MECHANICAL ABBREVIATION LIST

ABBREVIATION	DESCRIPTION
A	COMPRESSED AIR
A(___#)	COMPRESSED AIR (SPECIFIC PSIG)
AAV	AUTOMATIC AIR VENT
ACC	AIR COOLED CONDENSER
ACCU	AIR COOLED CONDENSER UNIT
AD	ACCESS DOOR
AD	AREA DRAIN
AE	AIR EXTRACTOR
AFF	ABOVE FINISHED FLOOR
AHR	AIR HANDLING UNIT
AHU	ALTERNATE
ALT	AMPERE
AMP	AIR PRESSURE DROP
APD	ARGON
AR	AMERICAN SOCIETY OF HEATING, REFRIGERATION
ASHRAE	AND AIR-CONDITIONING ENGINEERS
	AUTOMATIC SPRINKLER RISER
ASR	AIR TRANSFER DUCT
ATD	AUXILIARY
AUX	ACID VENT
AV	ACID VENT THROUGH ROOF
AVTR	ACID WASTE
AW	
	BUILDING AUTOMATION SYSTEM
BAS	BLOWER COIL UNIT
BCU	BACK DRAFT DAMPER
BDD	BELOW FINISHED FLOOR
BFF	BACKFLOW PREVENTER
BFP	BRAKE HORSEPOWER
BHP	BOTTOM OF DUCT
BOD	BOTTOM OF PIPE
BOP	BRITISH THERMAL UNIT
BTU	BRITISH THERMAL UNIT PER HOUR
BTUH	BEVERAGE CONDUIT
BVC	BACKWATER VALVE
BWV	
	COMMON
C	CAPACITY
CAP	CONSTANT AIR VOLUME
CAHR	COMPRESSED AIR HOSE REEL
CAV	CATCH BASIN
CB	COOLING COIL
CC	COLD DECK
CD	CONDENSATE DRAIN
CD	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
CFCI	CUBIC FEET PER HOUR
CFH	CUBIC FEET PER MINUTE
CFM	CHILLER
CH	CHILLED WATER
CHW	CHILLED WATER RETURN
CHWR	CHILLED WATER SUPPLY
CHWS	COOLING
CLG	CONDENSATE
CNDS	CONDENSATE (SPECIFIC PSIG)
CNDS (__#)	CLEAN OUT
CO	CARBON DIOXIDE
CO2	CONTINUATION OR CONTINUED
CONT	CONTRACTOR
CONTR	CONVECTOR
CONV	COEFFICIENT OF PERFORMANCE
COP	CLEAN OUT TO GRADE
COTG	CIRCULATING PUMP
CP	CONDENSATE RETURN UNIT
CRU	CLINICAL SERVICE SINK
CSS	COOLING TOWER
CT	CABINET UNIT HEATER
CUH	DOMESTIC COLD WATER
CW	DOMESTIC COLD WATER - FILTERED
CWF	CONDENSER WATER RETURN
CWR	CONDENSER WATER SUPPLY
CWS	
	DRIP AND TRAP
D&T	DISCHARGE AIR
DA	DISCHARGE AIR TEMPERATURE
DAT	DRY BULB
DB	DIRECT DIGITAL CONTROL
DDC	DEGREE
DEG	DRAINAGE FIXTURE UNITS
DFU	DIAMETER
DIA	DAMPER
DMPR	DAY/NIGHT
D/N	DOWN
DN	DOWNSPOUT NOZZLE
DNZ	DUCT SILENCER
DS	DRAIN TILE
DT	DRAIN TILE CONNECTION
DTC	DOMESTIC WATER HEATER
DWH	DRAWING
DWG	
	EXISTING
(E)	EXHAUST GRILLE OR REGISTER
E	EACH
EA	EXHAUST AIR
EA	ENTERING AIR TEMPERATURE
EAT	EXPANSION COMPENSATOR
EC	ELECTRIC CABINET UNIT HEATER
ECUH	ENTERING DRY BULB
EDB	ENERGY EFFICIENCY RATIO
EER	EMERGENCY EYE WASH / SHOWER
EES	EMERGENCY EYE WASH
EEW	EXHAUST FAN
EF	EFFICIENCY
EFF	ELECTRIC HEATING COIL
EHC	EXPANSION JOINT
EJ	ELEVATION
EL	ELECTRICAL
ELEC	ENERGY MANAGEMENT SYSTEM
EMS	ENERGY RECOVERY LOOP
ERL	ENERGY RECOVERY LOOP RETURN
ERLR	ENERGY RECOVERY LOOP SUPPLY
ERLS	ENERGY RECOVERY UNIT
ERU	EMERGENCY SHOWER
ESH	EXTERNAL STATIC PRESSURE
ESP	ELECTRIC UNIT HEATER
EUH	ENTERING WET BULB
EWB	ELECTRIC WATER COOLER
EWC	ENTERING WATER TEMPERATURE
EWT	EXHAUST
EXH	
	FIRE PROTECTION
F	DEGREES FAHRENHEIT
°F	FACE AND BYPASS
F&B	FLOAT AND THERMOSTATIC
F&T	FACE AREA
FA	FAN COIL UNIT
FCU	

ABBREVIATION	DESCRIPTION
FD	FLOOR DRAIN
FFD	FUNNEL FLOOR DRAIN
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FHR	FIRE HOSE RACK
FHV	FIRE HOSE VALVE
FLA	FULL LOAD AMPS
FLR	FLOOR
FM	FLOW METER
FMS	FLOW MEASURING STATION
FPM	FEET PER MINUTE
FP	FIRE PUMP
FPTU	FAN POWERED (AIR) TERMINAL UNIT
FS	FLOOR SINK
FSEC	FOOD SERVICE EQUIPMENT CONTRACTOR
FT	FEET
FTR	FINNED TUBE RADIATION
FV	FACE VELOCITY
G	NATURAL GAS
GA	GAUGE
GAL	GALLON
GRH	GRAVITY RELIEF HOOD
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GSAN	GREASE SANITARY WASTE
H	HYDROGEN
HB	HOSE BIBB
HC	HEATING COIL
HD	HOT DECK
HEPA	HIGH EFFICIENCY PARTICULATE ARRESTANCE
HL	HIGH LIMIT
HOA	HAND/OFF/AUTO
HP	HEAT PUMP
HP	HORSEPOWER
HPCW	HIGH PRESSURE DOMESTIC COLD WATER
HPHW	HIGH PRESSURE DOMESTIC HOT WATER
HPHWR	HIGH PRESSURE DOMESTIC HOT WATER RETURN
HPL	HEAT PUMP LOOP
HPLR	HEAT PUMP LOOP RETURN
HPLS	HEAT PUMP LOOP SUPPLY
HR	HOUR
HS	HOSE STATION
HTG	HEATING
HV	HEATING VENTILATING
HVAC	HEATING, VENTILATING, AIR CONDITIONING
HWH	HOT WATER HEATING
HWHR	HOT WATER HEATING RETURN
HWHS	HOT WATER HEATING SUPPLY
HW	DOMESTIC HOT WATER
HW(__)	DOMESTIC HOT WATER (SPECIFIC TEMP °F)
HWR	DOMESTIC HOT WATER RETURN
HX	HEAT EXCHANGER
HZ	HERTZ
IAQ	INDOOR AIR QUALITY
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IH	INTAKE HOOD
IN	INCHES
IR	INFRARED HEATER
IW	INDIRECT WASTE
JC	JANITOR'S CLOSET
JP	JOCKEY PUMP
KA	THOUSAND AMP
KW	KILOWATT
KWH	KILOWATT-HOUR
LAT	LEAVING AIR TEMPERATURE
LAB	LABORATORY
LAV	LAVATORY
LBS	POUNDS
LDB	LEAVING DRY BULB
LL	LOW LIMIT
LPC	LOW PRESSURE CONDENSATE
LPG	LIQUIFIED PETROLEUM GAS (PROPANE)
LPS	LOW PRESSURE STEAM
LRA	LOCKED ROTOR AMPS
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MA	MIXED AIR
MAT	MIXED AIR TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MBH	THOUSAND BRITISH THERMAL UNITS PER HOUR
MCA	MEDICAL COMPRESSED AIR
MCA	MINIMUM CIRCUIT AMPACITY
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MEZZ	MEZZANINE
MFR	MANUFACTURER
MH	MANHOLE
MIL	1/1000th INCH
MIN	MINIMUM
MISC	MISCELLANEOUS
MMBH	MILLION BRITISH THERMAL UNITS PER HOUR
MOP	MAXIMUM OVERCURRENT PROTECTION
M/S	MOTOR STARTER
MTD	MOUNTED
MTR	MOTOR
MV	MANUAL AIR VENT
MVAC	MEDICAL VACUUM
N	NITROGEN
N2O	NITROUS OXIDE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NCTC	NORMALLY CLOSED TIMED CLOSED
NCTO	NORMALLY CLOSED TIMED OPEN
NFPA	NATIONAL FIRE PROTECTION AGENCY
NOTC	NORMALLY OPEN TIMED CLOSED
NOTO	NORMALLY OPEN TIMED OPEN
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NOM	NOMINAL
NPCW	NON POTABLE COLD WATER

ABBREVIATION	DESCRIPTION
O	OXYGEN
OA	OUTSIDE AIR
OAT	OUTSIDE AIR TEMPERATURE
OB	OUTLET BOX
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER/CENTER TO CENTER
OD	OUTSIDE DIAMETER
OED	OPEN ENDED DUCT
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
OL	OVERLOAD
ORC	OVERFLOW RAIN CONDUCTOR
ORD	OVERFLOW ROOF DRAIN
OSAN	OIL SANITARY WASTE
OS&Y	OUTSIDE SCREW AND YOKE
OV	OUTLET VELOCITY
OWS	OPERATOR WORKSTATION
PACU	PACKAGED AIR CONDITIONING UNIT
PBD	PARALLEL BLADE DAMPER
PC	PUMPED CONDENSATE
PCW	PROCESS COOLING WATER
PCWR	PROCESS COOLING WATER RETURN
PCWS	PROCESS COOLING WATER SUPPLY
PD	PRESSURE DROP (FEET OF WATER)
PH	PERIMETER HEAT
PHR	PERIMETER HEAT RETURN
PHS	PERIMETER HEAT SUPPLY
PNL	PANEL
PPM	PARTS PER MILLION
PRESS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PSAN	PUMPED SANITARY
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH - ABSOLUTE
PSIG	POUNDS PER SQUARE INCH - GAUGE
PST	PUMPED STORM
PW	PURIFIED WATER
PWR	PURIFIED WATER RETURN
PWS	PURIFIED WATER SUPPLY
(R)	RELOCATED
R	RETURN GRILLE OR REGISTER
RA	RETURN AIR
RAT	RETURN AIR TEMPERATURE
RC	RAIN CONDUCTOR
RCP	RADIANT CEILING PANEL
RD	ROOF DRAIN
REQD	REQUIRED
REF	ROOF EXHAUST FAN
RF	RETURN FAN
RH	RELATIVE HUMIDITY
RL	REFRIGERANT LIQUID
RLFA	RELIEF AIR
RPM	REVOLUTIONS PER MINUTE
RPDA	REDUCED PRESSURE BACKFLOW DETECTION ASSY
RPZA	REDUCED PRESSURE BACKFLOW ZONE ASSY
RS	REFRIGERANT SUCTION
RTU	ROOFTOP UNIT
S	SUPPLY AIR DIFFUSER OR GRILLE
SA	SOUND ATTENUATOR
SA	SUPPLY AIR
SAN	SANITARY WASTE
SAT	SUPPLY AIR TEMPERATURE
SCCR	SHORT CIRCUIT CURRENT RATING
SECT	SECTION
SF	SUPPLY FAN
SH	SHOWER
SK	SINK
SMR	SNOW MELT RETURN
SMS	SNOW MELT SUPPLY
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SPKLR	SPRINKLER
SQFT	SQUARE FOOT/SQUARE FEET
S/S	START/STOP
SS	SERVICE SINK
ST	STORM
STD	STANDARD
STK	STACK
STM	STEAM
STM(__#)	STEAM (SPECIFIC PSIG)
S/W	SUMMER/WINTER
SW	SWITCH
T	TRANSFER GRILLE
TC	TEMPERATURE CONTROL
TC	TEMPERING COIL
TCP	TEMPERATURE CONTROL PANEL
TD	TRENCH DRAIN
TEMP	TEMPERATURE
TEMP	TEMPORATURE
TH	TERMINAL HEATING
THA	TOTAL HEAT ABSORBED
THR	TERMINAL HEATING RETURN
THR	TOTAL HEAT REJECTED
THS	TERMINAL HEATING SUPPLY
TMR	TIMER SWITCH
TPD	TEPID WATER
TSP	TOTAL STATIC PRESSURE
TU	(AIR) TERMINAL UNIT
TV	TURNING VANES
TW	TEMPERED WATER
TYP	TYPICAL
UH	UNIT HEATER
UL	UNDERWRITER'S LABORATORY
UON	UNLESS OTHERWISE NOTED
UR	URINAL
UV	UNIT VENTILATOR
V	VALVE
V	VENT
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VB	VACUUM BREAKER
VD	VOLUME DAMPER (MANUALLY ADJUSTABLE)
VOL	VOLUME
VFC	VARIABLE FREQUENCY CONTROLLER
VTR	VENT THROUGH ROOF
VTU	VENTURI TERMINAL UNIT
VUV	VERTICAL UNIT VENTILATOR
W	WASTE
W&V	WASTE AND VENT
WAGD	WASTE ANESTHETIC GAS DISPOSAL
WB	WET BULB
WC	WATER CLOSET
WC	WATER COLUMN
WG	WATER GAUGE
WH	WALL HYDRANT
WMSD	WASHING MACHINE SUPPLY AND DRAIN BOX
WPD	WATER PRESSURE DROP
WT	WEIGHT
XFMR	TRANSFORMER
ZVB	ZONE VALVE BOX

TEMPERATURE CONTROL - PARTIAL SYMBOLS LIST

SYMBOL	DESCRIPTION
CO2	CARBON DIOXIDE SENSOR
CO	CARBON MONOXIDE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
FM	FLOW METER
	GUARD FOR STAT OR SENSOR
H	HUMIDISTAT OR HUMIDITY SENSOR (AS DEFINED ON TC DRAWINGS)

SYMBOL	DESCRIPTION
OS	OCCUPANCY SENSOR
PT	PRESSURE TRANSMITTER
SP	STATIC PRESSURE SENSOR OR PROBE
	VALVE - 2 WAY CONTROL VALVE
	VALVE - 3 WAY CONTROL VALVE
T	THERMOSTAT OR TEMPERATURE SENSOR (AS DEFINED ON TC DRAWINGS)

NOTE: LIST OF ADDITIONAL SYMBOLS & ABBREVIATIONS ASSOCIATED WITH TEMPERATURE CONTROLS ARE IDENTIFIED ON TC DRAWINGS.

