
UNION	UNION
CHECK VALVE	CHECK VALVE
RELIEF VALVE	RELIEF VALVE
DOUBLE CHECK VALVE ASSEMBLY	DOUBLE CHECK VALVE ASSEMBLY
PRESSURE GAUGE	PRESSURE GAUGE
PRESSURE REDUCING VALVE	PRESSURE REDUCING VALVE
CONNECT NEW TO EXISTING	CONNECT NEW TO EXISTING
FLOW SWITCH	FLOW SWITCH
TAMPER SWITCH	TAMPER SWITCH
PRESSURE SWITCH	PRESSURE SWITCH
AUTOMATIC TRANSFER SWITCH	AUTOMATIC TRANSFER SWITCH

SPRINKLER SYMBOL LEGEND

SYMBOL	DESCRIPTION
CONCEALED PENDANT SPRINKLER	CONCEALED PENDANT SPRINKLER

DRY TYPE TRANSFORMER SCHEDULE

SIZE	KVA	PRIMARY AMPS	SECONDARY AMPS	480 VOLT OVERCURRENT	208 VOLT (NOTE 4) OVERCURRENT	480 VOLT FEEDER
T4	45	54	125	90A, 3P	150A, 3P	3#3 & 1#8G - 1 1/4"

TRANSFORMER NOTES:

- BOND NEUTRAL TRANSFORMER SECONDARY TO THE TRANSFORMER GROUND BAR AND CASE WITH SYSTEM BONDING JUMPER.
- USE NEAREST AVAILABLE EFFECTIVELY GROUNDED WATER PIPE, STRUCTURAL STEEL AND/OR DRIVEN GROUND ROD IN ACCORDANCE WITH N.E.C. 250-81 AND 250-83 FOR THE SEPARATELY DERIVED SYSTEM GROUNDING ELECTRODE.
- ALL CONDUCTOR SIZES ARE FOR COPPER CONDUCTORS. N.E.C. TABLE 310.15(B)(16).
- SECONDARY OVERCURRENT PROTECTION SHALL BE LOCATED WITHIN 10 (10) FEET OF THE TRANSFORMER SECONDARY TERMINALS EITHER IN A PANELBOARD (MAIN BREAKER), AN INDIVIDUALLY MOUNTED CIRCUIT BREAKER, OR A FUSIBLE DISCONNECT SWITCH.
- GROUNDING ELECTRODE CONDUCTOR TO BE RUN FROM GROUND BAR IN TRANSFORMER TO THE GROUNDING ELECTRODE FOR THE SEPARATELY DERIVED SYSTEM.
- SYSTEM BONDING JUMPER/SUPPLY SIDE BONDING JUMPER TO BE INSTALLED BETWEEN THE TRANSFORMER GROUND BAR AND CASE AND BETWEEN THE GROUND BAR IN THE FIRST SUPPLY SIDE DISCONNECTING MEANS (PANELBOARD, ENCLOSED CIRCUIT BREAKER OR FUSIBLE DISCONNECT SWITCH) AND TRANSFORMER GROUND BAR. INSTALL MULTIPLE SUPPLY SIDE BONDING JUMPERS OF THE SIZE LISTED. (1) IN EACH FEEDER RACEWAY.

MOTOR / EQUIPMENT CIRCUIT INSTALLATION NOTES

- GENERAL NOTES:
- DISCONNECT SWITCHES SHALL BE HEAVY-DUTY TYPE AND SHALL BE LOCATED AT EQUIPMENT LOCATION UNLESS OTHERWISE NOTED.
 - OVERCURRENT PROTECTION DEVICES (OCPD) SHALL BE MOLDED CASE CIRCUIT BREAKERS UNLESS NOTED WITH AN "F" FOR FUSE.
 - DISCONNECT SWITCHES AND CIRCUIT BREAKERS SHALL BE NEMA 3R RATED WHEN LOCATED OUTSIDE.
 - REFER TO ELECTRICAL AND MECHANICAL PLANS FOR EXACT LOCATIONS OF EQUIPMENT.
 - STARTERS SHALL BE SQUARE D CLASS 8336 OR APPROVED EQUAL.

- REMARKS:
- FOR EQUIPMENT LOCATED OUTSIDE BUILDING ON PAD, CIRCUIT SHALL RUN UNDER SLAB FROM PANEL TO UNIT LOCATION. COORDINATE EXIST STUB-UP LOCATION IN FIELD WITH HVAC CONTRACTOR PRIOR TO ROUGH-IN.
 - FOR PUMP ASSEMBLIES, PROVIDE POWER SUPPLY TO CONTROL PANEL AND FROM CONTROL PANEL TO ALL PUMPS ON PUMP ASSEMBLY.

PLUMBING PIPING LEGEND

SYMBOL	DESCRIPTION
COLD WATER	COLD WATER
HOT WATER (110°F)	HOT WATER (110°F)
SANITARY DRAIN/WASTE ABOVE FLOOR	SANITARY DRAIN/WASTE ABOVE FLOOR
SANITARY DRAIN/WASTE BELOW FLOOR	SANITARY DRAIN/WASTE BELOW FLOOR
VENT	VENT
CO2 PIPING	CO2 PIPING
PIPE RISER	PIPE RISER
PIPE DROP	PIPE DROP
PIPE TEE TOWARDS (UP IN PLAN)	PIPE TEE TOWARDS (UP IN PLAN)
PIPE TEE AWAY (DOWN IN PLAN)	PIPE TEE AWAY (DOWN IN PLAN)
PIPE DROP AND RUN	PIPE DROP AND RUN
DIRECTION OF FLOW	DIRECTION OF FLOW
PIPE TRAP	PIPE TRAP
DIRT LEG	DIRT LEG
CLEANOUT	CLEANOUT
UNION OR FLANGE	UNION OR FLANGE
BLIND FLANGE	BLIND FLANGE
END CAP	END CAP
REDUCER (ECCENTRIC)	REDUCER (ECCENTRIC)
REDUCER (CONCENTRIC)	REDUCER (CONCENTRIC)

PLUMBING VALVE AND SYMBOL LEGEND

SYMBOL	DESCRIPTION
BALL VALVE	BALL VALVE
CHECK VALVE	CHECK VALVE
SOLENOID VALVE	SOLENOID VALVE
PRESSURE GAUGE	PRESSURE GAUGE
THERMOMETER	THERMOMETER
DOUBLE CHECK VALVE ASSEMBLY	DOUBLE CHECK VALVE ASSEMBLY
REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY AND DRAIN	REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY AND DRAIN
WATER HAMMER ARRESTOR	WATER HAMMER ARRESTOR
ADA ACCESSIBLE FIXTURE	ADA ACCESSIBLE FIXTURE

SPRINKLER SYSTEM NOTES

- THESE GENERAL NOTES ARE APPLICABLE TO ALL FIRE PROTECTION DRAWINGS.
- DRAWINGS ARE DIAGNAMATIC AND SHOW THE GENERAL INTENT OF WORK. SEE DETAILS, RISERS, AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

- THE DRAWINGS INDICATE A SUGGESTED SPRINKLER HEAD LAYOUT AND THAT EACH AREA IS COVERED BY SPRINKLER PROTECTION AS REQUIRED BY ALL APPLICABLE STATE OF MA BUILDINGS AND FIRE CODES. THE SPRINKLER QUANTITIES SHALL NOT BE CONSIDERED AS A TAKE OFF OR AS EXACT LOCATIONS. EXACT SPACING, DENSITY, AND LOCATION REQUIREMENTS SHALL BE AS DICTATED BY NFPA 13.
- THE CONTRACTOR SHALL PERFORM A FLOW TEST TO VERIFY PRESSURE AVAILABLE AT THE SITE. INFORMATION FROM THE CONTRACTOR'S FLOW TEST SHALL BE USED FOR HYDRAULIC CALCULATIONS.
- THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS INCLUDING EXISTING TEE OUTLET SIZE FOR ALL RETURN BEND ASSEMBLIES. BEFORE ANY NEW WORK STARTS, THE CONTRACTOR SHALL DETERMINE THAT ALL EXISTING OUTLETS ARE A MINIMUM OF ONE INCH. IF IT IS DETERMINED THAT THE EXISTING OUTLET SIZE IS LESS THAN ONE INCH, ALL SPRINKLER WORK SHALL STOP AND IT SHALL BE BROUGHT TO THE ARCHITECT'S ATTENTION. THE CONTRACTOR SHALL NOT PROCEED WITH WORK UNTIL DIRECTION IS GIVEN BY THE ARCHITECT.
- COMBINED INSIDE AND OUTSIDE HOSE STREAM ALLOWANCE FOR HYDRAULIC CALCULATIONS SHALL BE 250 GPM.
- HYDRAULIC CALCULATIONS SHALL INCLUDE A SAFETY FACTOR OF 10%.
- PIPE VELOCITY AT ANY POINT OF THE SYSTEM SHALL NOT EXCEED 18FPS.
- INSTALLATION OF SPRINKLERS SHALL BE BASED ON THE FOLLOWING:

AREA	OCCUPANCY CLASSIFICATION	DENSITY (GPM/SF)	AREA OF APPLICATION (SF)
FLOWER, MOMMIES ROOMS, DRY ROOMS	ORDINARY HAZARD GROUP 1	0.15	1500
CORRIDOR, LOCKER ROOMS	LIGHT HAZARD	0.10	1500

SPRINKLER PIPE SIZE SCHEDULE

NO. OF SPRINKLER HEADS	PIPE SIZE
1-2	1"
3	1 1/4"
4-5	1 1/2"
6-10	2"

NOTE:
PIPE SIZES SHOWN ARE BASED ON Riser LAYOUTS ONLY. ACTUAL PIPE SIZES SHALL BE DETERMINED BY CONTRACTORS HYDRAULIC CALCULATION BASED ON THE CONTRACTORS INSTALLATION DRAWINGS. CONTRACTOR SHALL ALLOW FOR THIS AND INCLUDE THIS IN THE CONTRACT PRICE.

LIGHTING FIXTURE INSTALLATION NOTES

- NOTES:
- LIGHT FIXTURES LISTED SHALL BE CONSIDERED BASIS OF DESIGN. EQUAL FIXTURE SUBSTITUTIONS ARE ACCEPTABLE FOR ALL FIXTURES IN THE LIGHTING FIXTURE SCHEDULE, UNLESS INDICATED OTHERWISE. EQUAL FIXTURE APPROVAL SHALL BE AS JUDGED BY THE ENGINEER AND THE ARCHITECT. IN ADDITION TO THE REQUIREMENTS LISTED IN THE LIGHTING FIXTURE SCHEDULE AND IN THE SPECIFICATIONS, THE PROPOSED EQUAL FIXTURES SHALL:
A. BE OF EQUAL QUALITY CONSTRUCTION AND FINISH.
B. BE SUPPLIED WITH ALL REQUIRED ACCESSORIES TO MATCH THE SPECIFIED (BASIS OF DESIGN) FIXTURE.
C. PROVIDE THE SAME DISTRIBUTION, EFFICACY AND SOURCE LUMEN OUTPUT.
D. HAVE THE SAME LISTINGS AS THE BASIS OF DESIGN FIXTURE, INCLUDING DLC AND ENERGY STAR QUALIFICATIONS.
 - ALL FIXTURES SHALL BE UL LISTED.
 - ALL NECESSARY MOUNTING HARDWARE: HANGERS, BRACKETS, RAILS, YOKES, CANOPES, STEMS, CHAINS, ROW JOINERS, ETC. SHALL BE FURNISHED AND INSTALLED.
 - REFER TO ARCHITECTURAL DRAWINGS FOR SPECIFIC DETAILS, ARRANGEMENT, MOUNTING HEIGHTS, SUSPENSION LENGTHS, CEILING CONSTRUCTION, ETC. ALL COLORS AND FINISHES SHALL BE SELECTED BY ARCHITECT.
 - FIXTURES SHALL BE SEISMICALLY SUPPORTED AS REQUIRED BY THE APPLICABLE BUILDING CODE. FIXTURES SHALL BE SUPPORTED FROM BUILDING STRUCTURE AND SHALL BE INDEPENDENT OF DUCTS, PIPES, CEILINGS AND THEIR SUPPORTING MEMBERS. FIXTURES SHALL BE SUPPORTED WITH A MINIMUM OF 2 SUPPORTS.
 - WIRE EMERGENCY FIXTURES AND EXIT SIGNS AHEAD OF SWITCHED LEGS.
 - MINIMUM MOUNTING HEIGHT OF FIXTURES IN MECHANICAL AND ELECTRICAL SPACES IS 8'-6" AFF. COORDINATE MOUNTING HEIGHT IN FIELD WITH EQUIPMENT IN ROOM SUCH THAT LIGHTING IS NOT OBSTRUCTED BY DUCTWORK, PIPING AND CONDUIT. PROVIDE NECESSARY CHAIN/MOUNTING HARDWARE TO SUSPEND FIXTURES QUANTITY.
 - REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
 - WHERE EXIT SIGNS ARE SHOWN AS WALL MOUNTED ABOVE A DOOR, MOUNT SUCH THAT THE BOTTOM OF THE SIGN IS NO MORE THAN 9" ABOVE THE DOOR FRAME, UNLESS INDICATED OTHERWISE ON PLANS.

ELECTRICAL LIGHTING NOTES

- EXIT SIGNS AND EMERGENCY BATTERY UNITS SHALL BE WIRED TO LINE SIDE OF LOCAL LIGHTING BRANCH CIRCUIT. AHEAD OF ALL SWITCHING DEVICES.
- REFER TO DETAILS SHEET FOR TYPICAL LIGHTING CONTROL WIRING SCHEMATICS.

ELECTRICAL POWER NOTES

- RECEPTACLES LOCATED WITHIN 8' FROM WATER SOURCES SHALL BE GFI TYPE.
- ELECTRICAL CONTRACTOR SHALL PROVIDE (1) 2" CONDUIT SLEEVE INTO EACH ROOM SHOWN WITH COMMUNICATIONS DEVICE(S). LOCATE ABOVE CEILING WHERE POSSIBLE.
- 15A AND 20A, 120V AND 250V NON-LOCKING TYPE RECEPTACLES MOUNTED BELOW 5'-6" AFF SHALL BE LISTED TAMPER-RESISTANT TYPE IN ACCORDANCE WITH NEC 406.12.

MECHANICAL GENERAL NOTES

- GENERAL
- GENERAL NOTES, SYMBOLS AND DETAILS ARE APPLICABLE TO ALL DRAWINGS WITHIN DIVISION 23.
 - DRAWINGS ARE DIAGNAMATIC AND ARE INTENDED TO INDICATE CAPACITY, SIZE, APPROXIMATE LOCATION AND GENERAL ARRANGEMENT. DETERMINE EXACT LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
 - COORDINATE ROOF AND WALL PENETRATIONS WITH WORK OF OTHER SECTIONS AND WITH FLASHING REQUIREMENTS. COORDINATE SLAB PENETRATIONS WITH WORK OF OTHER SECTIONS.
 - RUN DUCTS AND PIPING CONCEALED, UNLESS SPECIFIED OTHERWISE OR AS APPROVED BY THE ARCHITECT.
 - INSTALL SENSORS (TEMPERATURE, HUMIDITY, CO2, THERMOSTATS) AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY ARCHITECT. MOUNTING HEIGHT AFF SHALL COMPLY WITH ADA AND SHALL BE MOUNTED LEVEL WITH ADJACENT SWITCHES (IE LIGHT SWITCHES).
 - COORDINATE WORK OF THIS SECTION WITH THAT OF OTHER SECTIONS AND WITH ALL TRADES INVOLVED. PROVIDE OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS.
 - SUPPORT EQUIPMENT. PIPING AND DUCTWORK FROM BUILDING STRUCTURE OR WITH STEEL SUPPORTS AND PLATFORMS AS REQUIRED. PROVIDE VIBRATION ISOLATION FOR ROTATING EQUIPMENT. DUCTWORK AND PIPING IN ACCORDANCE WITH THE SPECIFICATIONS.
 - CONTROL WIRING METHODS SHALL COMPLY WITH NEC, AND DIVISION 26 SPECIFICATIONS.
 - VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' DRAWINGS. VERIFY AND PROVIDE FITTINGS TO TRANSITION TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
 - PERFORM PRESSURE AND LEAKAGE TESTS BEFORE INSULATING DUCTWORK AND PIPING.
 - COORDINATE AND PROVIDE HOUSEKEEPING PADS FOR FLOOR-MOUNTED MECHANICAL EQUIPMENT. HOUSEKEEPING PADS SHALL BE REINFORCED CONCRETE WITH 1" CHAMFERED EDGES, 4" THICK, WITH MINIMUM CLEARANCE OF 6" FROM EQUIPMENT BASE TO EDGE OF PAD. INCREASE DEPTH WHERE REQUIRED FOR PROPER INSTALLATION OF EQUIPMENT. INCLUDING BUT NOT LIMITED TO CONDENSING BOILERS TO ALLOW PROPER INSTALLATION OF NEUTRALIZATION EQUIPMENT AND GRAVITY DISCHARGE TO FLOOR DRAIN OR CONDENSATE PUMP) AND AHU (TO ALLOW INSTALLATION OF CONDENSATE TRAP).

AIR SYSTEM SPECIFIC NOTES:

- REFER TO SPECIFICATIONS FOR DUCTWORK CONSTRUCTION CLASSES, SEAL, AND LEAKAGE CLASSES.
- PROVIDE FLEXIBLE CONNECTIONS ON ALL DUCTS CONNECTING TO FANS AND AIR HANDLING UNITS UNLESS INTERNALLY ISOLATES MOUNTING HEIGHT AFF SHALL COMPLY WITH ASSOCIATED AIR PRESSURE DIFFERENTIAL.
- ELBOWS IN DUCT SYSTEMS SHALL BE FULL RADIUS (CENTERLINE RADIUS = 1.0 DUCT WIDTH) WHERE SPACE PERMITS. WHERE LIMITED CLEARANCE OCCURS, PROVIDE SHORT RADIUS ELBOW WITH FULL LENGTH SPLITTER VANES PER SMACNA, OR MITERED ELBOW WITH TURNING VANES PER SMACNA.
- PROVIDE VENTS AT HIGH POINTS IN PIPING SYSTEMS AND DRAIN VALVES AT LOW POINTS ON PIPING MATERIALS.
- THOUGH SOME ISOLATION VALVES ARE SHOWN ON THE DRAWINGS, IT IS NOT THE INTENT OF THE DRAWINGS TO SHOW ALL ISOLATION VALVES. PROVIDE ISOLATION VALVES AT CONNECTIONS TO EQUIPMENT AND AS REQUIRED BY SPECIFICATIONS AND DETAILS.

FIRESTOPPING NOTES:

- PROVIDE FIRE STOPPING AND SMOKE BARRIER SEALING OF ALL PENETRATIONS THROUGH FIRE OR SMOKE WALLS, BARRIERS AND PARTITIONS AS REQUIRED TO MAINTAIN RATING. REFER TO ARCHITECTURAL FLOOR PLANS AND CODE SHEETS FOR WALL RATINGS. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

FIRE PROTECTION ABBREVIATIONS

- AFF ABOVE FINISHED FLOOR
ATS AUTOMATIC TRANSFER SWITCH
DVC DRY
EC DOUBLE CHECK VALVE
ELEV EXTENDED COVERAGE
ELEV ELEVATION
FA FIRE ALARM
FACP FIRE ALARM CONTROL PANEL
FD FIRE DEPARTMENT
FDC FIRE DEPARTMENT CONNECTION
FHV FIRE HOSE VALVE
FP FIRE PROTECTION
FPM FEET PER MINUTE
FS FLOW SWITCH
GPH GALLONS PER HOUR
GPM GALLONS PER MINUTE
HDC HIGH TEMPERATURE CLASSIFICATION
ITC INTERMEDIATE TEMPERATURE CLASSIFICATION
N.C. NORMALLY CLOSED
N.O. NORMALLY OPEN
N.TS NOT TO SCALE
N.Y. NOTED YEM AND YOKE
PA PREACTION
PD PRESSURE DROP
PIV PRESSURE INDICATOR VALVE
PIS PRESSURE REDUCING VALVE
PS PRESSURE SWITCH
PSI POUNDS PER SQUARE INCH
RPPB REDUCED PRESSURE BACKFLOW PREVENTER
RPM REVOLUTIONS PER MINUTE
RS SUPERVISORY SWITCH
TS TAMPER SWITCH
TYP TYPICAL
V VOLTS
VEL VELOCITY
WG WIRE GUARD

DUCTWORK LEGEND

SYMBOL	DESCRIPTION
12x6	RECTANGULAR DUCTWORK
12"	ROUND DUCTWORK
12x6	SUPPLY DUCTWORK TOWARDS (UP IN PLAN)
12x6	RECTANGULAR SUPPLY DUCTWORK AWAY (DOWN IN PLAN)
12x6	RECTANGULAR RETURN DUCTWORK TOWARDS (UP IN PLAN)
12x6	RECTANGULAR RETURN DUCTWORK AWAY (DOWN IN PLAN)
12x6	RECTANGULAR EXHAUST DUCTWORK TOWARDS (UP IN PLAN)
12x6	RECTANGULAR EXHAUST DUCTWORK AWAY (DOWN IN PLAN)
12x6	CAPPED DUCT

AIR DEVICE LEGEND

SYMBOL	DESCRIPTION
12x6	SUPPLY DIFFUSER
12x6	RETURN GRILLE OR REGISTER
12x6	EXHAUST GRILLE OR REGISTER
12x6	SIDEWALL SUPPLY GRILLE
12x6	SIDEWALL RETURN OR EXHAUST GRILLE OR REGISTER
XX-# (###)	AIR DEVICE TAG (TAG NO. (AIRFLOW))

DAMPER LEGEND

SYMBOL	DESCRIPTION
MANUAL VOLUME DAMPER	MANUAL VOLUME DAMPER
MOTORIZED CONTROL DAMPER W/ACCESS DOOR	MOTORIZED CONTROL DAMPER W/ACCESS DOOR
BACKDRAFT DAMPER	BACKDRAFT DAMPER

CONTROLS LEGEND

PLAN SYMBOL	DESCRIPTION
C	CARBON DIOXIDE SENSOR
H	HUMIDITY SENSOR
T	THERMOSTAT

DRAWING SYMBOLS

SYMBOL	DESCRIPTION
CONNECT TO EXISTING	CONNECT TO EXISTING
KEYNOTE TAG	KEYNOTE TAG
EQUIPMENT TAG	EQUIPMENT TAG
EXISTING LINETYPE	EXISTING LINETYPE
NEW WORK LINETYPE	NEW WORK LINETYPE

MECHANICAL GENERAL ABBREVIATIONS

- AFF ABOVE FINISHED FLOOR
ALT ALTERNATE
AUJ AUTHORITY HAVING JURISDICTION
AP ACCESS PANEL
AP AIR PRESSURE DROP
BHP BREAK HORSEPOWER
BTU BRITISH THERMAL UNIT
BTU/HOUR BTU/HOUR
BTH BOTTOM OF DUCT
BOP BOTTOM OF PIPE
CAP CAPACITY
CFM COEFFICIENT OF PERFORMANCE
CFM CUBIC FEET PER MINUTE
CUPF CUBIC FEET PER MINUTE
DECIBELS
DB DRY BULB TEMPERATURE
DDC DIRECT DIGITAL CONTROL
DIA DIAMETER
DN DOWN
EA EXHAUST AIR
EAT ENTERING AIR TEMPERATURE (DRY BULB)
EDB ENTERING DRY BULB
EER ENERGY EFFICIENCY RATIO
ELEC ELECTRICAL
ESP EXTERNAL STATIC PRESSURE
ETR EXISTING TO REMAIN
EWB ENTERING WET BULB
EWV ENTERING WATER TEMPERATURE
F DEGREES FAHRENHEIT
F FEET
FT WG FEET WATER GAUGE
FLA FULL LOAD AMPS
FPM FEET PER MINUTE
GPH GALLONS PER HOUR
GPM GALLONS PER MINUTE
GRD GROUND
HD HEAD
HP HORSEPOWER
HSF HEATING SEASON PERFORMANCE FACTOR
HZ HERTZ
HVAC HEATING, VENTILATION AND AIR CONDITIONING
IN INCHES
IN WG INCHES WATER GAUGE
INTEGRATED PART LOAD VALUE
KWH KILOWATTS
L LOUVER
LAT LEAVING AIR TEMPERATURE
LDB LEAVING DRY BULB
LWB LEAVING WET BULB
LWT LEAVING WATER TEMPERATURE
MAX MAXIMUM
MECH MECHANICAL
MBH THOUSANDS OF BTU / HOUR
MCA MINIMUM CIRCUIT AMPACITY
MIN MINIMUM
N.C. NOT IN CONTRACT
N.TS NOT TO SCALE
OAT OUTSIDE AIR TEMPERATURE
OD OUTER DIAMETER
OED OPEN ENDED DUCT
P PHASE
PHB PHASE
PIS PRESSURE REDUCING VALVE
PSIG POUNDS PER SQUARE INCH GAUGE
QTY QUANTITY
RA RETURN AIR
RPM REVOLUTIONS PER MINUTE
SA SUPPLY AIR
SP STATIC PRESSURE
SPD STATIC PRESSURE DROP
SS STAINLESS STEEL
SSF SATURATED SUCTION PRESSURE
SQFT SQUARE FEET
TEMP TEMPERATURE
TSP TOTAL STATIC PRESSURE
TSTAT THERMOSTAT
TYP TYPICAL
UNLESS OTHERWISE INDICED
W/O WITHOUT
WET WET BULB
WC WATER COLUMN
WG WATER GAUGE
WMS WIRE MESH SCREEN
WPD WATER PRESSURE DROP

EQUIPMENT ABBREVIATIONS

- AHU AIR HANDLING UNIT
CP CONDENSATE PUMP
CB CONDENSING UNIT
EB ELECTRIC BASEBOARD
EHV ELECTRIC UNIT HEATER
EWH ENERGY RECOVERY VENTILATOR
EG EXHAUST GRILLE
F FAN
H HUMIDIFIER
LB LINEAR BAR GRILLE
P PUMP
PD SUPPLY DIFFUSER
SG SUPPLY GRILLE

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Sheet Description

MEPFP ABBREVIATIONS, NOTES, AND SYMBOLS

Sheet Number

MEPFP0.0

- FLOWER 128, MOM/VEG 127 SCOPE NOTES

1. FP - NEW SPRINKLERS. SEE PART PLAN
P - NEW WASTE PUMPS. SEE PART PLAN
M - NEW HVAC SYSTEMS. SEE PART PLAN
E - ALL NEW ELECTRICAL SYSTEMS. SEE PART PLAN
- LOCKER ROOMS 131 & 132 SCOPE NOTES

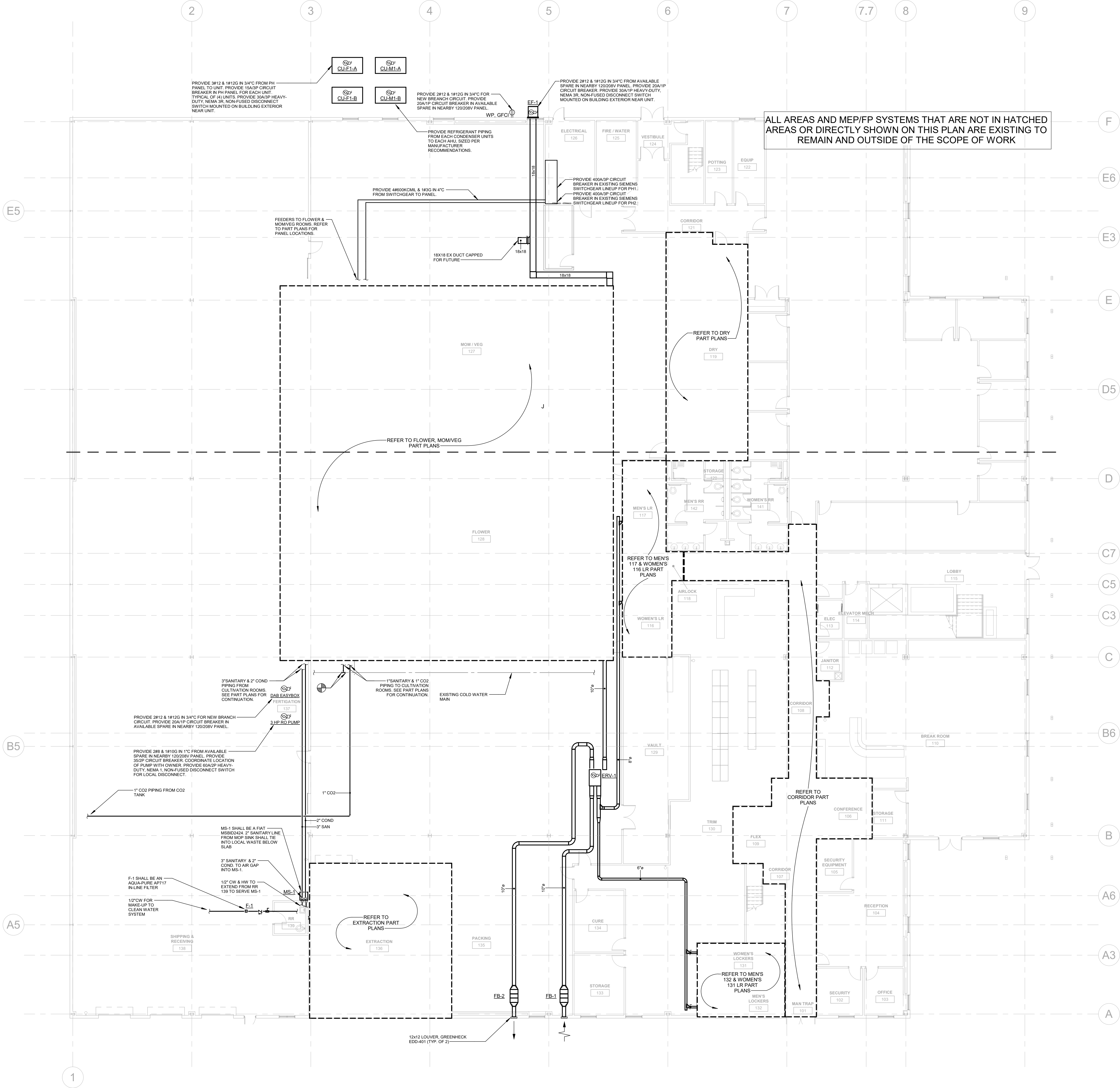
1. FP - NEW SPRINKLER HEADS
P - ETR SYSTEMS
M - NEW EXHAUST
E - NEW ELECTRICAL AND FIRE ALARM DEVICES. SEE PART PLAN
- LOCKER ROOMS 116 & 117 SCOPE NOTES

1. FP - NEW SPRINKLER HEAD IN AIRLOCK. ETR SYSTEMS IN LOCKER ROOMS. SEE PART PLAN
P - ETR SYSTEMS
M - NEW MECHANICAL EXHAUST. SEE PART PLAN
E - REMOVAL OF EXISTING POWER. SEE PART PLAN
- CORRIDOR SCOPE NOTES

1. FP - ETR SYSTEMS
P - ETR SYSTEMS
M - ETR SYSTEMS
E - NEW RECEPTACLES AND FIRE ALARM DEVICES. SEE PART PLAN
- DRY ROOM 119 SCOPE NOTES

1. FP - ETR SYSTEMS
P - ETR SYSTEMS
M - NEW DEHUMIDIFICATION. SEE PART PLAN
E - POWER FOR NEW DEHUMIDIFICATION SYSTEM. SEE PART PLAN

ALL AREAS AND MEP/FP SYSTEMS THAT ARE NOT IN HATCHED AREAS OR DIRECTLY SHOWN ON THIS PLAN ARE EXISTING TO REMAIN AND OUTSIDE OF THE SCOPE OF WORK



2WR

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Sheet Description

MEPFP OVERALL PLAN

Sheet Number

MEPFP1.0

PRINTED: 9/24/2021 4:12:34 PM

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FIRE PROTECTION KEY NOTES

- F1 PROVIDE NEW SPRINKLER HEADS FOR GROW ROOMS. PROVIDE NEW BRANCH PIPING FROM 3" EXISTING WET SPRINKLER MAIN SHOWN ON PLAN. REFER TO SPRINKLER PIPE SIZE SCHEDULE FOR BRANCH PIPE SIZING.

PLUMBING KEY NOTES

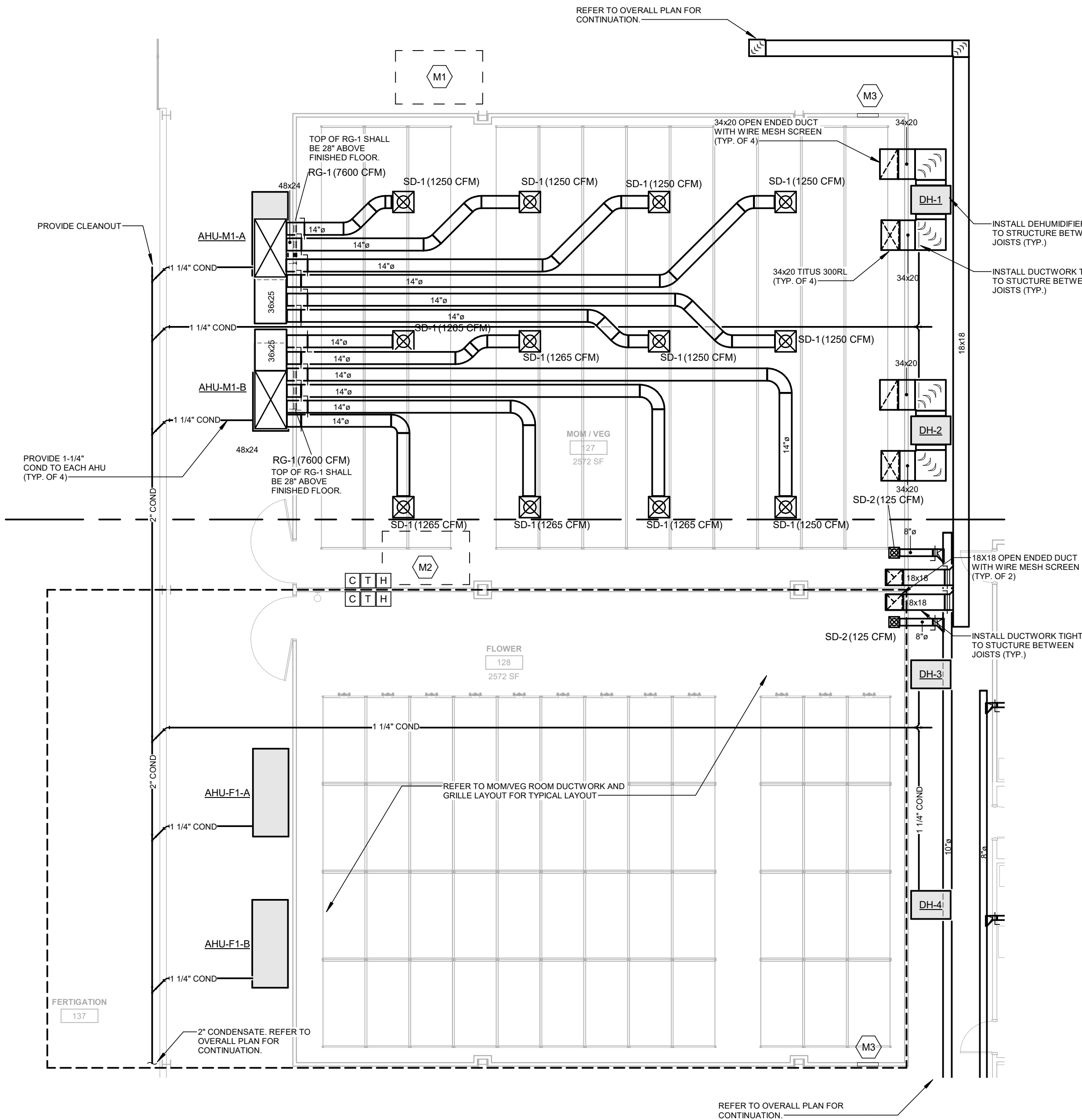
- P1 1/2" CW LINE TO AHU HUMIDIFIER SERVING CULTIVATION ROOM.
- P2 1/2" CO2 TO SUPPLY DUCTWORK. PROVIDE SHUTOFF VALVE AND SOLENOID VALVE. COORDINATE FINAL LOCATION AND TERMINATION POINT OF CO2 PIPING WITH OWNER (TYP OF BOTH CULTIVATION ROOMS).
- P3 SP-1 & SP-2 SHALL BE LIBERTY PUMP P682XLE52. PROVIDE WITH PRO680XL BASIN & PDC-230 DUPLEX CONTROL PACKAGE. WASTE FROM CULTIVATION TABLE SHALL DRAIN VERTICALLY WITH A FLEXIBLE PIPE AND CONNECT TO A 2" HORIZONTAL PVC PIPE THAT IS DIRECTLY CONNECTED TO THE SUMP INLET.
- P4 1" CW. SEE OVERALL PLAN FOR CONTINUATION.
- P5 3" SANITARY. SEE OVERALL PLAN FOR CONTINUATION.
- P6 1" CO2. SEE OVERALL PLAN FOR CONTINUATION.

MECHANICAL KEY NOTES

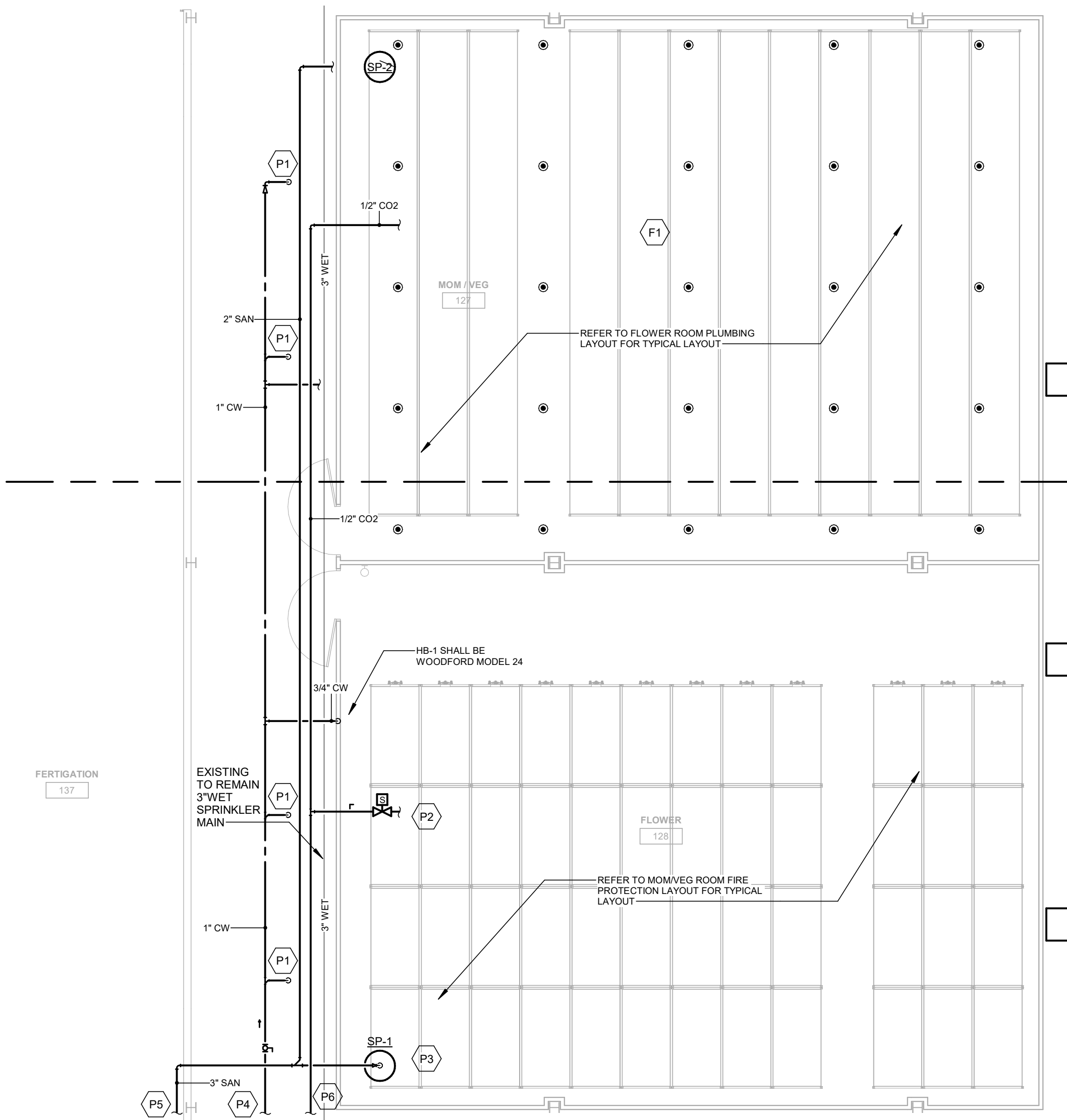
- M1 LOCATION OF EXISTING HVAC UNIT TO REMAIN. REMOVE AND CAP EXISTING DUCT TAP LOCATED IN PROPOSED MOM/VEG ROOM 127.
- M2 LOCATION OF EXISTING HVAC UNIT TO REMAIN. RECONFIGURE EXISTING DUCTWORK IN ORDER FOR GRILLES TO BE LOCATED OUTSIDE OF PROPOSED FLOWER & MOM/VEG ROOMS.
- M3 PROVIDE 24"x24" TRANSFER GRILLE. TITUS 350RL WITH MOTORIZED DAMPER. DAMPER SHALL BE NORMALLY CLOSED AND SHALL OPEN UPON ACTIVATION OF EF-1.