MECHANICAL SYMBOL LIST

PIPING SYMBOLS

SYMBOL	DESCRIPTION
AV	AIR VENT - AUTOMATIC
MV	AIR VENT - MANUAL
BFP	BACKFLOW PREVENTER
	CATCH BASIN
	CIRCULATING PUMP
CO	CLEAN OUT - IN FLOOR
CO	CLEAN OUT - FLANGE
	DIRECTION OF FLOW
	DIRECTION OF PITCH - DOWN
	FINNED TUBE RADIATION
	FIRE PROTECTION - SIAMESE CONNECTION - FREE STANDING
	FIRE PROTECTION - SIAMESE CONNECTION - WALL MOUNTED
	FIRE PROTECTION - SPRINKLER HEAD, CONCEALED
	FIRE PROTECTION - SPRINKLER HEAD, PENDANT
	FIRE PROTECTION - SPRINKLER HEAD, UPRIGHT
	FIRE PROTECTION - SPRINKLER HEAD, SIDEWALL
	FLOOR DRAIN
	FLOOR DRAIN - ELEVATION
	FLOOR DRAIN - FUNNEL
	FLOOR DRAIN - FUNNEL, ELEVATION
	FLOW MEASURING DEVICE (FOR TEST AND BALANCING)
FS	FLOW SWITCH
FM	FLOW METER
HB	HOSE BIBB
MH	MANHOLE
	OPEN SITE DRAIN
	PIPE - ANCHOR
	PIPE - CAP OR PLUG
	PIPE - ELBOW DOWN
	PIPE - ELBOW UP
	PIPE - EXPANSION JOINT OR COMPENSATOR
	PIPE - FLANGE
	PIPE - HOSE AND BRAID FLEXIBLE CONNECTION
	PIPE - RUBBER FLEXIBLE CONNECTION
	PIPE - GUIDE
	PIPE - TEE DOWN
	PIPE - TEE UP
	PIPE - UNION
P/T	PRESSURE AND TEMPERATURE TEST PLUG
	PRESSURE GAUGE AND COCK
	REDUCER - CONCENTRIC
	REDUCER - ECCENTRIC
	ROOF/OVERFLOW DRAIN
	STEAM TRAP - FLOAT AND THERMOSTATIC
	STRAINER
	STRAINER WITH VALVE AND BLOW-OFF
	THERMOMETER
	TRAP
	VALVE - ANGLE
	VALVE - BALL
0.5	VALVE - BALANCE (i.e. BALANCE VALVE TO 0.5 GPM)
0.5	VALVE - COMBINATION BALANCE & FLOW MEASURING (i.e. BALANCE VALVE TO 0.5 GPM)
	VALVE - BUTTERFLY
	VALVE - CHECK
	VALVE - SPRING CHECK
	VALVE - GAS (MANUAL)
	VALVE - GLOBE
	VALVE - ISOLATION
	VALVE - NEEDLE
	VALVE - OS&Y
	VALVE - PLUG
	VALVE - PRESSURE REGULATING
	VALVE - PRESSURE REDUCING
	VALVE - PRESSURE RELIEF
	VALVE - PRESSURE & TEMPERATURE RELIEF
VTR	VENT THROUGH ROOF
WH	WALL HYDRANT

DUCTWORK SYMBOLS

SYMBOL	DESCRIPTION
TU-101	AIR TERMINAL UNIT
TU-101	AIR TERMINAL UNIT WITH HEATING COIL
VTU-101	VENTURI AIR TERMINAL UNIT
VTU-101	VENTURI AIR TERMINAL UNIT WITH HEATING COIL
	DAMPER - HORIZONTAL FIRE (EXISTING, NEW)
	DAMPER - HORIZONTAL FIRE / SMOKE (EXISTING, NEW)
	DAMPER - SMOKE (EXISTING, NEW)
	DAMPER - VERTICAL FIRE (EXISTING, NEW)
	DAMPER - VERTICAL FIRE / SMOKE (EXISTING, NEW)
BDD	DAMPER - BACK DRAFT
M	DAMPER - MOTORIZED
	DAMPER - VOLUME (MANUALLY ADJUSTABLE)
	DIFFUSER - BLANK OFF
	DIFFUSER - LINEAR SLOT
	DIFFUSER - SQUARE OR RECTANGULAR
	DUCT CROSS SECTION - SUPPLY
	DUCT CROSS SECTION - RETURN
	DUCT CROSS SECTION - EXHAUST
	DUCT - FLEXIBLE CONNECTION
	DUCT - FLEXIBLE DUCT
	DUCT TAKE-OFF - ROUND CONICAL
	DUCT TAKE-OFF - RECTANGULAR WITH SHOE TAP
	ELBOW - RECTANGULAR WITH TURNING VANES
	ELBOW - RECTANGULAR/ ROUND SMOOTH RADIUS
	ELBOW DOWN - RECTANGULAR
	ELBOW DOWN - ROUND
	ELBOW UP - RECTANGULAR
	ELBOW UP - ROUND
	FAN - AXIAL
	FAN - CENTRIFUGAL (ELEVATION)
	HEATING COIL
D	INCLINED DROP IN DIRECTION OF AIRFLOW
R	INCLINED RISE IN DIRECTION OF AIRFLOW
	INTAKE OR RELIEF HOOD
	REGISTER - RETURN OR EXHAUST
	REGISTER - RETURN WITH BOOT
	REGISTER - TRANSFER GRILLE
	ROOF EXHAUST FAN
	TRANSITION - CONCENTRIC
	TRANSITION - ECCENTRIC
	UNIT HEATER - HORIZONTAL THROW
	UNIT HEATER - VERTICAL THROW

DOUBLE LINE PIPING SYMBOLS

SYMBOL	DESCRIPTION
	VALVE - 2 WAY CONTROL
	VALVE - 3 WAY CONTROL
	VALVE - BUTTERFLY
H	VALVE - CHECK
	VALVE - DETECTOR CHECK
	VALVE - OS&Y HORIZONTAL STEM
	VALVE - OS&Y VERTICAL STEM

DOUBLE LINE PIPING SYMBOLS

SYMBOL	DESCRIPTION
	FLANGE
	FLEX CONNECTION
	STRAINER - BASKET
	STRAINER - Y TYPE

DOUBLE LINE DUCTWORK SYMBOLS

SYMBOL	DESCRIPTION
	ELBOW - RECTANGULAR SHORT RADIUS WITH SPLITTER VANES
	ELBOW - ROUND
	ELBOW - RECTANGULAR SMOOTH RADIUS

DOUBLE LINE DUCTWORK SYMBOLS

SYMBOL	DESCRIPTION
	DUCT TAKE-OFF - RECTANGULAR WITH SHOE TAP
	DUCT TAKE-OFF - ROUND CONICAL
	ELBOW - RECTANGULAR WITH TURNING VANES
	ELBOW DOWN - RECTANGULAR
	ELBOW DOWN - ROUND
	ELBOW UP - RECTANGULAR
	ELBOW UP - ROUND
	HEATING COIL
D	INCLINED DROP IN DIRECTION OF AIRFLOW
R	INCLINED RISE IN DIRECTION OF AIRFLOW
	TRANSITION - CONCENTRIC
	TRANSITION -ECCENTRIC

MECHANICAL DRAWING INDEX

STANDARD METHODS OF NOTATION

S-1 10ø 350-4	SUPPLY DIFFUSER WITH SCHEDULE TAG "1", 10" DIAMETER NECK SIZE 350 CFM TYPICAL FOR 4
R-1 22x22 640-2	RETURN REGISTER WITH SCHEDULE TAG "1", 22"x 22" NECK SIZE 640 CFM TYPICAL FOR 2 EXHAUST REGISTER E DESIGNATION SIMILAR.
TU-101	AIR TERMINAL UNIT WITH HEATING COIL NO. 101 WITH SERVICE CLEARANCE SHOWN
VTU-101	VENTURI AIR TERMINAL WITH HEATING COIL NO. 101 WITH SERVICE CLEARANCE SHOWN
(2)WC-1	PLUMBING FIXTURE UNIT IDENTIFICATION TAG WATER CLOSET TYPE "1" TYPICAL FOR 2
8	PIPE DIAMETER NOTATION ALL SIZES IN INCHES
8ø 22x10 18x14ø	DUCT SIZE NOTATION ALL SIZES IN INCHES OVAL DUCT RECTANGULAR DUCT
1	CONSTRUCTION KEY NOTE (NUMBER) OR DEMOLITION KEY NOTE (LETTER)
EF 1	EQUIPMENT DESIGNATION, (i.e. EXHAUST FAN NUMBER 1)
HW-1	PIPING RISER DESIGNATION, (i.e. HOT WATER RISER NUMBER 1)
	NEW SYSTEM COMPONENT EXISTING SYSTEM COMPONENT TO REMAIN POINT OF NEW CONNECTION SYMBOL
1 M5.1	SECTION OR PLAN NUMBER SHEET WHERE SECTION IS DRAWN
1 M5.1	AREA OF ENLARGEMENT PLAN NUMBER SHEET WHERE ENLARGED PLAN IS DRAWN
1 M5.1	SECTION OR PLAN NUMBER SECTION OR ENLARGED PLAN SCALE: 1/8" = 1' - 0" SHEET WHERE SECTION IS CUT OR ENLARGED PLAN IS REFERENCED
SHEET M1.0 SHEET M1.1	MATCHLINE
	HEAVY LINE WEIGHT INDICATES NEW WORK
	LIGHT LINE WEIGHT INDICATES EXISTING EQUIPMENT OR REFERENCED INFORMATION
	GRAY LINE INDICATES BACKGROUND INFORMATION
	DASHED LINES INDICATE PIPING ROUTED BELOW SLAB OR GRADE
	HATCH MARKS INDICATE EQUIPMENT OR MATERIALS TO BE DISCONNECTED AND REMOVED.

NOTE: SOME SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT.

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Project Number	21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: ACF Checked: ACF

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MECHANICAL STANDARDS AND DRAWING INDEX

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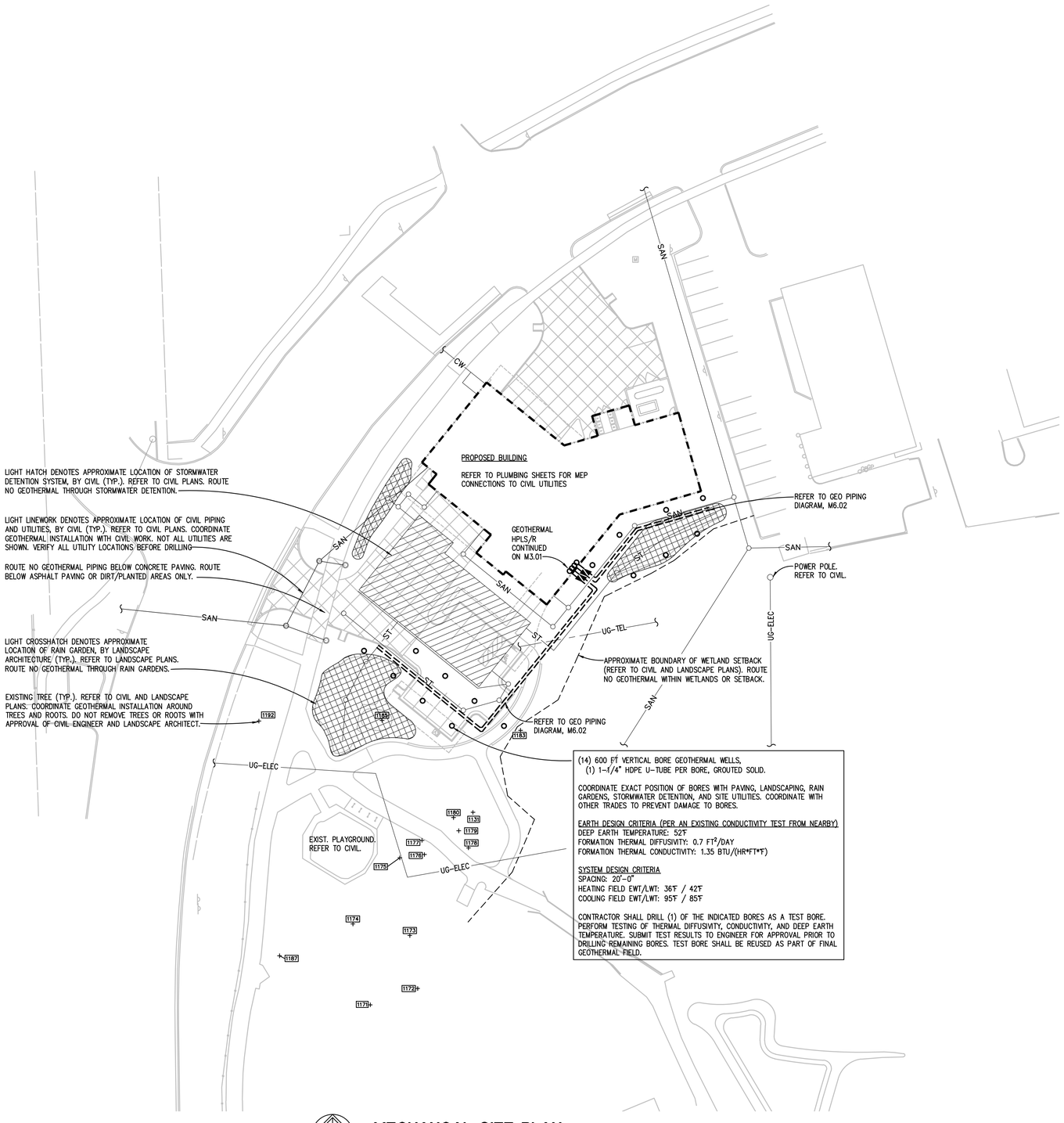
COLLABORATIVE ARCHITECTURE

Sheet
M0.01

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



(14) 600 FT VERTICAL BORE GEOTHERMAL WELLS,
(1) 1-1/4" HDPE U-TUBE PER BORE, GROUTED SOLID.

COORDINATE EXACT POSITION OF BORES WITH PAVING, LANDSCAPING, RAIN GARDENS, STORMWATER DETENTION, AND SITE UTILITIES. COORDINATE WITH OTHER TRADES TO PREVENT DAMAGE TO BORES.

EARTH DESIGN CRITERIA (PER AN EXISTING CONDUCTIVITY TEST FROM NEARBY)
DEEP EARTH TEMPERATURE: 52°F
FORMATION THERMAL DIFFUSIVITY: 0.7 FT^2/DAY
FORMATION THERMAL CONDUCTIVITY: 1.35 BTU/(HR*FT*°F)

SYSTEM DESIGN CRITERIA
SPACING: 20'-0"
HEATING FIELD EWT/LWT: 36°F / 42°F
COOLING FIELD EWT/LWT: 95°F / 85°F

CONTRACTOR SHALL DRILL (1) OF THE INDICATED BORES AS A TEST BORE. PERFORM TESTING OF THERMAL DIFFUSIVITY, CONDUCTIVITY, AND DEEP EARTH TEMPERATURE. SUBMIT TEST RESULTS TO ENGINEER FOR APPROVAL PRIOR TO DRILLING REMAINING BORES. TEST BORE SHALL BE REUSED AS PART OF FINAL GEOTHERMAL FIELD.

MECHANCAL SITE PLAN
SCALE: 1" = 30'

Know what's **below.**
Call before you dig.

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MECHANCAL SITE PLAN

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Sheet M0.02

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"

PROJECT TRUE

FIRST LEVEL HVAC PIPING PLAN

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

HVAC PIPING GENERAL NOTES:

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5 PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.

6 SUBMIT PROPOSED METHODS OF ANCHORING AND GUIDING PIPING SYSTEMS TO STRUCTURAL ENGINEER FOR APPROVAL.

7 COORDINATE LOCATION OF DUCT-MOUNTED HYDRONIC DEVICES WITH SHEET METAL TRADES.

8 BRANCH PIPING SERVING TERMINAL UNIT HEATING COILS OR RADIANT CEILING PANELS SHALL BE 3/4" UNLESS OTHERWISE NOTED. BRANCH PIPING SERVING MORE THAN ONE TERMINAL UNIT HEATING COIL SHALL BE 1" UNLESS OTHERWISE NOTED. BRANCH PIPING SERVING HOT WATER UNIT HEATERS AND CABINET UNIT HEATERS SHALL BE 1" UNLESS OTHERWISE NOTED.

9 REFER TO TEMPERATURE CONTROLS STANDARD MOUNTING HEIGHTS DETAIL FOR ELEVATIONS OF WALL MOUNTED TEMPERATURE CONTROL DEVICES.

CONSTRUCTION KEY NOTES:

1 TSTAT TO LOCAL VAV DIFFUSER.

2 ISOLATION VALVES BEHIND ARCHTECTURAL ACCESS PANEL. REFER TO RISER ON SHEET M6.01.

TCA
ARCHITECTURE + PLANNING + DESIGN

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PBA Project No.: 2021.0121

STATE OF MICHIGAN
AARON CHRISTOPHER FRANTZ
ENGINEER
No. 6201068182
PROFESSIONAL ENGINEER

Project Number	21018

Issue	Date
SCHEMATIC DESIGN	03/04/22
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: ACF Checked: ACF

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

FIRST LEVEL HVAC PIPING PLAN

A3C COLLABORATIVE ARCHITECTURE
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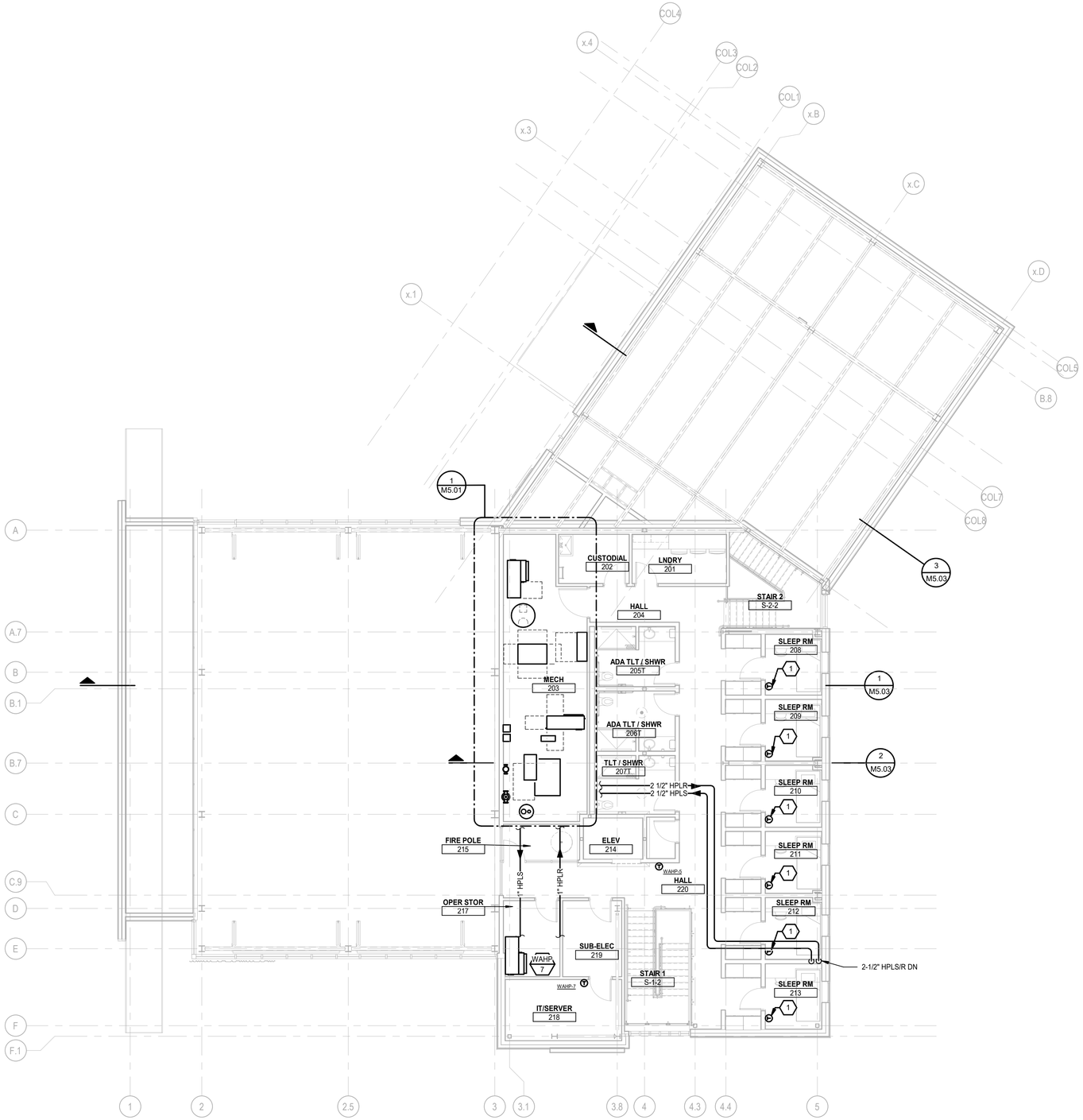
THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



PROJECT TRUE

SECOND LEVEL HVAC PIPING PLAN

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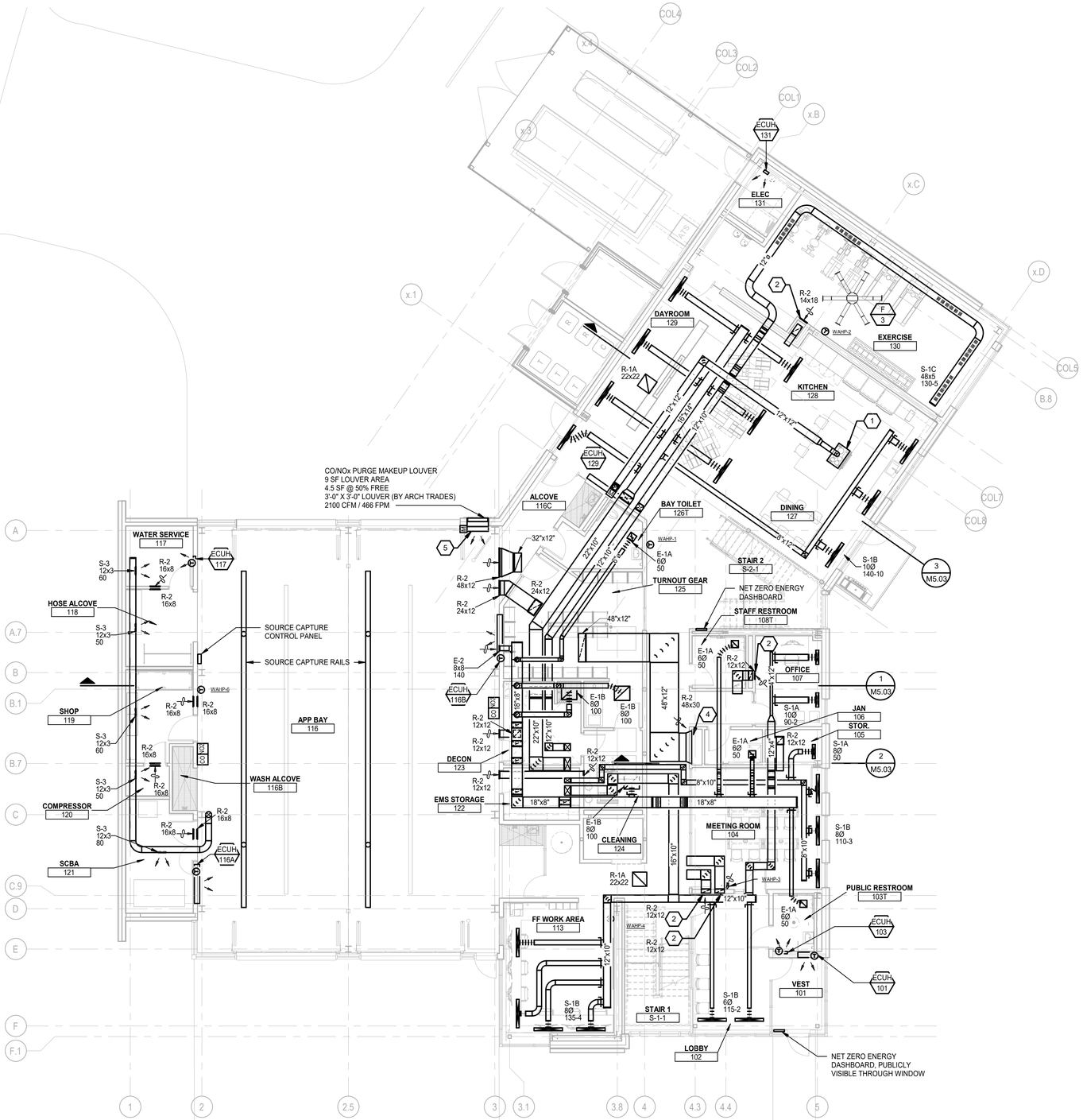

FIRST LEVEL SHEET METAL PLAN

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

PROJECT TRUE

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CONSTRUCTION KEY NOTES:

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2 BOTTOM OF RETURN GRILLE 1'-0" AFF UON. TOPOF ARCHITECTURAL RETURN PLENUM OPEN TO CEILING PLENUM UON.

3 AIM NOZZLE DIFFUSER AT BASE OF OPPOSITE WALL. REFER TO SECTION.

4 BOTTOM OF RETURN GRILLE 1'-0" AFF UON. CONNECT RETURN AIR DUCT TO ARCHITECTURAL RETURN AIR TRANSFER PLENUM (REFER TO ARCHITECTURAL).