ELECTRICAL KEY NOTES

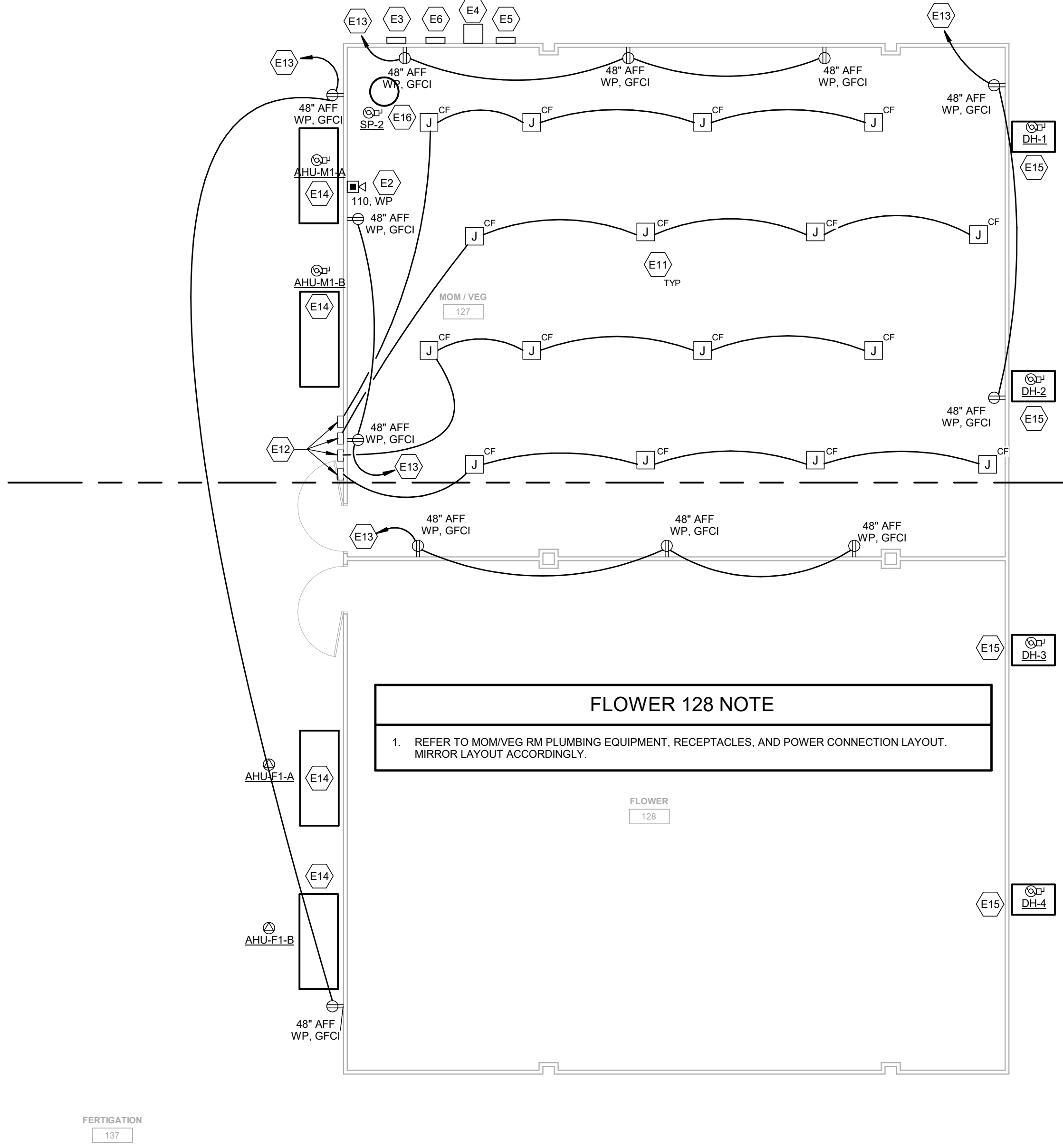
- E1 PROVIDE SURFACE-MOUNT WORK LIGHT FIXTURE, BASIS OF DESIGN GROWLITE GLE-GL, GREEN LED, 1-10V DIMMING.
- E2 PROVIDE NEW FIRE ALARM NOTIFICATION APPLIANCE COMPATIBLE WITH EXISTING FIRELITE ES-200X SYSTEM. INCLUDE MODIFICATION OF EXISTING CIRCUITS, PROVISIONS FOR ADDITIONAL CIRCUITS, UPDATED BATTERY CALCULATION, AND REPROGRAMMING OF SYSTEM TO ACCOMMODATE ADDITIONAL DEVICES.
- E3 PROVIDE 277/480V, 3P, 4W, 225 MCB, 42-CIRCUIT, NEMA 1 PANELBOARD FOR MOM/VEG ROOM LABELED "7H1".
- E4 PROVIDE 45 KVA, 480V PRIMARY, 120/208V SECONDARY NEMA TRANSFORMER HUNG FROM CEILING STRUCTURE. COORDINATE MOUNTING WITH STRUCTURAL ENGINEER. REFER TO TRANSFORMER SCHEDULE.
- E5 PROVIDE 120/208V, 3P, 4W, 150A MCB, 42-CIRCUIT, NEMA 1 PANELBOARD FOR MOM/VEG AND FLOWER LABELED "PL1".
- E6 PROVIDE 277/480V, 3P, 4W, 225A MCB, 42-CIRCUIT, NEMA 1 PANELBOARD FOR FLOWER ROOM LABELED "7H2".
- E7 NOT USED.
- E8 PROVIDE 2#12 & 1#12G IN 3/4" TO 20A/1P CIRCUIT BREAKER IN PH PANEL.
- E9 PROVIDE JUNCTION BOX FOR GROW LIGHT FIXTURES ON CEILING. COORDINATE RECEPTACLE TYPE AND LOCATION WITH OWNER AND VENDOR. PROVIDE GFI PROTECTION TO CIRCUIT IN COMPLIANCE WITH NEC.
- E10 PROVIDE 2#12 & 1#12G IN 3/4" TO 20A/1P CIRCUIT BREAKER IN PH PANEL.
- E11 PROVIDE JUNCTION BOX FOR CIRCULATION FAN ON CEILING. COORDINATE LOCATION WITH ARCHITECTURAL PLANS.
- E12 PROVIDE 2#12 & 1#12G IN 3/4" BETWEEN CIRCULATION FANS TO 20A/1P CIRCUIT. PROVIDE 30A-2P NEMA 1 HEAVY-DUTY NON-FUSED DISCONNECT SWITCH OUTSIDE ROOM FOR EACH CIRCUIT.
- E13 PROVIDE 2#12 & 1#12G IN 3/4" FOR NEW BRANCH CIRCUIT. PROVIDE 20A/1P CIRCUIT BREAKER IN PANEL PL1.
- E14 PROVIDE 3#4 & 1#6G IN 1-1/4" FROM PH PANEL TO UNIT. PROVIDE 80A/3P CIRCUIT BREAKER IN PH PANEL FOR EACH UNIT. PROVIDE 100A/3P HEAVY-DUTY, NEMA 1, NON-FUSED DISCONNECT SWITCH ON CORRIDOR WALL.
- E15 PROVIDE 3#10 & 1#10G IN 3/4" FROM PH PANEL TO UNIT. PROVIDE 30A/2P CIRCUIT BREAKER IN PH PANEL FOR EACH UNIT. PROVIDE 30A/2P HEAVY-DUTY, NEMA 1, NON-FUSED DISCONNECT SWITCH ON CORRIDOR WALL AND L7-30.
- E16 PROVIDE 3#12 & 1#12G IN 3/4" FROM PL1 PANEL TO SUMP PUMP. PROVIDE 20A/2P CIRCUIT BREAKER IN PL1 PANEL FOR EACH UNIT. PROVIDE MOTOR RATED TOGGLE SWITCH.



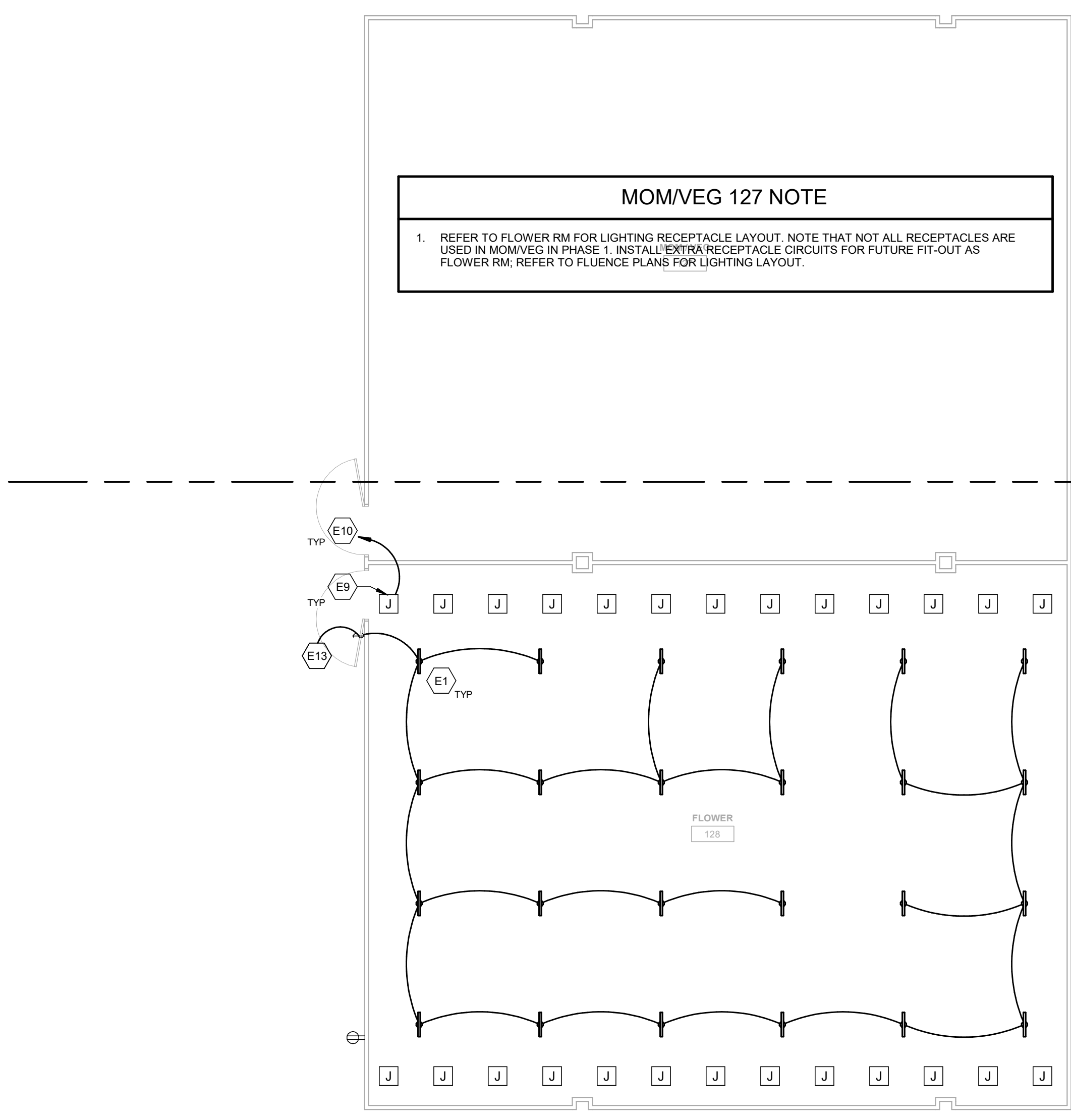
1 FLOWER & MOM/VEG ROOM MECHANICAL DUCTWORK PART PLAN
1/8" = 1'-0"



2 FLOWER & MOM/VEG ROOM FIRE PROTECTION & PLUMBING PART PLAN
1/8" = 1'-0"



3 FLOWER & MOM/VEG ROOM ELECTRICAL POWER PART PLAN
1/8" = 1'-0"



4 FLOWER & MOM/VEG ROOM ELECTRICAL GROW LIGHT PART PLAN
1/8" = 1'-0"



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Sheet Description

FLOWER & MOM/VEG ROOM MEPFP PART PLANS

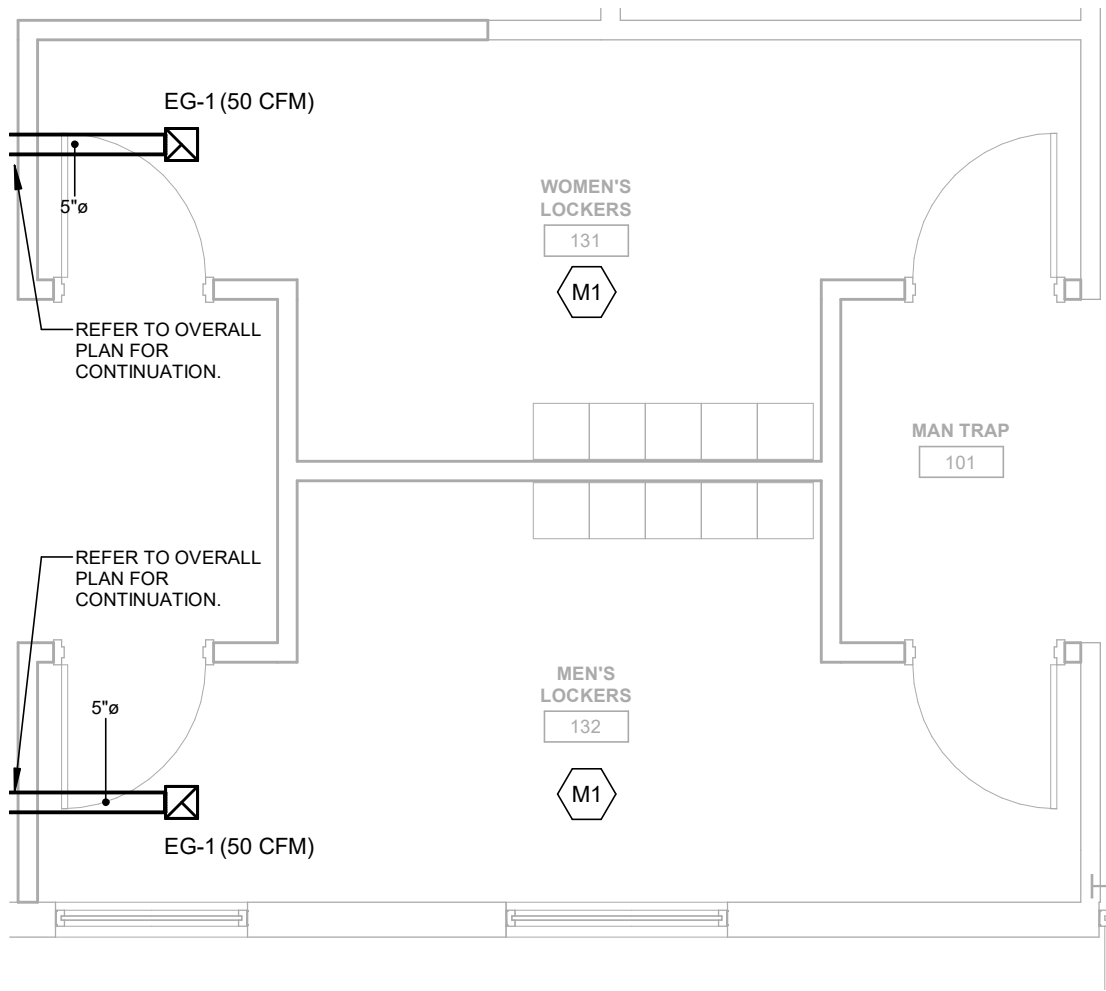
Sheet Number

MEPFP2.0

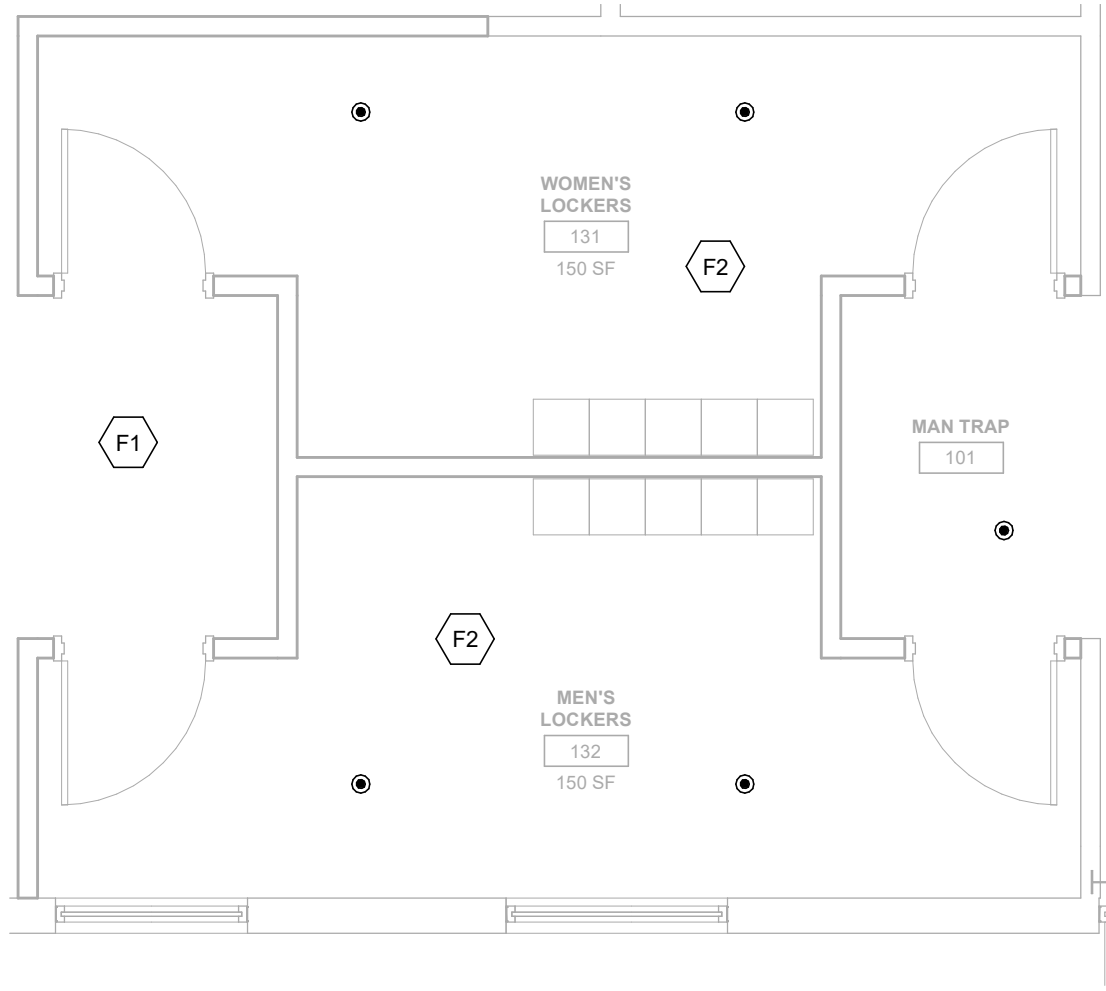
FIRE PROTECTION KEY NOTES	
F1	SPRINKLERS IN ENTRANCE TO TRIM ROOM ARE EXISTING TO REMAIN.
F2	PROVIDE NEW SPRINKLER FROM EXISTING BRANCH PIPE FOR NEW CEILING.

MECHANICAL KEY NOTES	
M1	HEATING AND COOLING SYSTEMS ARE EXISTING TO REMAIN.

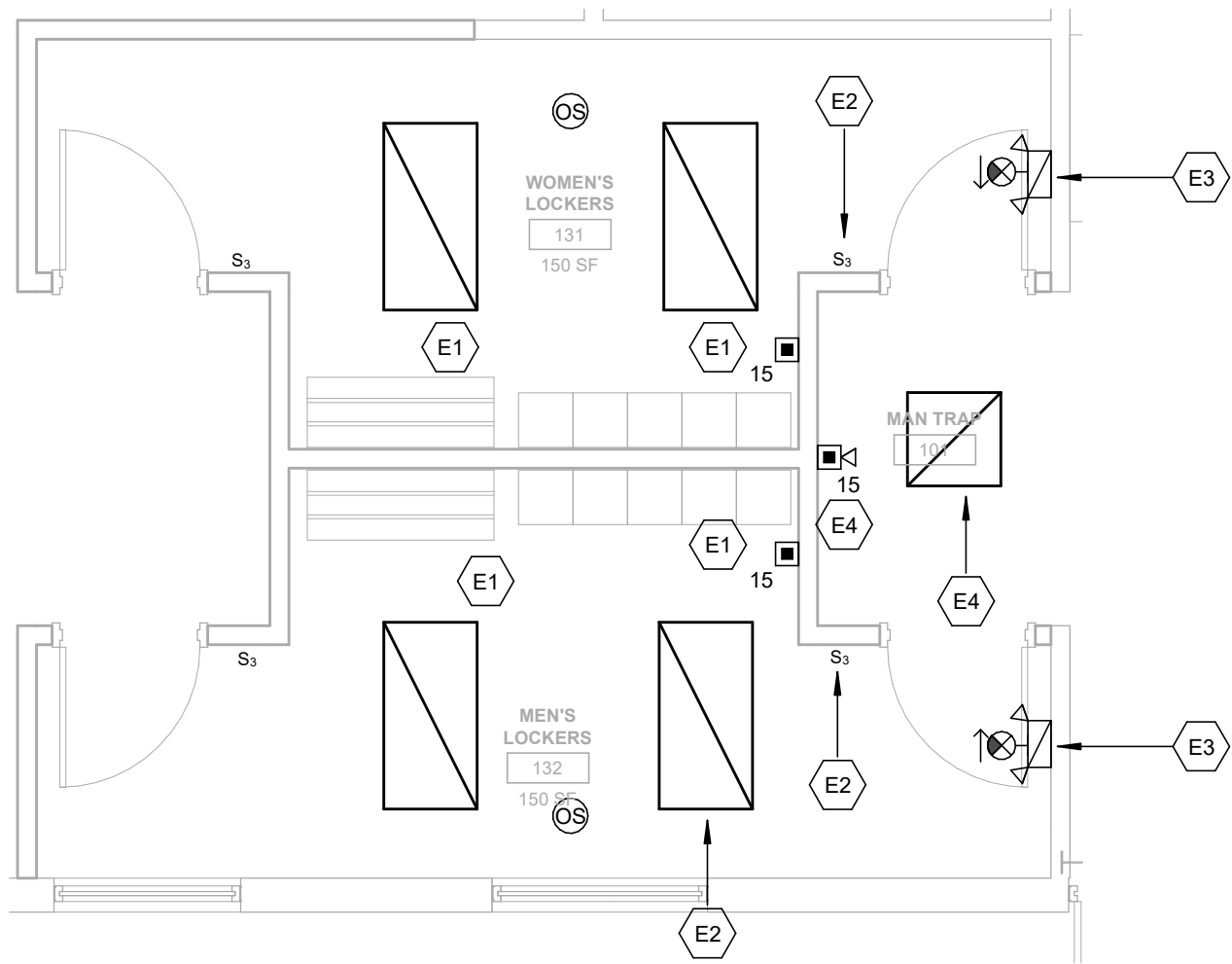
ELECTRICAL KEY NOTES	
E1	REUSE EXISTING LIGHT FIXTURES; ADJUST LOCATION AS NECESSARY FOR CEILING GRID. PROVIDE NEW WIRING BETWEEN SWITCHES AND FIXTURES.
E2	EXTEND 20A/1P WIRING TO EXISTING UNSWITCHED LIGHTING CIRCUIT.
E3	PROVIDE THERMOPLASTIC EMERGENCY EXIT SIGN WITH EGRESS LIGHTING, BASIS OF DESIGN LITHONIA LHQM LED, LETTERING AS INDICATED.
E4	PROVIDE FIXTURE, BASIS OF DESIGN COLUMBIA LCAT 2X2 SERIES, LCAT22-35MLG-R-EDU, 300LM, 3500K, 80+CRI, DLC LISTED, REMOVABLE LENS. EXTEND EXISTING CORRIDOR LIGHTING CIRCUIT TO NEW FIXTURE (TYPICAL OF POWER AND CONTROL.)
E5	PROVIDE NEW FIRE ALARM NOTIFICATION APPLCANCE COMPATIBLE WITH EXISTING FIRELITE ES-200X SYSTEM. INCLUDE MODIFICATION OF EXISTING CIRCUITS. PROVISIONS FOR ADDITIONAL CIRCUITS, UPDATED BATTERY CALCULATION, AND REPROGRAMMING OF SYSTEM TO ACCOMMODATE ADDITIONAL DEVICES.



2 LOCKER ROOMS 131 & 132 MECHANICAL DUCTWORK PART PLAN
1/4" = 1'-0"



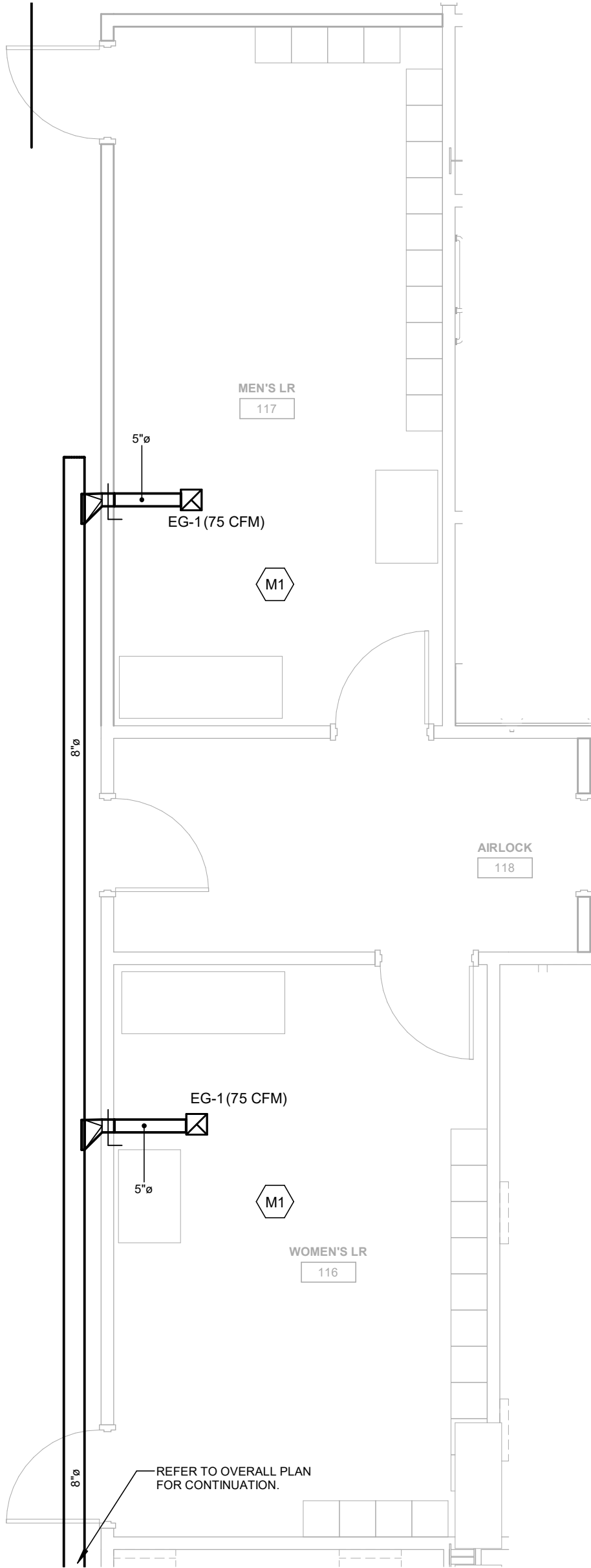
1 LOCKER ROOMS 131 & 132 FIRE PROTECTION PART PLAN
1/4" = 1'-0"



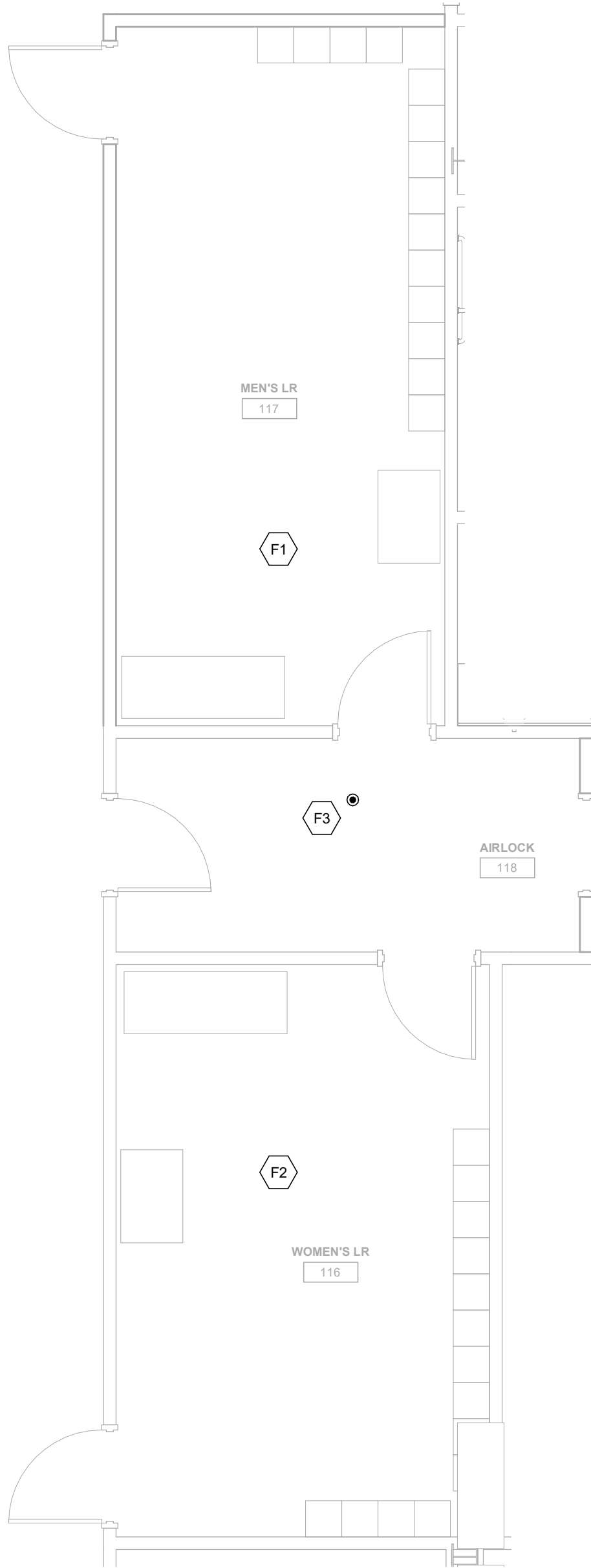
FIRE PROTECTION KEY NOTES	
F1	EXISTING SPRINKLERS IN MEN'S LR 117 ARE EXISTING TO REMAIN.
F2	EXISTING SPRINKLERS IN WOMEN'S LR 116 ARE EXISTING TO REMAIN.
F3	PROVIDE NEW SPRINKLER FROM EXISTING BRANCH PIPE FOR NEW CEILING.

MECHANICAL KEY NOTES	
M1	EXISTING HEATING AND COOLING SYSTEMS ARE EXISTING TO REMAIN

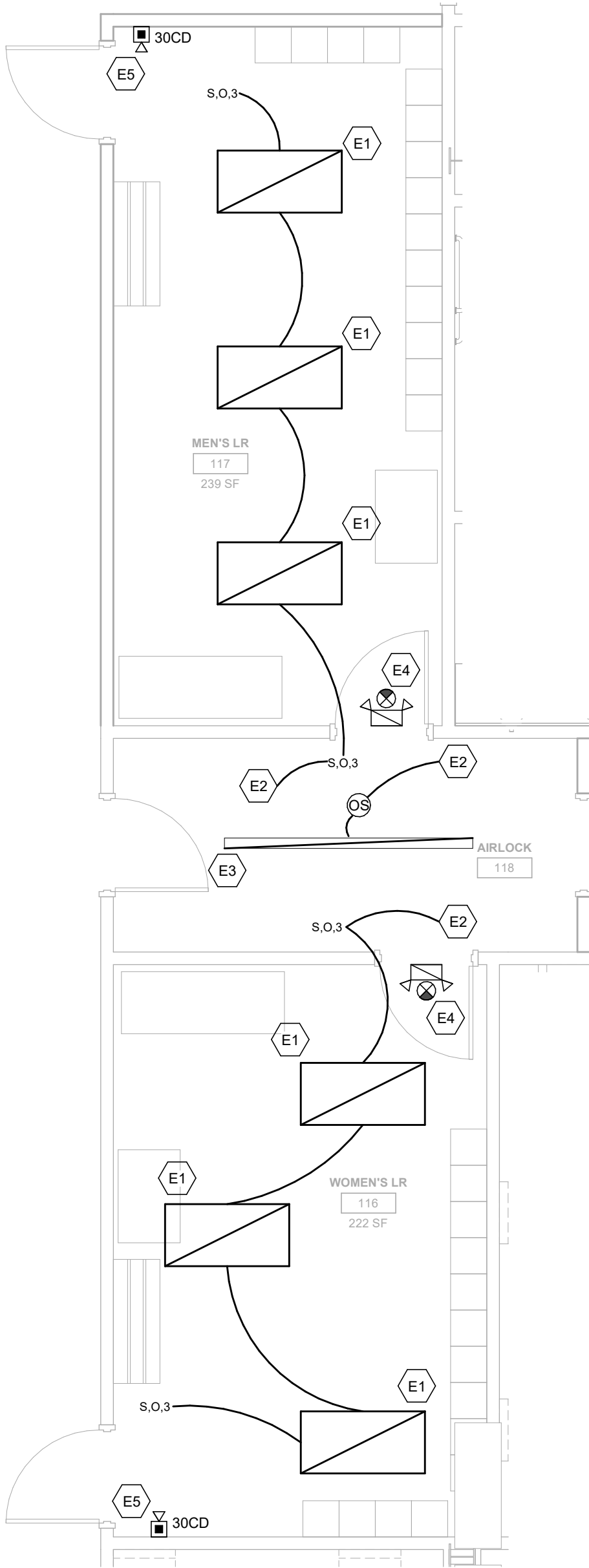
ELECTRICAL KEY NOTES	
E1	REUSE EXISTING LIGHT FIXTURES; ADJUST LOCATION AS NECESSARY FOR CEILING GRID. PROVIDE WIRING BETWEEN SWITCHES AND FIXTURES.
E2	EXTEND 20A/1P WIRING TO EXISTING UNSWITCHED LIGHTING CIRCUIT
E3	PROVIDE FIXTURE, BASIS OF DESIGN COLUMBIA LCL SERIES, LCL8-35-HL-ED-U, 3500K, 80+CRI, DLC LISTED, ACRYLIC DIFFUSER
E4	PROVIDE THERMOPLASTIC EMERGENCY EXIT SIGN WITH EGRESS LIGHTING, BASIS OF DESIGN LITHONIA LHQM LED, LETTERING AS INDICATED
E5	PROVIDE NEW FIRE ALARM NOTIFICATION APPLIANCE COMPATIBLE WITH EXISTING FIRELITE ES-200X SYSTEM. INCLUDE MODIFICATION OF EXISTING CIRCUITS, PROVISIONS FOR ADDITIONAL CIRCUITS, UPDATE BATTERY CALCULATION, AND REPROGRAMMING OF SYSTEM TO ACCOMMODATE ADDITIONAL DEVICES



1 LOCKER ROOMS 116 & 117 MECHANICAL DUCTWORK PART PLAN
1/4" = 1'-0"

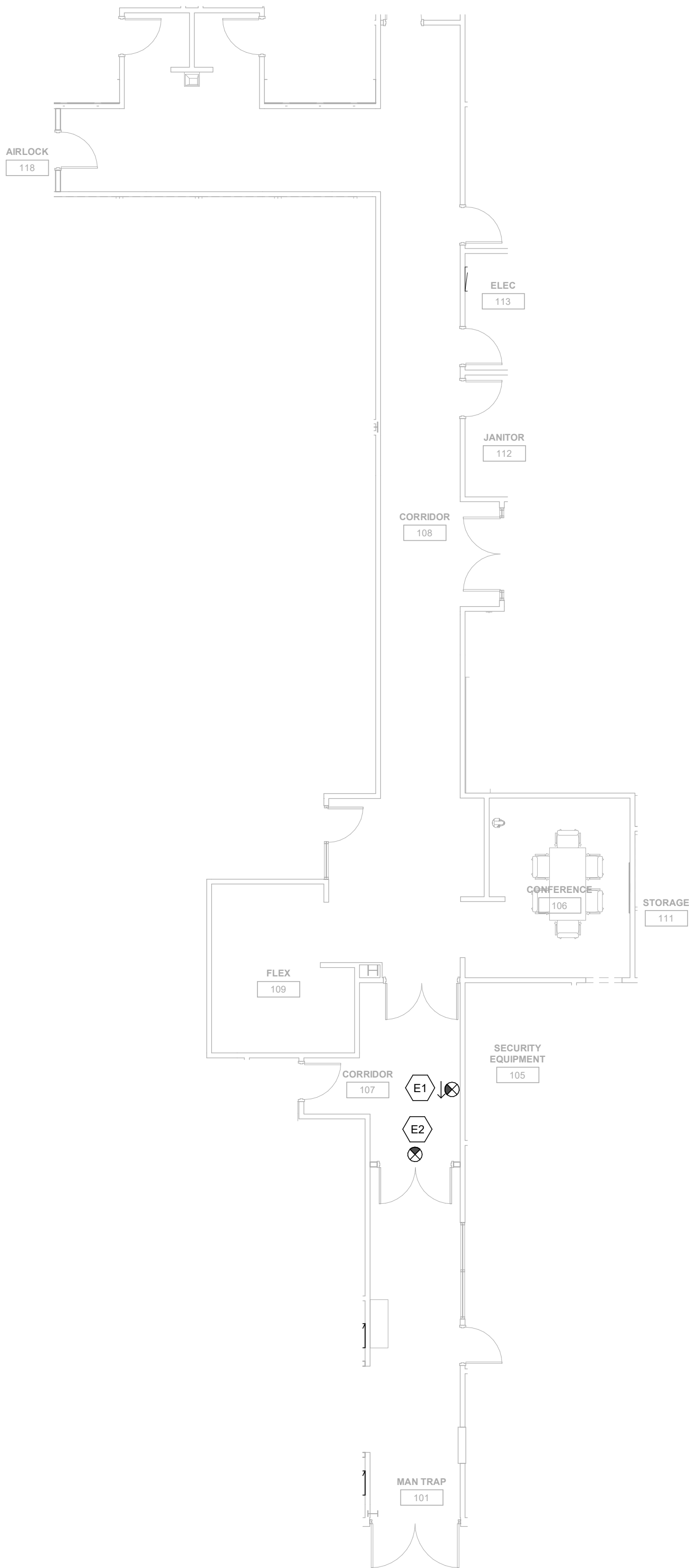


2 LOCKER ROOMS 116 & 117 FIRE PROTECTION PART PLAN
1/4" = 1'-0"



3 LOCKER ROOMS 116 & 117 ELECTRICAL PART PLAN
1/4" = 1'-0"

ELECTRICAL KEY NOTES	
E1	EXISTING EXIT SIGN LOCATION
E2	RELOCATE EXISTING EXIT SIGN AS INDICATED. REMOVE OR BLANK OUT EXISTING DIRECTIONAL ARROW. EXTEND EXISTING BRANCH CIRCUIT WIRING AS NECESSARY.