5 COVER OPENING WITH 1/2" WIRE MESH.

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STATE OF MICHIGAN · AARON CHRISTOPHER FRANTZ · ENGINEER · No. 6201068185 · REGISTERED PROFESSIONAL ENGINEER

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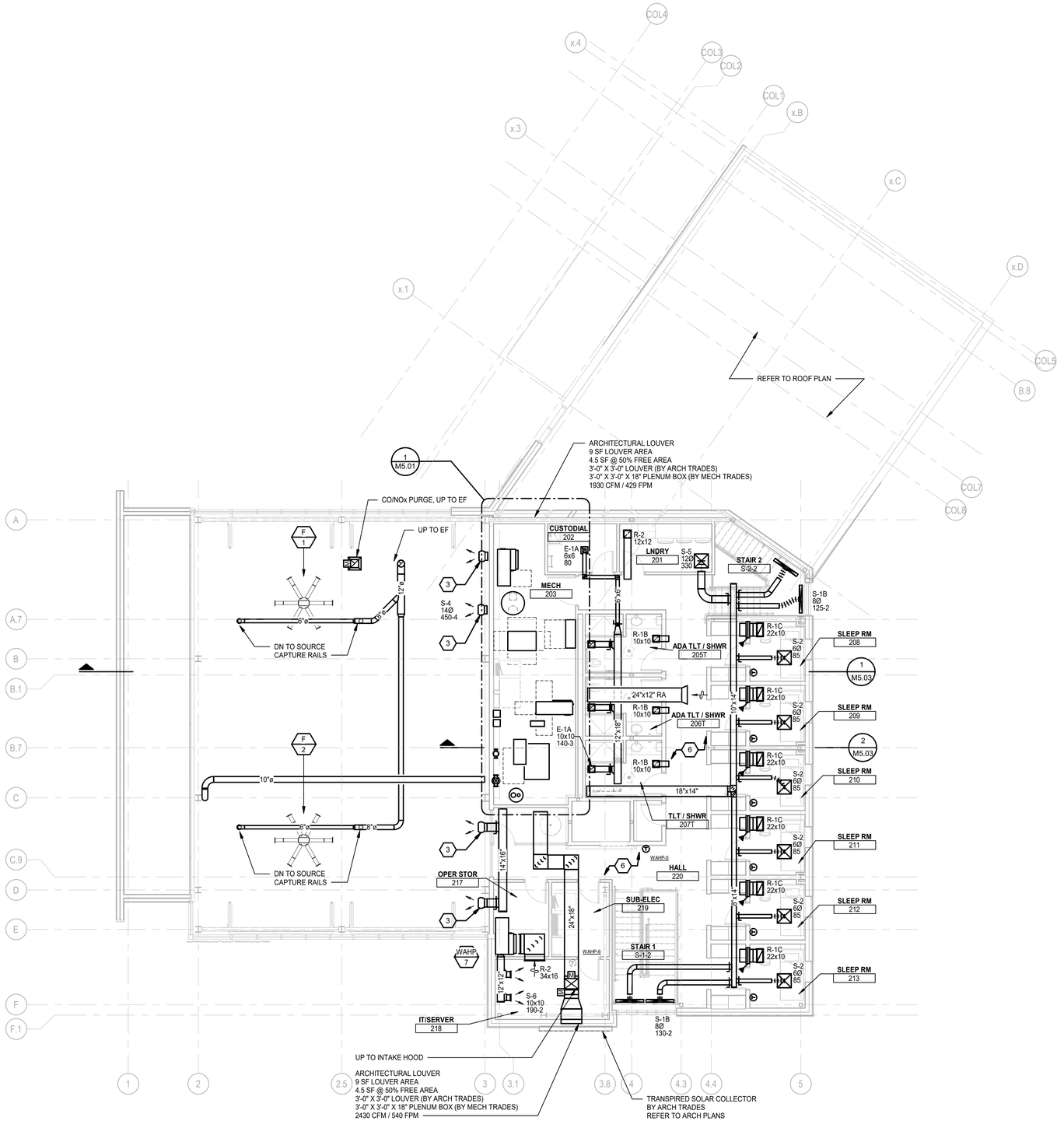

SECOND LEVEL SHEET METAL PLAN

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PROJECT TRUE

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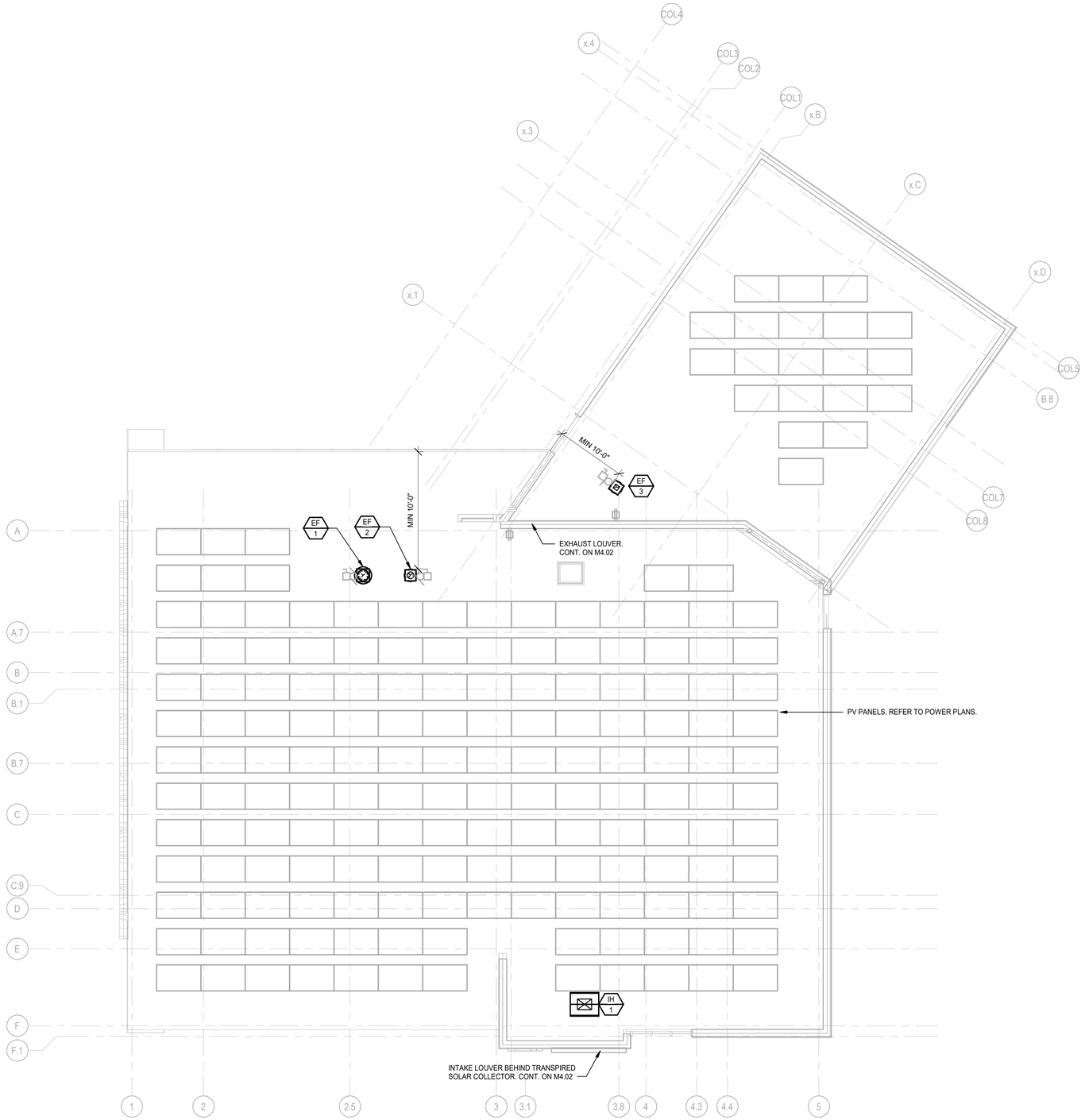

PROJECT TRUE

ROOF SHEET METAL PLAN
SCALE: 1/8" = 1'-0"

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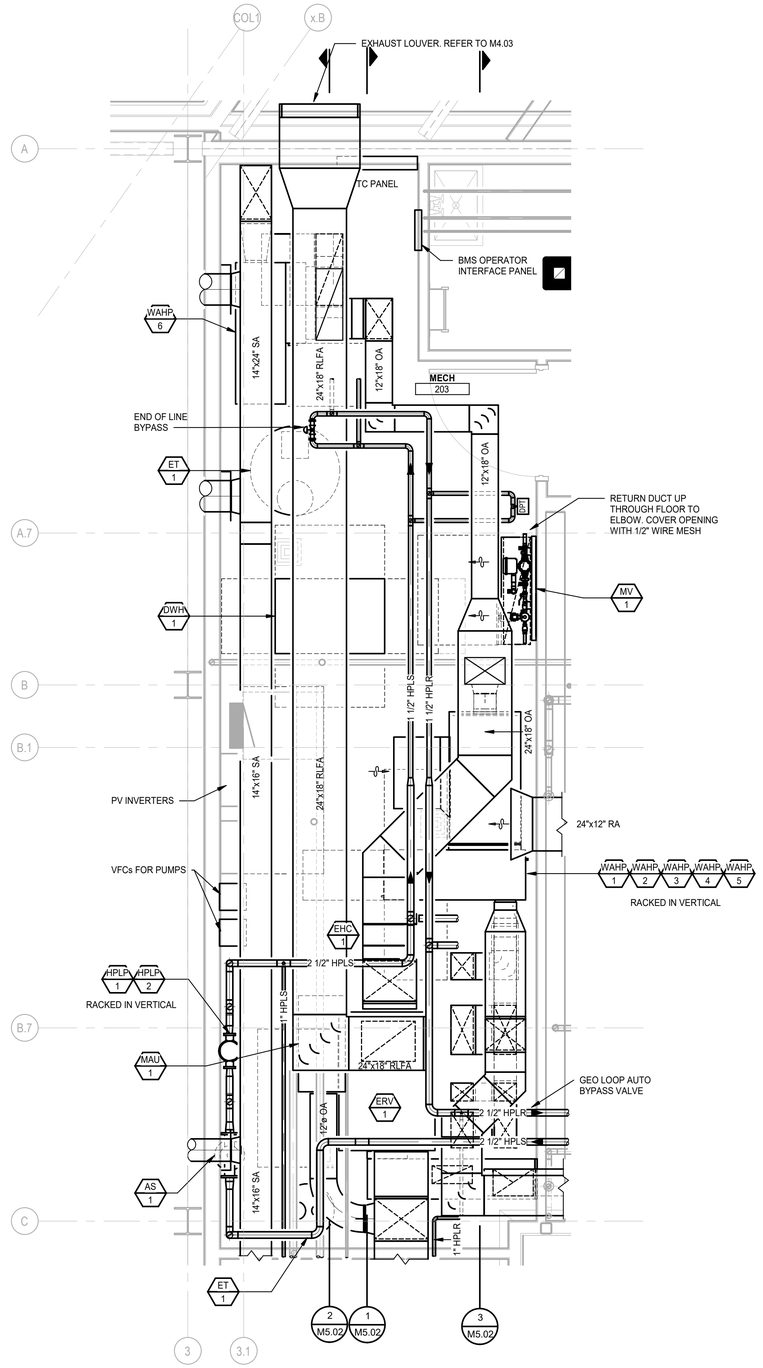

1 / M3.02 **ENLARGED MECHANICAL PLAN**
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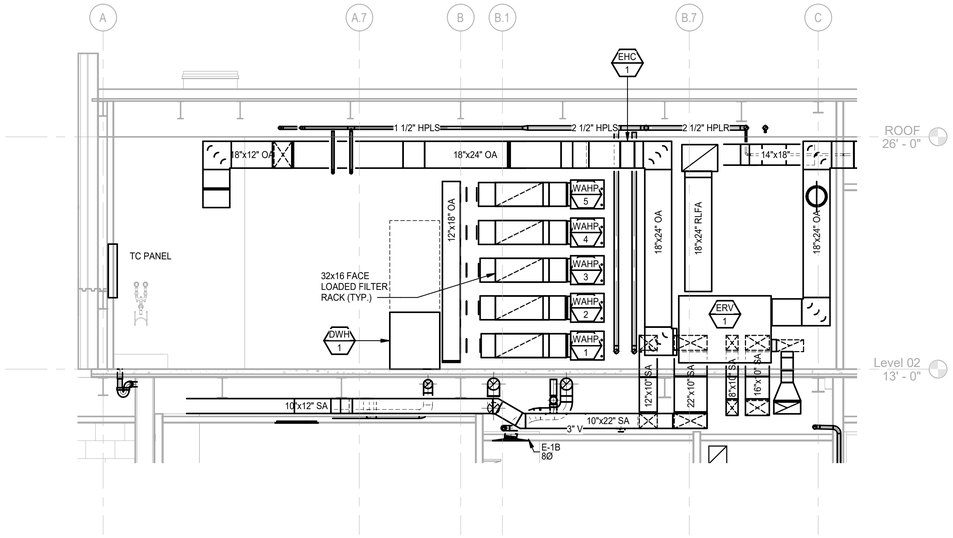
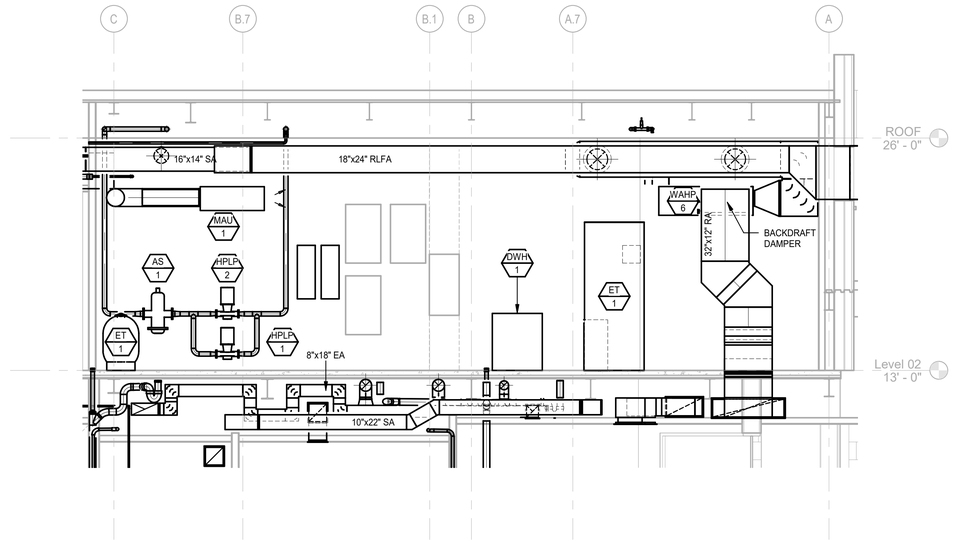
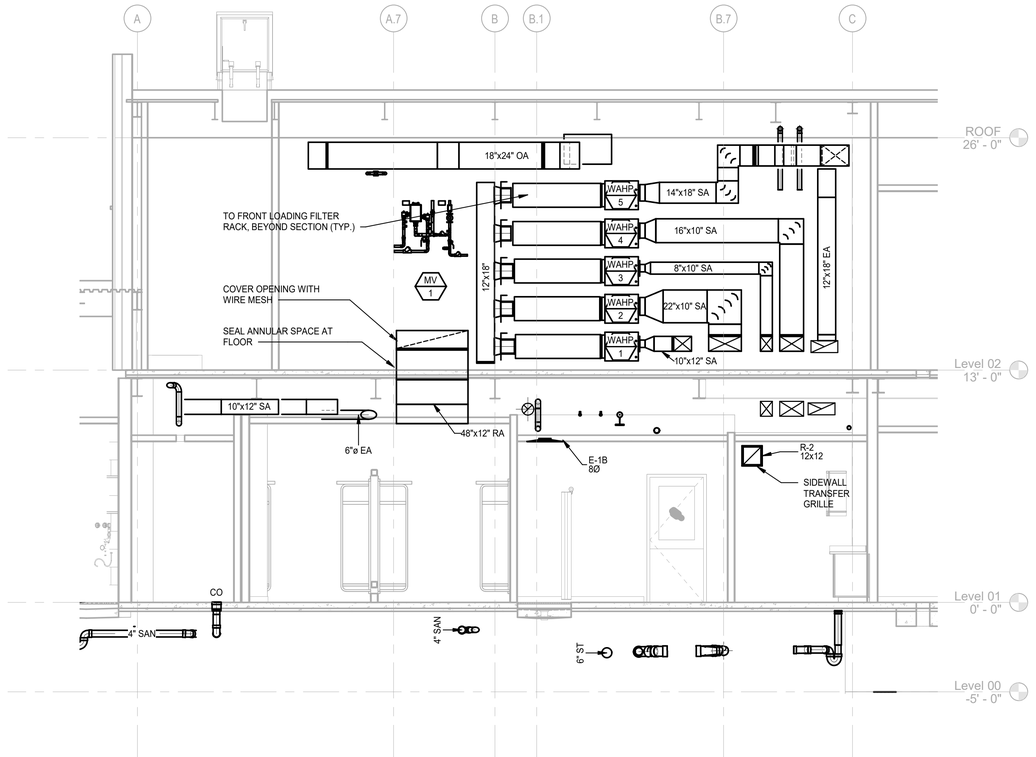


1 M5.01 **MECHANICAL ROOM SECTION - WEST**
SCALE: 1/4" = 1'-0"



2 M5.01 **MECHANICAL ROOM SECTION - EAST**
SCALE: 1/4" = 1'-0"



3 M5.01 **MECHANICAL ROOM SECTION - EAST 2**
SCALE: 1/4" = 1'-0"

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PBA Project No: 2021.0121

STATE OF MICHIGAN
AARON CHRISTOPHER FRANTZ
ENGINEER
No. 6201068182
LICENSED PROFESSIONAL ENGINEER

Project Number	21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: ACF Checked: ACF

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

MECHANICAL SECTIONS

A3C COLLABORATIVE ARCHITECTURE
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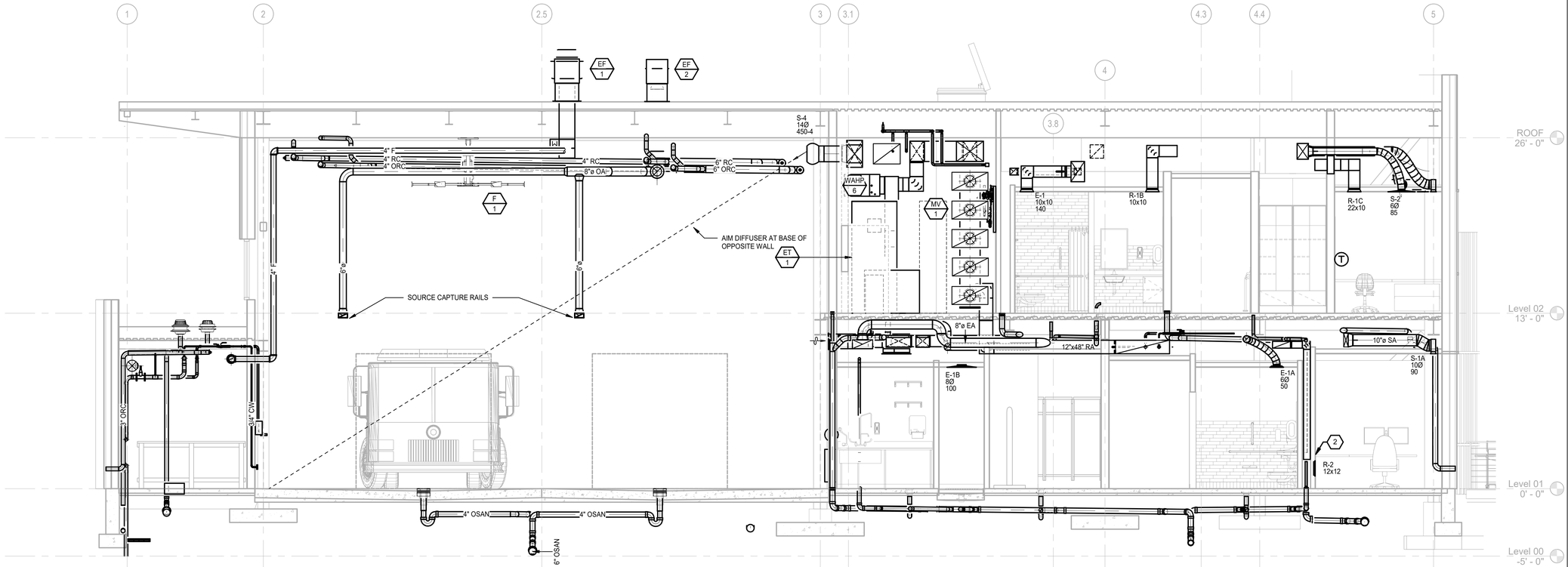
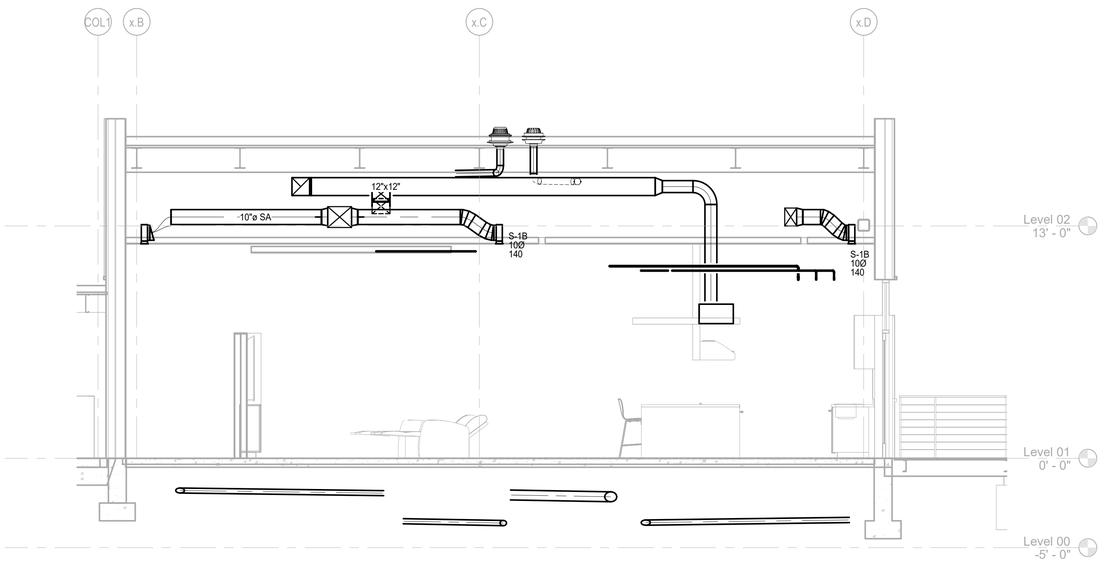
Sheet M5.02

10/11/2024 11:45:27 AM BIM 360://20-43 Ann Arbor FS4/2021-0121-AAFS4-MEP-V21.rvt

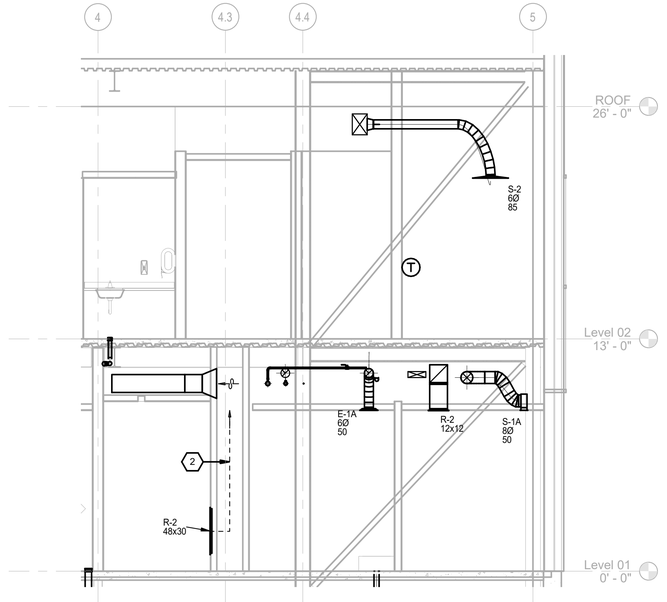
THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



1 M3.01 **APP BAY MECHANICAL SECTION - NORTH**
SCALE: 1/4" = 1'-0"



3 M3.02 **DAYROOM MECHANICAL SECTION - EAST**
SCALE: 1/4" = 1'-0"



2 M3.01 **CORRIDOR MECHANICAL SECTION - NORTH**
SCALE: 1/4" = 1'-0"

10/11/2024 11:45:31 AM BIM 360://20-43 Ann Arbor FS4/2021-0121-AAFS4-MEP-V21.rvt

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MECHANICAL SECTIONS

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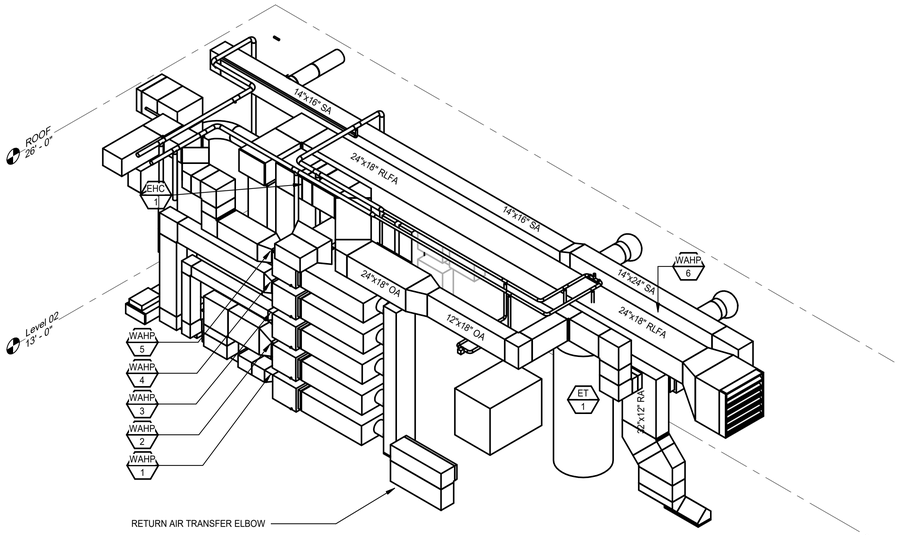
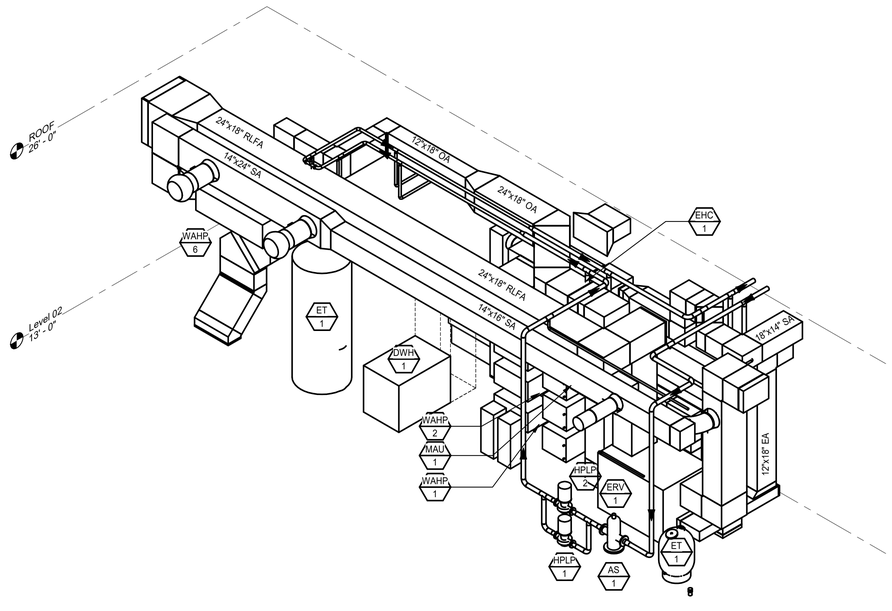
Sheet M5.03