1 CORRIDOR ELECTRICAL PART PLAN
1/8" = 1'-0"

2WR

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Sheet Description

CORRIDOR MEPFP PART PLANS

Sheet Number

MEPFP2.4

MECHANICAL KEY NOTES

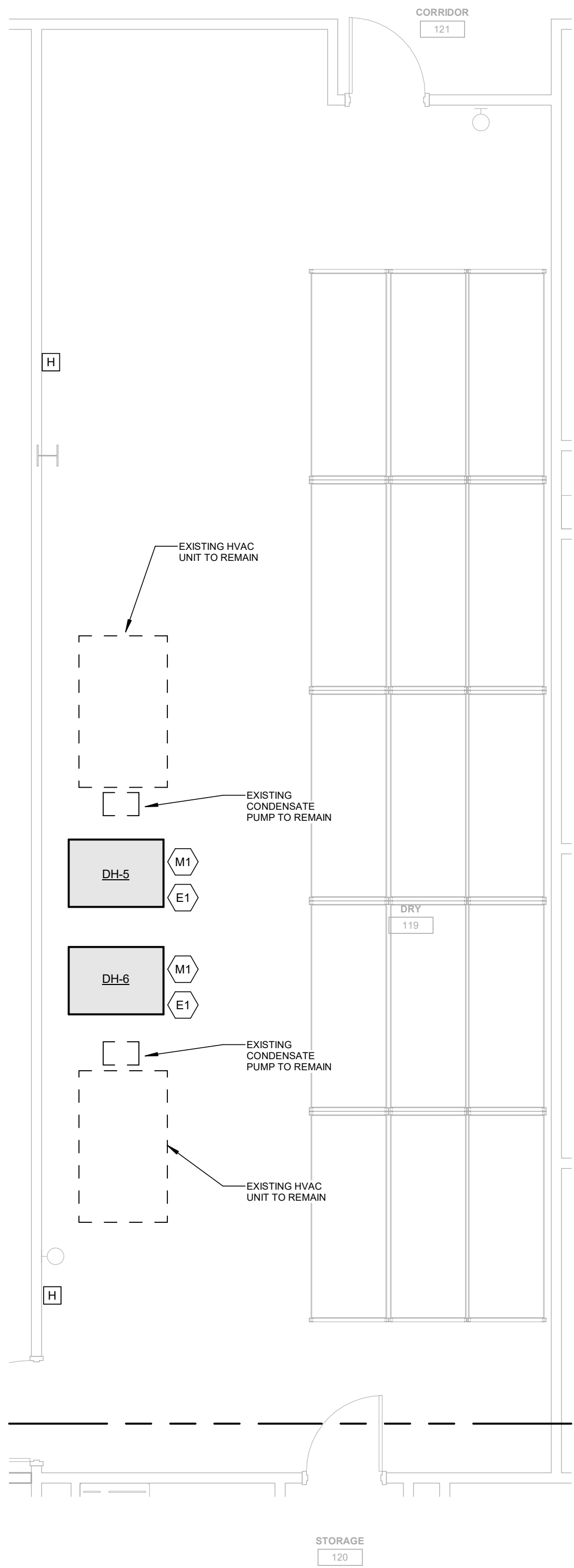
M1

PROVIDE 1" CONDENSATE PIPE FROM DH-S TO EXISTING CONDENSATE PUMP CURRENTLY SERVING THE EXISTING HVAC UNIT.

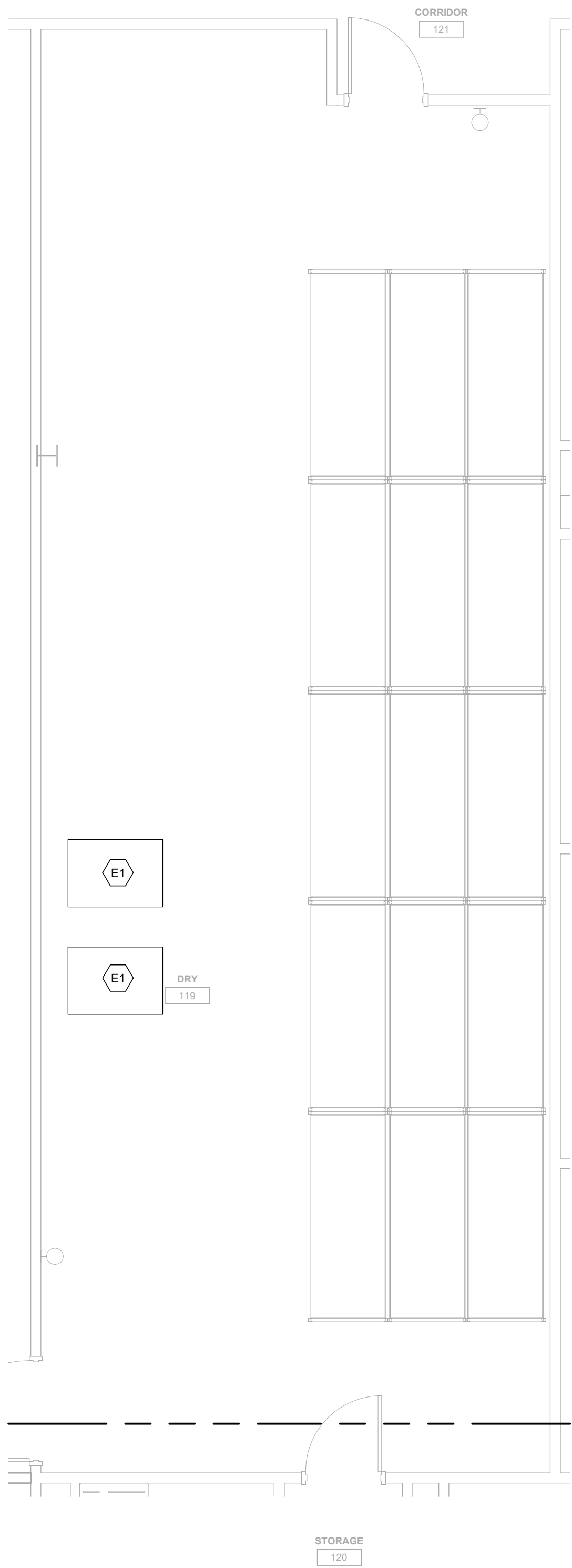
ELECTRICAL KEY NOTES

E1

PROVIDE 3#10 & 1#10G IN 3/4" C FROM PH PANEL TO UNIT. PROVIDE 30A/2P CIRCUIT BREAKER IN PH PANEL FOR EACH UNIT. PROVIDE 30A/2P HEAVY-DUTY, NEMA 1, NON-FUSED DISCONNECT SWITCH ON CORRIDOR WALL AND L7-30 RECEPTACLE FOR EACH UNIT.



1 DRY ROOM MECHANICAL DUCTWORK PART PLAN
1/4" = 1'-0"



2 DRY ROOM ELECTRICAL PART PLAN
1/4" = 1'-0"

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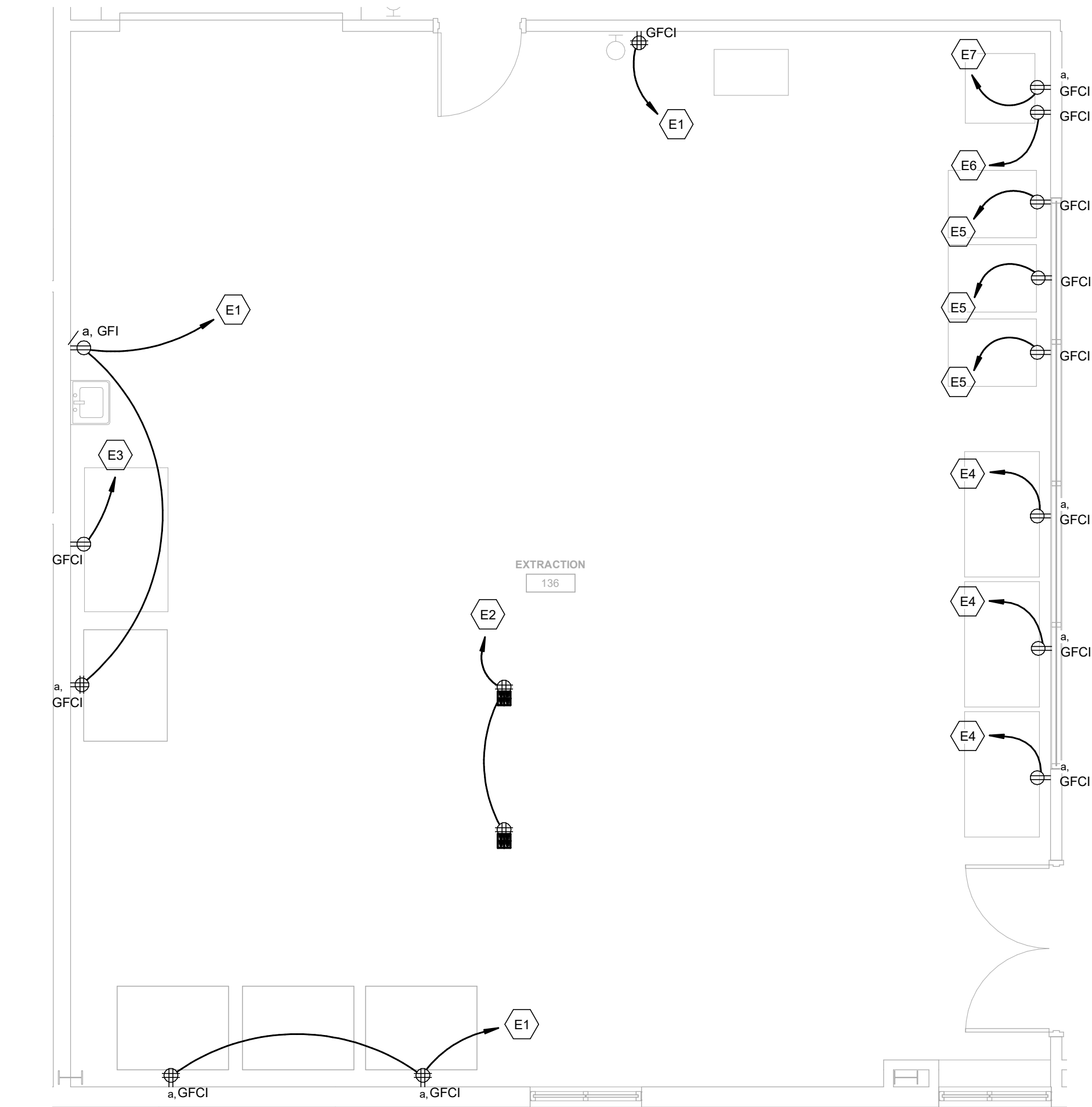
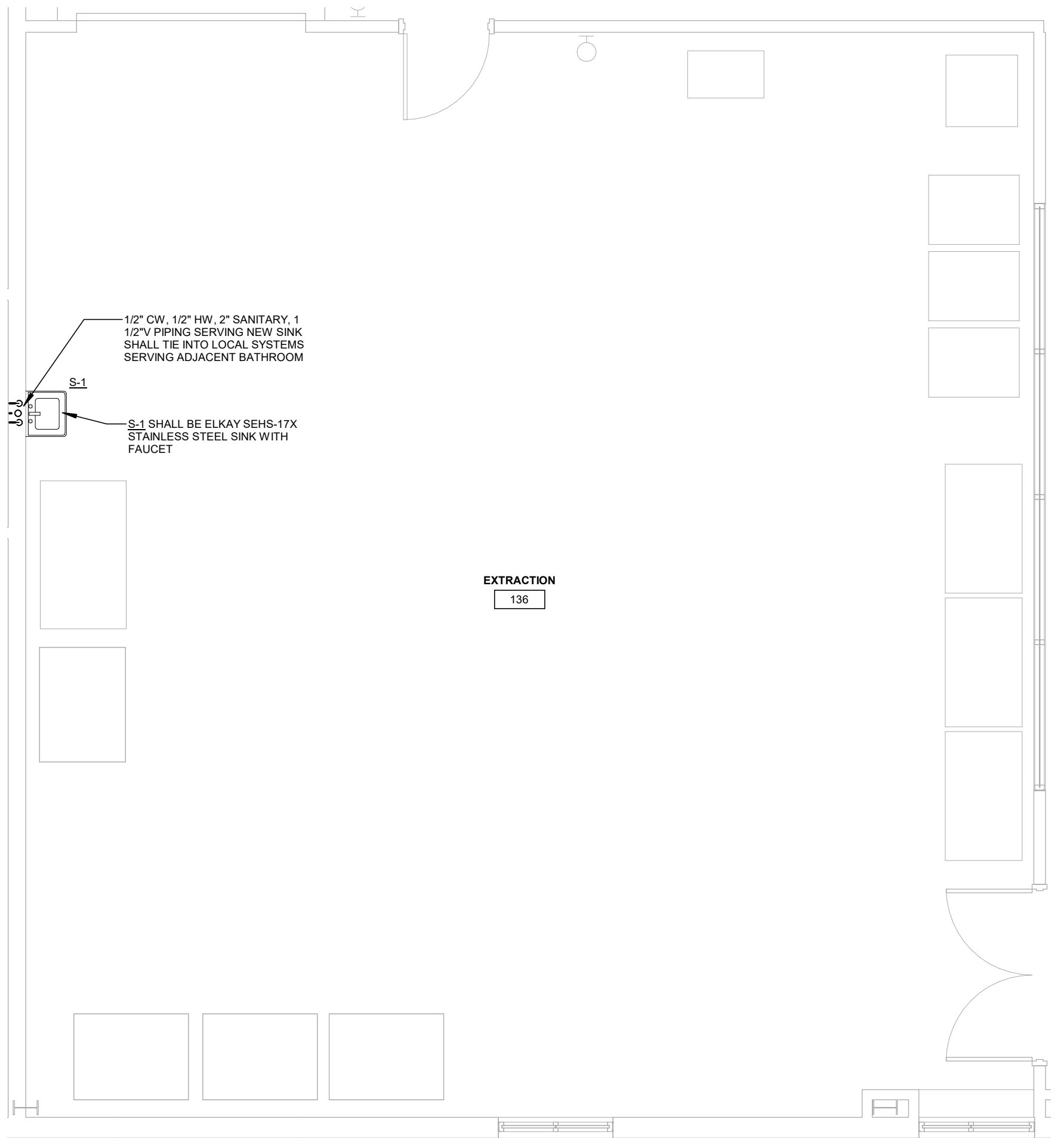
DRY ROOM MEPFP PART PLANS

Sheet Number

MEPFP2.5

MECHANICAL KEY NOTES	
M1	PROVIDE 1" CONDENSATE PIPE FROM DH-S TO EXISTING CONDENSATE PUMP CURRENTLY SERVING THE EXISTING HVAC UNIT.

ELECTRICAL KEY NOTES	
E1	PROVIDE 2#12 & 1#12G MC CABLE FROM RECEPTACLES TO 120V, 20A/1P CIRCUIT BREAKER IN PANEL. COORDINATE MOUNTING HEIGHT OF RECEPTACLES W/ ARCHITECT & OWNER PRIOR TO ROUGH-IN.
E2	PROVIDE 2#12 & 1#12G MC CABLE FROM CEILING-MOUNTED RECEPTACLES TO 120V, 20A/1P CIRCUIT BREAKER IN PANEL.
E3	PROVIDE 2#12 & 1#12G MC CABLE FROM ICEWATER EXTRACTOR TO 120V, 20A/1P CIRCUIT BREAKER IN PANEL. MOUNT RECEPTACLE @ 18" AFF.
E4	PROVIDE 2#12 & 1#12G MC CABLE FROM FREEZER TO 120V, 20A/1P CIRCUIT BREAKER IN PANEL. MOUNT RECEPTACLE @ 18" AFF.
E5	PROVIDE 2#12 & 1#12G MC CABLE FROM FREEZE DRYER TO 120V, 20A/1P CIRCUIT BREAKER IN PANEL. COORDINATE MOUNTING HEIGHT OF RECEPTACLE W/ ARCHITECT & OWNER PRIOR TO ROUGH-IN.
E6	PROVIDE 2#12 & 1#12G MC CABLE FROM AIR COMPRESSOR TO 120V, 20A/1P CIRCUIT BREAKER IN PANEL. MOUNT RECEPTACLE @ 18" AFF.
E7	PROVIDE 2#12 & 1#12G MC CABLE FROM ROSIN PRESS TO 120V, 20A/1P CIRCUIT BREAKER IN PANEL. COORDINATE MOUNTING HEIGHT OF RECEPTACLE W/ ARCHITECT & OWNER PRIOR TO ROUGH-IN.



2WR

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CONSTRUCTION DOCUMENTS

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Revisions:

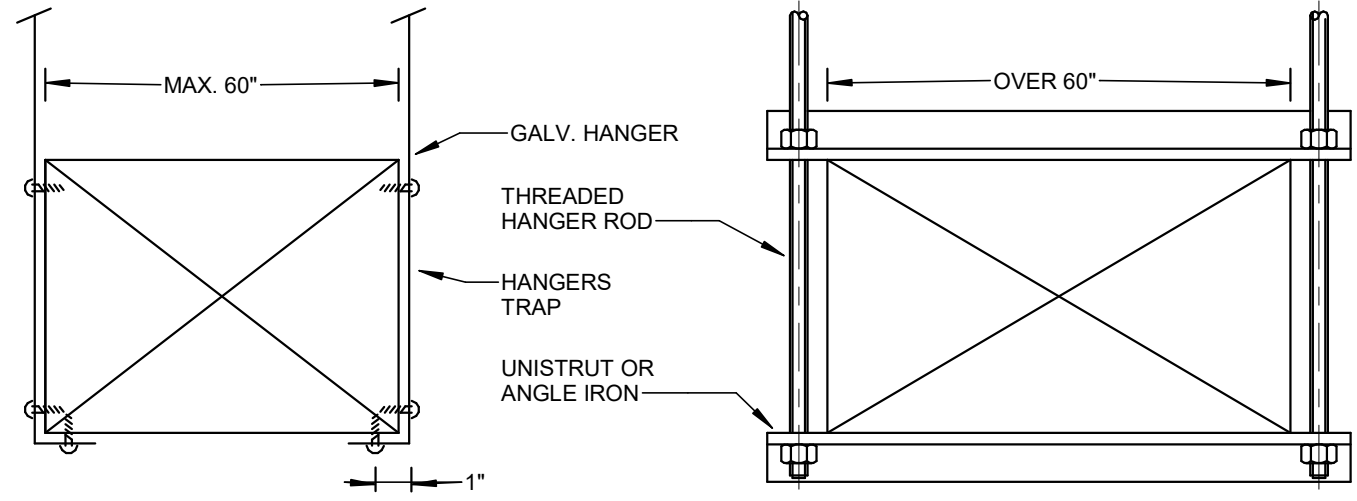
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Sheet Description

EXTRACTION ROOM MEPFP PART PLANS

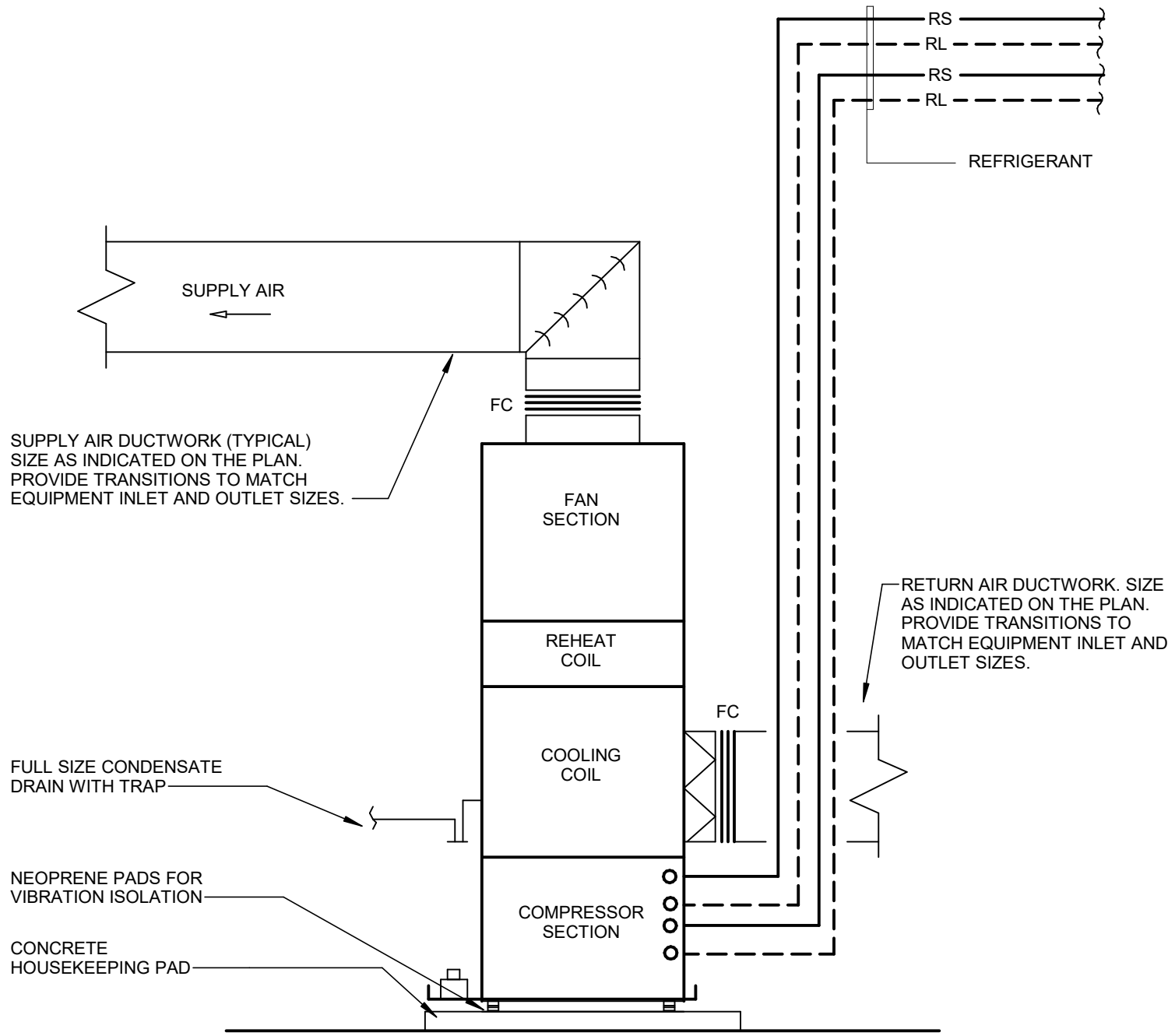
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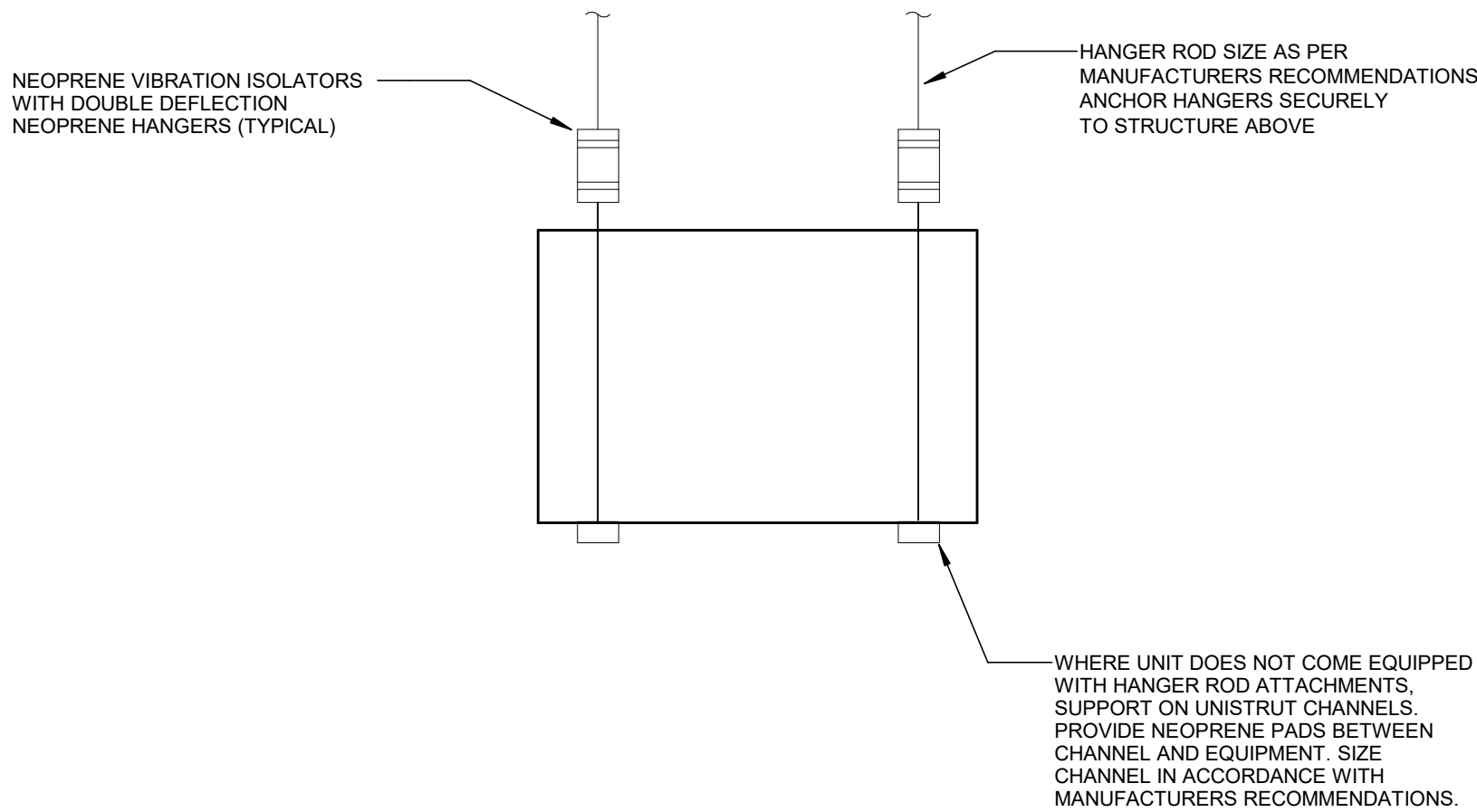


- NOTES:
- ON DUCTS OVER 48" WIDE, BOTTOM SHALL BE BRACED BY ANGLE. FOR CROSS SECTION AREA MORE THAN 8 SQ FT, DUCT SHALL BE BRACED BY ANGLES ON ALL FOUR SIDES.
 - CUTTING AND PATCHING SHALL BE LIMITED TO A MINIMUM AS REQUIRED FOR PROPER INSTALLATION. SUPPORTS SHALL BE SPACED AND SIZED AS PER SMACNA.

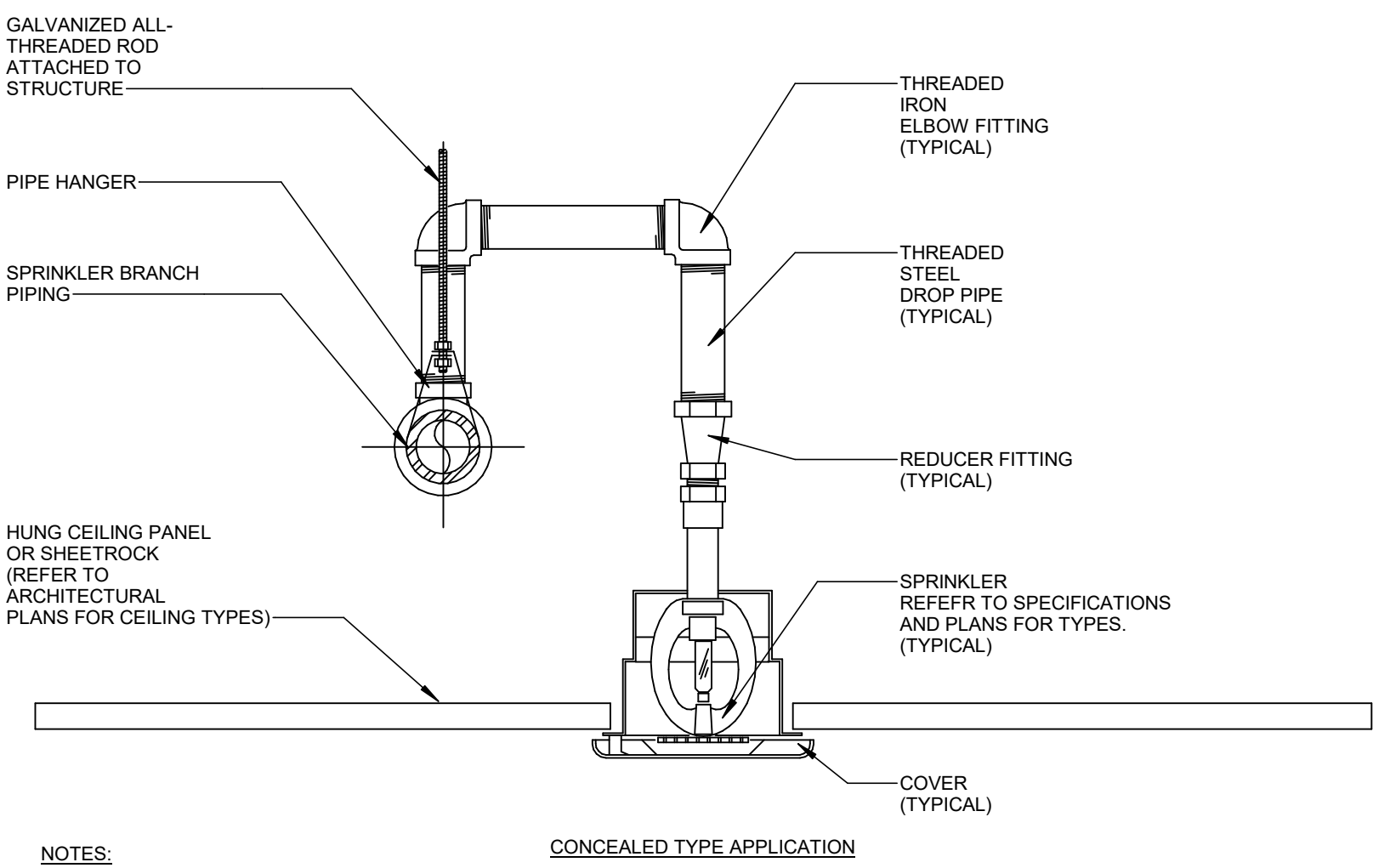
1 DUCT HANGER SUPPORT DETAIL
NTS



2 VERTICAL CULTIVATION ROOM AHU DETAIL
NTS

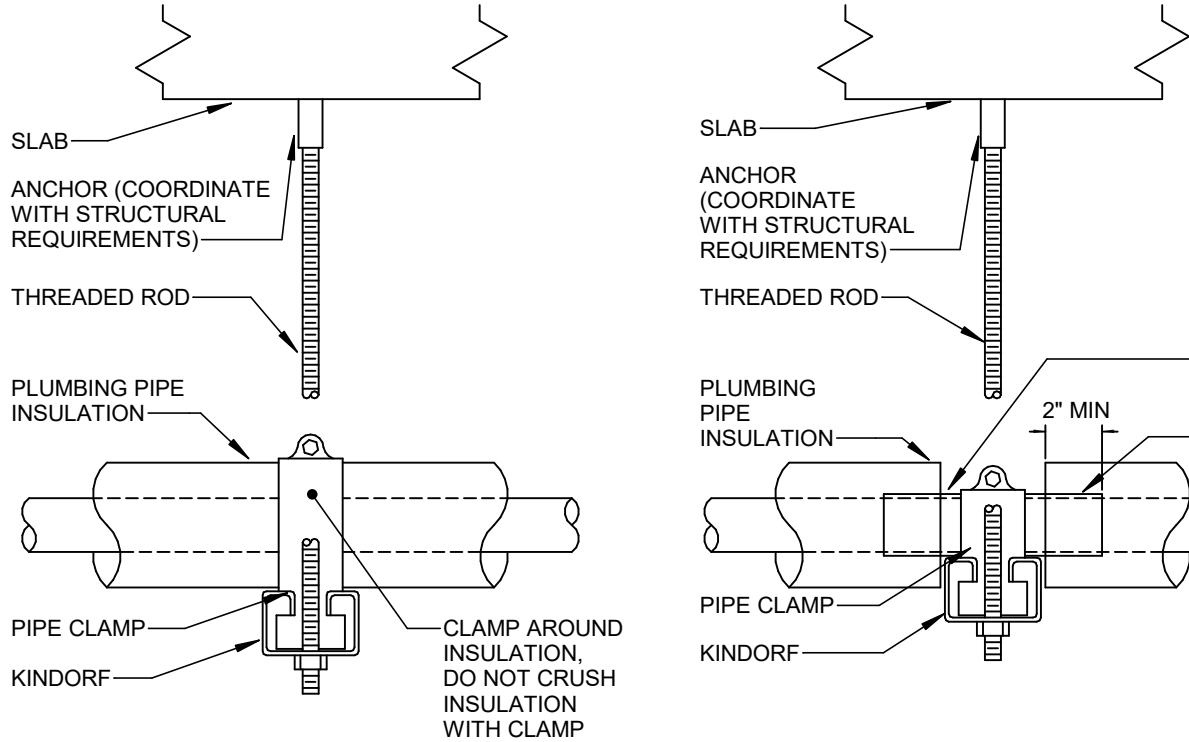


3 DEHUMIDIFIER HANGING DETAIL
NTS

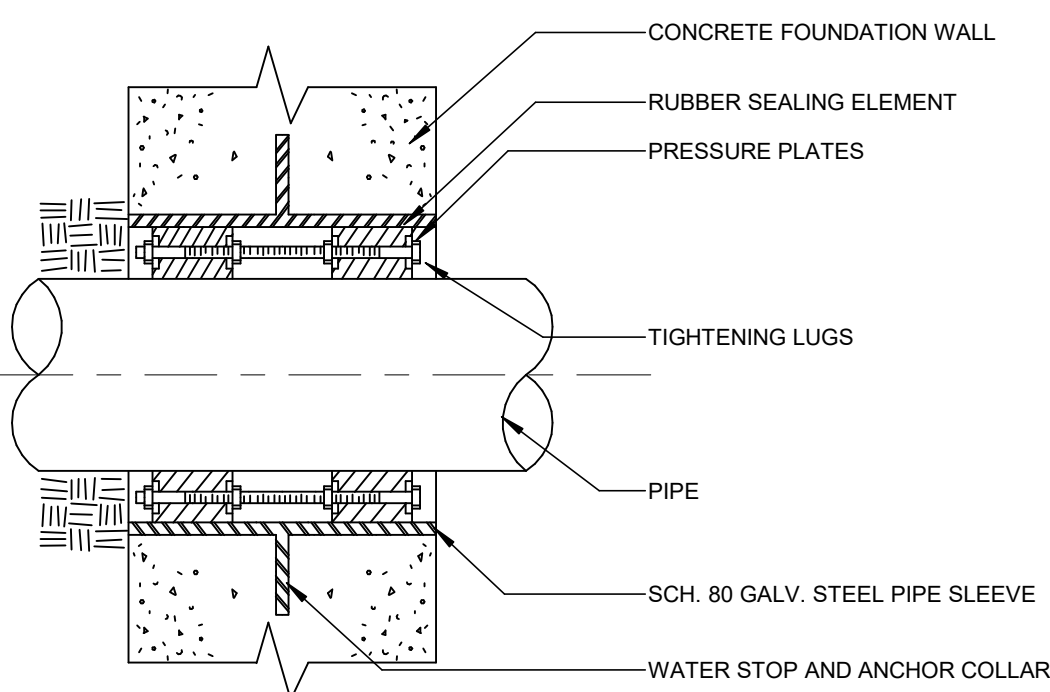


- NOTES:
- CONCEALED SPRINKLER DEPTH REQUIREMENT: 2-1/4" MINIMUM TO 2-3/4" MAXIMUM.

4 TYPICAL SPRINKLER ARM OVER INSTALLATION DETAIL
NTS



5 PIPE INSULATION & HANGER DETAIL
NTS



6 PIPE PENETRATION THROUGH EXTERIOR WALL DETAIL
NTS

SPLIT DX AIR HANDLING UNIT SCHEDULE																																							
GENERAL					PHYS.	SUPPLY FAN				DX COOLING				HOT-GAS REHEAT			HUMIDIFIER		ELECTRICAL				REMARKS																
TAG	MANUFACTURER	MODEL	SERVICE	MATCHED COMP. UNIT	WEIGHT (LBS)	CFM	ESP (IN WG)	FAN QTY.	HP (EA. FAN)	TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	MIN DEHUM. CAPACITY (LBS/HR)	ENTERING AIR DB(°F) WB(°F)	LEAVING AIR DB(°F) WB(°F)	TOTAL CAPACITY (MBH)	EAT (°F)	LAT (°F)	KW	CAPACITY (LB/HR)	FLA	MOP	VOLTAGE	PHASE	TYPE	RATINGS	FEATURES	INSTALL												
AHU-F1-AB THRU AHU-F8-AB	DATA AIRE	G-POD GPAU-09134	FLOWER ROOMS	CU-F1-AB THRU CU-F8-AB	2,400	7,600	1.0	2	6.3	284	198	154.6	75.0 63.0	51.0 49.0	178.3	63.3	80.0	10.2	30	62.7	80	460	3	1	1	1-14	1												
REMARKS - TYPE					REMARKS - RATINGS								REMARKS - FEATURES												REMARKS - INSTALL														
1. VERTICAL AHU W/ OUTDOOR AIR-COOLED CONDENSER					1. COOLING CAPACITY SHOWN IS NET								1. MODULATING HOT GAS REHEAT 2. BACKNET COMMUNICATION 3. R-410A REFRIGERANT 4. DOUBLE WALL CONSTRUCTION, 3LB INSULATION 5. TANDEM SCROLL COMPRESSORS, DUAL CIRCUIT 6. TOP SUPPLY, REAR RETURN 7. BOTH LEFT AND RIGHT HAND CONFIGURATIONS ARE REQUIRED. COORDINATE WITH FLOOR PLANS 8. ECM PLENUM FANS												9. MERV-11 FILTERS 10. MERV-8 FILTERS 11. PROVIDE UVGI COIL SURFACE DISINFECTION DOWNSTREAM OF COOLING COIL AMERICAN ULTRAVIOLET CK SERIES OR EQUAL 12. MODULATING STEAM HUMIDIFIER 13. ZONE CONTROL/ZONE MASTER TO ALLOW UNITS TO PROVIDE LEAD/LAG CONTROL AND UNIT ROTATION 14. STANDARD DAP4 TOUCHSCREEN CONTROLLER												1. PROVIDE SPLIT SYSTEM REFRIGERANT PIPING BETWEEN AIR HANDLING UNIT AND COMPRESSOR UNIT. SIZED AND CONFIGURED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. PIPING AND CONDUIT (POWER & CONTROLS) WALL PENETRATIONS SHALL BE WATERTIGHT.		

SPLIT AIR CONDITIONING SYSTEM CONDENSER UNIT SCHEDULE																
GENERAL				PHYSICAL	PERF.	ELECTRICAL				REMARKS						
TAG	MANUFACTURER	MODEL	MATCHED AIR HANDLING UNIT	WEIGHT (LBS)	LXWXH (IN)	NOMINAL TONS	SOUND POWER (DBA)	MCA	MOP	VOLTAGE	PHASE	TYPE	RATINGS	FEATURES	INSTALL	
CU-F1-AB, CU-M1-AB	DATA AIRE	GHRC-09934	AHU-F1-AB, AHU-M1-AB	750	48.5x92.5x 43	26	-	5.7	15	460	3	1	1	1,2,3	1	
REMARKS - TYPE				REMARKS - RATINGS				REMARKS - FEATURES				REMARKS - INSTALL				
1. REMOTE CONDENSER				1. 95 DEG. F OUTDOOR AMBIENT				1. DISCONNECT SWITCH 2. DUAL CIRCUIT 3. EC MOTORS				1. PROVIDE WITH 4" CONCRETE PAD				

DEHUMIDIFIER SCHEDULE													
TAG	MANUFACTURER	MODEL NUMBER	LOCATION	PERFORMANCE			ELECTRIC DATA					WEIGHT (LB)	REMARKS
				CAPACITY (LB/HR)	AIRFLOW (CFM)	WATTS	VOLTS	PHASE	HZ	FLA	MOP		
DH-1 THRU 6	ANDEN	A710V3	FLOWER, MOM/VEG, DRY ROOMS	31.1	1,760	4,820	277	1	60	17.4	30	360	1,2,3,4,5,6,7
REMARKS:													
1. CAPACITY BASED ON 80F / 60% RH CONDITIONS 2. R-410A REFRIGERANT 3. RECEPTACLE BY DIV 26 4. PROVIDE 3/4" DRAIN WITH P-TRAP 5. PROVIDE OPTIONAL CONDENSATE PUMP KIT 6. PROVIDE WITH DUCT KIT 7. PROVIDE WITH WALL MOUNTED HUMIDISTAT.													