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



MECH ROOM ISO 1



MECH ROOM ISO 2

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MECHANICAL ISOMETRIC VIEWS

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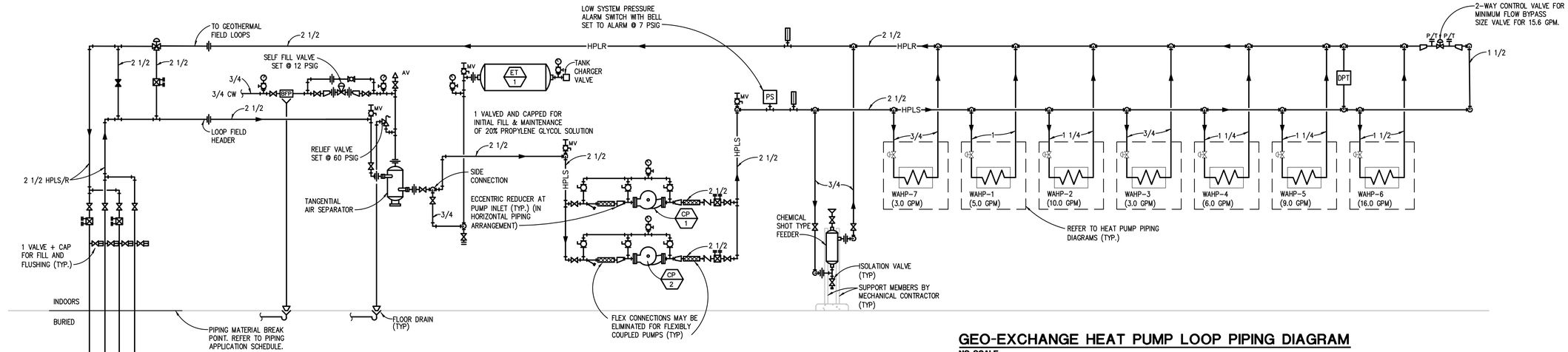
Sheet
M5.51

10/11/2024 11:45:32 AM BIM 360://20-43 Ann Arbor FS4/2021-0121-AAFS4-MEP-V21.rvt

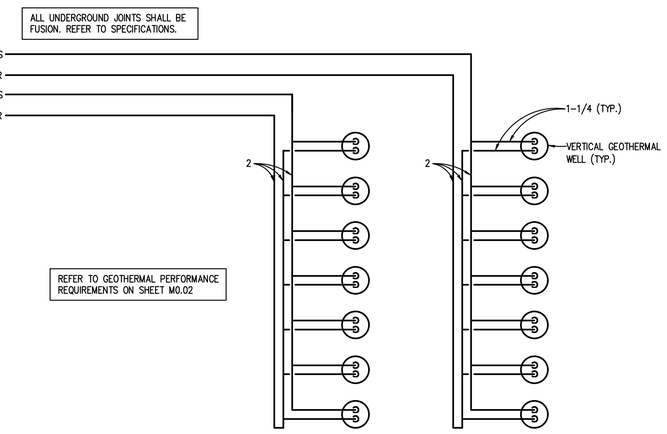
NOTES

ALL BRANCH PIPING CONNECTIONS TO MAINS SHALL BE FROM SIDE OR BOTTOM OF PIPE



GEO-EXCHANGE HEAT PUMP LOOP PIPING DIAGRAM

NO SCALE



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REGISTERED PROFESSIONAL ENGINEER

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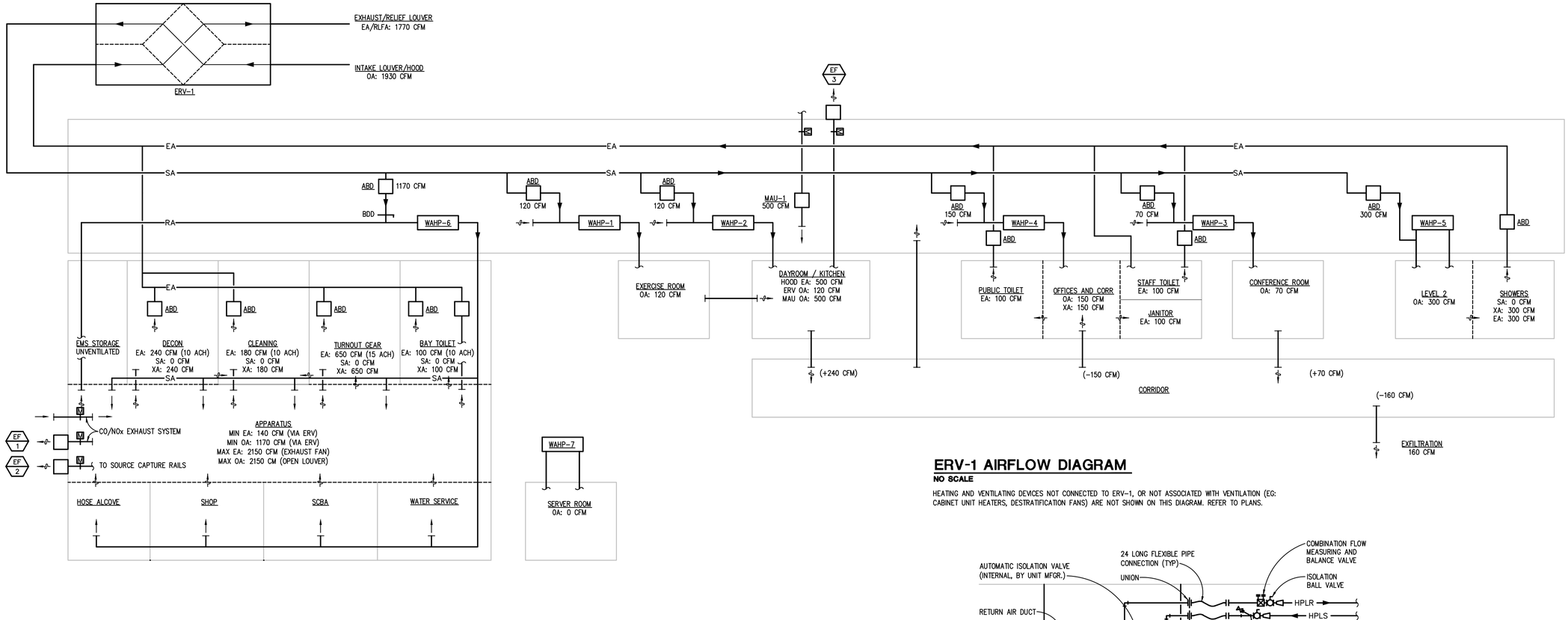
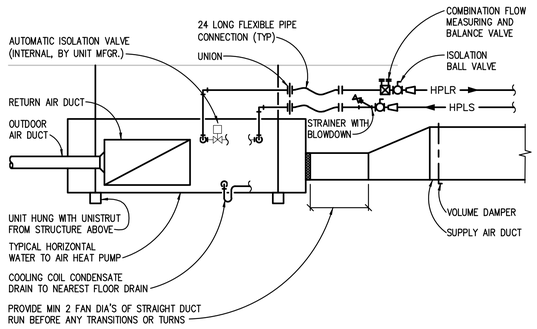


ERV-1 AIRFLOW DIAGRAM

NO SCALE

HEATING AND VENTILATING DEVICES NOT CONNECTED TO ERV-1, OR NOT ASSOCIATED WITH VENTILATION (EG: CABINET UNIT HEATERS, DESTRATIFICATION FANS) ARE NOT SHOWN ON THIS DIAGRAM. REFER TO PLANS.



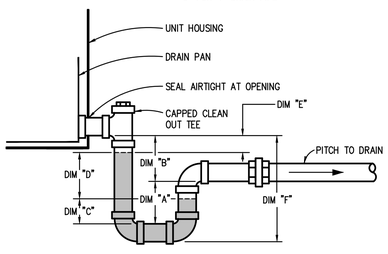
HORIZONTAL HEAT PUMP PIPING DIAGRAM AND INSTALLATION DETAIL

NO SCALE

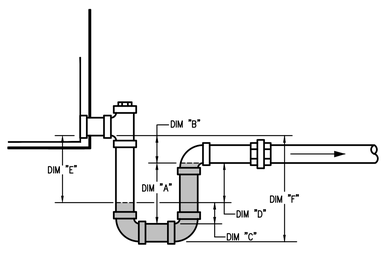
TRAP DIMENSION TABLE

TYPE OF SYSTEM	S.P. AT DRAIN PAN (IN.) (NOTE A)	DIMENSION "A" (INCHES) MIN.	DIMENSION "B" (INCHES)	DIMENSION "C" (INCHES) (TRAP SEAL)	DIMENSION "D" (INCHES)	DIMENSION "E" (INCHES)	DIMENSION "F" (INCHES) (+/−) DRAIN PIPE SIZE (INCHES)			
							1 TO 1−1/2	2	2 1/2, 3	4
DRAW THROUGH	−2.1 TO −3	3.5	3.5	2	3	2	8.0−8.5	9.0	9.5−10.0	11.0
	UP TO −2	3.0	3.0	2	2	2	7.0−7.5	8.0	8.5−9.0	10.0
BLOW THROUGH	UP TO +2	4.0	2.0	2	2	4	7.0−7.5	8.0	8.5−9.0	10.0
	+2.1 TO +3	5.0	2.0	2	3	5	8.0−8.5	9.0	9.5−10.0	11.0

NOTES:
A. REFER TO EQUIPMENT SCHEDULES FOR (−) OR (+) STATIC PRESSURE AT DRAIN PAN.
A. BASE TRAP DIMENSIONS ON −____" S.P. FOR DRAW THROUGH UNITS AND +____" S.P. FOR BLOW THROUGH UNITS.
B. DRAIN PIPE SIZE SHALL BE SIZE OF DRAIN PAN OUTLET, MINIMUM 1".
C. DIMENSION "G" IS MIN: 3" FOR UP TO 1 1/2" DRAIN PIPE
4" FOR 2" DRAIN PIPE
5" FOR 2 1/2" OR 3" DRAIN PIPE
6" FOR 4" DRAIN PIPE



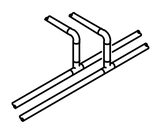
DRAW THROUGH



BLOW THROUGH

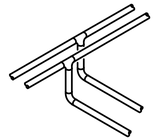
CONDENSATE DRAIN PAN TRAP DETAIL (UNITARY UNITS NOT ABOVE CEILING)

NO SCALE



BRANCH CONNECTION OFF TOP

APPLIES TO THE FOLLOWING SYSTEMS:
(NO SYSTEMS IN MECHANICAL DIVISION)



BRANCH CONNECTION OFF BOTTOM

APPLIES TO THE FOLLOWING SYSTEMS:
HEAT PUMP LOOP

NOTE: BOTTOM AS INDICATED OR SIDE CONNECTION IS ACCEPTABLE. CONNECTION ABOVE CENTERLINE OF MAINS IS NOT ACCEPTABLE.

TYPICAL BRANCH TAKE-OFF CONNECTION PIPING DETAIL

NO SCALE

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Project Number 21018

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City Of Ann Arbor
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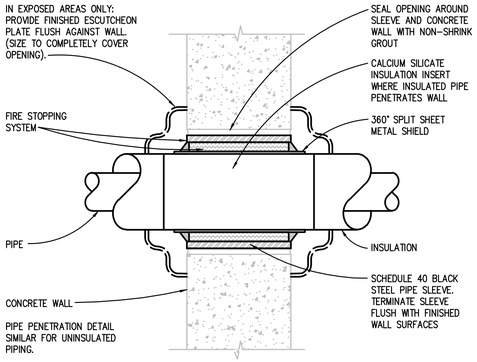
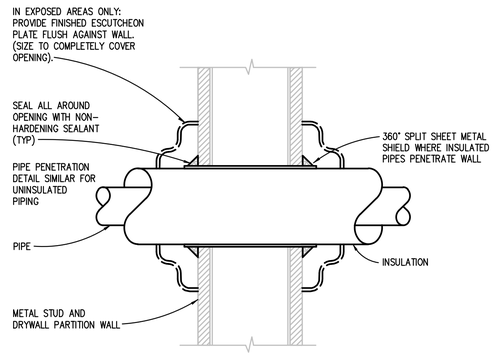


DETAIL INDICATES THE INSTALLATION REQUIREMENTS FOR A FIRE RATED ASSEMBLY. FOR A NON-FIRE RATED ASSEMBLY PACK SLEEVED OPENING WITH INSULATION MATERIAL AND CAULK WITH NON-HARDENING SEALANT.

FIRE RATED AND NON-FIRE RATED POURED CONCRETE OR BLOCK WALL PIPE PENETRATION DETAIL

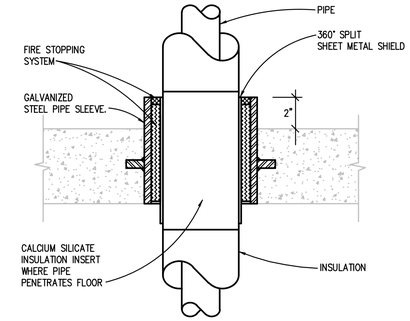
NO SCALE



THIS DETAIL DOES NOT APPLY TO HEATING PIPING 2" AND LARGER. FOR HEATING PIPING 2" AND LARGER REFER TO "FIRE RATED AND NON-FIRE RATED METAL STUD AND DRYWALL PARTITION WALL PIPE PENETRATION DETAIL"

NON-FIRE RATED METAL STUD AND DRYWALL PARTITION WALL PIPE PENETRATION DETAIL

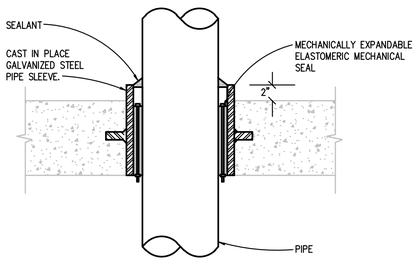
NO SCALE



NEW FLOOR PIPE PENETRATION DETAIL

NO SCALE

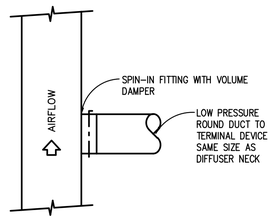
NOTE: PIPES ENCASED IN WALLS EXEMPT FROM THIS DETAIL.