FAN SCHEDULE																				
GENERAL					PHYS.	PERFORMANCE							ELECTRICAL				REMARKS			
TAG	MANUFACTURER	MODEL	LOCATION	SERVICE	WEIGHT (LBS)	CFM	ESP (IN WG)	RPM	FEI	STATIC EFFIC.	BHP	SONES	FLA	HP	VOLTAGE	PHASE	TYPE	RATINGS	FEATURES	INSTALL
EF-1	GREENHECK	CUE-160-VG	SIDEWALL	CULTIVATION ROOMS	89	2,600	1.0	1,270	-	52%	0.78	16.0	13	1.0	115	1	1	1, 2	1-3	1
REMARKS - TYPE					REMARKS - RATINGS							REMARKS - FEATURES				REMARKS - INSTALL				
1. CENTRIFUGAL SIDEWALL DIRECT DRIVE FAN					1. AIR PERFORMANCE CERTIFIED IN ACCORDANCE TO AMCA 211 2. SOUND PERFORMANCE CERTIFIED IN ACCORDANCE TO AMCA 311							1. EC MOTOR 2. NON-FUSED DISCONNECT SWITCH 3. CONTROL DAMPER, TWO POSITION, FAIL OPEN				1. INTERLOCK FAN WITH CO2 SENSOR. IF CO2 LEVEL RISES ABOVE 9000 PPM, THE EXHAUST FAN DAMPER SHALL OPEN AND FAN SHALL TURN ON TO FULL SPEED. SYSTEM SHALL STAY ON UNTIL MANUALLY TURNED OFF.				

DIFFUSER, GRILLE & REGISTER SCHEDULE											REMARKS	
SYMBOL	NECK SIZE / RUNOUT SIZE (IN)	FACE SIZE (IN)	AIRFLOW SELECTION RANGE (CFM)	SERVICE	MAX. AIR P.D.	MAX. N.C. LEVEL	MOUNTING	MANUFACTURER / MODEL NUMBER	FEATURES & ACCESSORIES	INSTALLATION		
SD-1	8	12x12	0-200	SUPPLY	0.1	30	12"x12" SURFACE MOUNT	TITUS TDC	-	-		
SD-2	14	24x24	201-1300	SUPPLY	0.1	35	24"x24" SURFACE MOUNT	TITUS TDC	-	-		
EG-1	5	6x6	0-100	EXHAUST / RETURN	0.1	30	24"x24" LAY-IN MODULE	TITUS 350RL	-	-		
RG-1	24x48	24x48	0-7200	EXHAUST / RETURN	0.1	35	24"x24" LAY-IN MODULE	TITUS 350RL	-	-		
GENERAL NOTES:											REMARKS - FEATURES & ACCESSORIES	
1. BORDER TYPES SHALL BE COMPATIBLE WITH CEILING TYPE FOR THE ROOM IN WHICH IT IS LOCATED. CONTRACTOR SHALL REVIEW THE ARCHITECTURAL REFLECTED CEILING PLANS FOR SPECIFIC CEILING TYPES IN EACH SPACE. FINISHES, COLOR AND BORDER TYPES SHALL BE APPROVED BY THE ARCHITECT 2. REFER TO PLANS FOR LOCATION, AIR QUANTITIES, TYPE AND BLOW PATTERN OF EACH DEVICE 3. PROVIDE ALUMINUM CONSTRUCTION FOR DEVICES INSTALLED IN HIGH MOISTURE AREAS INCLUDING TOILET ROOMS, SHOWER ROOMS, KITCHEN, ETC. 4. PROVIDE CABLE-OPERATED DAMPER WITH REMOTE ACTUATOR FOR VOLUME DAMPERS LOCATED ABOVE GYP AND INACCESSIBLE CEILINGS.											REMARKS - INSTALLATION	

ENERGY RECOVERY VENTILATOR SCHEDULE																																	
GENERAL			BUILDING SUPPLY DATA										BUILDING EXHAUST DATA				RECOVERED MBH		% EFFICIENCY		ELECTRICAL			REMARKS									
TAG	MANUFACTURER	MODEL	AIRFLOW (CFM)	WINTER				SUMMER				MAX PD (IN WC)	AIRFLOW (CFM)	WINTER				SUMMER				MAX PD (IN WC)	WIN-TER	SUM-MER	WIN-TER	SUM-MER	MCA	MOP	VOLTAGE / PHASE	TYPE	RATINGS	FEATURES	INSTALL
				EAT(F)		LAT(F)		EAT(F)		LAT(F)				EAT(F)		LAT(F)		EAT(F)		LAT(F)													
				DB	WB	DB	WB	DB	WB	DB	WB			DB	WB	DB	WB	DB	WB	DB	WB												
ERV-1	RENEWAIRE	HE1X1NH	250	3.1	1.1	58.1	44.4	90.4	73.3	77.7	66.0	1.5	250	75.0	62.5	-	-	75.0	62.5	-	-	1.5	18.1	6.9	81.2	70.4	10.8	15	208V / 1P	1	-	1-6	1
REMARKS - TYPE			REMARKS - RATINGS								REMARKS - FEATURES				REMARKS - INSTALL																		
1. FIXED ENTHALPY CORE TYPE - SENSIBLE AND LATENT HEAT TRANSFER			1. - 2. - 3. -								1. EC MOTORS 2. SINGLE POINT POWER CONNECTION 3. MERV 8 FILTERS 4. NONFUSED DISCONNECT 5. DOUBLE WALL CONSTRUCTION 6. DIGITAL TIME CLOCK - WALL MOUNT				1. COORDINATE LOCATION OF TIME CLOCK WITH ARCHITECT. 2. - 3. -																		

FILTER BANK SCHEDULE															
GEN'L.		PHYSICAL								PERF.		REMARKS			
TAG		SIZE A	SIZE B	SIZE C	SIZE D	FACE AREA (SQ FT)	LOCATION	TYPE	DEPTH (IN)	FACE VEL. (FT/MIN)	INITIAL PD (IN WG)	TYPE	RATINGS	FEATURES	INSTALL
FB-1	1	24X12	-	-	-	-	2.0	PRE	8	2	-	-	1	1	1,2
								FINAL	HEPA	12	500	0.5	-	-	-
FB-2	1	24X12	-	-	-	-	2.0	PRE	8	2	-	-	1	1	2,2
								FINAL	CARBON	12	500	0.5	-	-	-
REMARKS - TYPE		REMARKS - RATINGS				REMARKS - FEATURES				REMARKS - INSTALL					
1. SIMILAR TO CAMFIL SIDELOCK, 14 GAUGE GALVANIZED STEEL, ACCESS DOOR BOTH SIDES		1. PRESSURE DROP (SPD) AT CLEAN CONDITION (INITIAL RESISTANCE), AT VELOCITY INDICATED (NOT AT ACTUAL VELOCITY)				1. HEPA/ULPA FINAL FILTER, SIMILAR TO CAMFIL ABSOLUTE VG, MODEL 85013-010 2. CARBON FINAL FILTER, SIMILAR TO CAMFIL CAMSORB RIGA-CARB, ACTIVATED CARBON				1. PROVIDE A SPARE SET OF FILTERS 2. SUSPEND UNIT FROM STRUCTURE ABOVE AT FOUR CORNERS					

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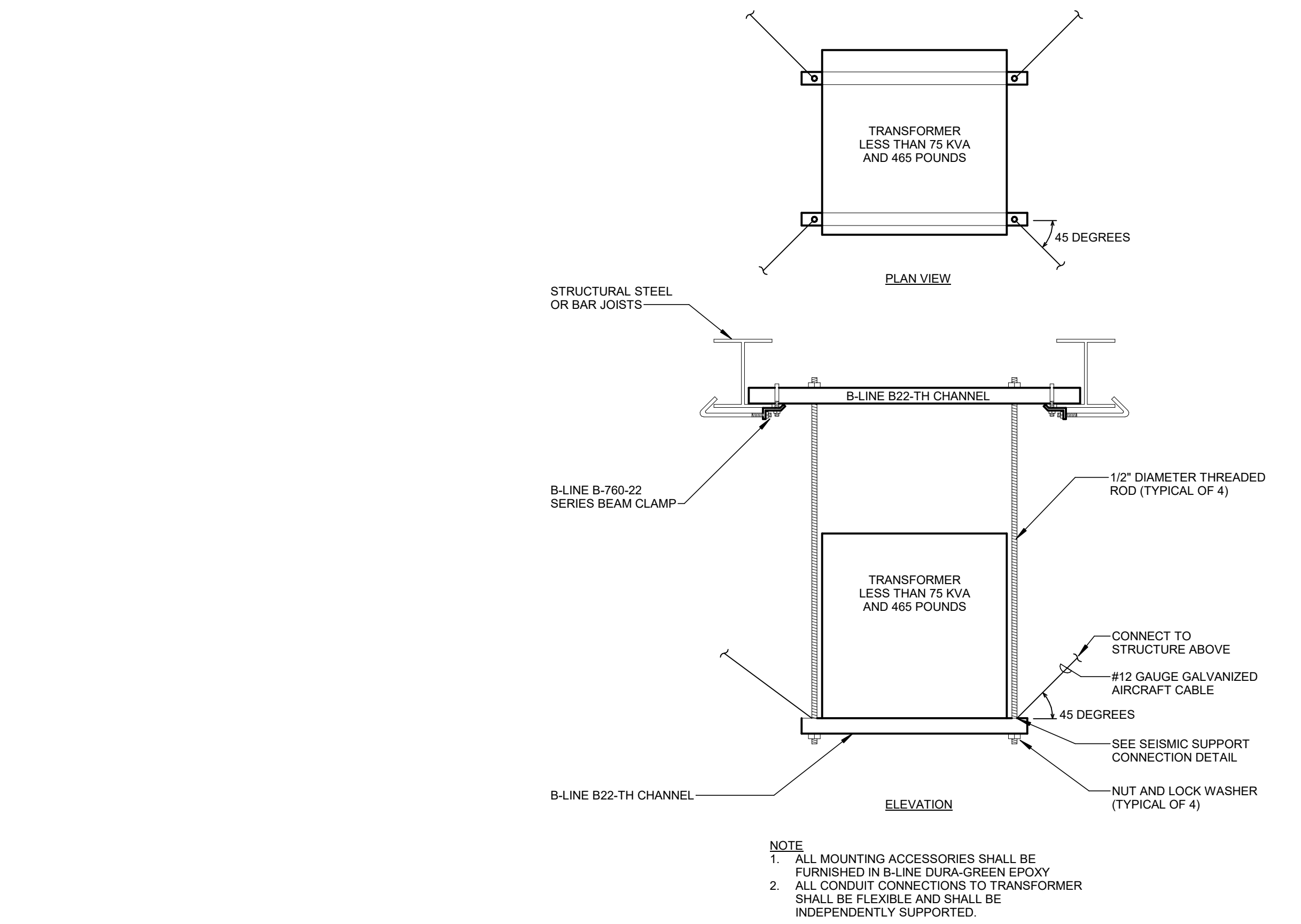
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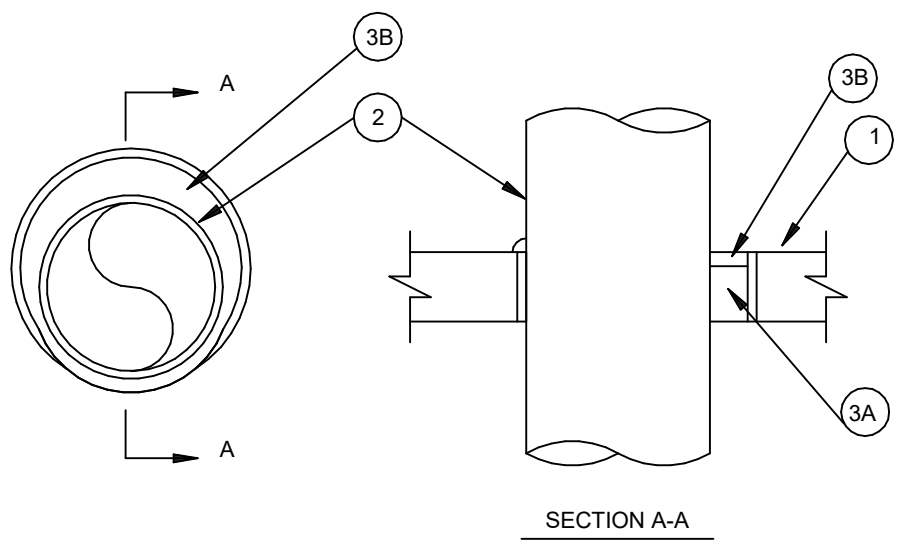
MECHANICAL
SCHEDULES &
MPFP DETAILS

Sheet Number

MEPFP3.0

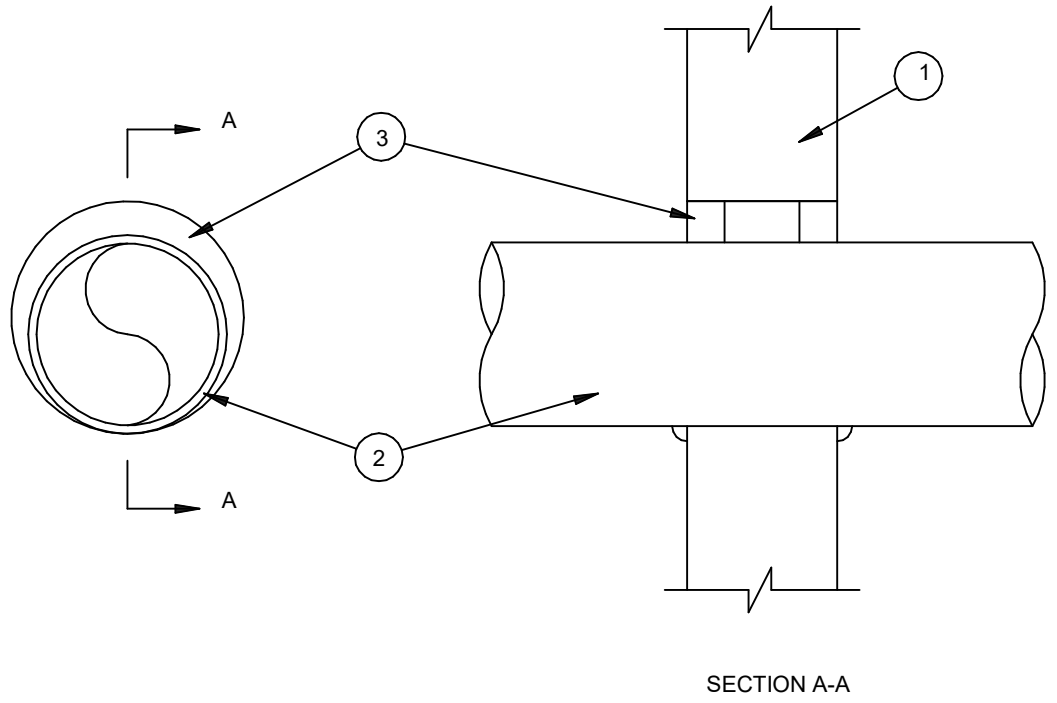


1 SUSPENDED TRANSFORMER SEISMIC SUPPORT DETAIL
NTS



1. FLOOR ASSEMBLY — MIN 2-1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE. MAX DIAMETER OF OPENING IS 31-7/8 IN.
2. THROUGH PENETRANTS — ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED CONCENTRICALLY WITHIN THE FIRESTOP DEVICE. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR ASSEMBLY.
3. FIRESTOP SYSTEM — THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
 - A. PACKING MATERIAL — MIN 2 IN. THICKNESS OF MIN 4 PCF MINERAL WOOL BATT INSULATION TIGHTLY PACKED INTO THE OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM TOP SURFACE OF FLOOR AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.
 - B. FILL, VOID OR CAVITY MATERIALS* - SEALANT MIN 1/2 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH TOP SURFACE OF FLOOR. AT POINT CONTACT, A MIN 1/2 IN. DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE CONCRETE/SLEEVE/PIPE INTERFACE ON TOP SURFACE OF FLOOR.SEALANT: HILTI FS-ONE OR APPROVED EQUAL.
*BEARING THE UL CLASSIFICATION MARK

3 UL LISTED CONDUIT SLEEVE FIRESTOPPING SPECIFICATIONS
NTS

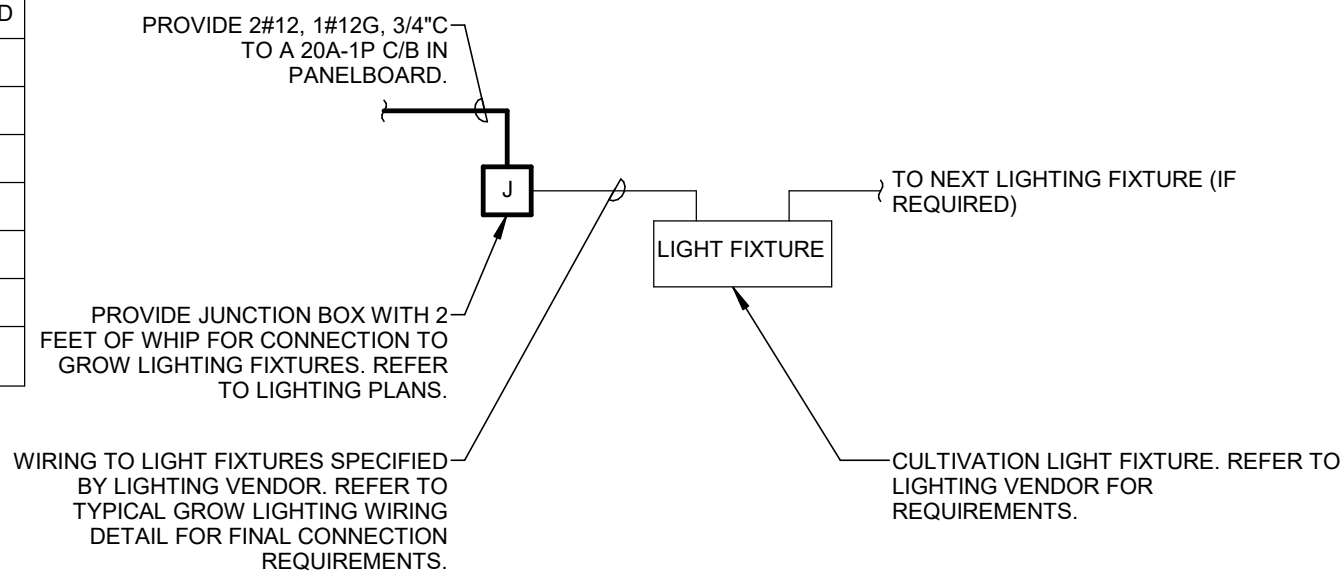


1. WALL ASSEMBLY - MIN 3-3/4 IN. AND 5 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS.
 2. THROUGH PENETRANTS - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE CENTERED WITHIN THE FIRESTOP SYSTEM. PIPE MAY BE INSTALLED WITH CONTINUOUS POINT CONTACT. PIPE, CONDUIT OR TUBE MAY BE INSTALLED AT AN ANGLE NOT GREATER THAN 45 DEGREES FROM PERPENDICULAR. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY.
 3. FILL, VOID OR CAVITY MATERIAL* - MIN 5/8 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. AT THE POINT OR CONTINUOUS CONTACT LOCATIONS BETWEEN PIPE AND WALL, A MIN 1/2 IN. DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE PIPE-WALL INTERFACE ON BOTH SURFACES OF WALL.
- SEALANT: FS-ONE SEALANT
*BEARING THE UL CLASSIFICATION MARK
4. PROVIDE A BEAD OF NON-SHRINK, WP SILICON SEALANT AROUND EXTERIOR WALL PENETRATIONS.

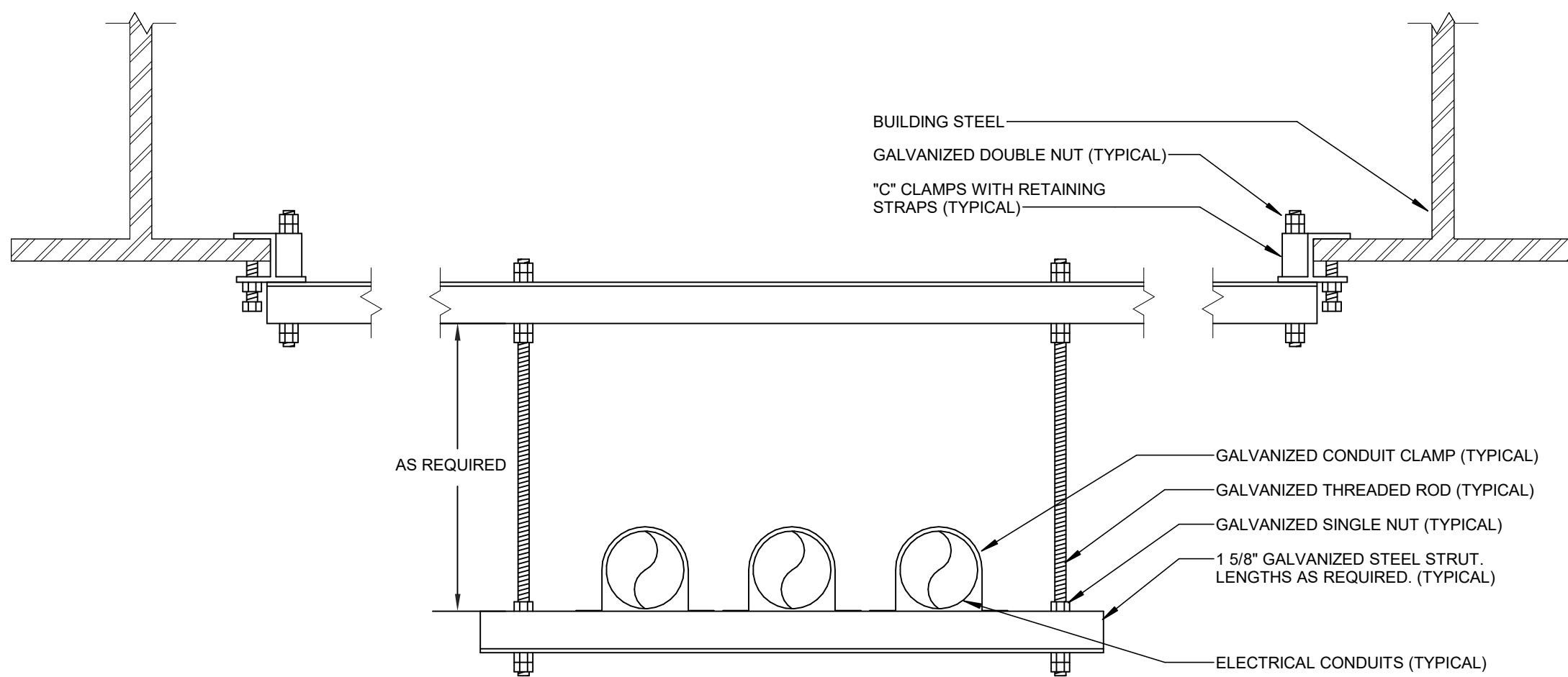
4 TYPICAL CONDUIT HANGING DETAIL
1/8" = 1'-0"

ITEM	SPECIFIED BY	FURNISHED	INSTALLED
CONDUCTORS TO JUNCTION BOX	CES	DIV. 26	DIV. 26
JUNCTION BOX	CES	DIV. 26	DIV. 26
POWER CABLING TO LIGHT FIXTURES	VENDOR	OWNER	DIV. 26
CONTROL CABLING TO LIGHT FIXTURES	VENDOR	OWNER	DIV. 26
CULTIVATION LIGHT FIXTURES	VENDOR	OWNER	DIV. 26
WORK LIGHT FIXTURES	CES	DIV. 26	DIV. 26
WORK LIGHT FIXTURE CONTROL AND POWER	CES	DIV. 26	DIV. 26

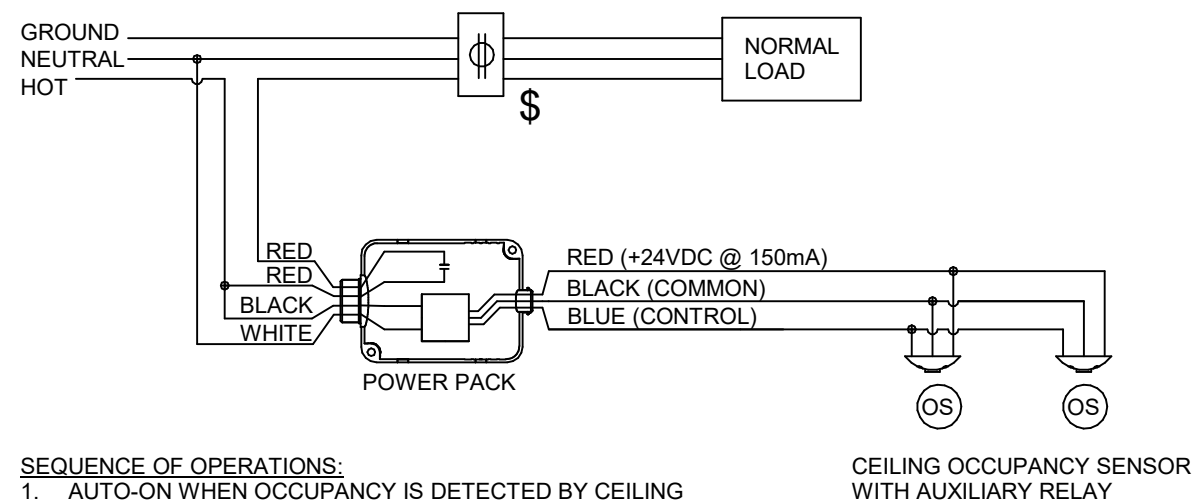
- NOTES:**
1. REFER TO LIGHTING VENDOR DRAWINGS FOR FINAL LIGHT FIXTURE LOCATION AND QUANTITIES.
 2. REFER TO WORK LIGHTING FIXTURE PART PLAN FOR PLACEMENT OF WORK LIGHTS.
 3. VENDOR IS FLUENCE. LIGHTING DRAWINGS BASED ON PLANS RECEIVED BY CES DATED 09/21/2021.



2 CULTIVATION ROOM LIGHTING DETAIL
NTS

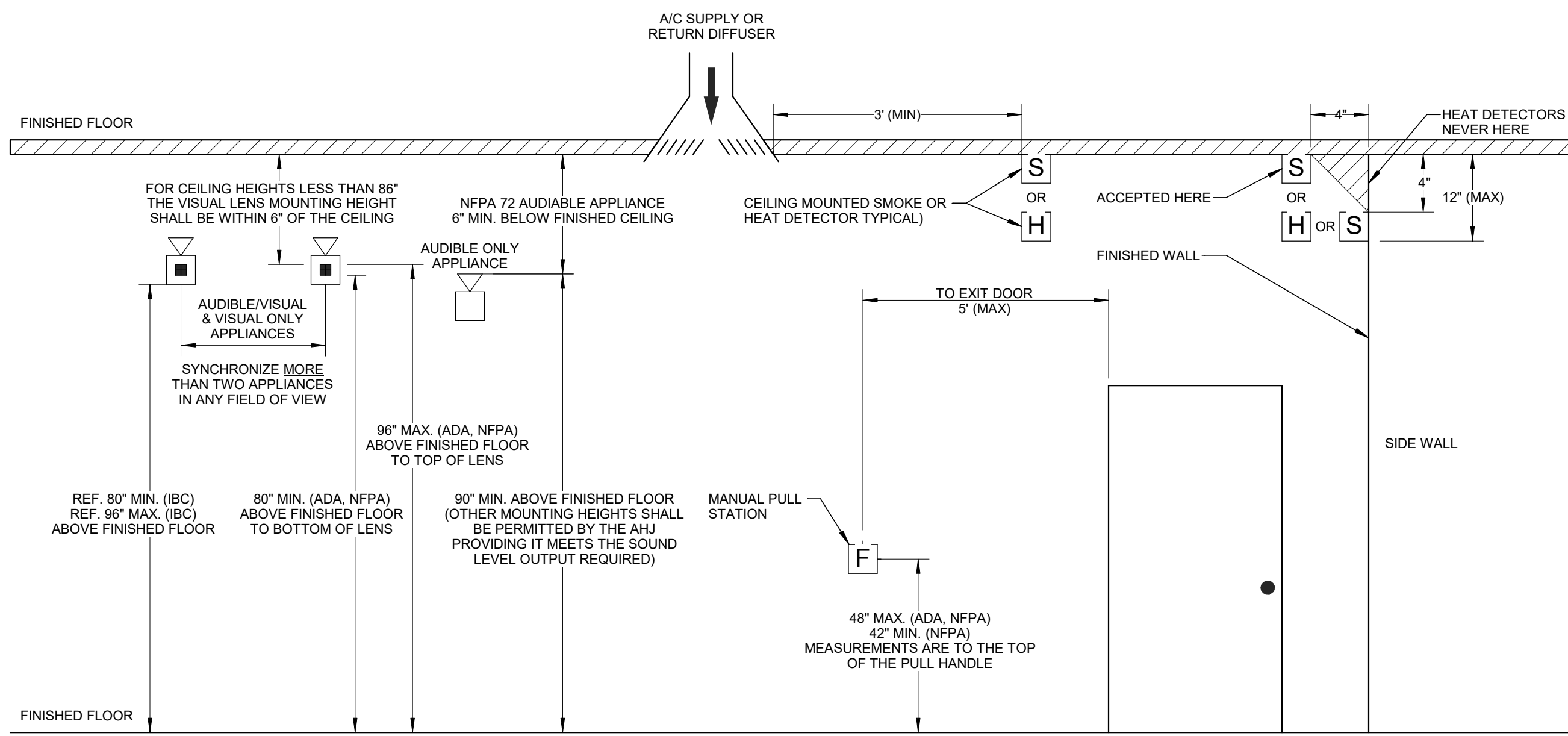


- NOTES:**
1. PROVIDE ALL REQUIRED HARDWARE INCLUDING BUT NOT LIMITED TO THREADED ROD, WASHERS, BOLTS, BEAM CLAMPS, STRAPS, AND CHANNEL SPRING NUTS.
 2. QUANTITIES AND SIZE OF CONDUITS VARY.



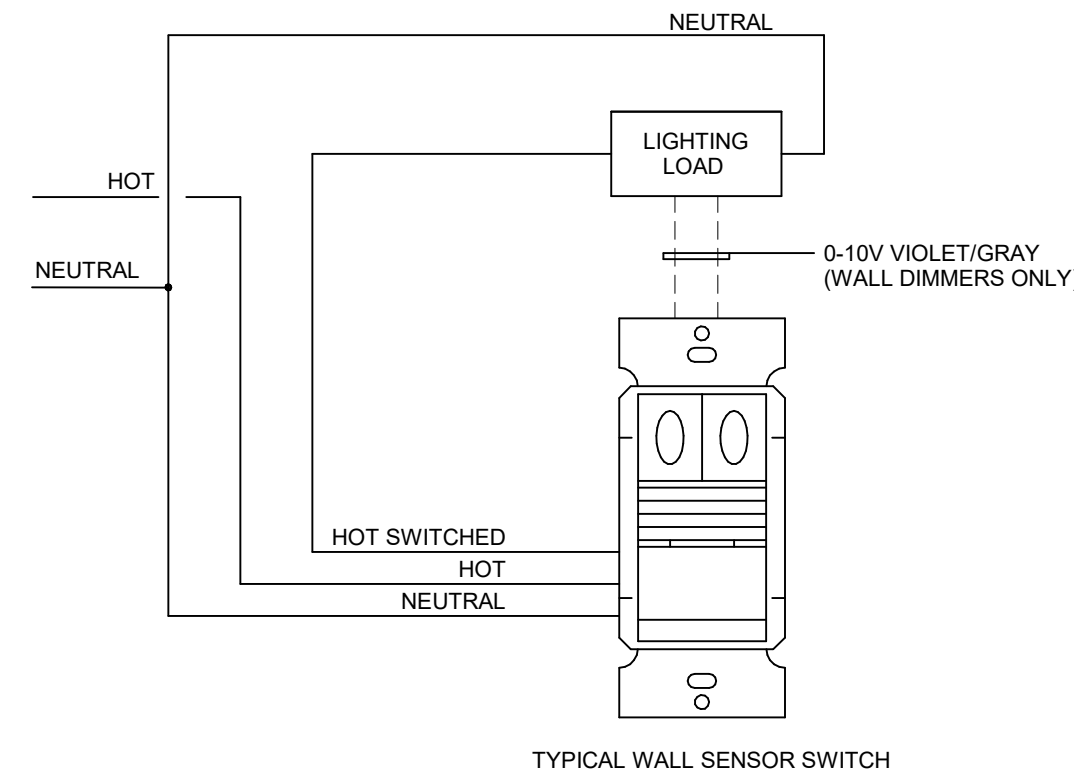
- SEQUENCE OF OPERATIONS:**
1. AUTO-ON WHEN OCCUPANCY IS DETECTED BY CEILING SENSOR(S). REFER TO FLOOR PLANS FOR QUANTITY AND LOCATIONS.
 2. AUTO-OFF AFTER 20 MINUTES OF UNOCCUPIED SPACE.
 3. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

5 TYPICAL STANDALONE OCCUPANCY SENSOR DETAIL
NTS



NOTE:
REFER TO THE PROPER DEVICE INSTALLATION INSTRUCTIONS FOR BACKBOX MOUNTING HEIGHT.

6 FIRE ALARM DEVICE MOUNTING HEIGHT REFERENCE DETAIL
N.T.S.



- NOTES:**
1. REFER TO MANUFACTURERS WIRING DIAGRAM FOR EXACT WIRING DETAIL.
 2. WIRE IN SERIES WITH THREE-WAY SWITCH, WHERE INDICATED ON PLANS.
 3. PROVIDE 0-10V WIRING FROM WALL DIMMERS, WHERE INDICATED ON PLANS.
 4. LIGHTING SHALL TIME OUT AFTER 20 MINUTES.
 5. REFER TO LIGHTING CONTROL SPECIFICATION FOR ADDITIONAL INFORMATION.

- TYPICAL SPECIFICATIONS:**
1. "OS" OCCUPANCY SENSOR SWITCH. (SET TO AUTO-ON, AUTO-OFF MODE)
 2. "OSD" OCCUPANCY SENSOR 0-10V DIMMER. (SET TO AUTO-ON, AUTO-OFF MODE)
 3. "VS" VACANCY SENSOR SWITCH. (SET TO MANUAL-ON, AUTO-OFF MODE)
 4. "VSD" VACANCY SENSOR 0-10V DIMMER. (SET TO MANUAL-ON, AUTO-OFF MODE)

7 TYPICAL LINE VOLTAGE SENSOR SWITCH DETAIL
NTS

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Drawn By: CEC
Checked By: NHF
Revisions:

No.	Date	Description
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Sheet Description

ELECTRICAL DETAILS

Sheet Number

21.00.00 - GENERAL

- A. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.
- B. THESE SPECIFICATIONS ARE APPLICABLE TO ALL PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS UNLESS NOTED OTHERWISE. REVIEW THE ARCHITECTURAL, STRUCTURAL, ELECTRICAL, PLUMBING DRAWINGS FOR NOTES, DIMENSIONS, ETC., AND COORDINATE WITH OTHER TRADES INVOLVED.

C. DESCRIPTION

1. THIS PROJECT COMPRISES ALTERATIONS AND RENOVATIONS TO THE EXISTING BUILDING.
2. SCOPE OF WORK CONSISTS OF INSTALLATION OF MATERIALS TO BE FURNISHED UNDER THE CONTRACT DOCUMENTS AND WITHOUT LIMITING GENERALITY THEREOF CONSISTS OF FURNISHING LABOR, MATERIALS, EQUIPMENT, INSTALLATION, AND SIMILAR OPERATIONS, STAGING, APPURTENANCES, AND SERVICES NECESSARY AND/OR INCIDENTAL TO PROPERLY COMPLETE ALL WORK AS SHOWN ON THE DRAWINGS AND DESCRIBED HEREIN.

D. DEFINITIONS: THE FOLLOWING DEFINITIONS APPLY TO THIS CONTRACT

1. FURNISH: THE TERM "FURNISH" MEANS TO "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS"
2. INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT PROJECT SITE INCLUDING THE ACTUAL "UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS"
3. PROVIDE: THE TERM "PROVIDE" MEANS TO "FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."
4. REMOVE: THE TERM "REMOVE" MEANS TO DISCONNECT FROM ITS PRESENT POSITION, REMOVE FROM THE PREMISES AND TO DISPOSE OF IN A LEGAL MANNER."
5. SUBSTITUTIONS: "SUBSTITUTIONS" ARE REQUESTS FOR CHANGES IN PRODUCTS, MATERIALS AND/OR METHODS OF CONSTRUCTION AS PROPOSED BY THE CONTRACTOR AFTER AWARD OF THE CONTRACT."

E. DRAWINGS

1. DRAWINGS ARE DIAGRAMMATIC. THE FINAL PLACEMENT OF EQUIPMENT OR DEVICES IN THE FIELD MAY NOT DIRECTLY CORRESPOND TO THAT WHICH IS SHOWN ON THE DRAWINGS. THOUGH SOME OFFSETS & TRANSITIONS MAY BE SHOWN IN PIPING & SHEET METAL TO HELP INDICATE THE PHYSICAL RELATIONSHIP BETWEEN THEM, IT IS NOT THE INTENT OF THE DRAWINGS TO SHOW ALL PIPING & SHEET METAL DETAILS & TRANSITIONS REQUIRED. THE CONTRACTOR SHALL FULLY COORDINATE THE WORK AND PROVIDE ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO COMPLETE THE WORK OUTLINED ON THESE CONTRACT DOCUMENTS. IF A CONFLICT IN POSITIONING OCCURS, THE CONTRACTOR IS TO NOTIFY THE ENGINEER IMMEDIATELY TO ASCERTAIN WHAT THE INTENT WAS BY THE DESIGN PROFESSIONAL.

F. CODES AND STANDARDS: WORK SHALL CONFORM TO THE CURRENT EDITIONS OF THE FOLLOWING:

1. NFPA 13 - INSTALLATION OF SPRINKLER SYSTEMS.
2. NFPA 13R - STANDARD FOR INSTALLATION OF SPRINKLER SYSTEMS IN RESIDENTIAL OCCUPANCIES UP TO AND INCLUDING FOUR STORIES IN HEIGHT.
3. NFPA STANDARD 14 - STANDARD FOR THE INSTALLATION OF STANDPIPE AND HOSE SYSTEMS.
4. NFPA 24 - INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES.
5. STATE BUILDING AND FIRE CODES.
6. LOCAL AUTHORITIES HAVING JURISDICTION.

G. PERMITS AND FEES:

1. THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS, AND PAY ALL GOVERNMENT AND STATE SALES TAXES AND FEES WHERE APPLICABLE, AND OTHER COSTS, INCLUDING UTILITY CONNECTIONS OR EXTENSIONS IN CONNECTION WITH THE WORK, FILE ALL NECESSARY DRAWINGS, PREPARE ALL DOCUMENTS AND OBTAIN ALL NECESSARY APPROVALS OF ALL GOVERNMENTAL AND STATE DEPARTMENTS HAVING JURISDICTION, OBTAIN ALL NECESSARY CERTIFICATES OF INSPECTION FOR THE WORK, AND DELIVER A COPY TO THE OWNER AND ENGINEER BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK.

H. EXISTING SYSTEMS AND EQUIPMENT

1. EXISTING TO BE REUSED/RELOCATED EQUIPMENT: REPORT ANY EXISTING EQUIPMENT DEFICIENCIES TO THE OWNER AND THE ARCHITECT AND/OR ENGINEER.
2. CONNECT WORK TO VARIOUS EXISTING SYSTEMS AS INDICATED ON THE DRAWINGS. WORK SHALL BE COMPATIBLE WITH THE EXISTING SYSTEM CONDITIONS. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED AS WELL AS WITH EXISTING SYSTEMS, THE STRUCTURE, AND OTHER OBSTRUCTIONS.

I. SURVEY AND MEASUREMENTS

1. THIS PROJECT INVOLVES CONSTRUCTION INSIDE AN EXISTING STRUCTURE. CONTRACTORS, BY SUBMITTING A BID, SHALL BE COMPLETELY FAMILIAR WITH THE EXISTING CONDITION OF THE BUILDING AS IT INFLUENCES THE WORK DESCRIBED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY IDENTIFIED BY EXPERIENCED OBSERVERS.
2. DO NOT SCALE DRAWINGS. SCALE INDICATED ON DRAWINGS IS FOR ESTABLISHING REFERENCE POINTS ONLY. ACTUAL FIELD CONDITIONS SHALL GOVERN ALL DIMENSIONS.
3. PRIOR TO ORDERING ANY MATERIALS AND EQUIPMENT, THOROUGHLY REVIEW THE SITE CONDITIONS TO DETERMINE IF ADEQUATE CLEARANCES AND ACCESS IS ALLOWED TO INSTALL THE COMPONENTS. ORDER EQUIPMENT BROKEN DOWN AS NECESSARY TO ALLOW FOR PROPER RIGGING THROUGH THE PROJECT AREA. PROVIDE ALL NECESSARY ALTERATIONS TO THE STRUCTURE OF THE BUILDING AS NECESSARY TO RIG THE EQUIPMENT IN PLACE.
4. CONTRACTORS SHALL VERIFY, LAYOUT AND BE RESPONSIBLE FOR ALL MEASUREMENTS OF ALL EXISTING CONDITIONS BEFORE COMMENCING WORK AND SHALL NOTIFY ARCHITECT AND/OR ENGINEER IF A CONDITION EXISTS THAT PREVENTS THE CONTRACTOR FROM ACCOMPLISHING THE INTENT OF THE DRAWINGS.

J. SUBMITTALS AND SHOP DRAWINGS

1. SUBMIT FOR REVIEW, ELECTRONIC SHOP DRAWINGS IN SEARCHABLE PDF FORMAT FOR THE FOLLOWING:
- a. SUBMITTAL DATA FOR ALL MATERIAL AND EQUIPMENT. CLEARLY IDENTIFY DEVIATIONS OF THE SUBMITTED PRODUCTS FROM THE DESIGN.
- b. SHOP DRAWINGS, DRAWN TO ACCURATE SCALE OF 1/4"=1'-0". HIGHLIGHT, ENCIRCLE, OR OTHERWISE INDICATE DEVIATIONS FROM THE CONTRACT DOCUMENTS. DO NOT REPRODUCE CONTRACT DOCUMENTS OR COPY STANDARD INFORMATION AS THE BASIS OF SHOP DRAWINGS. STANDARD INFORMATION PREPARED WITHOUT SPECIFIC REFERENCE TO THE PROJECT IS NOT CONSIDERED SHOP DRAWINGS.
- c. HYDRAULIC CALCULATIONS PREPARED IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 13.
2. DO NOT USE SHOP DRAWINGS WITHOUT AN APPROPRIATE FINAL STAMP INDICATING ACTION TAKEN IN CONNECTION WITH CONSTRUCTION.
3. DO NOT ORDER ANY MATERIALS OR EQUIPMENT PRIOR TO RECEIVING FINAL APPROVED SUBMITTALS.
4. SCHEDULE AT LEAST TEN WORKING DAYS EXCLUSIVE OF TRANSMITTAL TIME, FOR SUBMITTAL REVIEW.

K. AS-BUILT DRAWINGS

- A. MAINTAIN ONE SET OF PRINTS ON THE SITE AND NOTE ALL CHANGES OR DEVIATIONS FROM THE ORIGINAL DESIGN THEREON. AT THE COMPLETION OF THE PROJECT, INCORPORATE ALL CHANGES INTO RECORD AS-BUILT DRAWINGS IN ELECTRONIC FORMAT AND SUBMIT FOR APPROVAL.

L. OPERATION AND MAINTENANCE

1. UPON COMPLETION OF ALL WORK AND TESTS, THE CONTRACTOR SHALL INSTRUCT THE OWNER OR THE OWNER'S REPRESENTATIVE IN THE OPERATION, ADJUSTMENT AND MAINTENANCE OF ALL EQUIPMENT FURNISHED. THE CONTRACTOR SHALL GIVE AT LEAST SEVEN (7) DAYS NOTICE TO THE OWNER AND THE ENGINEER IN ADVANCE OF THIS PERIOD.
2. THE CONTRACTOR SHALL PREPARE THREE (3) COPIES OF A COMPLETE OPERATION AND MAINTENANCE MANUAL, BOUND IN BOOKLET FORM. ORGANIZE OPERATING AND MAINTENANCE DATA INTO SUITABLE SETS OF MANAGEABLE SIZE. BIND PROPERLY INDEXED DATA IN INDIVIDUAL HEAVY-DUTY, 3-RING VINYL-COVERED BINDERS, WITH POCKET FOLDERS FOR SLOTTED SHEET INFORMATION AND DESIGNATION PARTITIONS WITH IDENTIFICATION TABS. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.
3. MAINTENANCE AND INSTRUCTION MANUALS SHALL BE SUBMITTED TO THE OWNER AT THE SAME TIME AS THE SEVEN (7) DAY NOTICE IS GIVEN PRIOR TO THE INSTRUCTION PERIOD.

M. CLEANING

1. EQUIPMENT: AFTER COMPLETION OF PROJECT, CLEAN THE EXTERIOR SURFACE OF EQUIPMENT INCLUDED IN THIS SECTION, INCLUDING REMOVAL OF CONCRETE RESIDUE.
2. WORK AREA: AFTER COMPLETION OF PROJECT, REMOVE ALL CONSTRUCTION DEBRIS, TEMPORARY FACILITIES AND EQUIPMENT FROM WORK AREA. CLEAN WORK AREA TO PERMIT OCCUPATION.

N. GUARANTEE

1. GUARANTEE WORK OF THESE CONTRACT DOCUMENTS IN WRITING FOR NOT LESS THAN ONE (1) YEAR FROM DATE OF FINAL NOTICE OF ACCEPTANCE. REPAIR OR REPLACE DEFECTIVE MATERIALS, EQUIPMENT, WORKMANSHIP AND INSTALLATION THAT DEVELOP WITHIN THIS PERIOD, PROMPT AND TO OWNERS SATISFACTION AND CORRECT DAMAGE CAUSED IN MAKING NECESSARY REPAIRS AND REPLACEMENTS UNDER GUARANTEE WITHIN CONTRACT PRICE.

N. MEANS AND METHODS ALL TRADES

1. INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. DO NOT BURN WASTE MATERIALS. DO NOT BURY DEBRIS OR EXCESS MATERIALS ON THE OWNER'S PROPERTY. DO NOT DISCHARGE VOLATILE, HARMFUL, OR DANGEROUS MATERIALS INTO DRAINAGE SYSTEMS. REMOVE AND DISPOSE OF ALL WASTE MATERIALS, PACKAGING MATERIAL, SKIDS ETC. FROM THE SITE AND DISPOSE OF IN A LAWFUL MANNER IN ACCORDANCE WITH MUNICIPAL, STATE AND FEDERAL REGULATIONS.
3. MATERIALS AND EQUIPMENT SHALL BE UL LISTED WHERE STANDARD HAS BEEN ESTABLISHED.
4. CAREFULLY INSPECT ALL BUILDING ELEMENTS PRIOR TO CUTTING OR DRILLING INTO WALL, FLOORS OR CEILINGS. PATCH AND PAINT SURFACES DISTURBED BY WORK UNDER THIS CONTRACT AS REQUIRED TO RESTORE THEM TO THEIR ORIGINAL CONDITION.
5. SCAFFOLDING, RIGGING, HOISTING: THE CONTRACTOR SHALL FURNISH ALL SCAFFOLDING, RIGGING, HOISTING AND SERVICES NECESSARY FOR ERECTION AND DELIVERY INTO THE PREMISES ANY EQUIPMENT AND APPARATUS FURNISHED UNDER THIS DIVISION. REMOVE SAME FROM PREMISES WHEN NO LONGER REQUIRED.
6. EXCAVATION AND BACKFILLING: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE SIZES, DEPTHS, FILL AND BEDDING REQUIREMENTS AND ANY OTHER EXCAVATION WORK REQUIRED UNDER THESE SPECIFICATIONS
7. WATERPROOFING: WHERE ANY WORK PIERCES WATERPROOFING, INCLUDING WATERPROOF CONCRETE, ROOFS, EXTERIOR WALL AND FLOORS IN WET AREAS, THE METHOD OF INSTALLATION SHALL BE REVIEWED BY THE ENGINEER BEFORE WORK IS DONE. THE CONTRACTOR SHALL FURNISH ALL NECESSARY SLEEVES, CAULKING AND FLASHING REQUIRED TO MAKE DRAININGS ABSOLUTELY WATERTIGHT.
8. PROVIDE FIRESTOPPING AROUND ALL FIRE PROTECTION, PLUMBING, MECHANICAL AND ELECTRICAL PENETRATIONS THROUGH FIRE RATED PARTITIONS. PROVIDE ASBESTOS FREE FIRESTOPPING SYSTEM CAPABLE OF MAINTAINING AN EFFECTIVE BARRIER AGAINST FLAME AND GASES. SYSTEM SHALL BE UL LISTED AND COMPLY WITH ASTM E 814.
9. PROVIDE ACCESS PANELS IN WALLS, FLOORS AND GYPSUM WALL BOARD CEILINGS TO ALLOW ACCESS TO VALVES AND OTHER APPARATUS AND EQUIPMENT REQUIRING PERIODIC SERVICE AND INSPECTION. NOT ALL ACCESS PANELS ARE INDICATED ON THE PLANS. REVIEW ARCHITECTURAL AND MECHANICAL PLANS TO DETERMINE THE LOCATION AND QUANTITY OF ACCESS PANELS REQUIRED. COORDINATE TYPE AND LOCATION WITH ARCHITECTURAL PLANS.

21.05.00 - COMMON WORK RESULTS FOR FIRE SUPPRESSION SYSTEMS

- A. WORKMANSHIP AND QUALIFICATIONS: MATERIALS AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH NFPA AND APRI (LOCAL CODES AND ORDINANCES). THE SPRINKLER CONTRACTOR SHALL BE STATE LICENSED TO INSTALL SPRINKLER SYSTEMS. FIRE PROTECTION DEVICES USED SHALL BE LISTED AND APPROVED BY UNDERWRITERS LABORATORIES (UL) AND/OR FACTORY MUTUAL (FM).
- B. GROOVED JOINT COUPLINGS, FITTINGS, VALVES, AND SPECIALTIES SHALL BE THE PRODUCTS OF A SINGLE MANUFACTURER. GROOVING TOOLS SHALL BE OF THE SAME MANUFACTURER AS THE GROOVED COMPONENTS.
- C. VALVES: SHALL BEAR UL AND/OR FM LABEL OR MARKING. PROVIDE MANUFACTURER'S NAME AND PRESSURE RATING MARKED ON VALVE BODY. ITEMS OF SIMILAR CLASS SHALL BE THE PRODUCTS OF THE SAME MANUFACTURER. MANUFACTURERS: KENNEDY VALVE MFG. CO., VICTAULIC, STOCKHAM, NIBCO, WATTS, HAMMOND, MILWAUKEE.
- D. PIPE & FITTINGS (ABOVE GRADE)
1. STEEL PIPING: ASTM A53, SCHEDULE 40 SEAMLESS CARBON STEEL. SCHEDULE 10 PIPE SHALL BE ALLOWED FOR PIPE SIZES LARGER THAN 1-1/4" DIAMETER WHEN ROLL GROOVED MECHANICAL COUPLINGS ARE USED.
2. CAST IRON FITTINGS: ANSI/ASME B16.1, FLANGES AND FLANGED FITTINGS, ANSI/ASME B16.4, GROOVED JOINT COUPLINGS.
3. MALLEABLE IRON FITTINGS: ANSI/ASME B16.3, SCREWED CLASS 300 TYPE. THREADS SHALL CONFORM TO ANSI/ASME A47.
4. GROOVED MECHANICAL FITTINGS: ANSI A21.10AWWA C-110 DUCTILE IRON, ASTM A536 GRADE 65-45-12 DUCTILE IRON, ASTM A234 GRADE WPB, OR FACTORY FABRICATED FROM CARBON STEEL PIPE CONFORMING TO ASTM A53, WITH GROOVES OR SHOULDERS DESIGNED TO ACCEPT GROOVED END COUPLINGS. FITTINGS SHALL BE OF THE SAME MANUFACTURER AS THE ADJOINING COUPLINGS.
5. GROOVED MECHANICAL COUPLINGS: ASTM A536 GRADE 65-45-12, DUCTILE IRON HOUSING, ELASTOMER GASKET WITH NUTS AND BOLTS TO SECURE ROLL GROOVED PIPE AND FITTINGS.
6. RIGID TYPE COUPLINGS: HOUSINGS CAST WITH OFFSETTING, ANGLE-PATTERN BOLT PADS TO PROVIDE RIGIDITY AND SYSTEM SUPPORT AND HANGING IN ACCORDANCE WITH NFPA-13.
- a. 1-1/4" THROUGH 4": FACTORY ASSEMBLED FOR INSTALLATION WITHOUT FIELD DISASSEMBLY, VICTAULIC STYLE 009 EZ.
- b. 5" THROUGH 8": VICTAULIC FIRELOCK STYLE 005.
- c. 10" AND LARGER: VICTAULIC HO ZERO-LEAK STYLE 07.
7. FLEXIBLE TYPE COUPLINGS: USE IN LOCATIONS WHERE VIBRATION ATTENUATION AND STRESS RELIEF ARE REQUIRED, AND FOR SEISMIC CONSIDERATIONS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. VICTAULIC STYLE 75.

E. GASKETS

1. WET SYSTEMS: C-SHAPE OR EZ STYLE 009.

F. JOINTS

1. GROOVED MECHANICAL COUPLINGS: ASTM A536 GRADE 65-45-12, DUCTILE IRON HOUSING, FLUSH/SEAL, OR QUICKVIC ELASTOMER GASKET WITH NUTS AND BOLTS TO SECURE ROLL GROOVED PIPE AND FITTINGS. HOUSINGS CAST WITH OFFSETTING, ANGLE-PATTERN BOLT PADS TO PROVIDE RIGIDITY, AND MANUFACTURED TO CONNECT COPPER TUBING AND FITTINGS WITHOUT FLARING. VICTAULIC STYLE 806 OR STYLE 607 QUICKVIC STAB-ON COUPLINGS.
2. ASTM B32, SOLDER, GRADE 95TA OR ANSI/ASME A58.8 BCUF SILVER BRAZE.
3. CAST IRON: AWWA C151 PIPING WITH AWWA C110 STANDARD THICKNESS FITTINGS AND AWWA C111 RUBBER GASKET JOINTS OR MECHANICAL GROOVED COUPLINGS WITH DUCTILE IRON HOUSING CLAMPS TO ENGAGE AND LOCK. "C" BACK-TO-BACK COMPOSITION SEALING GASKET, STEEL BOLTS, NUTS, AND WASHERS, GALVANIZED FOR GALVANIZED PIPE.

G. GLOBE VALVES

1. UP TO AND INCLUDING 2": BRONZE BODY AND TRIM, 175 LB. COLD WATER NON-SHOCK WORKING PRESSURE, RISING STEM, HAND WHEEL, SOLID WEDGE OR DISC, THREADED ENDS.
2. OVER 2": IRON BODY, BRONZE TRIM, 175 LB. COLD WATER NON-SHOCK WORKING PRESSURE, RISING STEM PRE-GROOVED FOR MOUNTING TAMPER SWITCH, HAND WHEEL, OUTSIDE THE GROUND AND YOKE, SOLID TAPER BRONZE OR CAST IRON WEDGE, GROOVED OR FLANGED ENDS.
3. OVER 4": IRON BODY, BRONZE TRIM, 175 POUND COLD WATER, NON-SHOCK WORKING PRESSURE. VALVE SHALL HAVE SOLID TAPER WEDGE, OUTSIDE SCREW AND YOKE, RISING STEM, FLANGED BONNET WITH BODY AND BONNET CONFORMING TO ASTM A128 CLASS 8, REPLACEABLE BRONZE WEDGE FACING RINGS, GROOVED OR FLANGED ENDS, AND A PACKING ASSEMBLY CONSISTING OF A CAST IRON GLAND FLANGE, BRASS GLAND, PACKING, BONNET AND BRONZE BONNET BUSHING. VALVE SHALL BE CAPABLE OF BEING REPACKED UNDER PRESSURE, WITH VALVE WIDE OPEN.

H. GLOBE VALVES

1. UP TO AND INCLUDING 2 INCHES (50 MM): CLASS 125, BRONZE BODY, BRONZE TRIM, RISING STEM AND HAND WHEEL, INSIDE SCREW, RENEWABLE RUBBER DISC, THREADED ENDS, WITH BACK SEATING CAPACITY, PACKABLE UNDER PRESSURE.
2. OVER 2 INCHES (50 MM): IRON BODY, BRONZE TRIM, RISING STEM, HAND WHEEL, OS&Y, PLUG-TYPE DISC, FLANGED ENDS, RENEWABLE SEAT AND DISC.

I. ANGLE VALVES

1. UP TO AND INCLUDING 2": CLASS 125, BRONZE BODY, BRONZE TRIM, RISING STEM AND HAND WHEEL, INSIDE SCREW, RENEWABLE RUBBER DISC, THREADED ENDS, WITH BACK SEATING CAPACITY, PACKABLE UNDER PRESSURE.
2. OVER 2": IRON BODY, BRONZE TRIM, RISING STEM, HAND WHEEL, OS&Y, PLUG-TYPE DISC, FLANGED ENDS, RENEWABLE SEAT AND DISC.

J. BALL VALVES

1. UP TO AND INCLUDING 2": BRONZE TWO PIECE BODY, STANDARD PORT, CHROME PLATED BRASS BALL, 316 STAINLESS STEEL STEM, TEFLON SEATS BRASS STEM NUT, DIE-CAST BRASS GEAR BOX WITH SUPERVISORY SWITCH, THREADED OR GROOVED ENDS.
2. OVER 2": MANUFACTURERS' CAST STEEL BODY, CHROME PLATED STEEL BALL, TEFLON SEAT AND STUFFING BOX SEALS, LEVER HANDLE.

K. BUTTERFLY VALVES

1. DUCTILE IRON BODY, DUCTILE IRON DISC WITH EPDM DISC COATING AND INTEGRALLY CAST STEM, GROOVED ENDS.
2. CAST BRONZE BODY, DUCTILE IRON DISC WITH EPDM DISC COATING AND INTEGRALLY CAST STEM, COPPER-TUBING DIMENSIONED GROOVED ENDS.
3. CAST IRON WITH RESILIENT REPLACEABLE EPDM SEAT, WAFER OR LUG ENDS, EXTENDED NECK WITH 316 STAINLESS STEEL STEM, MSS-SP-97, 200 PSI.
4. DISC: EPDM COATED DUCTILE IRON OR ALUMINUM BRONZE.
5. OPERATOR: NOTCHED PLATE LEVER HANDLE, HANDWHEEL, OR GEAR DRIVE, AND WEATHERPROOF ACTUATOR WITH SUPERVISORY SWITCHES.

L. CHECK VALVES

1. UP TO AND INCLUDING 2": CLASS 125, BRONZE SWING DISC, SCREWED ENDS.
2. HORIZONTAL SWING OVER 2": 300 PSI CWP, DUCTILE IRON BODY AND COUPLED CAP CONFORMING TO ASTM A536, GRADE 65-45-12; HORIZONTAL SWING, WITH STAINLESS STEEL DISC, ELASTOMER SEAT, AND GROOVED ENDS.
3. CLASS 175, CAST IRON BODY AND BOLTED CAP CONFORMING TO ASTM A128, CLASS 8; HORIZONTAL SWING, WITH A BRONZE DISC OR CAST IRON DISC WITH BRONZE DISC RING, AND FLANGED ENDS VALVE SHALL BE CAPABLE OF BEING REFITTED WHILE THE VALVE REMAINS IN LINE.
4. SPRING ACTUATED OVER 2": 300 PSI CWP, DUCTILE IRON BODY CONFORMING TO ASTM A536, GRADE 65-45-12; VERTICAL OR HORIZONTAL CHECK, WITH STAINLESS STEEL SPRING AND SHAFT.
5. 2-1/2" AND 3": ALUMINUM BRONZE DISC WITH DISC MOUNTED ELASTOMER SEAL AND PPS (POLYPHENYLENE SULFIDE) COATED SEAT.
6. 4" AND LARGER: ELASTOMER COATED DUCTILE IRON DISC WITH WELDED-IN NICKEL SEAT.

M. DRAIN VALVES:

1. BALL VALVE: BRASS WITH CAP AND CHAIN, 3/4" HOSE THREAD

N. BACKFLOW PREVENTERS

1. REDUCED PRESSURE BACKFLOW PREVENTERS: ANSI/ASSE 1013, AWWA C511, BRONZE BODY, TWO INDEPENDENTLY OPERATING SPRING LOADED CHECK VALVES, DIAPHRAGM TYPE DIFFERENTIAL PRESSURE RELIEF VALVE LOCATED BETWEEN CHECK VALVES, TWO GATE VALVES, STRAINER, TEST COCKS AND AIR GAP FITTING.
2. REDUCED PRESSURE DETECTOR CHECK VALVE ASSEMBLIES: ANSI/ASSE 1047, AWWA C511, BRONZE BODY, TWO INDEPENDENTLY OPERATING SPRING LOADED CHECK VALVES, DIAPHRAGM TYPE DIFFERENTIAL PRESSURE RELIEF VALVE LOCATED BETWEEN CHECK VALVES, METERED BYPASS, TWO GATE VALVES, STRAINER, TEST COCKS AND AIR GAP FITTING.
3. DOUBLE CHECK VALVE ASSEMBLY: ANSI/ASSE 1015, AWWA C510, BRONZE BODY, TWO INDEPENDENTLY OPERATING SPRING LOADED CHECK VALVES, TWO GATE VALVES, STRAINER, AND TEST COCKS.
4. DOUBLE CHECK DETECTOR CHECK VALVE ASSEMBLIES: ANSI/ASSE 1048, AWWA C510, BRONZE BODY, TWO INDEPENDENTLY OPERATING SPRING LOADED CHECK VALVES, METERED BYPASS, TWO GATE VALVES, STRAINER, TEST COCKS.

P. UNIONS & DIELECTRIC CONNECTIONS

1. UNIONS FOR PIPE 2" AND UNDER:
- a. FERROUS PIPING: 150 PSIG (1034 KPA) MALLEABLE IRON, THREADED.
- b. COPPER PIPE: BRONZE, SOLDERED JOINTS.
2. DIELECTRIC CONNECTIONS: WATERWAY FITTING WITH WATER IMPERVIOUS ISOLATION BARRIER, VICTAULIC STYLE 47 OR APPROVED EQUAL.

Q. PIPE HANGERS AND SUPPORTS

1. CONFORM TO NFPA 13 AND NFPA 14.
2. HANGERS: MALLEABLE IRON, CARBON STEEL, ADJUSTABLE SWIVEL, SPLIT RING, CARBON STEEL, ADJUSTABLE, CLEVIS.
3. MULTIPLE OR TRAPEZE HANGERS: STEEL CHANNELS WITH WELDED SPACERS AND HANGER RODS.
4. WALL SUPPORT FOR PIPE SIZES TO 3": CAST IRON HOOK.
5. WALL SUPPORT FOR PIPE SIZES 4" AND OVER: WELDED STEEL BRACKET AND WROUGHT STEEL CLAMP.
6. VERTICAL SUPPORT: STEEL RISER CLAMP ANGLE RING.
7. FLOOR SUPPORT: CAST IRON ADJUSTABLE PIPE SADDLE, LOCK NUT, NIPPLE, FLOOR FLANGE, AND CONCRETE PIER OR STEEL SUPPORT.

R. GENERAL INSTALLATION REQUIREMENTS FOR PIPE AND FITTINGS

1. INSTALL PIPING IN ACCORDANCE WITH NFPA 13 FOR SPRINKLER SYSTEMS, NFPA 14 FOR STANDPIPE AND HOSE SYSTEMS, AND NFPA 24 FOR SERVICE MAINS.
2. PLACE PIPING IN CONCEALED SPACES ABOVE FINISHED CEILINGS UNLESS NOTED OTHERWISE.
3. ROUTE PIPING IN ORDERLY MANNER, PLUMB AND PARALLEL TO BUILDING STRUCTURE, MAINTAIN GRADIENT.
4. INSTALL PIPING TO CONSERVE BUILDING SPACE, TO NOT INTERFERE WITH USE OF SPACE AND OTHER WORK.
5. GROUP PIPING WHENEVER PRACTICAL AT COMMON ELEVATIONS.
6. INSTALL PIPE SLEEVE AT PIPING PENETRATIONS THROUGH FOOTINGS, PARTITIONS, WALLS, AND FLOORS. SEAL PIPE AND SLEEVE PENETRATIONS TO MAINTAIN FIRE RESISTANCE EQUIVALENT TO FIRE SEPARATION.
7. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR CONNECTED EQUIPMENT. USE VICTAULIC STYLE 77 OR 75 COUPLINGS IN ACCORDANCE WITH VICTAULIC INSTRUCTIONS FOR EXPANSION AND CONTRACTION OF PIPE.
8. GROOVED JOINT COUPLINGS AND FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS. GROOVED ENDS SHALL BE CLEAN AND FREE FROM OXIDATION, PROJECTIONS, AND ROLL MARKS IN THE AREA FROM PIPE END TO GROOVE. GASKETS SHALL BE VERIFIED AS SUITABLE FOR THE INTENDED SERVICE PRIOR TO INSTALLATION. GASKETS SHALL BE MOLDED AND PRODUCED BY THE COUPLING MANUFACTURER. THE GROOVED COUPLING MANUFACTURER'S FACTORY TRAINED REPRESENTATIVE SHALL PROVIDE ON-SITE TRAINING FOR CONTRACTOR'S FIELD PERSONNEL IN THE USE OF GROOVING TOOLS, APPLICATION OF GROOVE, AND INSTALLATION OF GROOVED JOINT PRODUCTS. THE MANUFACTURER'S REPRESENTATIVE SHALL PERIODICALLY VISIT THE JOBSITE AND REVIEW INSTALLATION. CONTRACTOR SHALL REMOVE AND REPLACE ANY JOINTS DEEMED IMPROPERLY INSTALLED.
9. PITCH PIPING AND ARRANGE SYSTEMS TO DRAIN AT LOW POINTS, USE ECCENTRIC REDUCERS TO MAINTAIN TOP OF PIPE LEVEL.
10. PREPARE PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES FOR FINISH PAINTING, WHERE PIPE SUPPORT MEMBERS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAPE, BRUSH CLEAN, AND APPLY ONE COAT OF ZINC RICH PRIMER TO WELDING.
11. DO NOT PENETRATE BUILDING STRUCTURAL MEMBERS UNLESS INDICATED.
12. WHERE MORE THAN ONE PIPING SYSTEM MATERIAL IS SPECIFIED, INSTALL COMPATIBLE SYSTEM COMPONENTS AND JOINTS. INSTALL FLANGES, UNION, AND COUPLINGS AT LOCATIONS REQUIRING SERVICING.
13. DIE CUT THREADED JOINTS WITH FULL CUT STANDARD TAPER PIPE THREADS WITH RED LEAD AND UNSEED OIL OR OTHER NON-TOXIC JOINT COMPOUND APPLIED TO MATE THREADS ONLY.
14. PROVIDE DIELECTRIC FITTINGS WHENEVER JOINING TWO DISSIMILAR METALS.
15. PROVIDE SURGE RESTRAINERS ON ALL END OF BRANCHES AND ARM OVERS IN EXCESS OF 12'.

S. GENERAL INSTALLATION REQUIREMENTS FOR VALVES

1. INSTALL DRAIN VALVES AT MAIN SHUT-OFF VALVES, LOW POINTS OF PIPING AND APPARATUS.
2. VALVES SHALL BE ACCESSIBLE FOR OPERATION AND SERVICING. PROVIDE ACCESS PANELS WHERE REQUIRED.
3. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED. REMOVE PROTECTIVE COATINGS AFTER INSTALLATION.
4. INSTALL GATE OR BUTTERFLY VALVES FOR SHUT-OFF OR ISOLATING SERVICE.
5. INSTALL BURIED SHUT OFF VALVES IN VALVE BOX.

T. GENERAL INSTALLATION REQUIREMENTS FOR PIPE HANGERS AND SUPPORTS

1. INSTALL IN ACCORDANCE WITH NFPA 13 AND NFPA 14.
2. INSTALL HANGERS TO WITH MINIMUM 1/2" SPACE BETWEEN FINISHED COVERING AND ADJACENT WORK.
3. PLACE HANGERS WITHIN 12" OF EACH HORIZONTAL ELBOW.
4. USE HANGERS WITH 1-1/2" MINIMUM VERTICAL ADJUSTMENT, DESIGN HANGERS FOR PIPE MOVEMENT WITHOUT DISENGAGEMENT OF SUPPORTED PIPE.
5. SUPPORT VERTICAL PIPING AT EVERY FLOOR, SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZONTAL PIPING.
6. WHERE INSTALLING SEVERAL PIPES IN PARALLEL AND AT SAME ELEVATION, PROVIDE MULTIPLE OR TRAPEZE HANGERS.
7. INSTALL COPPER PLATED HANGERS AND SUPPORTS FOR COPPER PIPING.
8. PRIME COAT EXPOSED STEEL HANGERS AND SUPPORTS. HANGERS AND SUPPORTS LOCATED IN CRAWL SPACES, PIPE SHAFTS, AND SUSPENDED CEILING SPACES ARE NOT CONSIDERED EXPOSED.
- U. TESTING: PRESSURE TEST THE ABOVE GROUND SYSTEM IN ACCORDANCE TO NFPA 13. TESTING SHALL BE COMPLETED PRIOR TO PERMANENT SEALING OF WALLS AND PARTITIONS. PRESSURE TEST BELOW GRADE PIPING IN ACCORDANCE WITH NFPA 24.

21.13.10 - FIRE-SUPPRESSION SPRINKLER SYSTEMS

A. SYSTEM DESCRIPTION (EXISTING BUILDING)

1. PROVIDE A WET PIPE SYSTEM HYDRAULICALLY DESIGNED IN ACCORDANCE WITH NFPA 13 AND ALL REQUIREMENTS OF THE LOCAL AUTHORITY HAVING JURISDICTION, TO PROVIDE COVERAGE FOR SPACES INDICATED ON THE DRAWINGS.
2. PROVIDE ALTERATIONS AND RENOVATIONS TO THE EXISTING SPRINKLER SYSTEM. FIELD VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING SHOP DRAWINGS INCLUDING BUT NOT LIMITED TO LOCATION OF THE EXISTING SPRINKLER HEADS, LOCATIONS AND SIZES OF EXISTING SPRINKLER PIPING, AVAILABLE STATIC PRESSURE, RESIDUAL PRESSURE, AND LOCATION OF THE BASE OF THE RISER. MODIFY EXISTING PIPING AS REQUIRED FOR THE LAYOUT OF NEW SPRINKLER HEADS, INCLUDING MODIFICATIONS TO EXISTING PIPING.
3. HYDRAULIC DATA AND WATER SUPPLY INFORMATION PROVIDED ON THE PLANS FOR REFERENCE ONLY. CONTRACTOR SHALL PERFORM A WATER FLOW TEST, RESULTS OF THE CONTRACTORS WATER FLOW TEST SHALL BE USED FOR PREPARING HYDRAULIC CALCULATIONS.
4. INTERFACE SYSTEM WITH BUILDING FIRE ALARM SYSTEM.
5. THE SPRINKLER LOCATIONS AND PIPING ARRANGEMENTS INDICATED ON THE CONTRACT DOCUMENTS ARE DIAGRAMMATIC.
6. SPRINKLER LOCATIONS INDICATED ARE FOR STANDARD COVERAGE SPRINKLERS. MAXIMUM 225 SQUARE FEET PER SPRINKLER FOR LIGHT HAZARD AND 130 SQUARE FEET PER SPRINKLER FOR ORDINARY HAZARD. EXTENDED COVERAGE SPRINKLERS SHALL NOT BE INSTALLED IN ANY LOCATIONS UNLESS SPECIFICALLY INDICATED.
- B. SUBMITTALS
1. SUBMIT FIRE PROTECTIONS SHOP DRAWINGS DRAWN TO A MINIMUM SCALE OF 1/4"=1'-0". DRAWINGS SHALL INCLUDE DETAILED PIPE LAYOUT, PIPE MATERIALS USED, JOINING METHODS, HANGERS AND SUPPORTS, FLOOR AND WALL PENETRATION SEALS, CONTROLS, AND COMPONENTS AND ACCESSORIES.
2. SUBMIT HYDRAULIC CALCULATIONS PREPARED IN ACCORDANCE WITH NFPA 13.
3. SHOP DRAWINGS AND HYDRAULIC CALCULATIONS SHALL BEAR THE SEAL OF A PROFESSIONAL ENGINEER LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED.
4. PRODUCT DATA: SUBMIT DATA ON SPRINKLERS, VALVES, AND SPECIALTIES.
5. AFTER REVIEW BY THE OWNER'S REPRESENTATIVE, SUBMIT SPRINKLER LAYOUT SHOP DRAWINGS, PRODUCT DATA, AND HYDRAULIC CALCULATIONS TO THE AUTHORITY HAVING JURISDICTION, FIRE MARSHALL, AND OWNER'S INSURANCE UNDERWRITER FOR APPROVAL. SUBMIT PROOF OF APPROVAL FROM SUCH AUTHORITIES/ORGANIZATIONS.

C. SPRINKLERS

1. MANUFACTURERS: VIKING, TYCO, VICTAULIC, GRINNELL CORP., RELIABLE SPRINKLER CORP.
2. SPRINKLERS SHALL BE ADJUSTABLE, GLASS BULB, AUTOMATIC SPRINKLERS WITH 12P" ORifice AND 5.8-K FACTOR UNLESS OTHERWISE INDICATED. TYPE OF SPRINKLER HEAD SHALL BE AS INDICATED ON THE PLANS AND IN ACCORDANCE WITH THE FOLLOWING:
3. SPRINKLER BODIES SHALL BE DIE CAST BRASS, WITH HEX SHAPED WRENCH BOSS. INTEGRALLY CAST INTO THE SPRINKLER BODY TO REDUCE THE RISK OF DAMAGE DURING INSTALLATION.
4. UNLESS OTHERWISE INDICATED, ORDINARY TEMPERATURE RATED SPRINKLER HEADS SHALL BE PROVIDED.
5. WHERE SPRINKLERS WILL BE INSTALLED IN CLOSE PROXIMITY TO HEAT SOURCES AND SPECIAL LOCATIONS, AS IDENTIFIED IN NFPA 13, TEMPERATURE RATINGS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 13.
6. WHERE PLANS CALL FOR EXTENDED COVERAGE SPRINKLER HEADS, COORDINATE COVERAGE REQUIREMENTS WITH EXTENDED PRESSURE AND K-FACTOR.
7. SPARE SPRINKLERS: FURNISH SPARE AUTOMATIC SPRINKLERS IN ACCORDANCE WITH THE REQUIREMENTS OF NFPA 13 FOR STOCK OF EXTRA SPRINKLERS. THE SPRINKLERS SHALL BE REPRESENTATIVE OF, AND IN PROPORTION TO, THE NUMBER OF EACH TYPE AND TEMPERATURE RATING OF THE SPRINKLERS INSTALLED. PROVIDE TWO SPECIAL SPRINKLER WRENCHES, OR MINIMUM ONE WRENCH FOR EACH CONTACT OR SPRINKLER BOX, WHICHEVER IS GREATER.
8. IN AREAS WHERE SPRINKLERS ARE SUBJECT TO PHYSICAL DAMAGE, PROVIDE SPRINKLER GUARD ASSEMBLY OVER HEAD, FINISH TO MATCH SPRINKLER FINISH. THIS SHALL INCLUDE BUT NOT BE LIMITED TO SPRINKLERS IN ELEVATOR SHAFTS, UNDER LOWER RAKES OF STAIRWAYS, IN ELECTRICAL ROOMS, BOILER ROOMS AND OTHER MECHANICAL ROOMS, 7'-0" OR LESS ABOVE FINISHED FLOORS, AND IN GYMNASIUM/FITNESS CENTER AREAS.

E. PIPING SPECIALTIES

1. MANUFACTURERS: POTTER-ROEMER, VIKING, TYCO, VICTAULIC, GRINNELL CORP., RELIABLE SPRINKLER CORP. SUBSTITUTIONS: ALLOWED.
2. ELECTRIC/ALARM: ELECTRICALLY OPERATED RED ENAMELED GONG WITH PRESSURE ALARM SWITCH, 120 VOLT, WITH WEATHERPROOF BACK BOX.
3. VALVE TAMPER SUPERVISORY SWITCH: TWO FORM C CONTACTS, RATED 10 AMP AT 120 VOLT, UL LISTED AND FM APPROVED, UP TO 2" - POTTER MODEL PCVS-1. OVER 2" SWITCH SHALL BE POTTER MODEL OSVSU-2.
4. PRESSURE SWITCH: 1/2" MATE PRESSURE CONNECTION TO ALARM VALVE RISER AND ACTUATED BY ANY FLOW OF WATER IN EXCESS OF ONE SPRINKLER. MAXIMUM PRESSURE RATING 175 PSI, WEATHER-PROOF WITH TAMPER RESISTANT SCREWS, RATED 10 AMPS AT 120 VOLT.
5. PRESSURE GAGE: RATED FOR 300 PSI USE, 3-1/2" DIAMETER.
- F. GENERAL INSTALLATION REQUIREMENTS FOR SPRINKLER SYSTEMS
1. INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. INSTALL FIRE PROTECTION SYSTEMS IN ACCORDANCE WITH NFPA 13, NFPA 13D, NFPA 13R, AND NFPA 24 FOR SERVICE MAINS.
3. MINIMIZE SHUT-DOWNS OF EXISTING WATER SUPPLIES. WORK SHALL BE COMPLETE BEFORE MAKING THE FINAL CONNECTIONS TO THE EXISTING WATER SUPPLIES. NOTIFY THE OWNER'S REPRESENTATIVE BEFORE AFFECTING THE OPERATION OF ANY EXISTING FIRE PROTECTION EQUIPMENT.
4. SPRINKLERS LOCATED IN FULL SIZE CEILING TILES SHALL BE CENTERED IN THE TILE, PROVIDE PIPING OFFSETS AS REQUIRED.
5. SPRINKLER BULB PROTECTOR SHALL REMAIN IN PLACE UNTIL THE SPRINKLER IS COMPLETELY INSTALLED. REMOVE THE BULB PROTECTOR BY HAND AFTER INSTALLATION AND BEFORE THE SYSTEM IS PLACED IN SERVICE.
6. COORDINATE FLOW SWITCHES, TAMPER SWITCHES, AND ALL OTHER SPRINKLER DEVICES WITH THE FIRE ALARM SYSTEM.
7. PROVIDE AND APPLY SIGNS TO CONTROL, DRAIN, TEST AND ALARM VALVES TO IDENTIFY THEIR PURPOSE AND FUNCTION.

SPRINKLER SCHEDULE:

1. QUICK-RESPONSE CONCEALED: BRASS FINISH WITH FACTORY PAINTED WHITE COVER PLATE, VICTAULIC MODEL V3802.

7430 E. Caley Ave
Suite 280E
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HIGHMARK PROVISIONS

201 SUMMER STREET /
HOLLISTON, MA 01746

CONSTRUCTION DOCUMENTS

22.00.00 - GENERAL

- A. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.
- B. THESE SPECIFICATIONS ARE APPLICABLE TO ALL PLUMBING DRAWINGS UNLESS NOTED OTHERWISE. REVIEW THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, PLUMBING DRAWINGS FOR NOTES, DIMENSIONS, ETC., AND COORDINATE WITH OTHER TRADES INVOLVED.
- C. THIS SECTION APPLIES TO ALL DIVISION 22 SPECIFICATION SECTIONS WHERE THERE ARE DIFFERENCES OR DISCREPANCIES BETWEEN THIS SPECIFICATION SECTION AND OTHER DIVISION 22 SPECIFICATION SECTIONS. THE MORE STRINGENT REQUIREMENT(S) SHALL APPLY.

D. DESCRIPTION

1. THIS PROJECT COMPRISES ALTERATIONS AND RENOVATIONS TO THE EXISTING BUILDING.
2. SCOPE OF WORK CONSISTS OF INSTALLATION OF MATERIALS TO BE FURNISHED UNDER THE CONTRACT DOCUMENTS AND WITHOUT LIMITING GENERALITY THEREOF: CONSISTS OF FURNISHING LABOR, MATERIALS, EQUIPMENT, HOISTING, TRANSPORTATION, RIGGING, STAGING, APPURTENANCES, AND SERVICES NECESSARY AND INDISTINGUISHABLE TO PROPERLY COMPLETE ALL WORK AS SHOWN ON THE DRAWINGS AND DESCRIBED HEREIN.
- E. DEFINITIONS: THE FOLLOWING DEFINITIONS APPLY TO THIS CONTRACT
1. FURNISH: THE TERM "FURNISH" MEANS TO "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS" INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS."
2. INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT PROJECT SITE INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS."
3. PROVIDE: THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."
4. REMOVE: THE TERM "REMOVE" MEANS TO DISCONNECT FROM ITS PRESENT POSITION, REMOVE FROM THE PREMISES AND TO DISPOSE OF IN A LEGAL MANNER."
5. SUBSTITUTIONS: "SUBSTITUTIONS" ARE REQUESTS FOR CHANGES IN PRODUCTS, MATERIALS AND OTHER METHODS OF CONSTRUCTION AS PROPOSED BY THE CONTRACTOR AFTER AWARD OF THE CONTRACT."