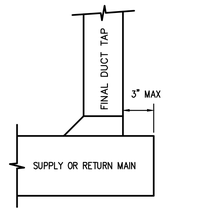
NEW SLAB ON GRADE FLOOR PIPE PENETRATION DETAIL

NO SCALE

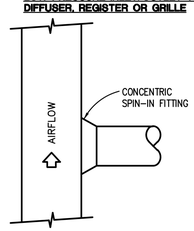
NOTE: PIPES ENCASED IN WALLS EXEMPT FROM THIS DETAIL.



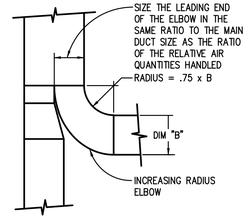
LOW PRESSURE INLET/OUTLET TO/FROM DIFFUSER, REGISTER OR GRILLE



LOW PRESSURE END OF RUN

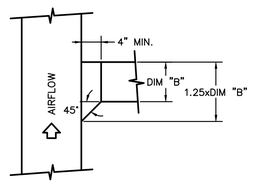


RECTANGULAR TO ROUND DUCT

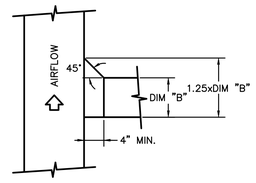


SUPPLY, RETURN OR EXHAUST DUCT

FOR USE WHEN A BRANCH TAKE-OFF IS TO HANDLE MORE THAN 25% OF THE AIR HANDLED BY THE MAIN DUCT



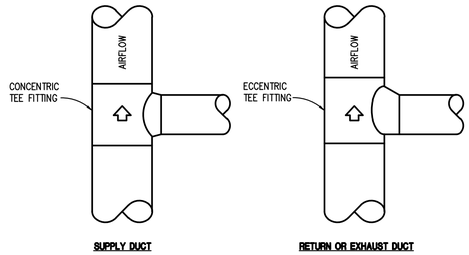
SUPPLY DUCT



RETURN OR EXHAUST DUCT

RECTANGULAR DUCT BRANCH TAKE-OFF DETAILS

NO SCALE



SUPPLY DUCT

RETURN OR EXHAUST DUCT

SPIRAL DUCT BRANCH TAKE-OFF DETAILS

NO SCALE **(ROUND AND FLAT OVAL SIMILAR)**

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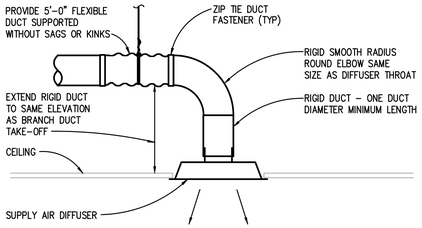
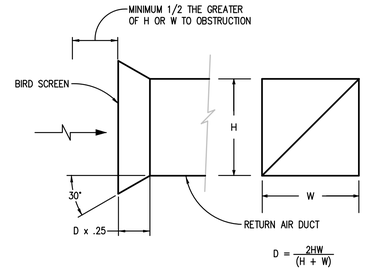


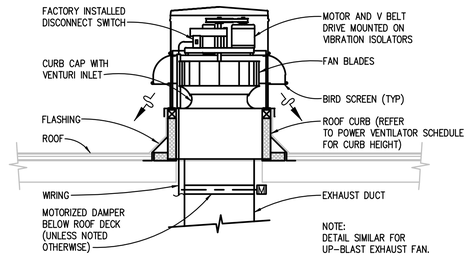
ROUND NECK SUPPLY AIR DIFFUSER DETAIL

NO SCALE



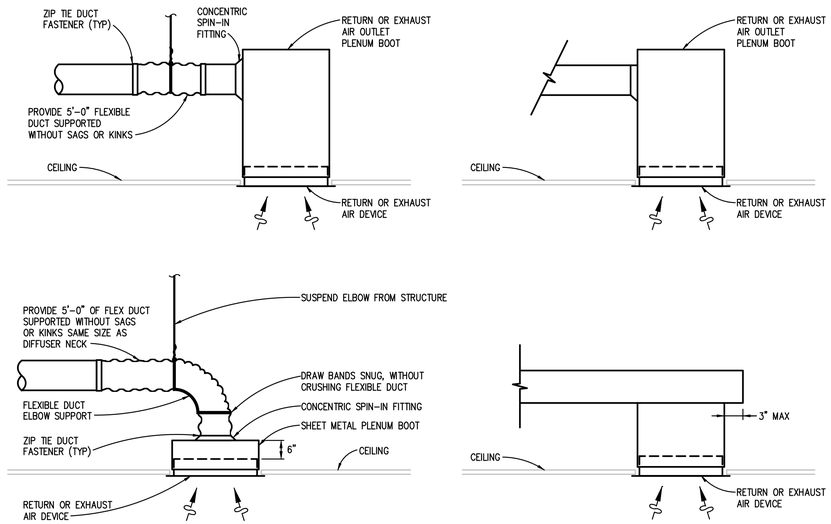
BELLMOUTH DETAIL

NO SCALE



ROOF MOUNTED POWER VENTILATOR EXHAUST FAN DETAIL

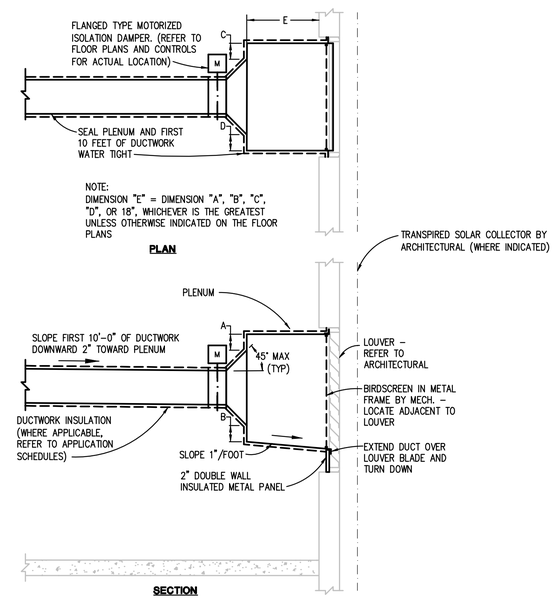
NO SCALE



RETURN OR EXHAUST AIR DEVICE INSTALLATION DETAIL

NO SCALE

NOTE: PAINT INTERIOR SURFACE OF PLENUM BOX FLAT BLACK.



OUTDOOR AIR INTAKE OR EXHAUST/RELIEF PLENUM DETAIL

NO SCALE

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Sheet M6.04

ABOVEGROUND HVAC PIPING & VALVE APPLICATION SCHEDULE

	MATERIAL								CONNECTION									ISOLATION VALVES				
PIPE SIZE (INCHES)	SOFT COPPER TYPE K	HARD COPPER TYPE L	HARD COPPER TYPE M	CARBON STEEL (SCHED. 40)	CARBON STEEL (SCHED. 80)	CARBON STEEL (STD.)	COPPER TYPE DWV	POLYPROPYLENE RCT	SOLDERED	BRAZED	WELDED	THREADED	FLANGED	GROOVED	PRESSURE SEAL	MECHANICALLY FORMED TEE	SOCKET FUSION	BALL	GENERAL SERVICE BUTTERFLY	HI-PERF BUTTERFLY	GATE	KEYED NOTES
HEAT PUMP LOOP - MIN. WORKING PRESS. & TEMP.: 125 PSIG AT 200 DEG F																						
UP TO 2		X							X	X					X	X		X				
UP TO 2								X									X	X				
2-1/2 TO 4		X								X				X	X	X			X			A
2-1/2 TO 4								X									X		X			

GENERAL NOTES

1. 'X' INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A PIPING SYSTEM, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
2. DISSIMILAR-METAL PIPING JOINTS: CONSTRUCT JOINTS USING DIELECTRIC FITTINGS COMPATIBLE WITH BOTH PIPING MATERIALS. IF A BRONZE VALVE CONNECTS THE DISSIMILAR METALS NO FURTHER DIELECTRIC ISOLATION IS REQUIRED.

   a. NPS 2 AND SMALLER: USE BRASS COUPLING, NIPPLE, OR UNION.
   b. NPS 2-1/2 AND LARGER: USE DIELECTRIC FLANGE KITS.

3. USE UNIONS OR FLANGES AT VALVE AND EQUIPMENT CONNECTIONS.
4. HVAC EQUIPMENT DRAINS, VENTS, SAFETY VALVE PIPING, BLOWDOWN PIPING AND THE LIKE SHALL BE SAME PIPING MATERIAL AS ASSOCIATED PIPING SYSTEM.
5. GROOVED END VALVES MAY BE USED WITH GROOVED PIPING.

KEYED NOTES

A. GROOVED AND FLANGED FITTINGS, JOINTS, AND COUPLINGS, IF INDICATED AS AN ACCEPTABLE SELECTION, MAY BE USED IN ACCESSIBLE LOCATIONS FOR THIS PIPING SYSTEM ONLY. ACCESSIBLE LOCATIONS ARE DEFINED AS EXPOSED CONSTRUCTION OR ABOVE LAY-IN CEILINGS.

ABOVEGROUND HVAC PIPE & ACCESSORY INSULATION APPLICATION SCHEDULE

	INSULATION MATERIAL & THICKNESS (INCHES)							FIELD-APPLIED JACKET MATERIAL						
	FLEXIBLE ELASTOMERIC	FIBERGLASS	MINERAL WOOL	POLYISOCYANURATE	PHENOLIC	CELLULAR GLASS	CALCIUM SILICATE	ALUMINUM	STAINLESS STEEL	PVC	SELF-ADHESIVE (FOR OUTDOOR APPLICATIONS)	PVDC (INDOOR)	PVDC (OUTDOOR)	KEYED NOTES
INDOOR PIPE SYSTEM AND SIZE (INCHES)														
HEAT PUMP LOOP SUPPLY & RETURN														
NPS 1-1/4 AND SMALLER	1	1						X		X				A
NPS 1-1/2 AND LARGER	1.5	1.5						X		X				A

UNLESS OTHERWISE INDICATED OR SCHEDULED, THE FOLLOWING DO NOT REQUIRE INSULATION:
DIRECT BURIED COOLING SYSTEM PIPING

GENERAL NOTES

1. 'X' OR THICKNESS IN INCHES INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
2. INSULATE PIPING WITHIN AIR HANDLING EQUIPMENT THE SAME AS INDOOR PIPING. PROVIDE ALUMINUM OR STAINLESS STEEL JACKET.
3. FOR PIPING NPS 1-1/4 AND SMALLER WITHIN PARTITIONS IN CONDITIONED SPACES INSULATION MAY BE REDUCED BY ONE-INCH THICKNESS, BUT NOT TO LESS THAN ONE-INCH THICKNESS.
4. FOR PIPING NPS 1 AND SMALLER, INSULATION IS NOT REQUIRED FOR STRAINERS, CONTROL VALVES, AND BALANCING VALVES.

KEYED NOTES

A. PROVIDE FIELD APPLIED JACKET FOR PIPING EXPOSED IN EQUIPMENT ROOMS, STORAGE ROOMS, JANITORS CLOSETS, RECEIVING ROOMS, TEST AREAS, CIRCULATION AREAS AND SUCH AREAS SUBJECT TO DAMAGE WITHIN 10 FEET (3 METERS) OF FINISHED FLOOR.

DUCT SYSTEM APPLICATION SCHEDULE

	DUCT MATERIAL																			
AIR SYSTEMS	G90 GALV. SHEET METAL	DOUBLE-WALL LINED G90 GALV. SHEET METAL (SOLID INNER WALL)	DOUBLE-WALL LINED G90 GALV. SHEET METAL (PERF. INNER WALL)	G90 GALV. SHEET METAL WITH 1-INCH LINING	GALVANNEALED SHEET METAL	ALUMINUM	TYPE 304 STAINLESS STEEL	TYPE 316 STAINLESS STEEL	PVC COATED GALV. SHEET METAL (4X1)	PVC COATED GALV. SHEET METAL (1X4)	PVC COATED GALV. SHEET METAL (4X4)	16 GA. CARBON STEEL	ZERO-CLEARANCE PREFABRICATED RANGE HOOD EXHAUST DUCT	FABRIC	DESIGN PRESSURE CLASS (INCHES WG)	SEAL CLASS	MAX. ALLOWABLE LEAKAGE RATE (PERCENT)	KEYED NOTES
SUPPLY AIR WITHOUT TERMINAL UNITS	X														+2	A	5	
RETURN AIR WITHOUT TERMINAL UNITS	X														-2	A	5	
EXHAUST AIR WITHOUT TERMINAL UNITS	X														-2	A	5	
KITCHEN EXHAUST (NON-COMMERCIAL)							X								-2	N/A	N/A	C
LOCKER ROOM AND WET AREA EXHAUST						X	X								-2	A	5	
AIR TRANSFER DUCT				X											+2	A	5	
RELIEF AIR DOWNSTREAM OF FANS	X														+6	A	5	
OUTSIDE AIR AND MIXED AIR DUCT	X														-6	A	5	

GENERAL NOTES

1. 'X' INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A DUCT SYSTEM, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
2. 4 X 1 PVC-COATED GALVANIZED STEEL: FACTORY-APPLIED PVC COATINGS SHALL BE 4 MILS (0.10 MM) THICK ON EXTERIOR SHEET METAL SURFACES OF DUCTS AND FITTINGS EXPOSED TO CORROSIVE CONDITIONS AND MINIMUM 1 MIL (0.025 MM) THICK ON INTERIOR SURFACES.
3. 1 X 4 (4 X 1 REVERSE COATED) PVC-COATED GALVANIZED STEEL: FACTORY-APPLIED PVC COATINGS SHALL BE 4 MILS (0.10 MM) THICK ON INTERIOR SHEET METAL SURFACES OF DUCTS AND FITTINGS EXPOSED TO CORROSIVE CONDITIONS AND MINIMUM 1 MIL (0.025 MM) THICK ON EXTERIOR SURFACES.
4. 4 X 4 PVC-COATED GALVANIZED STEEL: FACTORY-APPLIED PVC COATINGS SHALL BE 4 MILS (0.10 MM) THICK ON SHEET METAL SURFACES OF DUCTS AND FITTINGS EXPOSED TO CORROSIVE CONDITIONS AND 4 MILS (0.10 MM) THICK ON OPPOSITE SURFACES.