F. DRAWINGS

1. DRAWINGS ARE DIAGRAMMATIC. THE FINAL PLACEMENT OF EQUIPMENT OR DEVICES IN THE FIELD MAY NOT DIRECTLY CORRESPOND TO THAT WHICH IS SHOWN ON THE DRAWINGS, THOUGH SOME OFFSETS & TRANSITIONS MAY BE SHOWN IN PIPING TO HELP INDICATE THE PHYSICAL RELATIONSHIP BETWEEN THEM. IT IS NOT THE INTENT OF THE DRAWINGS TO SHOW ALL PIPING OFFSETS & TRANSITIONS REQUIRED. THE CONTRACTOR SHALL FULLY COORDINATE THE WORK AND PROTECT ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO COMPLETE THE WORK OUTLINED ON THESE CONTRACT DOCUMENTS. IF A CONFLICT IN POSITIONING OCCURS THE CONTRACTOR IS TO NOTIFY THE ENGINEER IMMEDIATELY TO ASCERTAIN WHAT THE INTENT WAS BY THE DESIGN PROFESSIONAL.

G. CODES AND STANDARDS: WORK SHALL CONFORM TO THE CURRENT EDITIONS OF THE FOLLOWING:

1. INTERNATIONAL BUILDING CODE
2. 248 CMR 10.00: UNIFORM STATE PLUMBING CODE
3. INTERNATIONAL MECHANICAL CODE
4. NATIONAL ELECTRIC CODE (NFPA 70)
5. THE LIFE SAFETY CODE (NFPA 101)

H. PERMITS AND FEES:

1. THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS, AND PAY ALL GOVERNMENT AND STATE FEES AND CHARGES AND ALL OTHER FEES, CHARGES, AND OTHER COSTS, INCLUDING UTILITY CONNECTIONS OR EXTENSIONS IN CONNECTION WITH THE WORK. FILE ALL NECESSARY DRAWINGS, PREPARE ALL DOCUMENTS AND OBTAIN ALL NECESSARY APPROVALS OF ALL GOVERNMENTAL AND STATE DEPARTMENTS HAVING JURISDICTION. OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION FOR HISHER WORK, AND DELIVER A COPY TO THE OWNER AND ENGINEER BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK.

I. EXISTING SYSTEMS AND EQUIPMENT

1. EXISTING TO BE REUSED/RELOCATED EQUIPMENT: REPORT ANY EXISTING EQUIPMENT DEFICIENCIES TO THE OWNER AND THE ARCHITECT AND/OR ENGINEER.
2. CONNECT WORK TO VARIOUS EXISTING SYSTEMS AS INDICATED ON THE DRAWINGS. WORK SHALL BE COMPATIBLE WITH THE EXISTING SYSTEM CONDITIONS. WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED AS WELL AS WITH EXISTING SYSTEMS, THE STRUCTURE, AND OTHER OBSTRUCTIONS.

J. SURVEY AND MEASUREMENTS

1. THIS PROJECT INVOLVES CONSTRUCTION INSIDE AN EXISTING STRUCTURE. CONTRACTORS, BY SUBMITTING A BID, SHALL BE COMPLETELY FAMILIAR WITH THE EXISTING CONDITION OF THE BUILDING AS IT INFLUENCES THE WORK DESCRIBED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY IDENTIFIED BY EXPERIENCED OBSERVERS.
2. DO NOT SCALE DRAWINGS: SCALE INDICATED ON DRAWINGS IS FOR ESTABLISHING REFERENCE POINTS ONLY. ACTUAL FIELD CONDITIONS SHALL GOVERN ALL DIMENSIONS.
3. PRIOR TO ORDERING ANY MATERIALS AND EQUIPMENT, THOROUGHLY REVIEW THE SITE CONDITIONS TO DETERMINE IF ADEQUATE CLEARANCES AND ACCESS IS ALLOWED TO INSTALL THE COMPONENTS. ORDER EQUIPMENT BROKEN DOWN AS NECESSARY TO ALLOW FOR PROPER RIGGING THROUGH THE PROJECT AREA. PROVIDE ALL NECESSARY ALTERATIONS TO THE STRUCTURE OF THE BUILDING AS NECESSARY TO RIG THE EQUIPMENT IN PLACE.
4. CONTRACTORS SHALL VERIFY LAYOUT AND BE RESPONSIBLE FOR ALL MEASUREMENTS OF ALL EXISTING CONDITIONS BEFORE COMMENCING WORK AND SHALL NOTIFY ARCHITECT AND/OR ENGINEER IF A CONDITION EXISTS THAT PREVENTS THE CONTRACTOR FROM ACCOMPLISHING THE INTENT OF THE DRAWINGS.

K. SUBMITTALS AND SHOP DRAWINGS

1. SUBMIT FOR REVIEW, ELECTRONIC SHOP DRAWINGS IN SEARCHABLE PDF FORMAT FOR THE FOLLOWING.
- a. SUBMITTAL DATA FOR ALL MATERIAL AND EQUIPMENT. CLEARLY IDENTIFY DEVIATIONS OF THE SUBMITTED FROM THE DESIGN.
- b. SHOP DRAWINGS: DRAWN TO ACCURATE SCALE OF 1/4"=1'-0". HIGHLIGHT, ENCLOSE, OR OTHERWISE INDICATE DEVIATIONS FROM THE CONTRACT DOCUMENTS. DO NOT REPRODUCE CONTRACT DOCUMENTS OR COPY STANDARD INFORMATION AS THE BASIS OF SHOP DRAWINGS. STANDARD INFORMATION PREPARED WITHOUT SPECIFIC REFERENCE TO THE PROJECT IS NOT CONSIDERED SHOP DRAWINGS.
2. DO NOT USE SHOP DRAWINGS WITHOUT AN APPROPRIATE FINAL STAMP INDICATING ACTION TAKEN IN CONNECTION WITH CONSTRUCTION.
3. DO NOT ORDER ANY MATERIALS OR EQUIPMENT PRIOR TO RECEIVING FINAL APPROVED SUBMITTALS.
4. SCHEDULE AT LEAST TEN WORKING DAYS EXCLUSIVE OF TRANSMITTAL TIME, FOR SUBMITTAL REVIEW.

L. AS-BUILT DRAWINGS

- A. MAINTAIN ONE SET OF PRINTS ON THE SITE AND NOTE ALL CHANGES OR DEVIATIONS FROM THE ORIGINAL DESIGN THEREON. AT THE COMPLETION OF THE PROJECT, INCORPORATE ALL CHANGES INTO RECORD AS-BUILT DRAWINGS IN ELECTRONIC FORMAT AND SUBMIT FOR APPROVAL.
2. THE CONTRACTOR SHALL PREPARE THREE (3) COPIES OF A COMPLETE OPERATION AND MAINTENANCE MANUAL, BOUND IN BOOKLET FORM. ORGANIZE OPERATING AND MAINTENANCE DATA INTO SUITABLE SETS OF MANAGEABLE SIZE. BIND PROPERLY INDEXED DATA IN INDIVIDUAL HEAVY-DUTY 3-RING VINYL-COVERED BINDERS, WITH POCKET FOLDERS FOR FOLDED SHEET INFORMATION AND DESIGNATION PARTITIONS WITH IDENTIFICATION TABS. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.
3. MAINTENANCE AND INSTRUCTION MANUALS SHALL BE SUBMITTED TO THE OWNER AT THE SAME TIME AS THE SEVEN (7) DAY NOTICE IS GIVEN PRIOR TO THE INSTRUCTION PERIOD.

M. OPERATION AND MAINTENANCE

1. UPON COMPLETION OF ALL WORK AND TESTS, THE CONTRACTOR SHALL INSTRUCT THE OWNER OR THE OWNER'S REPRESENTATIVE IN THE OPERATION, ADJUSTMENT AND MAINTENANCE OF ALL EQUIPMENT/FURNISHED. THE CONTRACTOR SHALL GIVE AT LEAST SEVEN (7) DAYS NOTICE TO THE OWNER AND THE ENGINEER IN ADVANCE OF THIS PERIOD.
2. THE CONTRACTOR SHALL PREPARE THREE (3) COPIES OF A COMPLETE OPERATION AND MAINTENANCE MANUAL, BOUND IN BOOKLET FORM. ORGANIZE OPERATING AND MAINTENANCE DATA INTO SUITABLE SETS OF MANAGEABLE SIZE. BIND PROPERLY INDEXED DATA IN INDIVIDUAL HEAVY-DUTY 3-RING VINYL-COVERED BINDERS, WITH POCKET FOLDERS FOR FOLDED SHEET INFORMATION AND DESIGNATION PARTITIONS WITH IDENTIFICATION TABS. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.
3. MAINTENANCE AND INSTRUCTION MANUALS SHALL BE SUBMITTED TO THE OWNER AT THE SAME TIME AS THE SEVEN (7) DAY NOTICE IS GIVEN PRIOR TO THE INSTRUCTION PERIOD.

N. CLEANING

1. EQUIPMENT: AFTER COMPLETION OF PROJECT, CLEAN THE EXTERIOR SURFACE OF EQUIPMENT INCLUDED IN THIS SECTION, INCLUDING REMOVAL OF CONCRETE RESIDUE.
2. WORK AREA: AFTER COMPLETION OF PROJECT, REMOVE ALL CONSTRUCTION DEBRIS, TEMPORARY FACILITIES AND EQUIPMENT FROM WORK AREA. CLEAN WORK AREA TO PERMIT OCCUPATION.
3. DOMESTIC WATER PIPING: PRIOR TO STARTING WORK, VERIFY SYSTEM IS COMPLETE, FLUSHED AND CLEANED. ENSURE ACIDITY (PH) OF WATER TO BE TREATED IS BETWEEN 7.4 AND 7.8 BY ADJING ALKALI (CAUSTIC: SODA OR SODA ASH) OR ACID (HYDROCHLORIC). INJECT DISINFECTANT, FREE CHLORINE IN LIQUID, POWDER, TABLET OR GAS FORM, THROUGHOUT SYSTEM TO OBTAIN 50 TO 80 mg/L RESIDUAL, BLEED FROM OUTLETS TO ENSURE DISTRIBUTION AND TEST FOR DISINFECTANT RESIDUAL AT MINIMUM 15 PERCENT OF OUTLETS. MAINTAIN RESIDUAL FOR 24 HOURS. REPEAT TREATMENT. FLUSH DISINFECTANT FROM SYSTEM UNTIL RESIDUAL EQUAL TO THAT OF INCOMING WATER OF 1.0 mg/L. TAKE SAMPLES NO SOONER THAN 24 HOURS AFTER FLUSHING. FROM 10 PERCENT OF OUTLETS AND FROM WATER ENTRY, AND ANALYZE IN ACCORDANCE WITH AWWA C651.

O. GUARANTEE

1. GUARANTEE WORK OF THESE CONTRACT DOCUMENTS IN WRITING FOR NOT LESS THAN ONE (1) YEAR FROM DATE OF FINAL NOTICE OF ACCEPTANCE. REPAIR OR REPLACE DEFECTIVE MATERIALS, EQUIPMENT, WORKMANSHIP AND INSTALLATION THAT DEVELOP WITHIN THIS PERIOD. PROMPT AND TO OWNER'S SATISFACTION AND CORRECT DAMAGE CAUSED IN MAKING NECESSARY REPAIRS AND REPLACEMENTS UNDER GUARANTEE WITHIN CONTRACT PRICE.
- P. MEANS AND METHODS ALL TRADES

1. INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS.
2. DO NOT BURN WASTE MATERIALS. DO NOT BURY DEBRIS OR EXCESS MATERIALS ON THE OWNER'S PROPERTY. DO NOT DISCHARGE VOLATILE, HARMFUL OR DANGEROUS MATERIALS INTO DRAINAGE SYSTEMS. REMOVE AND DISPOSE OF ALL WASTE MATERIALS, PACKAGING MATERIAL, SKIDS, ETC. FROM THE SITE AND DISPOSE OF IN A LAWFUL MANNER IN ACCORDANCE WITH MUNICIPAL, STATE AND FEDERAL REGULATIONS.
3. MATERIALS AND EQUIPMENT SHALL BE AS LISTED WHERE STANDARD HAS BEEN ESTABLISHED.
4. CAREFULLY INSPECT ALL BUILDING ELEMENTS PRIOR TO CUTTING OR DRILLING INTO WALL, FLOORS OR CEILINGS. PATCH AND PAINT SURFACES DISTURBED BY WORK UNDER THIS CONTRACT AS REQUIRED TO RESTORE THEM TO THEIR ORIGINAL CONDITION.
5. SCAFFOLDING, RIGGING, HOISTING: THE CONTRACTOR SHALL FURNISH ALL SCAFFOLDING, RIGGING, HOISTING AND SERVICES NECESSARY FOR ERECTION AND DELIVERY INTO THE PREMISES ANY EQUIPMENT AND APPARATUS FURNISHED UNDER THIS DIVISION. REMOVE SAME FROM PREMISES WHEN NO LONGER REQUIRED.
6. EXCAVATION AND BACKFILLING: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE SIZES, DEPTHS, FILL AND BEDDING REQUIREMENTS AND ANY OTHER EXCAVATION WORK REQUIRED UNDER THESE SPECIFICATIONS.

7. WATERPROOFING: WHERE ANY WORK PIERCES WATERPROOFING, INCLUDING WATERPROOF CONCRETE, ROOFS, EXTERIOR WALL AND FLOORS IN WET AREAS, THE METHOD OF INSTALLATION SHALL BE REVIEWED BY THE ENGINEER BEFORE WORK IS DONE. THE CONTRACTOR SHALL FURNISH ALL NECESSARY SLEEVES, CAULKING AND FLASHING REQUIRED TO MAKE OPENINGS ABSOLUTELY WEATHERTIGHT."
8. PROVIDE FIRESTOPPING AROUND ALL FIRE PROTECTION, PLUMBING, MECHANICAL AND ELECTRICAL PENETRATIONS THROUGH FIRE RATED PARTITIONS. PROVIDE ASBESTOS FREE FIRESTOPPING SYSTEM CAPABLE OF MAINTAINING AN EFFECTIVE BARRIER AGAINST FLAME AND GASES. SYSTEM SHALL BE UL LISTED AND COMPLY WITH ASTM E 814. REFER TO ARCHITECTURAL DRAWINGS FOR RATINGS OF ASSEMBLIES.

9. PROVIDE ACCESS PANELS IN WALLS, FLOORS AND GYPSUM WALL BOARD CEILINGS TO ALLOW ACCESS TO VALVES AND OTHER APPARATUS AND EQUIPMENT REQUIRING PERIODIC SERVICE AND INSPECTION. NOT ALL ACCESS PANELS ARE INDICATED ON THE PLANS. REVIEW ARCHITECTURAL AND PLUMBING PLANS TO DETERMINE THE LOCATION AND QUANTITY OF ACCESS PANELS REQUIRED. COORDINATE TYPE AND LOCATION WITH ARCHITECTURAL PLANS.

22.05.00 - COMMON WORK RESULTS FOR PLUMBING

A. IDENTIFICATION FOR PIPING AND EQUIPMENT:

1. MANUFACTURERS: CRAFTMARK IDENTIFICATION SYSTEMS, SAFETY SIGN CO., SETON IDENTIFICATION PRODUCTS, NORTHTOWN, KOLBI, SUBSTITUTIONS: DIVISION 01 - GENERAL REQUIREMENTS AND 22 04 00 - GENERAL REQUIREMENTS.
2. PLASTIC NAMEPLATES: LAMINATED THREE-LAYER PLASTIC WITH ENGRAVED BLACK LETTERS ON LIGHT BACKGROUND COLOR.
3. TAGS
- a. PLASTIC TAGS: LAMINATED THREE-LAYER PLASTIC WITH ENGRAVED BLACK LETTERS ON LIGHT BACKGROUND COLOR, MINIMUM 1-1/2 INCHES DIAMETER.
- b. METAL TAGS: ALUMINUM WITH STAMPED LETTERS; TAG SIZE MINIMUM 1-1/2 INCHES DIAMETER WITH FINISHED EDGES.
- c. INFORMATION TAGS: CLEAR PLASTIC WITH PRINTED "DANGER," "CAUTION," OR "WARNING" AND MESSAGE; SIZE 3-1/4 X 5-5/8 INCHES WITH GROMMET AND SELF-LOCKING NYLON TIES.
- d. TAG CHART: TYPEWRITTEN LETTER SIZE LIST OF APPLIED TAGS AND LOCATION IN AND/OR ON ALUMINUM FRAME.
4. PIPE MARKERS
- a. COLOR AND LETTERING TO CONFORM TO ASME A13.1.
- b. PLASTIC PIPE MARKERS: FACTORY FABRICATED, FLEXIBLE, SEMI-RIGID PLASTIC; PREFORMED TO FIT AROUND PIPE OR PIPE COVERING. LARGER SIZES MAY HAVE MAXIMUM SHEET SIZE WITH SPRINGS FASTENER. MINIMUM INFORMATION INDICATING MANUFACTURER, MASON INDUSTRIES, KINETICS OR AMBER BOOTH. TYPES OF ISOLATORS, REQUIRED DEFLECTIONS, AND INSTALLATION PRACTICES SHALL BE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE VIBRATION ISOLATION MANUFACTURER.
5. CEILING TAGS
- a. DESCRIPTION: STEEL WITH 3/4 INCH DIAMETER COLOR-CODED HEAD.
- b. COLOR CODE AS FOLLOWS: PLUMBING VALVES: GREEN.

B. SLEEVES

1. MANUFACTURERS: FLEXICRAFT INDUSTRIES: PIPE WALL SLEEVE, METRAPLEX; PIPE WALL SLEEVE, COI PIPELINE; PIPE WALL SLEEVE, OPT - EXPLICITLY AUTHORIZED BY HIGHMARK AND/OR ZWR + PARTNERS. PIPETHUNDERLINE LINK-SEAL, INC. METRAPLEX - METRAPLEX, BW-M - PIPE SEAL PS9 SERIES. SUBSTITUTIONS: SEE DIVISION 01 - GENERAL REQUIREMENTS AND 22 04 00 - GENERAL REQUIREMENTS.
2. VERTICAL PIPING:
- a. SLEEVE LENGTH: 1 INCH ABOVE FINISHED FLOOR.
- b. PROVIDE SEALANT FOR WATERTIGHT JOINT.
- c. BLOCKED OUT FLOOR OPENINGS: PROVIDE 1-1/2 INCH ANGLE SET IN SILICON ADHESIVE AROUND OPENING.
- d. DRILLED PENETRATIONS: PROVIDE 1-1/2 INCH ANGLE RING OR SQUARE SET IN SILICONE ADHESIVE AROUND PENETRATION.
3. SHEET METAL: PIPE PASSING THROUGH INTERIOR WALLS, PARTITIONS, AND FLOORS, UNLESS STEEL OR BRASS SLEEVES ARE SPECIFIED BELOW:
- a. ANCHORED SLEEVE - ZINC COATED OR CAST IRON PIPE.
- b. PROVIDE WATERTIGHT SPACE WITH LINK RUBBER OR MODULAR SEAL BETWEEN SLEEVE AND PIPE ON BOTH PIPE ENDS.
5. CLEARANCES:
- a. PROVIDE ALLOWANCE FOR INSULATED PIPING.
- b. WALL, FLOOR, FLOOR, PARTITIONS, AND BEAM FLANGES: 1 INCH GREATER THAN EXTERNAL PIPE DIAMETER.
- c. ALL RATED OPENINGS: CAULKED TIGHT WITH FIRE STOPPING MATERIAL CONFORMING TO HYPERLINK "HTTP://GLOBAL.HS.COM/DOC/DETAIL.CFM?RID=88&DOCUMENT_NAME=ASTM E814" ASTM E814-13A IN ACCORDANCE WITH DIVISION 07 THERMAL AND MOISTURE PROTECTION TO PREVENT THE SPREAD OF FIRE, SMOKE, AND GASES.

6. SLEEVES FOR PIPES THROUGH NON-FIRE RATED FLOORS: 18 GAGE THICK GALVANIZED STEEL.
7. SLEEVES FOR PIPES THROUGH NON-FIRE RATED WALLS, AND POTENTIALLY WET FLOORS: STEEL PIPE OR 18 GAGE THICK GALVANIZED STEEL.
8. SEALANT: REFER TO DIVISION 07 THERMAL AND MOISTURE PROTECTION.
9. MECHANICAL SLEEVE SEALS
- a. PRODUCT DESCRIPTION: MODULAR MECHANICAL TYPE, CONSISTING OF INTERLOCKING SYNTHETIC NITRILE RUBBER LINKS SHAPED TO CONTINUOUSLY FILL ANULAR SPACE BETWEEN OBJECT AND SLEEVE, CONNECTED WITH BOLTS AND PRESSURE PLATES CAUSING RUBBER SEALING ELEMENTS TO EXPAND WHEN TIGHTENED, PROVIDING WATERTIGHT SEAL AND ELECTRICAL INSULATION.
- b. PROVIDE NSF 61 CERTIFIED ASSEMBLY WHEN USED IN POTABLE WATER STORAGE TANK APPLICATIONS.

C. FORMED STEEL CHANNEL

1. MANUFACTURERS: B-LINE SYSTEMS, UNISTRUT CORP., ANVIL INTERNATIONAL, SUBSTITUTIONS: DIVISION 01 - GENERAL REQUIREMENTS AND 22 04 00 - GENERAL REQUIREMENTS.
2. PRODUCT DESCRIPTION: GALVANIZED 12 GAGE THICK STEEL, WITH HOLES 1-1/2 INCHES ON CENTER.

D. GENERAL INSTALLATION REQUIREMENTS FOR PLUMBING

1. CONNECTIONS BETWEEN COPPER & STEEL PIPING SHALL BE MADE WITH DIELECTRIC WATERWAYS, WITH BRONZE BODY VALVES, OR WITH BRASS ADAPTER FITTINGS.
2. INSTALL AND TEST GAS PIPING IN ACCORDANCE WITH THE FUEL GAS CODE AND NFPA 54.
3. PREPARATION
- a. REAM PIPE AND TUBE ENDS. REMOVE BURRS, BEVEL OR GROOVE PLAIN END FERROUS PIPE.
- b. REMOVE SCALE AND DIRT ON INSIDE AND OUTSIDE BEFORE ASSEMBLY.
- c. PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES OR UNIONS.
- d. KEEP OPEN ENDS OF PIPE FREE FROM SCALE AND DIRT. PROTECT OPEN ENDS WITH TEMPORARY PLUGS OR CAPS.
- e. AFTER COMPLETION, FILL, CLEAN, AND TREAT SYSTEM.
- E. INSTALLATION REQUIREMENTS FOR PLUMBING PIPING
1. INSTALL PIPING IN ACCORDANCE WITH ALL APPLICABLE PLUMBING CODES, ASME B31.1, AND ASME B31.9 AS APPLICABLE.
2. ROUTE PIPING PARALLEL TO BUILDING STRUCTURE AND MAINTAIN GRADIENT.
3. INSTALL PIPING TO CONSERVE BUILDING SPACE, AND NOT INTERFERE WITH USE OF SPACE.
4. GROUP PIPING WHENEVER PRACTICAL AT COMMON ELEVATIONS.
5. SLEEVE PIPE PASSING THROUGH PARTITIONS, WALLS AND FLOORS.
6. INSTALL FIRESTOPPING AT PENETRATIONS OF RATED ASSEMBLIES. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS AND RATINGS OF RATED ASSEMBLIES.
7. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR CONNECTED EQUIPMENT.
8. PROVIDE ACCESS WHERE VALVES AND FITTINGS ARE NOT EXPOSED.
9. SLOPE DOMESTIC WATER PIPING AND ARRANGE SYSTEMS TO DRAIN AT LOW POINTS, USE ECCENTRIC REDUCERS TO MAINTAIN TOP OF PIPE ALIGNED.
10. WHERE PIPE SUPPORT MEMBERS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAPE, BRUSH CLEAN, AND APPLY ONE COAT OF ZINC RICH PRIMER TO WELDS.
11. PREPARE UNFINISHED PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES, READY FOR FINISH PAINTING.
12. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.

F. TESTING

1. TEST PIPING IN ACCORDANCE WITH ALL APPLICABLE PLUMBING CODES, ASME B31.1 AND ASME B31.9 AS APPLICABLE.

22.05.29 - HANGERS AND SUPPORTS

- A. PROVIDE PIPE STANDS, SUPPORTS, HANGERS AND OTHER SUPPORTING APPLIANCES AS NECESSARY TO SUPPORT WORK REQUIRED BY CONTRACT DOCUMENTS. SPACING OF HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH APPLICABLE BUILDING AND MECHANICAL CODES. STRUCTURAL STEEL SUPPORTS, HANGERS, ETC., SHALL BE ANGLE IRON, STEEL CHANNEL OR STEEL ROD USED WITH APPROVED CLAMPS, INSERTS, ETC., ALL SUPPORTS, HANGERS, BRACKETS, ETC., SHALL BE AS APPROVED BY THE ENGINEER.
- B. ALL HANGERS SHALL BE GALVANIZED.
- C. ATTACH HANGERS AND SUPPORTS DIRECTLY ONTO THE STRUCTURE BY FIRST REMOVING EXISTING FIRE PROOFING AND AFTER SECURING THE ATTACHMENT, REPAIRING THE FIRE PROOFING TO ITS ORIGINAL CONDITION, CONTINUOUSLY OVER THE ATTACHMENT.
- D. FOR EXPANSION BOLTS/SHIELDS USE RED HEAD, HLTI OR WELT SELF DRILLING OR STEEL SHIELD, LOAD RATED. DO NOT USE DRILLED ANCHORS IN POST TENSION SLABS WITHOUT APPROVAL OF OWNER. DO NOT CUT REINFORCING STEEL WITH DRILLED INSERTS.

E. INSTALLATION REQUIREMENTS FOR HANGERS AND SUPPORTS

1. INSTALL IN ACCORDANCE WITH ASME B31.9, ASTM F708 AND MSS SP 89.
2. SUPPORT HORIZONTAL PIPING AS SCHEDULED.
3. INSTALL HANGERS TO PROVIDE MINIMUM 1/2 INCH SPACE BETWEEN FINISHED COVERING AND ADJACENT WORK.
4. PLACE HANGERS WITHIN 12 INCHES OF EACH HORIZONTAL ELBOW.
5. USE HANGERS WITH 1-1/2 INCH MINIMUM VERTICAL ADJUSTMENT. DESIGN HANGERS FOR PIPE MOVEMENT WITHOUT DISENGAGEMENT OF SUPPORTED PIPE.
6. SUPPORT VERTICAL PIPING AT EVERY FLOOR. SUPPORT RISER PIPING INDEPENDENTLY OF CONNECTED HORIZONTAL PIPING.
7. WHERE INSTALLING SEVERAL PIPES IN PARALLEL AND AT SAME ELEVATION, PROVIDE MULTIPLE PIPE HANGERS OR TRAPZEE HANGERS.
8. PROVIDE COPPER PLATED HANGERS AND SUPPORTS FOR COPPER PIPING.
9. PRIME COAT EXPOSED STEEL, HANGERS AND SUPPORTS, HANGERS AND SUPPORTS LOCATED IN CRAWL SPACES, PIPE SHIFTS, AND SUSPENDED CEILING SPACES ARE NOT CONSIDERED EXPOSED.
10. PROVIDE CLEARANCE IN HANGERS AND FROM STRUCTURE AND OTHER EQUIPMENT FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS.

22.05.48 - VIBRATION AND SEISMIC CONTROLS

1. PROVIDE VIBRATION ISOLATION FOR EACH PIECE OF ROTATING OR RECIPROCATING EQUIPMENT SHOWN ON THE DRAWINGS. ALL ISOLATION COMPONENTS SHALL BE SUPPLIED BY A SINGLE MANUFACTURER. MASON INDUSTRIES, KINETICS OR AMBER BOOTH. TYPES OF ISOLATORS, REQUIRED DEFLECTIONS, AND INSTALLATION PRACTICES SHALL BE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE VIBRATION ISOLATION MANUFACTURER.
- B. PROVIDE SEISMIC RESTRAINTS AS REQUIRED BY CODE.

22.07.00 - PLUMBING INSULATION

A. GENERAL REQUIREMENTS

1. INSULATION SHALL BE CERTAIN-TEED, KNAUF, MANVILLE, OR OWENS CORNING. MATERIALS SHALL MEET REQUIREMENTS OF ADHESIVE AND SEALANT COUNCIL STANDARDS AND SMACNA. INSTALL INSULATION, MASTICS, ADHESIVES, COATINGS, COVERS, WEATHER PROTECTION AND OTHER WORK IN STRICT ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS. ASTM E-84 FIRE HAZARD RATINGS SHALL BE 25 FLAME SPREAD, 50 SMOKE DEVELOPED.
2. FITTINGS, VALVES AND FLANGES SHALL BE INSULATED WITH SAME MATERIAL AND TO SAME THICKNESS AS ADJOINING PIPE INSULATION, WITH PRESENT SECTIONS.
3. FOR STRAINERS AND OTHER VALVES OR FITTINGS WHICH NEED MAINTENANCE, PROVIDE PREFORMED REMOVABLE ISOLATION SECTION.
4. INCREASE PIPE INSULATION AS REQUIRED FOR PIPING WITH HEAT TRACING PER MANUFACTURERS' REQUIREMENTS.

A. PRODUCTS AND APPLICATIONS

1. INSULATION SHALL BE FIBROUS GLASS PIPE INSULATION WITH FACTORY-APPLIED ASJ WITH K FACTOR OF AT LEAST 0.23 AT 75F MEAN TEMPERATURE.
2. PROVIDE INSULATION FOR THE FOLLOWING SYSTEMS:
- a. DOMESTIC HOT WATER PIPE INSULATION: MINIMUM 1 INCH THICKNESS. PROVIDE 1-1/2 INCH THICKNESS FOR DOMESTIC HOT WATER PIPES 1-1/2 INCH DIAMETER AND LARGER.
- b. DOMESTIC COLD WATER: MINIMUM 1/2 INCH THICKNESS. PROVIDE 1 INCH THICKNESS FOR COLD WATER PIPES 1-1/2 INCH DIAMETER AND GREATER.
- c. SANITARY PIPING HORIZONTAL ABOVE GROUND WITHIN BUILDING: MINIMUM 1 INCH THICKNESS.
- d. SANITARY PIPING VERTICAL ABOVE GROUND WITHIN BUILDING: MINIMUM 1 INCH THICKNESS.

22.10.00 - PLUMBING PIPING

A. DOMESTIC WATER PIPING - ABOVE GRADE

1. SOLDERED OR BRAZED: ASTM B88, TYPE L HARD DRAWN COPPER TUBING, WITH ASME B16.18 CAST BRASS OR ASME B16.22 WROUGHT COPPER FITTINGS. JOINTS SHALL BE SOLDER TYPE WITH ASTM B32 95-1 TWENTYMINUTY OR TIN AND SILVER SOLDER, OR BRACKETED BRASS/BRONZE AS 8 BOUP ALLOY BRASS/TEES SHALL BE FITTINGS, MECHANICALLY EXTRACTED COLLARS TEES ARE NOT ALLOWED.
2. GROOVED: ASTM B88, TYPE L WITH ROLLED GROOVED ENDS, WITH ASME B16.18 CAST COPPER ALLOY, ASME B16.22 WROUGHT COPPER BRONZE, AND ASTM F1476 GROOVED MECHANICAL COUPLINGS JOINTS WITH ENAMEL COATED ASTMA A395 DUCTILE IRON AND ASTM A536 SERVICE AND INSPECTION. NOT ALL ACCESS PANELS ARE INDICATED ON THE PLANS. DESIGN TO PERMIT SOME ANGULAR DEFLECTION, CONTRACTION, AND EXPANSION. ELASTOMER COMPOSITION GASKETS WITH APPROVED TEMPERATURE RANGE FROM -40°F TO 230°F, AND GALVANIZED OR STAINLESS STEEL BOLTS, NUTS, AND WASHERS. TEES SHALL BE FITTINGS; CLAMP TYPE TEES ARE NOT ALLOWED. MANUFACTURERS: ANVIL, GRUOLV, TYCOGRINNEL, VICTAULIC. FITTINGS AND JOINTS SHALL BE BY THE SAME MANUFACTURER.
3. PRESS CONNECTIONS: COPPER AND COPPER ALLOY PRESS CONNECTIONS SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. THE TUBING SHALL BE FULLY INSERTED INTO THE FITTING AND THE TUBING MARKED AT THE SHOULDER OF THE FITTING. THE FITTING ALIGNMENT SHALL BE CHECKED AGAINST THE MARK ON THE TUBING TO ASSURE THE TUBING IS FULLY ENGAGED (INSERTED) IN THE FITTING. THE JOINTS SHALL BE PRESSED USING THE TOOL(S) APPROVED BY THE MANUFACTURER.

B. DRAIN, WASTE, AND VENT PIPING (SANITARY AND STORM)

1. BELOW GRADE: HUB & SPIGOT: ASTM A74 CAST IRON PIPE, WITH ASTM A74 CAST IRON FITTINGS AND ASTM C584 RUBBER GASKET JOINT DEVICES OR LEAD AND CAUM.
2. HUBLESS (NO-HUB): CISPI 301 HUBLESS SERVICE WEIGHT CAST IRON PIPE WITH CISPI 310 NEOPRENE GASKET AND STAINLESS STEEL CLAMP AND SHIELD JOINT ASSEMBLIES.
3. COPPER: ASTM B306 TUBE OR ASTM B42 PIPE, WITH ASME B16.23, CAST BRONZE, OR ASME B16.25 WROUGHT COPPER ALLOY GRADE FITTINGS, AND ALLOY GRADE 885 TWENTYMINUTY SOLDER.
4. PVC PIPE: ASTM D1785 SCHEDULE 40, OR ASTM D2241 SDR 26 WITH NOT LESS THAN 150 PSI PRESSURE RATING. FITTINGS ARE PER ASTM D2466, PVC. JOINTS SHALL BE SOLVENT WELDED. WITH ASTM D2584 SOLVENT CEMENT PVC IS NOT ALLOWED IN ALL JURISDICTIONS AND OCCUPANCIES. REFER TO AUTHORITY HAVING JURISDICTION GUIDELINES FOR PVC. EDIT AS REQUIRED).

C. BRONZE BALL VALVES

1. MANUFACTURERS: APOLLO, CRANE, JENKINS, NIBCO, STOCKHAM.
2. GENERAL: BRONZE BODY, TWO PIECE, FULL PORT, 150 PSIG SWP, 60 PSIG WOG (UP TO 2"), 400 PSIG WOG (2-1/2" TO 4"), MSS SP-110, NSF 61 OR NSF/ANSI 372 CERTIFIED.
3. FEATURES: VINYL COATED LEVER HANDLE, CHROME PLATED SOLID BRASS BALL, BLOW-OUT PROOF STEM, ADJUSTABLE PACKING GLAND, PTFE SEATS AND SEALS.
4. EXTENDED LEVER HANDLE: PROVIDE AS NECESSARY TO ALLOW FOR UNCOMPRESSED INSULATION INSTALLATION; LEVER SHALL BE OPERABLE WITHOUT DISTURBING THE INSULATION.

D. STEEL BODY BALL VALVES

1. MANUFACTURERS: APOLLO, CRANE, JENKINS, NIBCO, STOCKHAM.
2. GENERAL: STEEL BODY, TWO PIECE, FULL PORT, 125 PSIG SWP, MSS SP-72.
3. FEATURES: VINYL COATED LEVER HANDLE, STAINLESS STEEL BALL AND STEM, PTFE SEATS AND SEALS, NSF 61 OR NSF/ANSI 372 CERTIFIED.
4. EXTENDED LEVER HANDLE: PROVIDE AS NECESSARY TO ALLOW FOR UNCOMPRESSED INSULATION INSTALLATION; LEVER SHALL BE OPERABLE WITHOUT DISTURBING THE INSULATION.

E. CHECK VALVES - HORIZONTAL SWING

1. MANUFACTURERS: APOLLO, CRANE, JENKINS, NIBCO, STOCKHAM.
2. GENERAL: ASTM B-61 BRONZE OR BRASS Y-PATTERN BODY, CLASS 125, 200 PSIG CWP, MSS SP-80, NSF 61 OR NSF/ANSI 372 CERTIFIED.
3. FEATURES: LOW LEAD BRASS SCREWED CAP, LOW LEAD BRASS DISC, LOW LEAD STEEL, LOW LEAD BRASS HINGE, STAINLESS STEEL, OR LOW LEAD BRASS HINGE PIN.

F. CHECK VALVES - SPRING LOADED

1. MANUFACTURERS: FLOMATIC, MILWAUKEE, NIBCO.
2. GENERAL: GLOBE STYLE IRON BODY, 200 PSIG CWP, ASME B16.1, 2" AND SMALLER, MSS SP 80, CLASS 250, BRONZE BODY, SPRING LOFT CHECK, SILENT CLOSING, DISC, INTEGRAL SEAT, SOLDERED OR THREADED ENDS, 2-1/2" AND LARGER, MSS SP 125, CLASS 125, LEAD FREE, WATER STYLE, CAST IRON BODY, BRONZE SEAT, CENTER GUIDED BRONZE DISC, STAINLESS STEEL SPRING AND SCREWS, FLANGED ENDS.
3. FEATURES: NSF 61 OR NSF/ANSI 372 CERTIFIED.

G. THERMOSTATIC MIXING VALVES

1. MANUFACTURERS: LAWLOR, LEONARD, POWERS, WATTS.
2. GENERAL: THERMOSTATIC CONTROLLER WITH SWIVEL ACTION CHECK STOPS, REMOVABLE CARTRIDGE, STAINLESS STEEL STRAINER, STAINLESS STEEL PISTON AND LIQUID FILLED MOTOR WITH BELLWOWS MOUNTED OUT OF WATER, ROUGH BRASS FINISH, LEAD FREE BRONZE OR BRASS VALVE BODY.

H. MISCELLANEOUS FITTINGS

1. DIELECTRIC WATERWAYS
- a. MANUFACTURERS: TYCOGRINNEL, CLEARFLOW, PRECISION PLUMBING PRODUCTS (PPP) CLEARFLOW, VICTAULIC STYLE 647.
- b. GALVANIZED ASTM A53 STEEL, ASTM A395 DUCTILE IRON, OR ASTM A536 DUCTILE IRON SLEEVE WITH INERT NON-CORROSIVE THERMOPLASTIC LINING, NSF 61 OR NSF/ANSI 372 CERTIFIED.
2. FLANGES
- a. COPPER PIPING: CLASS 150, SLIP-ON BRONZE FLANGES.
- b. STEEL PIPING: CLASS 150, SLIP-ON FORGED STEEL FLANGES.
- c. GASKETS: 1/16" THICK PREFORMED NEOPRENE GASKETS.

3. UNIONS

- a. COPPER PIPING: CLASS 150, BRONZE UNIONS WITH SOLDERED OR BRAZED JOINTS.
- b. STEEL PIPING: CLASS 150, MALLEABLE IRON, THREADED.
- c. DIELECTRIC CONNECTIONS: UNION WITH GALVANIZED OR PLATED STEEL, THREADED END, COPPER SOLDER END, WATER IMPERVIOUS ISOLATION BARRIER ARE REQUIRED WHERE TWO DISSIMILAR METAL PRODUCTS ARE CONNECTED WITHIN A SYSTEM.

I. VALVES AND FITTINGS FOR GAS PIPING

1. UNIONS - FOR PIPE 2 INCHES AND SMALLER:
- a. FERROUS PIPING: CLASS 150, MALLEABLE IRON, THREADED.
2. DIELECTRIC CONNECTIONS: UNION WITH GALVANIZED OR PLATED STEEL THREADED END, COPPER SOLDER END, WATER IMPERVIOUS ISOLATION BARRIER.
3. FLANGES - FOR PIPE 2-1/2 INCHES AND LARGER:
- a. FERROUS PIPING: CLASS 150, FORGED STEEL, SLIP-ON BRONZE FLANGES.
- b. COPPER PIPING: CLASS 150, SLIP-ON BRONZE FLANGES.
- c. GASKETS: 1/16 INCH THICK PREFORMED NEOPRENE GASKETS.
4. BALL VALVES
- a. MANUFACTURERS: APOLLO, CRANE, HAMMOND, JENKINS, MILWAUKEE, NIBCO, STOCKHAM, WATTS.
- b. 1/4 INCH TO 1 INCH, MSS SP 110, CLASS 125, TWO PIECE, THREADED ENDS, BRONZE BODY, CHROME PLATED BRONZE BALL, REINFORCED TEFLO SEATS, BLOW-OUT PROOF STEM, LEVER HANDLE, UL 842 LISTED FOR FLAMMABLE LIQUIDS AND LPG, FULL PORT.
- c. 1-1/4 INCH TO 3 INCH, MSS SP 110, CLASS 125, TWO PIECE, THREADED ENDS, BRONZE BODY, CHROME PLATED BRONZE BALL, REINFORCED TEFLO SEATS, BLOW-OUT PROOF STEM, LEVER HANDLE, UL 842 LISTED FOR FLAMMABLE LIQUIDS AND LPG, CONVENTIONAL PORT.

22.30.00 - PLUMBING EQUIPMENT

- A. FLOOR SINKS: MANUFACTURED BY JAY R. SMITH, FIAT, MIFAB, WADE, WATTS, ZURN.
- B. CLEANOUTS: MANUFACTURED BY JAY R. SMITH, JOSAM, MIFAB, WADE, WATTS, ZURN.
- C. HOSE BIBBS: MANUFACTURED BY CHICAGO FAUCETS, JAY R. SMITH, JOSAM, MIFAB, ROYAL, WADE, WATTS, WOODFORD, ZURN.
- D. WATER HAMMER ARRESTORS: MANUFACTURED BY JAY R. SMITH, JOSAM, MIFAB, PRECISION PLUMBING PRODUCTS (PPP), WADE, WATTS, WOODFORD, ZURN.
- E. TRAP PRIMERS: MANUFACTURED BY JAY R. SMITH, JOSAM, MIFAB, PRECISION PLUMBING PRODUCTS (PPP), WADE, WATTS, WOODFORD, ZURN.
- F. SUMP PUMPS: MANUFACTURED BY LIBERTY, ZOELLER, GOULDS.
- G. WATER FILTER: MANUFACTURED BY AQUA-PURE, PENTAIR, 3M.
- H. GENERAL
- a. VERIFY WALLS AND FLOOR FINISHES ARE PREPARED AND READY FOR INSTALLATION OF FIXTURES.
- b. COORDINATE CUTTING AND FORMING OF ROOF AND FLOOR CONSTRUCTION TO RECEIVE DRAINS.
- c. INSTALL COMPONENTS LEVEL AND PLUMB.
- d. EXTEND CLEANOUTS TO FINISHED FLOOR OR WALL SURFACE. LUBRICATE THREADED CLEANOUT PLUGS WITH MATURE OF GRAPHITE AND UNLINED OIL. ENSURE CLEARANCE AT CLEANOUT FOR RODDING OF DRAINAGE SYSTEM.
- e. INSTALL

23.00.00 - GENERAL

- A. THESE SPECIFICATIONS ARE APPLICABLE TO ALL PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS UNLESS NOTED OTHERWISE. REVIEW THE ARCHITECTURAL, STRUCTURAL, ELECTRICAL, PLUMBING DRAWINGS FOR NOTES, DIMENSIONS, ETC. AND COORDINATE WITH OTHER TRADES INVOLVED. THE WORK REQUIREMENTS DESCRIBED WITHIN DIVISION 20 SPECIFICATION SECTION "COMMON MECHANICAL / ELECTRICAL REQUIREMENTS" FORM COMPLEMENTARY REQUIREMENTS TO THE SCOPE OF WORK CONTAINED WITHIN DIVISION 23.
- B. DESCRIPTION
1. SCOPE OF WORK CONSISTS OF INSTALLATION OF MATERIALS TO BE FURNISHED UNDER THE CONTRACT DOCUMENTS AND WITHOUT LIMITING GENERALITY THEREOF CONSISTS OF: FURNISHING LABOR, MATERIALS, EQUIPMENT, HOISTING, TRANSPORTATION, RIGGING, STAGING, APPURTENANCES, AND SERVICES NECESSARY AND/OR INCIDENTAL TO PROPERLY COMPLETE ALL WORK AS SHOWN ON THE DRAWINGS AND DESCRIBED HEREIN.
- C. DEFINITIONS. THE FOLLOWING DEFINITIONS APPLY TO THIS CONTRACT
1. FURNISH: THE TERM "FURNISH" MEANS TO "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS"
2. INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT PROJECT SITE INCLUDING THE ACTUAL "UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS"
3. PROVIDE: THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.
4. REMOVE: THE TERM "REMOVE" MEANS TO DISCONNECT FROM ITS PRESENT POSITION, REMOVE FROM THE PREMISES AND TO DISPOSE OF IN A LEGAL MANNER."
5. SUBSTITUTIONS: "SUBSTITUTIONS" ARE REQUESTS FOR CHANGES IN PRODUCTS, MATERIALS AND/OR METHODS OF CONSTRUCTION AS PROPOSED BY THE CONTRACTOR AFTER AWARD OF THE CONTRACT."
- D. DRAWINGS
1. DRAWINGS ARE DIAGRAMMATIC. THE FINAL PLACEMENT OF EQUIPMENT OR DEVICES IN THE FIELD MAY NOT DIRECTLY CORRESPOND TO THAT WHICH IS SHOWN ON THE DRAWINGS. THOUGH SOME OFFSETS & TRANSITIONS MAY BE SHOWN IN PIPING & SHEET METAL TO HELP INDICATE THE PHYSICAL RELATIONSHIP BETWEEN THEM, IT IS NOT THE INTENT OF THE DRAWINGS TO SHOW ALL PIPING & SHEET METAL OFFSETS & TRANSITIONS REQUIRED. THE CONTRACTOR SHALL FULLY CONSIDER THE LOCATION AND QUANTITY OF ACCESS PANELS, EQUIPMENT AND LABOR NECESSARY TO COMPLETE THE WORK OUTLINED ON THESE CONTRACT DOCUMENTS & A CONTRACTOR IN POSSESSION OF THE CONTRACT IS TO NOTIFY THE ENGINEER IMMEDIATELY TO ASCERTAIN WHAT THE INTENT WAS BY THE DESIGN PROFESSIONAL.
- E. CODES AND STANDARDS. WORK SHALL CONFORM TO THE CURRENT EDITIONS OF THE FOLLOWING:
1. SHEET METAL, SMACNA STANDARDS
2. INTERNATIONAL MECHANICAL CODE
3. INTERNATIONAL ENERGY CONSERVATION CODE
4. INTERNATIONAL BUILDING SYSTEM CODES
5. ALL OTHER APPLICABLE STATE AND LOCAL CODES AND ORDINANCES. OWNER STANDARDS AND BASE BUILDING SPECIFICATIONS AND STANDARDS.
- F. PERMITS AND FEES:
1. THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS, AND PAY ALL GOVERNMENT AND STATE SALES TAXES AND FEES WHERE APPLICABLE, AND OTHER COSTS, INCLUDING UTILITY CONNECTIONS OR EXTENSIONS IN CONNECTION WITH THE WORK, FILE ALL NECESSARY PERMITTING SYSTEM DOCUMENTS. ALL WORK SHALL BE NECESSARY APPROVALS OF ALL GOVERNMENTAL AND STATE DEPARTMENTS HAVING JURISDICTION, OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION FOR HIS WORK, AND DELIVER A COPY TO THE OWNER AND ENGINEER BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK.
- G. EXISTING SYSTEMS AND EQUIPMENT
1. EXISTING TO BE REUSED/RELOCATED EQUIPMENT: REPORT ANY EXISTING EQUIPMENT DEFICIENCIES TO THE OWNER AND THE ARCHITECT AND/OR ENGINEER.
2. CONNECT WORK TO VARIOUS EXISTING SYSTEMS AS INDICATED ON THE DRAWINGS. WORK SHALL BE COMPATIBLE WITH THE EXISTING SYSTEM CONDITIONS. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED AS WELL AS WITH EXISTING SYSTEMS, THE STRUCTURE, AND OTHER OBSTRUCTION.
3. PROVIDE THE FOLLOWING SERVICES ON ALL EXISTING HVAC EQUIPMENT INDICATED TO REMAIN:
- a. CLEAN CONDENSATE PAN AND TRAP
- b. CALIBRATE CONTROLS
- c. FILTER CHANGES
- d. VERIFY FAN ROTATION AND OPERATION
- e. BALANCING
- f. VERIFY PITCH OF CONDENSATE DRAIN PIPES AND DRAIN PAN
- g. VERIFY EQUIPMENT CONTROL OPERATION
- h. LUBRICATION OF FANS, MOTORS, ETC.
- i. CLEAN HEATING/COOLING COILS
- H. SURVEY AND MEASUREMENTS
1. THIS PROJECT INVOLVES CONSTRUCTION INSIDE AN EXISTING STRUCTURE. CONTRACTORS, BY SUBMITTING A BID, SHALL BE COMPLETELY FAMILIAR WITH THE EXISTING CONDITION OF THE BUILDING AS IT INFLUENCES THE WORK DESCRIBED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY DETECTABLE BY EXPERIENCED DESIGNERS AND INSTALLATION PRACTICES SHALL BE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE VIBRATION ISOLATION MANUFACTURER.
2. DO NOT SCALE DRAWINGS. SCALE INDICATED ON DRAWINGS IS FOR ESTABLISHING REFERENCE POINTS ONLY. ACTUAL FIELD CONDITIONS SHALL GVERN ALL DIMENSIONS.
3. PRIOR TO ORDERING ANY MATERIALS AND EQUIPMENT, THOROUGHLY REVIEW THE SITE CONDITIONS TO DETERMINE IF ADEQUATE CLEARANCES AND ACCESS IS ALLOWED TO INSTALL THE EQUIPMENT. REQUEST PERMISSION FROM THE ARCHITECT AND/OR ENGINEER TO ALLOW FOR PROPER RIGGING THROUGH THE PROJECT AREA. PROVIDE ALL NECESSARY ALTERATIONS TO THE STRUCTURE OF THE BUILDING AS NECESSARY TO RIG THE EQUIPMENT IN PLACE.
4. CONTRACTORS SHALL VERIFY LAYOUT AND BE RESPONSIBLE FOR ALL MEASUREMENTS OF ALL EXISTING CONDITIONS BEFORE COMMENCING WORK AND SHALL NOTIFY ARCHITECT AND/OR ENGINEER IF A CONDITION EXISTS THAT PREVENTS THE CONTRACTOR FROM ACCOMPLISHING THE INTENT OF THE DRAWINGS.
- I. SUBMITTALS AND SHOP DRAWINGS
1. SUBMIT FOR REVIEW, ELECTRONIC SHOP DRAWINGS IN SEARCHABLE PDF FORMAT FOR THE FOLLOWING:
- a. SUBMITTAL DATA FOR ALL MATERIAL AND EQUIPMENT. CLEARLY IDENTIFY DEVIATIONS OF THE SUBMITTED PRODUCTS FROM THE DESIGN.
- b. DUCTWORK SHOP DRAWINGS: DRAWN TO ACCURATE SCALE OF 1/4"=1'-0". HIGHLIGHT, ENCLOSE, OR OTHERWISE INDICATE DEVIATIONS FROM THE CONTRACT DOCUMENTS. DO NOT REPRODUCE CONTRACT DOCUMENTS OR COPY STANDARD INFORMATION AS THE BASIS OF SHOP DRAWINGS. STANDARD INFORMATION PREPARED WITHOUT SPECIFIC REFERENCE TO THE PROJECT IS NOT CONSIDERED SHOP DRAWINGS.
- c. CONTROLS SHOP DRAWINGS: INCLUDE EQUIPMENT AND SYSTEM CONTROL SCHEMATICS, SEQUENCES OF OPERATIONS, LOGIC DIAGRAMS AND SYSTEM COMPONENTS.
2. DO NOT USE SHOP DRAWINGS WITHOUT AN APPROPRIATE FINAL STAMP INDICATING ACTION TAKEN IN CONNECTION WITH CONSTRUCTION.
3. DO NOT ORDER ANY MATERIALS OR EQUIPMENT PRIOR TO RECEIVING FINAL APPROVED SUBMITTALS.
4. SCHEDULE AT LEAST TEN WORKING DAYS EXCLUSIVE OF TRANSMITTAL TIME, FOR SUBMITTAL REVIEW.
- J. AS-BUILT DRAWINGS
- A. MAINTAIN ONE SET OF PRINTS ON THE SITE AND NOTE ALL CHANGES OR DEVIATIONS FROM THE ORIGINAL DESIGN OR INTENTION. AT THE COMPLETION OF THE PROJECT, ALL CHANGES INTO RECORD AS-BUILT DRAWINGS IN ELECTRONIC FORMAT AND SUBMIT FOR APPROVAL.
- K. OPERATION AND MAINTENANCE
1. UPON COMPLETION OF ALL WORK AND TESTS, THE CONTRACTOR SHALL INSTRUCT THE OWNER OR THE OWNER'S REPRESENTATIVE IN THE OPERATION, ADJUSTING AND MAINTENANCE OF ALL EQUIPMENT FURNISHED. THE CONTRACTOR SHALL GIVE AT LEAST SEVEN (7) DAYS NOTICE TO THE OWNER AND THE ENGINEER IN ADVANCE OF THIS PERIOD.
2. THE CONTRACTOR SHALL PREPARE THREE (3) COPIES OF A COMPLETE OPERATION AND MAINTENANCE MANUAL, BOUND IN BOOKLET FORM. ORGANIZE OPERATING AND MAINTENANCE DATA INTO SUITABLE SETS OF MANAGEABLE SIZE. BIND PROPERLY INDEXED DATA IN INDIVIDUAL HEAVY-DUTY 3-RING VINYL-COVERED BINDERS, WITH POCKET FOLDERS FOR FOLDED SHEET INFORMATION AND DESIGNATION PARTITIONS WITH IDENTIFICATION TABS. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.
3. OPERATION AND MAINTENANCE MANUAL SHALL INCLUDE THE FOLLOWING:
- a. MANUFACTURERS PRINTED OPERATING AND MAINTENANCE PROCEDURES.
- b. MAINTENANCE PROCEDURES FOR ROUTINE PREVENTATIVE MAINTENANCE AND TROUBLESHOOTING.
- c. COPIES OF WARRANTIES.
- d. APPROVED SHOP DRAWINGS AND PRODUCT DATA.
- e. BALANCE REPORTS.
- f. INCLUDE IN THE MANUAL, A TABULATED EQUIPMENT SCHEDULE FOR ALL EQUIPMENT. SCHEDULE SHALL INCLUDE PERTINENT DATA SUCH AS: MAKE, MODEL NUMBER, SERIAL NUMBER, VOLTAGE, NORMAL OPERATING CURRENT, BELT SIZE, FILTER QUANTITIES AND SIZES, BEARING NUMBER, ETC. SCHEDULE SHALL INCLUDE MAINTENANCE TO BE DONE AND FREQUENCY.
4. MAINTENANCE AND INSTRUCTION MANUALS SHALL BE SUBMITTED TO THE OWNER AT THE SAME TIME AS THE SEVEN (7) DAY NOTICE IS GIVEN PRIOR TO THE INSTRUCTION PERIOD.
- L. CLEANING
1. ALL WORK AREAS SHALL BE LEFT AS CLEAN AS NEW. CLEAN INTERNALS OF ALL DUCTWORK AND AIR HANDLING UNITS AND REPLACE FILTERS AFTERWARDS.
2. DUCTWORK: DUCTS SHALL BE THOROUGHLY CLEANED SO THAT NO DIRT OR DUST SHALL BE DISCHARGED FROM DIFFUSERS, REGISTERS, OR GRILLES, WHEN SYSTEM IS OPERATED.
3. PIPING: AFTER CONDENSATE PIPING HAS BEEN PRESSURE TESTED AND APPROVED FOR TIGHTNESS, CLEAN AND FLUSH PIPING.
4. EQUIPMENT: AFTER COMPLETION OF PROJECT, CLEAN THE EXTERIOR SURFACE OF EQUIPMENT INCLUDED IN THIS SECTION, INCLUDING REMOVAL OF CONCRETE RESIDUE.
5. WORK AREA: AFTER COMPLETION OF PROJECT, REMOVE ALL CONSTRUCTION DEBRIS, TEMPORARY FACILITIES AND EQUIPMENT FROM WORK AREA. CLEAN WORK AREA TO PERMIT OCCUPATION.
- M. GUARANTEE
1. GUARANTEE WORK OF THESE CONTRACT DOCUMENTS IN WRITING FOR NOT LESS THAN ONE (1) YEAR FROM DATE OF FINAL NOTICE OF ACCEPTANCE. REPAIR OR REPLACE DEFECTIVE MATERIALS, EQUIPMENT, WORKMANSHIP AND INSTALLATION THAT DEVELOP WITHIN THIS PERIOD. PROMPT AND TO OWNER'S SATISFACTION AND CORRECT DAMAGE CAUSED IN MAKING NECESSARY REPAIRS AND REPLACEMENTS UNDER GUARANTEE WITHIN CONTRACT PRICE.

N. MEANS AND METHODS ALL TRADES

1. INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. DO NOT BURN WASTE MATERIALS. DO NOT BURY DEBRIS OR EXCESS MATERIALS ON THE OWNERS' PREMISES. DO NOT DISCHARGE VOLATILE, HARMFUL OR DANGEROUS MATERIALS INTO DRAINAGE SYSTEMS. REMOVE AND DISPOSE TO A OTHER WORK IN STRICT ACCORDANCE WITH MUNICIPAL, STATE AND FEDERAL REGULATIONS.
3. MATERIALS AND EQUIPMENT SHALL BE UL LISTED WHERE STANDARD HAS BEEN ESTABLISHED.
4. CAREFULLY INSPECT ALL BUILDING ELEMENTS PRIOR TO CUTTING OR DRILLING INTO WALL, FLOORS OR CEILINGS. PATCH AND PAINT SURFACES DISTURBED BY WORK UNDER THIS CONTRACT AS REQUIRED TO RESTORE THEM TO THEIR ORIGINAL CONDITION.
5. SCAFFOLDING, RIGGING, HOISTING: THE CONTRACTOR SHALL FURNISH ALL SCAFFOLDING, RIGGING, HOISTING AND SERVICES NECESSARY FOR ERECTION AND DELIVERY INTO THE PREMISES ANY EQUIPMENT AND APPARATUS FURNISHED UNDER THIS DIVISION. REMOVE SAME FROM PREMISES WHEN NO LONGER REQUIRED.
6. EXCAVATION AND BACKFILLING: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE SIZES, DEPTHS, FILL AND BEDDING REQUIREMENTS AND ANY OTHER EXCAVATION WORK REQUIRED UNDER THESE SPECIFICATIONS.
7. WATERPROOFING, WHERE ANY WORK PIERCES WATERPROOFING, INCLUDING WATERPROOF CONCRETE, ROOFS, EXTERIOR WALL, AND FLOORS, WET AREAS, THE METHOD OF INSTALLATION SHALL BE REVIEWED BY THE ENGINEER BEFORE WORK IS DONE. THE CONTRACTOR SHALL FURNISH ALL NECESSARY SLEEVES, CAULKING AND FLASHING REQUIRED TO MAKE OPENINGS ABSOLUTELY WATER TIGHT.
8. PROVIDE FIRESTOPPING AROUND ALL FIRE PROTECTION, PLUMBING, MECHANICAL AND ELECTRICAL PENETRATIONS THROUGH FIRE RATED PARTITIONS. PROVIDE ASBESTOS FREE FIRE STOPPING SYSTEM CAPABLE OF MAINTAINING AN EFFECTIVE BARRIER AGAINST FLAME AND GASES. SYSTEM SHALL BE UL LISTED AND COMPLY WITH ASTM E 814.
9. PROVIDE ACCESS PANELS IN WALLS, FLOORS AND GYPSUM WALL BOARD CEILINGS TO FACTORY APPLIED FSK JACKET. PROVIDE MINIMUM OF R-12 (AS INSTALLED) INSULATION REQUIRING PERIODIC SERVICE AND INSPECTION. NOT ALL ACCESS PANELS ARE INDICATED ON THE PLANS. REVIEW ARCHITECTURAL AND MECHANICAL PLANS TO DETERMINE THE LOCATION AND QUANTITY OF ACCESS PANELS REQUIRED. COORDINATE TYPE AND LOCATION WITH ARCHITECTURAL PLANS.
- 23.04.17 - SLEEVES AND PENETRATIONS
- A. GENERAL REQUIREMENTS
1. LAY OUT PENETRATION AND SLEEVE OPENINGS IN ADVANCE. COORDINATE WORK CAREFULLY WITH ARCHITECTURAL AND STRUCTURAL WORK. PROVIDE CORE DRILLING OF EXISTING CONSTRUCTION WHERE REQUIRED. SUBMIT PROPOSED LOCATIONS FOR REVIEW PRIOR TO CORE DRILLING.
2. MAINTAIN FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PENETRATIONS. SEAL PENETRATIONS WITH APPROVED FIRESTOP MATERIALS.
3. SLEEVES FOR INSULATED PIPE AND DUCT IN NON-FIRE RATED CONSTRUCTION SHALL ACCOMMODATE CONTINUOUS INSULATION WITHOUT COMPRESSION.
- B. PIPE SLEEVES:
1. PROVIDE HOT-DIPPED GALVANIZED SCHEDULE 40 STEEL PIPE SLEEVES FOR PIPES PASSING THROUGH CONCRETE AND MASONRY WALLS AND CONCRETE FLOOR AND ROOF SLABS.
2. PROVIDE 26 GAUGE GALVANIZED STEEL SLEEVES THROUGH PARTITIONS AND NON-FIRE RATED CONSTRUCTION.
3. PROVIDE MECHANICAL SLEEVE SLABS CONSISTING OF INTERLOCKING MODULES AT EXTERIOR PIPE PENETRATIONS.
4. PROVIDE ADJUSTABLE ESCUTCHEONS ON EXPOSED PIPING THAT PASSES THROUGH FINISHED FLOORS, WALLS AND CEILINGS. ESCUTCHEONS SHALL BE CHROME-PLATED CAST BRASS, SIZED TO COVER SLEEVE OPENING AND TO ACCOMMODATE PIPE AND INSULATION, UP EQUIPMENT.
- 23.05.29 - HANGERS AND SUPPORTS
- A. PROVIDE PIPE STANDS, SUPPORTS, HANGERS AND OTHER SUPPORTING APPLIANCES AS NECESSARY TO SUPPORT WORK REQUIRED BY CONTRACT DOCUMENTS. SPACING OF HANGERS SHALL BE INSTALLED IN ACCORDANCE WITH APPLICABLE BUILDING AND MECHANICAL CODES. STRUCTURAL STEEL, SUPPORTS, HANGERS, ETC. SHALL BE ANGLE IRON, STEEL CHANNEL OR STEEL ROD USED WITH APPROVED CLAMPS, INSERTS, ETC. ALL SUPPORTS, HANGERS, BRACKETS, ETC. SHALL BE AS APPROVED BY THE ENGINEER.
- B. ALL HANGERS SHALL BE GALVANIZED.
- C. ATTACH HANGERS AND SUPPORTS DIRECTLY ONTO THE STRUCTURE BY FIRST REMOVING EXISTING FIRE PROOFING, AND AFTER SECURING THE ATTACHMENT, REPAIRING THE FIRE PROOFING TO ITS ORIGINAL CONDITION, CONTINUOUSLY OVER THE ATTACHMENT.
- D. SUPPORT ALL GALVANIZED DUCTWORK WITH GALVANIZED HANGERS AND MOUNTS AS REQUIRED BY SMACNA (6 FT SPACING). DO NOT SUPPORT RISERS FROM SLEEVES IN SLABS.

23.05.48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC

- A. PROVIDE VIBRATION ISOLATION FOR EACH PIECE OF ROTATING OR RECIPROCATING HVAC EQUIPMENT SHOWN ON THE DRAWINGS. VIBRATION ISOLATION COMPONENTS SHALL BE SUPPLIED BY A SINGLE MANUFACTURER - MASON INDUSTRIES, KINETICS OR AMBER BOOTH. TYPES OF ISOLATORS, REGULATED DELTACTIONS, AND INSTALLATION PRACTICES SHALL BE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF THE VIBRATION ISOLATION MANUFACTURER.
- 23.05.53 - PIPE AND DUCT IDENTIFICATION
- A. DUCTWORK AND PIPING SHALL BE LABELED WITH PREPRINTED SELF-ADHESIVE, PREMIUM GRADE VINYL, COLOR-CODED, WITH LETTERING INDICATING SERVICE, AND SHOWING FLOW DIRECTION.
- B. VALVES SHALL BE TAGGED WITH STAMPED OR ENGRAVED BRASS VALVE TAGS. INSTALL TAGS ON VALVES AND CONTROL DEVICES IN PIPING SYSTEMS, EXCEPT CHECK VALVES. VALVES WITHIN FACTORY-FABRICATED EQUIPMENT UNITS, SHUT-OFF VALVES, FAUCETS, CONVENIENCE AND LAWN-WATERING HOSE CONNECTIONS, AND HVAC TERMINAL DEVICES AND SIMILAR, ROUGH-IN CONNECTIONS OF END-USE FIXTURES AND UNITS. LIST TAGGED VALVES IN A VALVE SCHEDULE.
- C. MACHINERY SUCH AS CURS, FANS, ETC. SHALL BE LABELED WITH PLASTIC LABELS WITH ENGRAVED EQUIPMENT NUMBER CORRESPONDING TO DRAWING SCHEDULE NUMBERS.
- 23.05.93 - TESTING, ADJUSTING AND BALANCING
- A. PROVIDE QUALIFIED PERSONNEL, EQUIPMENT, APPARATUS AND SERVICES FOR START-UP, TESTING AND BALANCING OF MECHANICAL SYSTEMS, TO PERFORMANCE DATA SHOWN IN SCHEDULES, AS SPECIFIED, AND AS REQUIRED BY CODES, STANDARDS, REGULATIONS AND AUTHORITIES HAVING JURISDICTION INCLUDING CITY INSPECTORS, OWNERS AND ARCHITECT.
- B. PROVIDE THE SERVICES OF AN INDEPENDENT TESTING, ADJUSTING, AND BALANCING (TAB) AGENCY TO PROVIDE TAB SERVICES FOR THE MECHANICAL SYSTEMS. THE TAB AGENCY SHALL BE CERTIFIED BY NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB) OR THE ASSOCIATED AIR BALANCE COUNCIL (AABC) IN THOSE TESTING AND BALANCING DISCIPLINES REQUIRED FOR THIS PROJECT. THE TAB AGENCY SHALL PROVIDE AT LEAST ONE PROFESSIONAL ENGINEER REGISTERED IN THE STATE IN WHICH THE SERVICES ARE TO BE PERFORMED AND CERTIFIED BY NEBB OR AABC AS A TEST AND BALANCE ENGINEER.
- C. PRIOR TO TESTING, ADJUSTING, AND BALANCING, THE MECHANICAL CONTRACTOR SHALL VERIFY THAT THE SYSTEMS HAVE BEEN INSTALLED AND ARE OPERATING AS SPECIFIED. APPROVED SHOP DRAWINGS, AS BUILT DRAWINGS, AND ALL OTHER DATA REQUIRED FOR EACH SYSTEM AND/OR COMPONENT TO BE TESTED SHALL BE MADE AVAILABLE AT THE JOB SITE DURING THE ENTIRE TAB EFFORT. THE OWNER SHALL BE NOTIFIED IN WRITING OF ALL EQUIPMENT COMPONENTS, OR BALANCING DEVICES, THAT ARE DAMAGED, INCORRECTLY INSTALLED, OR MISSING, AS WELL AS ANY DESIGN DEFICIENCIES THAT WILL PREVENT PROPER TESTING, ADJUSTING, AND BALANCING. TESTING, ADJUSTING, AND BALANCING SHALL NOT COMMENCE UNTIL APPROVED BY THE OWNER.
- D. PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM IDENTIFIED, IN ACCORDANCE WITH THE DETAILED PROCEDURES OUTLINED IN EITHER NEBB "PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS" OR AABC, "NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE." THE TAB AGENCY SHALL TEST, ADJUST, AND BALANCE THE FOLLOWING MECHANICAL SYSTEMS:
1. ALL AIR HANDLING EQUIPMENT
2. ALL PUMPING SYSTEMS
3. ALL SUPPLY AIR SYSTEMS
4. ALL RETURN AIR SYSTEMS
5. VERIFY OPERATION OF ALL TEMPERATURE CONTROL SYSTEMS
6. TEST SYSTEMS FOR PROPER SOUND AND VIBRATION LEVELS

- A. SUBMIT TESTING, ADJUSTING, AND BALANCING REPORTS BEARING THE SEAL AND SIGNATURE OF THE TAB PROFESSIONAL ENGINEER. PREPARE A REPORT OF RECOMMENDATIONS FOR CORRECTING UNSATISFACTORY MECHANICAL PERFORMANCES WHEN A SYSTEM CANNOT BE SUCCESSFULLY BALANCED.
- B. START UP ALL SYSTEMS, PRESSURE TEST DUCTWORK AND PIPING, AND BALANCE SYSTEMS INCLUDING, BUT NOT LIMITED TO, ALL NEW AND EXISTING REGISTERS, GRILLES, DIFFUSERS, TERMINAL UNITS, FANS, ETC. WITHIN THE AREA OF WORK TO PERFORMANCE DATA SHOWN ON PLANS, SCHEDULES, AND AS SPECIFIED.
- C. DO NOT COVER OR CONCEAL WORK BEFORE TESTING AND INSPECTION AND OBTAINING APPROVAL.
- D. LEAKS, DAMAGE AND DEFECTS DISCOVERED OR RESULTING FROM STARTUP, TESTING, AND BALANCING SHALL BE REPAIRED OR REPLACED TO LIKE-NEW CONDITION WITH ACCEPTABLE MATERIALS. TESTING SHALL BE CONTINUED UNTIL SYSTEM OPERATES WITHOUT ADJUSTMENT OR REPAIR.
- E. REPORT ON REPORTING FORMS, SUBMITTED TO ARCHITECT FOR APPROVAL IN ADVANCE.
- F. SUBMIT PROCEDURES, RECORDING FORMS, AND TEST EQUIPMENT FOR REVIEW PRIOR TO BALANCING, AS DESCRIBED IN SPECIFICATIONS. SUBMIT ELECTRONIC COPY OF TESTING AND BALANCING REPORTS TO ARCHITECT FOR APPROVAL.
- G. FURNISH ALL TEST MEDIUMS AND DISPOSE OF ALL TEST MEDIUMS AT AN APPROVED OFF-SITE LOCATION AFTER TESTING IS COMPLETE.
- H. NOTE REQUIREMENT ABOVE FOR CFM AND STATIC PRESSURE READINGS PRIOR TO DEMOLITION
- I. THE BALANCING CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL DIRECTIONAL ADJUSTMENT OF ALL LINEAR DIFFUSERS AS INDICATED ON PLANS. IF NO DIRECTIONAL FLOW IS INDICATED INTERIOR LINEAR DIFFUSERS SHALL BE DIRECTED HORIZONTALLY AND PERIMETER LINEAR DIFFUSER SHALL BE DIRECTED VERTICALLY. IF PERIMETER LINEAR DIFFUSERS HAVE MULTIPLE SLOTS THE PERIMETER SLOT DIRECTED VERTICALLY, AND THE INTERIOR SLOT DIRECTED HORIZONTALLY TOWARDS THE INTERIOR SPACE.

23.07.13 - HVAC INSULATION

- A. GENERAL REQUIREMENTS
1. INSULATION SHALL BE CERTAIN-TYPE, KNAUF, MANVILLE, OR OWENS CORNING. MATERIALS SHALL MEET REQUIREMENTS OF ADHESIVE AND SEALANT COUNCIL STANDARDS AND SHALL INSTALL INSULATION. ADHESIVES, COATINGS, ADHESIVES, WEATHER-PROTECTION, AND OTHER WORK IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. ASTM E-84 FIRE HAZARD RATINGS SHALL BE 25 FLAME SPREAD, 50 SMOKE DEVELOPED.
2. INSULATION AND VAPOR BARRIER SHALL BE CONTINUOUS AROUND ENTIRE PERIMETER OF DUCTS. DUCTS SUPPORTED BY METAL STRAPS SHALL HAVE INSULATION ENCOMPASSING STRAPS, WHERE STRAPS PENETRATE AT TOP OF DUCT TIGHTLY SEAL AROUND STRAP WITH INSULATING TAPE. DUCTS SUPPORTED BY TRAPEZOID TYPE HANGERS UNDER DUCTS SHALL HAVE 1 LB. DENSITY RIGID INSULATION PROVIDED BETWEEN DUCT AND HANGER. INSULATION SHALL HAVE SAME THICKNESS AND VAPOR BARRIER AS SPECIFIED FOR SPECIFIC DUCT TYPE. RIGID INSULATION SECTION SHALL BE FULL WIDTH OF DUCT AND MINIMUM 1/2" LONG. TAPE AND SEAL ALL SEAMS WHERE RIGID INSULATION MEETS OTHER INSULATION.
3. FITTINGS, VALVES AND FLANGES SHALL BE INSULATED WITH SAME MATERIAL AND TO SAME THICKNESS AS ADJOINING PIPE INSULATION, WITH PRESENT SECTIONS.
4. FOR STRAINERS AND OTHER VALVES OR FITTINGS WHICH NEED MAINTENANCE, PROVIDE PREFORMED REMOVABLE INSULATION SECTION.
- B. PRODUCTS AND APPLICATIONS
1. INDOOR DUCT INSULATION SHALL BE MINERAL FIBER BLANKET DUCT INSULATION WITH FACTORY APPLIED FSK JACKET. PROVIDE MINIMUM OF R-6 (AS INSTALLED) INSULATION FOR THE FOLLOWING:
- a. SUPPLY AND FRESH AIR DUCTS WHEN LOCATED WITHIN CONCEALED SPACES INSIDE THE BUILDING ENVELOPE.
- b. RETURN AIR DUCTWORK IN UNCONDITIONED SPACES (WHERE SPACE TEMPERATURE IS MORE THAN 10 DEGREES F DIFFERENCE FROM DUCT TEMPERATURE)
2. OUTDOOR DUCT INSULATION SHALL BE RIGID MINERAL FIBER BOARD DUCT INSULATION WITH FACTORY APPLIED FSK JACKET. PROVIDE MINIMUM OF R-12 (AS INSTALLED) INSULATION. SUPPLY, RETURN, EXHAUST AND FRESH AIR DUCTS WHEN LOCATED OUTSIDE THE BUILDING ENVELOPE.
3. REFRIGERANT LINE AND CONDENSATE DRAIN LINE INSULATION SHALL BE 1 INCH THICK FLEXIBLE ELASTOMERIC, ACCEPTABLE MANUFACTURERS: ARMACELL OR K-FLEX.
4. CONDENSATE DRAIN LINE INSULATION SHALL BE 1 INCH THICK FLEXIBLE ELASTOMERIC, ACCEPTABLE MANUFACTURERS: ARMACELL OR K-FLEX.
5. EQUIPMENT INSULATION SHALL BE MINERAL FIBER BOARD INSULATION WITH FACTORY APPLIED ASJ. PROVIDE 2 INCH THICK FOR HEATING SYSTEM HEAT EXCHANGERS, 1 INCH THICK FOR OTHER EQUIPMENT. INSULATION SHALL BE FORMED OR FABRICATED TO FIT EQUIPMENT.
- C. OUTDOOR JACKET
- a. PROVIDE OUTDOOR PIPING WITH WATERPROOF 0.016" THICK ALUMINUM JACKET WITH 2" TRANSVERSE AND LONGITUDINAL LAPPED SEAMS ORIENTED TO SHED WATER.

23.09.00 - INSTRUMENTATION AND CONTROLS

- A. PROVIDE COMPLETE SYSTEM OF AUTOMATIC TEMPERATURE CONTROLS (ATC). CONTROL SYSTEM SHALL BE CAPABLE OF PERFORMING ALL SEQUENCES OF OPERATION SHOWN ON THE DRAWINGS OR DESCRIBED IN THESE SPECIFICATIONS. INDIVIDUAL CONTROL COMPONENTS MAY NOT BE SHOWN ON CONTRACT DOCUMENTS, BUT THE CONTRACTOR SHALL SUPPLY ALL COMPONENTS, AND CONTROL WIRING NECESSARY FOR A COMPLETE OPERABLE SYSTEM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SYSTEM COMPONENTS, WHETHER THE ELECTRICAL OR OTHER WORK IS SUBCONTRACTED OR NOT.
- B. INSTALL THERMOSTATS AT ADJUTMENT HEIGHTS ABOVE FINISHED FLOOR IN ACCORDANCE WITH "ADA" REQUIREMENTS, OR AS DIRECTED OTHERWISE BY ARCHITECT.
- C. ALL SAFETY SWITCHES AND CUT OUTS SHALL BE FIELD CALIBRATED AND SET PRIOR TO START-UP OF EQUIPMENT.
- D. ALL CONTROL WIRING SHALL COMPLY WITH THE REQUIREMENTS OF THE ELECTRICAL SPECIFICATIONS.
- E. WIRING BETWEEN FIRE ALARM SYSTEM AND TEMPERATURE CONTROL SYSTEM, EXCEPT FOR DUCT MOUNTED SMOKE DETECTORS, SHALL BE BY MECHANICAL CONTRACTOR.
- F. HEATING/COOLING THERMOSTATS SHALL HAVE AN ADJUSTABLE DEADBAND.
- G. LOCAL CONTROLLERS, RELAYS, SWITCHES, AND OTHER CONTROL COMPONENTS SHALL BE MOUNTED ON ENCLOSED CONTROL PANELS WITH HINGE-LOCK DOOR MOUNTED NEXT TO SYSTEM CONTROLLED. TEMPERATURE SETTINGS, ADJUSTMENTS AND CALIBRATIONS SHALL BE MADE AT SYSTEM CONTROL PANEL. PANEL SHALL HAVE CANOPY LIGHT AND ON-OFF SWITCH.

23.21.00 - PIPING AND PUMPS

- A. GENERAL REQUIREMENTS
1. PIPE MATERIALS AND FITTING MATERIALS SHALL BE AS INDICATED IN SCHEDULE OF PIPE AND FITTING MATERIALS. PROVIDE DIELECTRIC FITTINGS TO CONNECT DIFFERENT PIPING MATERIALS.
- B. SCHEDULE OF PIPE AND FITTING MATERIALS
1. CONDENSATE DRAIN (INCLUDING PUMPED CONDENSATE): 125 PS WORKING PRESSURE, TYPE 1 COPPER WITH SOLDERED COPPER JOINTS.
2. REFRIGERANT PIPING: TYPE A/CR COPPER
- C. VALVES AND STRAINERS
1. VALVES SHALL HAVE NAME OF MANUFACTURER AND GUARANTEED WORKING PRESSURE CAST OR STAMPED ON BODIES. VALVES OF SIMILAR TYPE SHALL BE BY A SINGLE MANUFACTURER. VALVES SHALL BE AS MANUFACTURED BY APOLLO, CRANE, HAMMOND, JENKINS, STOCKHOLM OR MILWAUKEE.
- D. COMBINATION BALANCING AND SHUT-OFF VALVES
1. PROVIDE CALIBRATED COMBINATION BALANCING SHUT-OFF VALVES AS INDICATED ON THE PLANS. ACCEPTABLE MANUFACTURERS SHALL BE ARMSTRONG, BELL AND GOSSET, FLOWSET, OR TAGO.
- E. AUTOMATIC FLOW CONTROL VALVES
1. PROVIDE AUTOMATIC PRESSURE COMPENSATING FLOW CONTROL VALVES BY GRISWOLD, FD OR TAB AS INDICATED ON THE PLANS. VALVES SHALL BE FACTORY SET AND SHALL AUTOMATICALLY LIMIT THE RATE OF FLOW TO WITHIN 5 PERCENT OF THE SPECIFIED CAPACITY.

23.31.00 - HVAC DUCTS

- A. GENERAL REQUIREMENTS
1. FOR GALVANIZED DUCTWORK, SEAL AIR DUCT JOINTS AND JOINTS BETWEEN FITTINGS AND DUCTS WITH HARDEST SEALANT OR APPROVED EQUAL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. DUCTWORK SHALL BE FREE FROM VIBRATION UNDER ALL CONDITIONS OF OPERATION.
3. DIFFUSER & REGISTER LOCATIONS SHALL BE COORDINATED WITH ARCHITECTURAL REFLECTED CEILING PLANS.
4. DIFFUSER SIZES SHOWN ARE NECK SIZES; REGISTER AND GRILLE SIZES ARE NOMINAL.
5. ALL DUCTS PENETRATING RATED FIRE WALLS SHALL BE PROVIDED WITH FIRE DAMPERS AND ACCESS DOORS.
6. DUCTWORK SHALL NOT RUN ALONG FULL HEIGHT PARTITIONS.
7. PATCH AND SEAL ALL EXISTING OPENINGS IN DUCTWORK NOT UTILIZED FOR NEW LAYOUT.
8. WHEN SECTION OF DUCTWORK IS NOT LABELED FOR SIZE, THE LARGER SIZE INDICATED ON THE CONNECTED DUCT SHALL PREVAIL. SIZE OF DUCT RUN-OUTS TO DIFFUSER SHALL EQUAL DIFFUSER NECK SIZE.
9. DUCT BRANCH CONNECTIONS AND TAKE OFF'S SHALL BE MADE WITH 45° CONNECTION, BELLMOUTH OR CONICAL ONLY. SPIN IN COLLARS AND STRAIGHT TAPS SHALL NOT BE USED.
10. ELBOWS AND BENDS FOR RECTANGULAR DUCTS SHALL HAVE CENTER LINE RADIUS OF 1.5 TIMES DUCT WIDTH WHEREVER POSSIBLE. WHERE CENTERLINE RADIUS IS LESS THAN 1.5 TIMES DUCT WIDTH WITH ELBOWS SHALL BE RADIUS THROAT WITH RADIUS HEEL AND FULL-LENGTH SPLITTER VANES.
11. NO PIPE, CONDUIT, HANGER, ARCHITECTURAL ELEMENT NOR STRUCTURAL MEMBER SHALL PASS THROUGH DUCT WITHOUT ARCHITECTS AND/OR ENGINEER'S WRITTEN APPROVAL.
- B. SHEETMETAL DUCTWORK
1. SHEET METAL DUCTS SHALL BE CONSTRUCTED OF HOT DIPPED G90 GALVANIZED SHEET METAL UNLESS OTHERWISE SPECIFIED. MATERIAL CONSTRUCTION AND INSTALLATION SHALL MEET REQUIREMENTS OF MOST RECENT EDITIONS OF SMACNA STANDARDS (EXCEPT FOR MORE STRINGENT REQUIREMENTS SPECIFIED OR SHOWN ON DRAWINGS). ALL MEDIUM PRESSURE DUCTWORK BETWEEN MAIN SYSTEM FAN AND AIR TERMINAL DEVICE SHALL BE MINIMUM 4"wg) PRESSURE CLASS, SEAL CLASS A, LEAKAGE CLASS B. ALL LOW-PRESSURE DUCTWORK BETWEEN TERMINAL DEVICE AND AIR OUTLETS SHALL BE MINIMUM 2"wg) PRESSURE CLASS. SEAL CLASS B, LEAKAGE CLASS 12.
- C. FLEXIBLE DUCTWORK
1. FLEXIBLE DUCTWORK, CONNECTING TO UNINSULATED OR UNLINED DUCT, SHALL BE VINYL-COATED FIBERGLASS CLOTH 0.0057" MINIMUM THICKNESS, 25 STRANDS PER INCH MINIMUM THREAD COUNT WITH CORROSION-RESISTANT HELICAL WIRE REINFORCEMENT. FLEX DUCT SHALL BE UL RATED FOR 12" W.C. POSITIVE PRESSURE, 2" W.C. NEGATIVE PRESSURE WITH A MAXIMUM VELOCITY OF 400 FPM. FLEX DUCT MUST BE LISTED AS A CLASS 1 FLEXIBLE DUCT ACCORDING TO UL 181 AND SHALL MEET THE REQUIREMENTS OF NFPA 90A. MAXIMUM ASTM E-84 FIRE HAZARD RATING SHALL BE 25 FLAME SPREAD, 50 FUEL CONTRIBUTED, AND 50 SMOKE DEVELOPED. UNINSULATED FLEXIBLE DUCT SHALL BE EQUIVALENT TO FLEXMASTER TYPE 4.
2. FLEXIBLE DUCT CONNECTED TO INSULATED OR LINED DUCT SHALL BE INSULATED WITH 1-1/2" 12 LB. DENSITY FIBERGLASS INSULATION AND FLAME RETARDANT (UL LISTED) VAPOR BARRIER. MEETING ASTM E-84 RATING AS REFERENCED ABOVE.
3. FLEXIBLE DUCTS SHALL NOT EXCEED 5 FEET LONG AND SHALL BE USED FOR STRAIGHT RUN ONLY, NO OFFSETS OR TURNS. MAXIMUM SAG OF 1/2" PER 1'-0".
4. HANGER AND SADDLE IN CONTACT WITH FLEXIBLE DUCT SHALL BE WIDE ENOUGH TO PREVENT RESTRICTION OF INTERNAL DUCT DIAMETER WHEN WEIGHT OF SUPPORTED SECTION RESTS ON HANGER OR SADDLE MATERIAL.
5. COLLARS TO WHICH FLEXIBLE DUCTS ARE ATTACHED SHALL BE AT LEAST 2" LONG. SLEEVES FOR JOINING SECTIONS OF FLEXIBLE DUCT SHALL BE AT LEAST 4" LONG.
6. APPLY SEALING COMPOUND TO METALLIC SURFACE AT CONNECTION OF FLEXIBLE DUCT WITH SHEET METAL DUCTS, COLLARS AND MIXING BOXES. SLIP FLEXIBLE DUCTWORK OVER SEALING COMPOUND, COMPLETE SEAL WITH 1/2" WIDE, COMMERCIALY-MADE METAL DRAW BANDS.

23.33.00 - AIR DUCT ACCESSORIES

- B. ADJUSTABLE MANUAL BALANCING DAMPERS:
1. GENERAL: NOT ALL MANUAL BALANCING DAMPERS MAY BE SHOWN ON THE PLANS FOR CLARITY. PROVIDE MANUAL ADJUSTABLE VOLUME DAMPERS, WITH EXTENDED MOUNT INDICATING AND LOCKING QUADRANTS ON EACH SUPPLY, RETURN, AND GENERAL EXHAUST DUCT TAKEOFF. AND AT EACH TAKEOFF TO A REGISTER, GRILLE, OR DIFFUSER. DAMPERS SHALL BE LOCATED AS FAR UPSTREAM AS POSSIBLE IN THE BRANCH DUCT OR TAKE OFF TO MINIMIZE DOWNSTREAM NOISE.
2. REMOTE ADJUSTABLE VOLUME DAMPERS: PROVIDE REMOTE ADJUSTABLE VOLUME DAMPERS IN AREAS WHERE CEILING CAVITY ACCESS IS LIMITED BY HARD (SOLID) CEILINGS, EQUIPMENT OBSTRUCTIONS, ARCHITECTURAL FEATURES, ETC. COORDINATE BETWEEN MECHANICAL PLANS AND ARCHITECTURAL CEILING PLANS TO DETERMINE IF AND WHERE REMOTE ADJUSTABLE VOLUME DAMPERS ARE REQUIRED. MANUALLY ADJUSTED REMOTE VOLUME DAMPERS SHALL BE SIMILAR TO YOUNG REGULATOR MODEL 270.
- C. FLEXIBLE CONNECTIONS
1. MAKE ALL CONNECTIONS BETWEEN AIR HANDLING UNITS AND DUCTWORK AND BETWEEN FANS AND DUCTWORK WITH FLEXIBLE CONNECTIONS. FOR INDOOR APPLICATIONS, FLEXIBLE CONNECTIONS SHALL BE NEOPRENE-COATED FIBROUS GLASS FIRE RETARDANT FABRIC, BY VENTAFIBRICS, OR DUROVUE. FOR OUTDOOR APPLICATIONS, FLEXIBLE CONNECTIONS SHALL BE DUPONT HYALON-COATED FIBROUS GLASS FIRE-, WEATHER-, AND UV-RESISTANT BY VENTAFIBRICS OR DUROVUE.

23.34.00 - HVAC FANS

- A. ALL FANS SHALL HAVE THEIR AIR PERFORMANCE RATED IN ACCORDANCE WITH AMCA AND SHALL BE LICENSED TO BEAR THE AMCA SEAL.
- B. ACCEPTABLE MANUFACTURERS: GREENHECK, COOK, TWIN CITY.
- 23.37.00 - AIR OUTLETS AND INLETS
- A. PROVIDE DIFFUSERS, REGISTERS, AND GRILLES FOR SUPPLY, RETURN, AND EXHAUST OUTLETS, OF SIZE, TYPE, MATERIAL, AND DESIGN SHOWN ON DRAWINGS. ACCEPTABLE MANUFACTURERS: KRUEGER, HAUOR, METALINE, TITUS, OR PRICE. SOUND PRESSURE LEVELS SHALL NOT EXCEED NC 30. COLOR AND FINISH SHALL BE SELECTED BY THE ARCHITECT.
- B. EXISTING TO REMAINE REUSED DIFFUSERS/REGISTERS/GRILLES SHALL BE CLEANED, TOUCH-UP PAINTED AND RENDERED IN LIKE-NEW-CONDITION BY THE CONTRACTOR.

23.36.00 - AIR TERMINAL UNITS

- A. ALL BOXES SHALL HAVE PRESSURE INDEPENDENT ELECTRONIC CONTROLLERS AND MULTI-POINT FLOW SENSORS. UNITS SHALL NOT DEVIATE FROM THE SET MINIMUM OR MAXIMUM FLOW SETTINGS BY MORE THAN 10%, REGARDLESS OF INLET PRESSURE. INLET VELOCITIES SHALL NOT EXCEED 2000 FPM. SOUND DATA SHALL BE IN ACCORDANCE WITH NOISE CRITERIA DATA SHOWN ON SCHEDULES AND SHALL BE CERTIFIED IN ACCORDANCE WITH AEC STANDARD 105. BOX AIR LEAKAGE SHALL NOT BE MORE THAN 2% OF MAXIMUM AIRFLOW. PROVIDE INTEGRAL (HOT WATER) (ELECTRIC) REHEAT COILS SIZED AS INDICATED ON DRAWINGS. CASING SHALL BE GALVANIZED STEEL LINED WITH 1-1/2 POUND INSULATION. INSULATION SHALL BE TOTALLY ENCAPSULATED TO PREVENT FIBERS FROM ENTERING AIRSTREAM. PROVIDE CONTROL TRANSFORMER AS REQUIRED. ACCEPTABLE MANUFACTURERS: TITUS, ENVIRONMENT, PRICE OR KRUEGER.
- B. FAN-POWERED BOXES SHALL BE PROVIDED WITH FULLY MODULATING EC MOTORS
- 23.31.00 - DECENTRALIZED UNITARY HVAC EQUIPMENT
- A. SPLIT SYSTEM AIR HANDLING UNITS
1. PROVIDE COMPLETE DX SYSTEM OF TYPES, SIZES, AND CAPACITIES SHOWN ON SCHEDULES. SYSTEM SHALL CONSIST OF MATCHING AIR-COOLED CONDENSER UNITS, COMPRESSORS, PIPING, CONTROLS, WIRING, AND OTHER ACCESSORIES AND APPURTENANCES NECESSARY TO PROVIDE FULLY AUTOMATICALLY FUNCTIONING SYSTEM. ACCEPTABLE MANUFACTURERS: ANNEXAIRE, CARRIER, YORK OR DAIKIN.
2. DX AIR CONDITIONING SYSTEM SHALL BE CAPABLE OF STARTING AND OPERATING DOWN TO 0° AMBIENT. LOW AMBIENT OPERATION SHALL BE ACCOMPLISHED BY VARYING THE SPEED OF CONDENSER FAN BASED ON SENSING OF HEAD PRESSURE IN REFRIGERANT LIQUID LINE. FAN SPEED SHALL BE ADJUSTED IN ACCORDANCE WITH AEC STANDARD 105. HEAD PRESSURE SENSING, OR BY FLOODING THE CONDENSER COIL WITH LIQUID REFRIGERANT TO MAINTAIN THE DESIRED CONDENSER PRESSURE. PROVIDE TIME DELAY RELAY FOR TIMED BYPASS OF THE LOW PRESSURE SWITCH OR OTHER MEANS TO START CONDENSING UNIT AT OR WITHOUT NUISANCE SAFETY TRIP UNITS. WHEN SPECIFIED, HOT GAS BYPASS IS TO BE PRE-PIPED INTEGRAL TO THE UNIT.
3. PROVIDE REFRIGERANT PIPING BETWEEN AIR-COOLED CONDENSER UNIT AND AIR HANDLING UNIT. PROVIDE ALL NECESSARY AUXILIARIES AND APPURTENANCES. REFRIGERANT PIPING SHALL BE ACOR COPPER TUBING WITH WROUGHT COPPER FITTINGS AND BRAZED JOINTS. REFRIGERANTS SHALL BE R-410A.
- B. HVAC FANS
1. PROVIDE AS SCHEDULED ON THE DRAWINGS, FANS BY THE MANUFACTURER SHOWN OR AN APPROVED EQUAL.
2. CENTRIFUGAL INLINE TYPE (DIRECT DRIVE).
- a. FAN HOUSING SHALL BE GALVANIZED SHEET STEEL, SUPPLIED WITH EXTERNALLY MOUNTED ELECTRICAL TERMINAL BOX WITH PRE-WIRED TERMINAL STRIP CONNECTIONS.
- b. FAN AIRFLOW PERFORMANCE SHALL BE BASED ON AMCA STANDARD 211 AND 311 TESTING.
- C. DEHUMIDIFIERS
1. PROVIDE AS SCHEDULED ON THE DRAWINGS, DEHUMIDIFIERS BY THE MANUFACTURERS SHOWN OR AN APPROVED EQUAL.
2. PROVIDE WITH EXTERNAL HUMIDISTAT CONTROL.

IMPORTANT NOTICE: THIS DOCUMENT IS CONFIDENTIAL. PLEASE DO NOT REPRODUCE THIS DOCUMENT IN ANY WAY OTHER THAN WHAT IS NEEDED TO PERFORM WITHIN THE SCOPE OF YOUR WORK. PLEASE RETURN THIS DOCUMENT TO HIGHMARK UPON COMPLETION OF YOUR WORK. IF YOU ARE USING ELECTRONIC COPIES, PLEASE DELETE THEM FROM YOUR SYSTEM ONCE YOUR WORK IS COMPLETED.

THIS DOCUMENT, AND ANY AFFILIATED ARCHITECTURAL DESIGN, CONSTRUCTION, SECURITY, AND PLANNING DOCUMENTS ("AFFILIATED DOCUMENTS") ARE CONFIDENTIAL, AND CONTAIN PROPRIETARY DATA AND INFORMATION OF HIGHMARK. THIS DOCUMENT, AND ANY AFFILIATED DOCUMENTS, SHALL BE VIEWED/USED SOLELY FOR THE PURPOSE STATED IN SUCH AUTHORIZATION. ANY COPYING, REPRODUCING, MODIFYING, DISTRIBUTING, DISPLAYING, OR COMMUNICATING THE CONTENTS OF THESE DOCUMENTS, IN ANY MEANS, IS STRICTLY PROHIBITED.

HIGHMARK PROVISIONS

201 SUMMER STREET /
HOLLISTON, MA 01746

CONSTRUCTION DOCUMENTS

Project Number: 2021377.00
Date: 9/24/2021
Drawn By: PTC
Checked By: NHF
Revisions:

No.	Date	Description
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Sheet Description

MECHANICAL SPECIFICATIONS

Sheet Number

MEPFP4.2

20.00.00 - GENERAL CONDITIONS FOR ELECTRICAL

A. DESCRIPTION

1. THIS PROJECT COMPRISES ALTERATIONS AND RENOVATIONS TO THE EXISTING BUILDING. THE EXISTING BUILDING IS CURRENTLY OCCUPIED AND THE PROJECT WILL PROCEED IN A MANNER WHICH WILL WITHIN POKET pockets. ORDERS FOR FOLDED SHEET INFORMATION. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.
2. MANUAL SHALL INCLUDE THE FOLLOWING:
- a. DESCRIPTION OF FUNCTION, NORMAL OPERATING CHARACTERISTICS AND LIMITATIONS.
- b. PERFORMANCE CURVES, ENGINEERING DATA AND TESTS, AND COMPLETE NOMENCLATURE AND COMMERCIAL NUMBERS OF REPLACEMENT PARTS.
- c. MANUFACTURERS PRINTED OPERATING PROCEDURES TO INCLUDE START-UP, BREAK-IN, AND ROUTINE AND NORMAL OPERATING INSTRUCTIONS, REGULATION, CONTROL, STOPPING, SHUTDOWN, AND EMERGENCY INSTRUCTIONS, AND SUMMER AND WINTER OPERATING INSTRUCTIONS.
- d. MAINTENANCE PROCEDURES FOR ROUTINE PREVENTATIVE MAINTENANCE AND TROUBLESHOOTING, DISASSEMBLY, REPAIR, AND REASSEMBLY, ALIGNING AND ADJUSTING INSTRUCTIONS.
- e. SERVICING INSTRUCTIONS AND LUBRICATION CHARTS AND SCHEDULES.
- f. CONDUIT STRAPS, ONE-HOLE OR TWO-HOLE, ZINC PLATED.
- g. SPARE PARTS LIST.
- h. COPIES OF WARRANTIES.
- i. WIRING DIAGRAMS.
- j. RECOMMENDED "TURN AROUND" CYCLES.
- k. INSPECTION PROCEDURES.
- l. APPROVED SHOP DRAWINGS AND PRODUCT DATA.
- m. EQUIPMENT START-UP REPORTS.

B. DEFINITIONS

1. FURNISH THE TERM "FURNISH" MEANS TO "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS."
2. INSTALL THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT PROJECT SITE INCLUDING THE ACTING, UNLOADING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SERVICING NECESSARY AND/OR INCIDENTAL TO PROPERLY COMPLETE ALL WORK AS SHOWN ON THE DRAWINGS AND AS DESCRIBED HEREIN.
3. PROVIDE THE TERM "PROVIDE" MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.
4. REMOVE THE TERM REMOVE MEANS TO DISCONNECT/FROM ITS PRESENT POSITION, REMOVE FROM THE PREMISES AND TO DISPOSE OF IN A LEGAL MANNER.
5. SUBSTITUTIONS ARE REQUESTS FOR CHANGES IN PRODUCTS, MATERIALS AND METHODS OF CONSTRUCTION AS PROPOSED BY THE CONTRACTOR AFTER AWARD OF THE CONTRACT.

C. EQUIPMENT EQUIVALENTS AND SUBSTITUTIONS

1. CERTAIN MANUFACTURERS OF MATERIAL, APPARATUS OR APPLIANCES ARE INDICATED IN THE DRAWINGS AND SPECIFICATIONS FOR THIS PROJECT. THESE ITEMS HAVE BEEN USED AS THE BASIS OF DESIGN, AND AS A CONVENIENCE IN FIXING THE MINIMUM STANDARD OF WORKMANSHIP, FINISH AND DESIGN THAT IS REQUIRED. IF THE CONTRACTORS USES AN "APPROVED EQUAL" ALTERNATIVE TO THE BASIS OF DESIGN, AND IF THE FEATURES OF THAT ALTERNATIVE HAVE AN IMPACT ON OTHER COMPONENTS OF THE PROJECT, THE CONTRACTOR SHALL INCLUDE THE NECESSARY ADJUSTMENTS IN THOSE COMPONENTS, WHETHER FOR ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, FIRE PROTECTION, OR ANY OTHER ELEMENTS, PLUS ANY TO ADJUSTMENTS FOR DIFFERENCE IN PERFORMANCE.
2. EQUIPMENT MATERIAL OR DEVICES SUBMITTED FOR REVIEW AS AN "EQUIVALENT" SHALL MEET THE FOLLOWING REQUIREMENTS:
- a. THE EQUIVALENT SHALL HAVE THE SAME CONSTRUCTION FEATURES SUCH AS, BUT NOT LIMITED TO:
- i. MATERIAL, THICKNESS, GAUGE, WEIGHT, DENSITY, ETC.
- ii. WEIGHT, RATED, BOLTED, ETC.
- iii. FINISH UNDERCOATING, CORROSION PROTECTION
- b. THE EQUIVALENT SHALL BE OF EQUAL OR BETTER OPERATING EFFICIENCY.
- c. THE EQUIVALENT SHALL BE LOCALLY REPRESENTED BY THE MANUFACTURER FOR SERVICE, PARTS AND TECHNICAL INFORMATION.
- d. THE EQUIVALENT SHALL BEAR THE SAME LABELS OF PERFORMANCE CERTIFICATION AS IS APPLICABLE TO THE SPECIFIED ITEM, SUCH AS UL OR NEMA LABELS OR DLC QUALIFICATIONS.

D. DRAWINGS

1. PROVIDE ALL MATERIALS, EQUIPMENT AND LABOR NECESSARY TO COMPLETE THE WORK OUTLINED ON THESE CONTRACT DOCUMENTS. THE CONTRACTOR IS TO NOTE THAT THESE DOCUMENTS ARE DIAGRAMMATIC ONLY AND THAT FINAL PLACEMENT OF EQUIPMENT OR DEVICES IN THE FIELD MAY NOT DIRECTLY CORRESPOND TO THAT WHICH IS SHOWN ON THE DRAWINGS. IF A CONFLICT IN POSITIONING OCCURS THE CONTRACTOR IS TO NOTIFY THE ENGINEER IMMEDIATELY TO ASCERTAIN WHAT THE INTENT WAS BY THE DESIGN PROFESSIONAL.
2. WHERE VARIANCES OCCUR BETWEEN THE DRAWINGS AND SPECIFICATIONS OR WITHIN EITHER OF THE DOCUMENTS, THE ITEM OR ORANGE/MENT OF BETTER QUALITY, HIGHER RATING, OR HIGHER VALUE SHALL BE INCLUDED IN THE CONTRACT PRICE. THE OWNER AND WORKMAN SHALL DECIDE ON THE ITEM AND THE MANNER IN WHICH THE WORK SHALL BE INSTALLED.

E. SURVEY AND MEASUREMENTS

1. PRIOR TO SUBMITTING BID, VISIT SITE AND IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK TO BE PERFORMED. NO COMPENSATION WILL BE GRANTED FOR ADDITIONAL WORK REQUIRED BY THE CONTRACTOR TO CORRECT CONDITIONS THAT ARE VISIBLE OR READILY IDENTIFIED BY EXPERIENCED OBSERVERS. INCLUDE IN THE BID ALL REMEDIATION WORK REQUIRED.
2. DO NOT SCALE DRAWINGS. SCALE INDICATED ON DRAWINGS IS FOR ESTABLISHING REFERENCE POINTS ONLY. ACTUAL FIELD CONDITIONS SHALL GOVERN ALL DIMENSIONS.
3. PRIOR TO ORDERING ANY ITEMS AND EQUIPMENT, THOROUGHLY REVIEW THE SITE CONDITIONS TO DETERMINE IF ADEQUATE CLEARANCES AND ACCESS IS ALLOWED TO INSTALL THE COMPONENTS, ORDER EQUIPMENT BROKEN DOWN TO AS NECESSARY TO ALLOW FOR PROPER RIGGING THROUGH THE PROJECT AREA. PROVIDE ALL NECESSARY ADJUSTMENTS TO THE STRUCTURE OF THE BUILDING AS NECESSARY TO RIG THE EQUIPMENT IN PLACE.
4. ARRANGE INSTALLATION TO PROVIDE ACCESS TO EQUIPMENT FOR EASY MAINTENANCE AND REPAIR.

- F. CODES AND STANDARDS: ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MOST RECENTLY ADOPTED EDITIONS OF THE FOLLOWING CODES AND STANDARDS, INCLUDING ALL JURISDICTIONAL REVISIONS:
1. STATE BUILDING CODE INCLUDING ALL SUPPLEMENTS.
2. STATE FIRE SAFETY CODE INCLUDING ALL SUPPLEMENTS.
3. STATE FIRE PREVENTION CODE INCLUDING ALL SUPPLEMENTS.
4. THE INTERNATIONAL FIRE ALARM AND SIGNALING CODE.
5. THE INTERNATIONAL EXISTING BUILDING CODE.
6. THE INTERNATIONAL PLUMBING CODE.
7. THE INTERNATIONAL MECHANICAL CODE.
8. THE INTERNATIONAL PLUMBING CODE.
9. THE INTERNATIONAL ENERGY CONSERVATION CODE.
10. NFPA 70: NATIONAL ELECTRICAL CODE WITH STATE AMENDMENTS.
11. NFPA 72: NATIONAL FIRE ALARM AND SIGNALING CODE.
12. NFPA 73: STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION.
13. NFPA 75: STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION.
14. NFPA 76: STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION.

- G. PERMITS AND FEES:
1. THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL PERMITS, AND PAY ALL GOVERNMENT AND STATE SALES TAXES AND FEES WHERE APPLICABLE, AND OTHER COSTS, FILE ALL NECESSARY DRAWINGS, PREPARE ALL NECESSARY DOCUMENTS, AND OBTAIN ALL NECESSARY APPROVALS OF ALL GOVERNMENT AND STATE DEPARTMENTS HAVING JURISDICTION, OBTAIN ALL REQUIRED CERTIFICATES OF INSPECTION FOR HIS WORK, AND DELIVER A TRUE COPY TO THE OWNER AND ENGINEER BEFORE REQUEST FOR ACCEPTANCE AND FINAL PAYMENT FOR THE WORK.

H. SHOP DRAWINGS

1. PROVIDE SHOP DRAWINGS FOR ALL DEVICES SPECIFIED UNDER EQUIPMENT SPECIFICATIONS FOR ALL SYSTEMS INCLUDING FIRE ALARM, SWITCHGEAR, CLOCK, LIGHTING, ETC., OR WHERE CALLED FOR ELSEWHERE IN THE SPECIFICATIONS, OR WHERE SCHEDULED ON THE DRAWINGS, OR WHERE CALLED OUT ON THE DRAWINGS. SHOP DRAWINGS SHALL INCLUDE MANUFACTURERS' NAMES, DATA NUMBERS, CATALOGUE CUTS, MATERIALS, IDENTIFICATION OF PRODUCTS AND MATERIALS INCLUDED, COMPLIANCE WITH SPECIFIED STANDARDS, NOTATION OF COORDINATION REQUIREMENTS, NOTATION OF DIMENSIONS ESTABLISHED BY FIELD MEASUREMENT AND OTHER SUCH DESCRIPTIVE DATA AS MAY BE REQUIRED TO IDENTIFY AND ACCEPT THE EQUIPMENT. A COMPLETE LIST IN EACH CATEGORY (EXAMPLE: ALL FIXTURES) OF ALL SHOP DRAWINGS, CATALOGUE CUTS, MATERIAL LISTS, ETC., SHALL BE SUBMITTED TO THE ENGINEER AT ONE TIME. NO CONSIDERATION WILL BE GIVEN TO A PARTIAL SUBMISSION OF DIFFERENT VOLTAGE SYSTEMS SHALL BE AS FOLLOWS:
2. SHOP DRAWINGS SHALL INCLUDE EQUIPMENT SUBMITTALS, FABRICATION AND INSTALLATION DRAWINGS, SETTING DIAGRAMS, SCHEDULES, PATTERNS, TEMPLATES AND SIMILAR DRAWINGS, INCLUDING THE FOLLOWING INFORMATION:
- a. DIMENSIONS
- b. WIRING DIAGRAMS AND RISER DIAGRAM
- c. CALCULATIONS
- d. IDENTIFICATION OF PRODUCTS AND MATERIALS INCLUDED.
- e. COMPLIANCE WITH SPECIFIED STANDARDS AND PERFORMANCE DATA AS INDICATED.
- f. NOTATION OF COORDINATION REQUIREMENTS
- g. NOTATION OF DIMENSIONS ESTABLISHED BY FIELD MEASUREMENT.
- h. DO NOT USE SHOP DRAWINGS WITHOUT AN APPROPRIATE FINAL STAMP INDICATING ACTION TAKEN IN CONNECTION WITH CONSTRUCTION.
- i. DO NOT ORDER ANY MATERIALS OR EQUIPMENT PRIOR TO RECEIVING FINAL APPROVED SHOP DRAWINGS.
- j. SHOP DRAWINGS SHALL BE IN PDF/CDR FORMAT. PHOTOCOPIES ARE NOT ACCEPTABLE.

I. COORDINATION DRAWINGS

1. PREPARE COORDINATION DRAWINGS AT A SCALE TO MATCH THE CONTRACT DOCUMENT FLOOR PLANS, DETAILING MAJOR ELEMENTS, COMPONENTS, AND SYSTEMS OF ELECTRICAL EQUIPMENT AND MATERIALS IN RELATIONSHIP WITH OTHER SYSTEMS, INSTALLATIONS, AND BUILDING COMPONENTS. INDICATE LOCATIONS WHERE SPACE IS LIMITED FOR INSTALLATION AND ACCESS AND WHERE SEQUENCING AND COORDINATION OF INSTALLATIONS ARE OF IMPORTANCE TO THE EFFICIENT FLOW OF THE WORK, INCLUDING BUT NOT NECESSARILY LIMITED TO THE FOLLOWING:
- a. INDICATE THE PROPOSED LOCATIONS OF LIGHT FIXTURES, PANELBOARDS, CONDUITS, CABINETS, ETC.
- b. CLEARANCES FOR INSTALLING AND MAINTAINING INSULATION.
- c. CLEARANCES FOR SERVICING AND MAINTAINING EQUIPMENT, INCLUDING NEC REQUIREMENTS AND SPACE FOR EQUIPMENT DISASSEMBLY REQUIRED FOR PERIODIC MAINTENANCE.
- d. EQUIPMENT CONNECTIONS AND SUPPORT DETAILS.
- e. EXTERIOR WALL AND FOUNDATION PENETRATIONS.
- f. FIRE-RATED WALL AND FLOOR PENETRATIONS.
- g. SIZES AND LOCATIONS OF REQUIRED CONCRETE PADS AND BASES.
2. INDICATE SCHEDULING, SEQUENCING, MOVEMENT, AND POSITIONING OF LARGE EQUIPMENT INTO THE BUILDING DURING CONSTRUCTION.
3. PREPARE FLOOR PLANS, ELEVATIONS, AND DETAILS TO INDICATE PENETRATIONS IN FLOORS, WALLS, AND CEILINGS AND THEIR RELATIONSHIP TO OTHER PENETRATIONS AND SYSTEMS.
4. PREPARE REFLECTED CEILING PLANS TO COORDINATE AND INTEGRATE INSTALLATIONS, AIR OUTLETS AND INLETS, LIGHT FIXTURES, COMMUNICATION SYSTEMS COMPONENTS, SPRINKLERS, AND OTHER CEILING-MOUNTED ITEMS.

J. AS-BUILT DRAWINGS

1. PREPARE AS-BUILT DRAWINGS TO A SCALE TO MATCH THE CONTRACT DOCUMENT FLOOR PLANS, DETAILING THE ACTUAL INSTALLATION OF MAJOR ELEMENTS, COMPONENTS, AND SYSTEMS OF MECHANICAL EQUIPMENT AND MATERIALS. WHERE SHOP DRAWINGS ARE USED, RECORD A CROSS-REFERENCE AT THE CORRESPONDING LOCATION ON THE AS-BUILT DRAWINGS. GIVE PARTICULAR ATTENTION TO CONCEALED ELEMENTS THAT WOULD BE DIFFICULT TO MEASURE AND RECORD AT A LATER DATE.
2. MARK NEW INFORMATION THAT IS IMPORTANT TO THE OWNER, BUT WAS NOT SHOWN ON CONTRACT DRAWINGS OR SHOP DRAWINGS.
3. NOTE RELATED CHANGE ORDER NUMBERS WHERE APPLICABLE.
4. FINAL RECORD DOCUMENT SHALL BE PREPARED IN THE LATEST AUTOCAD VERSION AND DIGITAL MEDIA FOR ALL DRAWINGS AND A CLEAN SET OF REPRODUCIBLE PAPER COPIES SHALL BE TURNED OVER TO THE OWNER AT THE COMPLETION OF THE WORK.

K. OPERATIONS AND MAINTENANCE MANUALS

1. THE CONTRACTOR SHALL PREPARE (1) PDF COPY AND (3) HARD COPIES OF A COMPLETE MAINTENANCE AND OPERATING INSTRUCTIONS MANUAL, BOUND IN BOOKLET FORM, ORGANIZE OPERATING AND MAINTENANCE DATA INTO SUITABLE SETS OF MANAGEABLE SIZE. BIND PROPERLY INDEXED DATA IN INDIVIDUAL HEAVY-DUTY, 3-RING, VINYL-COVERED RING-BINDERS WITH POKET pockets. ORDERS FOR FOLDED SHEET INFORMATION. MARK APPROPRIATE IDENTIFICATION ON FRONT AND SPINE OF EACH BINDER.
2. MANUAL SHALL INCLUDE THE FOLLOWING:
- a. DESCRIPTION OF FUNCTION, NORMAL OPERATING CHARACTERISTICS AND LIMITATIONS.
- b. PERFORMANCE CURVES, ENGINEERING DATA AND TESTS, AND COMPLETE NOMENCLATURE AND COMMERCIAL NUMBERS OF REPLACEMENT PARTS.
- c. MANUFACTURERS PRINTED OPERATING PROCEDURES TO INCLUDE START-UP, BREAK-IN, AND ROUTINE AND NORMAL OPERATING INSTRUCTIONS, REGULATION, CONTROL, STOPPING, SHUTDOWN, AND EMERGENCY INSTRUCTIONS, AND SUMMER AND WINTER OPERATING INSTRUCTIONS.
- d. MAINTENANCE PROCEDURES FOR ROUTINE PREVENTATIVE MAINTENANCE AND TROUBLESHOOTING, DISASSEMBLY, REPAIR, AND REASSEMBLY, ALIGNING AND ADJUSTING INSTRUCTIONS.
- e. SERVICING INSTRUCTIONS AND LUBRICATION CHARTS AND SCHEDULES.
- f. CONDUIT STRAPS, ONE-HOLE OR TWO-HOLE, ZINC PLATED.
- g. SPARE PARTS LIST.
- h. COPIES OF WARRANTIES.
- i. WIRING DIAGRAMS.
- j. RECOMMENDED "TURN AROUND" CYCLES.
- k. INSPECTION PROCEDURES.
- l. APPROVED SHOP DRAWINGS AND PRODUCT DATA.
- m. EQUIPMENT START-UP REPORTS.

L. WARRANTIES

1. ALL EQUIPMENT PROVIDED IN THIS PROJECT SHALL CARRY A MANUFACTURERS WARRANTY FOR NO LESS THAN ONE (1) YEAR FROM DATE OF BENEFICIAL USE, UNLESS NOTED OTHERWISE IN THE CONTRACT DOCUMENTS.

M. MISCELLANEOUS REQUIREMENTS

1. THE CONTRACTOR SHALL COORDINATE ALL INTERRUPTIONS OF SERVICES AND LIMITATIONS OF ACCESS WITH THE OWNER NO LESS THAN (5) DAYS PRIOR TO THE INTERRUPTION.
2. OBTAIN IN OWNERS NAME WRITTEN EQUIPMENT AND MATERIAL WARRANTIES OFFERED IN MANUFACTURERS PUBLISHED PRODUCT DATA WITHOUT EXCLUSION OR LIMITATION.
3. EQUIPMENT MATERIAL OR DEVICES SUBMITTED FOR REVIEW AS AN "EQUIVALENT" SHALL MEET THE FOLLOWING REQUIREMENTS:
- a. THE EQUIVALENT SHALL HAVE THE SAME CONSTRUCTION FEATURES SUCH AS, BUT NOT LIMITED TO:
- i. MATERIAL, THICKNESS, GAUGE, WEIGHT, DENSITY, ETC.
- ii. WEIGHT, RATED, BOLTED, ETC.
- iii. FINISH UNDERCOATING, CORROSION PROTECTION
- b. THE EQUIVALENT SHALL BE OF EQUAL OR BETTER OPERATING EFFICIENCY.
- c. THE EQUIVALENT SHALL BE LOCALLY REPRESENTED BY THE MANUFACTURER FOR SERVICE, PARTS AND TECHNICAL INFORMATION.
- d. THE EQUIVALENT SHALL BEAR THE SAME LABELS OF PERFORMANCE CERTIFICATION AS IS APPLICABLE TO THE SPECIFIED ITEM, SUCH AS UL OR NEMA LABELS OR DLC QUALIFICATIONS.

20.05.00 - COMMON WORK RESULTS FOR ELECTRICAL

A. ELECTRICAL ACCEPTANCE TESTING

1. TESTING SHALL BE PERFORMED ON ELECTRICAL EQUIPMENT AND SYSTEMS TO ASSURE THE EQUIPMENT AND SYSTEM ARE OPERATIONAL AND WITHIN APPLICABLE STANDARDS AND MANUFACTURING TOLERANCES. TESTING SHOULD VERIFY THAT EQUIPMENT AND SYSTEMS ARE INSTALLED IN ACCORDANCE WITH DESIGN SPECIFICATIONS. ALL TESTING SHALL OCCUR AT THE BUILDING SITE.
2. QUALIFIED TECHNICIANS WHO ARE TRAINED AND REGULARLY EMPLOYED FOR TESTING SERVICES SHALL DO ALL THE TESTING.
3. THE TESTING ORGANIZATION SHALL CONFORM TO THE GENERAL GUIDELINES OF SECTION 5 OF THE LATEST NETA ACCEPTANCE TESTING SPECIFICATIONS. THIS INCLUDES THE FOLLOWING:
- a. SAFETY AND PRECAUTIONS.
- b. EXPOSED FINISHED LOCATIONS: PROVIDE SURFACE METAL RACEWAY AND FITTINGS.
- c. TEST INSTRUMENT CALIBRATION.
- d. TEST RECORDS.
4. NOTIFY THE ARCHITECT, ENGINEER AND OWNER AT LEAST SEVEN (7) DAYS IN ADVANCE OF ANY TESTING.
5. INSPECTION AND TESTING OF ALL APPLICABLE ELECTRICAL EQUIPMENT LISTED BELOW SHALL BE DONE IN ACCORDANCE WITH THE LATEST VERSION OF NETA'S:
- a. TRANSFORMERS.
- b. TRANSFORMERS.
- c. LOW VOLTAGE CIRCUIT BREAKERS.

C. ELECTRICAL, POWER CONDUCTORS AND CABLES

1. COORDINATION:
- a. COORDINATE SIZES OF RACEWAYS, BOXES, AND EQUIPMENT ENCLOSURES INSTALLED UNDER OTHER SECTIONS WITH THE ACTUAL CONDUCTORS TO BE INSTALLED, INCLUDING ADJUSTMENTS FOR CONDUCTOR SIZES INCREASED FOR VOLTAGE DROP.
- b. COORDINATE WITH ELECTRICAL EQUIPMENT INSTALLED UNDER OTHER SECTIONS TO PROVIDE TERMINATIONS SUITABLE FOR USE WITH THE CONDUCTORS TO BE INSTALLED.

2. PROVIDE SINGLE CONDUCTOR BUILDING WIRE INSTALLED IN SUITABLE RACEWAY UNLESS OTHERWISE INDICATED, PERMITTED OR REQUIRED.

3. CONDUCTOR SIZES AND AMPACITIES SHOWN ARE BASED ON COPPER.

4. MINIMUM CONDUCTOR SIZES:
- a. BRANCH CIRCUITS: 12 AWG
- b. MAINS: 20 AWG
- c. 20A, 25A, 30A, 35A, 40A, 45A, 50A, 60A, 70A, 75A, 80A, 90A, 100A, 110A, 125A, 150A, 175A, 200A, 225A, 250A, 275A, 300A, 350A, 400A, 450A, 500A, 550A, 600A, 650A, 700A, 750A, 800A, 850A, 900A, 950A, 1000A, 1100A, 1200A, 1300A, 1400A, 1500A, 1600A, 1700A, 1800A, 1900A, 2000A, 2200A, 2400A, 2600A, 2800A, 3000A, 3200A, 3400A, 3600A, 3800A, 4000A, 4200A, 4400A, 4600A, 4800A, 5000A, 5200A, 5400A, 5600A, 5800A, 6000A, 6200A, 6400A, 6600A, 6800A, 7000A, 7200A, 7400A, 7600A, 7800A, 8000A, 8200A, 8400A, 8600A, 8800A, 9000A, 9200A, 9400A, 9600A, 9800A, 10000A, 10200A, 10400A, 10600A, 10800A, 11000A, 11200A, 11400A, 11600A, 11800A, 12000A, 12200A, 12400A, 12600A, 12800A, 13000A, 13200A, 13400A, 13600A, 13800A, 14000A, 14200A, 14400A, 14600A, 14800A, 15000A, 15200A, 15400A, 15600A, 15800A, 16000A, 16200A, 16400A, 16600A, 16800A, 17000A, 17200A, 17400A, 17600A, 17800A, 18000A, 18200A, 18400A, 18600A, 18800A, 19000A, 19200A, 19400A, 19600A, 19800A, 20000A, 20200A, 20400A, 20600A, 20800A, 21000A, 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46200A, 46400A, 46600A, 46800A, 47000A, 47200A, 47400A, 47600A, 47800A, 48000A, 48200A, 48400A, 48600A, 48800A, 49000A, 49200A, 49400A, 49600A, 49800A, 50000A, 50200A, 50400A, 50600A, 50800A, 51000A, 51200A, 51400A, 51600A, 51800A, 52000A, 52200A, 52400A, 52600A, 52800A, 53000A, 53200A, 53400A, 53600A, 53800A, 54000A, 54200A, 54400A, 54600A, 54800A, 55000A, 55200A, 55400A, 55600A, 55800A, 56000A, 56200A, 56400A, 56600A, 56800A, 57000A, 57200A, 57400A, 57600A, 57800A, 58000A, 58200A, 58400A, 58600A, 58800A, 59000A, 59200A, 59400A, 59600A, 59800A, 60000A, 60200A, 60400A, 60600A, 60800A, 61000A, 61200A, 61400A, 61600A, 61800A, 62000A, 62200A, 62400A, 62600A, 62800A, 63000A, 63200A, 63400A, 63600A, 63800A, 64000A, 64200A, 64400A, 64600A, 64800A, 65000A, 65200A, 65400A, 65600A, 65800A, 66000A, 66200A, 66400A, 66600A, 66800A, 67000A, 67200A, 67400A, 67600A, 67800A, 68000A, 68200A, 68400A, 68600A, 68800A, 69000A, 69200A, 69400A, 69600A, 69800A, 70000A, 70200A, 70400A, 70600A, 70800A, 71000A, 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