KEYED NOTES

A. SCREWS, DAMPERS, OR PROJECTIONS OF ANY TYPE ON INTERIOR OF DUCT SURFACE ARE PROHIBITED.
B. DUCT SHALL BE LINED WITHIN 25 FEET UPSTREAM OF FANS.
C. ALL WELDED CONSTRUCTION.

DUCT SYSTEM INSULATION APPLICATION SCHEDULE

	INSULATION MATERIAL & THICKNESS (INCHES)							FIELD APPLIED JACKET MATERIAL		
	FIBERGLASS BLANKET 0.75 LB/CU FT	FIBERGLASS BLANKET 1.0 LB/CU FT	FIBERGLASS BOARD 2.25 LB/CU FT	FIBERGLASS BOARD 6.0 LB/CU FT	FLEXIBLE ELASTOMERIC	ASTM E2336 2-HOUR FIRE RATED BLANKET	2-HOUR FIRE RATED BLANKET	ALUMINUM	SELF-ADHESIVE (FOR OUTDOOR APPLICATIONS)	KEYED NOTES
DUCT SYSTEMS LOCATED INDOORS										
SUPPLY AIR, EXCEPT AS NOTED BELOW		1.5								A, E
RECTANGULAR SUPPLY AIR IN MECHANICAL ROOMS			1.5							
ROUND & FLAT OVAL SUPPLY AIR IN MECHANICAL ROOMS		1.5								
RECTANGULAR RETURN AIR IN MECHANICAL EQUIPMENT ROOMS			1.5							
OUTSIDE AIR AND MIXED AIR, EXCEPT AS NOTED BELOW		1.5								
RECTANGULAR OUTSIDE AIR AND MIXED AIR IN MECHANICAL ROOMS			1.5							
KITCHEN EXHAUST AIR (TYPE II HOODS)		1.5								

PLENUMS, DUCTS, AND DUCT ACCESSORIES NOT REQUIRING INSULATION:
- FIBROUS-GLASS DUCTS
- DOUBLE-WALL METAL DUCTS WITH INSULATION OF SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE AND ASHRAE/IESNA 90.1 - 2013
- METAL DUCTS WITH DUCT LINER OF SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE AND ASHRAE/IESNA 90.1 - 2013
- FABRIC SUPPLY DUCTS
- FACTORY-INSULATED FLEXIBLE DUCTS
- FACTORY-INSULATED PLENUMS AND CASINGS
- FLEXIBLE CONNECTORS
- VIBRATION-CONTROL DEVICES
- FACTORY-INSULATED ACCESS PANELS AND DOORS

GENERAL NOTES

1. 'X' OR THICKNESS IN INCHES INDICATE ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A DUCT SYSTEM, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
2. REFER TO METAL DUCT SECTION OF SPECIFICATIONS FOR DUCT LINING AND DOUBLE-WALL INSULATED DUCT.
3. REFER TO HVAC CASINGS SECTION OF SPECIFICATIONS FOR DOUBLE-WALL INSULATED PLENUMS.

KEYED NOTES
A. INCLUDE INSULATION AROUND DUCT MOUNTED COILS AND AIR TERMINAL UNIT COILS.
E. EXPOSED SUPPLY DUCTWORK LOCATED IN A CONDITIONED SPACE SERVED BY THE SAME AIR HANDLING SYSTEM IS NOT REQUIRED TO BE INSULATED.

SCHEDULES GENERAL NOTES:

TYPICAL FOR ALL SCHEDULE SHEETS:

1. REFER TO ELECTRICAL STANDARD SCHEDULES, ONE LINE DIAGRAM AND PANEL SCHEDULES FOR ADDITIONAL ELECTRICAL INFORMATION
2. PROVIDE THE FOLLOWING FACTORY-WIRED ELECTRICAL OPTIONS/ACCESSORIES WHERE INDICATED IN SCHEDULE:
   - A - NON-FUSED DISCONNECT SWITCH
   - B - UNIT SHALL BE SINGLE POINT ELECTRICAL CONNECTION WITH FACTORY INSTALLED DISCONNECTING MEANS AND ALL REQUIRED STARTERS AND CONTROLS
   - C - SERVICE RECEPTACLE
   - D - FUSED DISCONNECT SWITCH
   - E - COMBINATION STARTER
   - F - UNIT SHALL HAVE (2) SINGLE POINT CONNECTIONS WITH FACTORY INSTALLED DISCONNECTING MEANS AND ALL REQUIRED STARTERS AND CONTROLS. (1) CONNECTION SHALL BE FOR CONDENSING SECTION AND (1) CONNECTION SHALL BE FOR THE REMAINDER OF THE UNIT.
3. FOR MODULATION/CONTROL TYPE COLUMN, "VFC" INDICATES VARIABLE FREQUENCY CONTROLLERS, "AUTO" INDICATES AUTOMATIC OPERATION (CONTROLLED BY TEMPERATURE CONTROLS OR SELF CONTAINED CONTROLS), "MANUAL" INDICATES HAND OPERATION.
4. IF VARIABLE FREQUENCY CONTROLLERS ARE INDICATED TO BE PROVIDED AND ARE NOT INSTALLED INTEGRAL TO THE UNIT, VARIABLE FREQUENCY CONTROLLERS SHALL BE SUPPLIED BY THE MECHANICAL CONTRACTOR (UNLESS OTHERWISE NOTED) AND INSTALLED BY THE ELECTRICAL CONTRACTOR INCLUDING THE LINE SIDE AND LOAD SIDE WIRING TO THE MOTOR AND INCLUDING MISCELLANEOUS STEEL REQUIRED FOR THE SUPPORT AND MOUNTING OF THE VFC. REFER TO FLOOR PLANS FOR LOCATION.
5. WHERE EQUIPMENT IS INDICATED TO HAVE A SINGLE POINT ELECTRICAL CONNECTION, THAT EQUIPMENT SHALL COME COMPLETE WITH FACTORY INSTALLED STARTERS, MOTOR OVERLOAD PROTECTION, CONTACTORS, FUSING AND ALL NECESSARY INTERNAL WIRING AND CONTROLS. PROVIDE A FACTORY MOUNTED UNIT DISCONNECTING MEANS WHERE THE ELECTRICAL CONTRACTOR SHALL MAKE SINGLE POINT CONNECTION. INSTALL PACKAGED EQUIPMENT SUCH THAT THE ELECTRICAL CONNECTION AND CONTROLS ARE ACCESSIBLE AND HAVE CLEARANCES MEETING THE NATIONAL ELECTRICAL CODE.
6. WHERE PACKAGED EQUIPMENT IS PROVIDED, NAMEPLATE MUST INDICATE MAXIMUM OVERCURRENT PROTECTION BY HACR RATED CIRCUIT BREAKERS OR FUSES. IF FUSE PROTECTION ONLY IS INDICATED, PROVIDE A FUSIBLE DISCONNECT AND FUSES WITH THE UNIT.
7. WHERE EQUIPMENT IS DESIGNATED BY MANUFACTURER AND MODEL NUMBER, THIS IS THE BASIS OF DESIGN. IF THE CONTRACTOR ELECTS TO PROVIDE EQUIPMENT BY OTHER SPECIFIED MANUFACTURERS OR PROPOSED ALTERNATE EQUIPMENT BY THE BASIS OF DESIGN MANUFACTURER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REVISIONS TO ELECTRICAL REQUIREMENTS, STRUCTURAL LOADING, OR ARCHITECTURAL APPURTENANCES AND SHALL INCLUDE THE COST OF SUCH REVISIONS IN HIS BID.
8. WHERE EQUIPMENT IS SCHEDULED TO INCLUDE A SERVICE RECEPTACLE, PROVIDE A FACTORY MOUNTED SERVICE RECEPTACLE WITH APPROPRIATE FUSES AND TRANSFORMERS CONNECTED ON THE LINE SIDE OF THE UNIT DISCONNECT. PROVIDE A NAMEPLATE ON THE DISCONNECT SWITCH INDICATING THE PRESENCE OF LIVE POWER TO THE SERVICE RECEPTACLE WHEN THE UNIT DISCONNECT IS IN THE OFF POSITION.
9. SIZE ALL EQUIPMENT FEEDERS BASED ON THE LISTED MOP (MAXIMUM OVERCURRENT PROTECTION). REFER TO THE FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE ON THE ELECTRICAL STANDARD SCHEDULES SHEET.

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Project Number 21018

Issue	Date
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BIDS/PERMITS	10/11/24

Drawn: ACF Checked: ACF

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Sheet M7.01

GRILLE, REGISTER, AND DIFFUSER SCHEDULE

UNIT IDENTIFICATION	TYPE	FACE SIZE	NECK SIZE	FRAME TYPE	ACCESSORY	CONSTRUCTION	FINISH	MODEL NUMBER	KEYED NOTES
S-1A	DIFFUSER	24x2 SLOTS	SEE PLAN	LAY IN	INSULATED PLENUM WITH REMOTE BALANCING DAMPER	ALUMINUM	WHITE	ML39	1
S-1B	DIFFUSER	48x2 SLOTS	SEE PLAN	LAY IN	INSULATED PLENUM WITH REMOTE BALANCING DAMPER	ALUMINUM	WHITE	ML39	1
S-1C	DIFFUSER	48x2 SLOTS	SEE PLAN	DUCT MOUNTED TYPE 16 BORDER	---	ALUMINUM	WHITE	ML39	2
S-2	VAV DIFFUSER	24x24	SEE PLAN	LAY IN	DISIO DISPLAY	STEEL	WHITE	PRICE VARITHERM VPD-C	
S-3	REGISTER	D+1-3/4	SEE PLAN	DUCT MOUNTED	OPPOSED BLADE DAMPER	ALUMINUM	WHITE	S300FL	
S-4	NOZZLE DIFFUSER	---	SEE PLAN	DUCT MOUNTED	---	ALUMINUM	WHITE	TND-AA	
S-5	DIFFUSER	24x24	SEE PLAN	LAY IN	---	STEEL	WHITE	PAS	
S-6	GRILLE	D+1-3/4	SEE PLAN	DUCT MOUNTED	---	STEEL	WHITE	300RL	
R-1A	GRILLE	24x24	22x22	LAY IN	---	STEEL	WHITE	PAR	
R-1B	GRILLE	12x12	10x10	LAY IN	---	STEEL	WHITE	PAR	
R-1C	GRILLE	24x12	22x10	LAY IN	---	STEEL	WHITE	PAR	
R-2	GRILLE	D+1-3/4	SEE PLAN	DUCT MOUNTED	---	STEEL	WHITE	350RL	
E-1A	GRILLE	12x12	SEE PLAN	LAY IN	---	STEEL	WHITE	PAR	
E-1B	GRILLE	24x24	SEE PLAN	LAY IN	---	STEEL	WHITE	PAR	
E-2	GRILLE	D+1-3/4	SEE PLAN	DUCT MOUNTED	---	STEEL	WHITE	350RL	

GENERAL NOTES:
1. MODEL NUMBERS ARE TITUS UNLESS OTHERWISE NOTED.

KEYED NOTES:
1. PROVIDE PLASTER FRAME WHERE INSTALLED IN HARD LID CEILING.
2. PROVIDE ROUND DUCT MOUNT FRAME.

VIBRATION ISOLATOR APPLICATION SCHEDULE

EQUIPMENT TYPE	EQUIPMENT CATEGORY	HORSEPOWER AND OTHER	RPM	EQUIPMENT LOCATION						KEYED NOTES
				SLAB ON GRADE			UP TO 40 FT (12 M) FLOOR SPAN			
				BASE TYPE	ISOLATOR TYPE	MIN. DEFL., IN. (MM)	BASE TYPE	ISOLATOR TYPE	MIN. DEFL., IN. (MM)	
PUMPS	CLOSE COUPLED	≤7.5 ≥10	ALL ALL	B C	2 3	0.25 (6) 0.75 (19)	C C	3 3	0.75 (19) 1.50 (38)	NOTE 3
	INLINE	5 TO 25 ≥30	ALL ALL	A A	3 3	0.75 (19) 1.50 (38)	A A	3, 8a OR 8b 3, 8a OR 8b	1.50 (38) 2.50 (64)	
	END SUCTION AND DOUBLE SUCTION/SPLIT CASE	≤40 50 TO 125 ≥150	ALL ALL ALL	C C C	3 3 3	0.75 (19) 0.75 (19) 0.75 (19)	C C C	3 3 3	1.50 (38) 2.50 (64) 3.50 (89)	
	PACKAGED PUMP SYSTEMS	ALL	ALL	A	3	0.75 (19)	C	3	2.50 (64)	
BASE MOUNTED HEAT PUMPS, FAN COILS, COMPUTER ROOM UNITS	ALL	ALL	ALL	A	3	0.75 (19)	A	3	1.50 (38)	NOTES 1, 3, 4
SUSPENDED HEAT PUMPS, FAN COILS, CONDENSING UNITS, COMPUTER ROOM UNITS, LOCATED INDOORS.	ALL	ALL	ALL				A OR B	8a OR 8b	1.50 (38)	NOTES 1, 3, 4

GENERAL NOTES:

KEYED NOTES:
1. THRUST RESTRAINTS: PROVIDE THRUST RESTRAINTS BETWEEN FAN DISCHARGE AND DUCT (IN PAIRS, LOCATED ON THE CENTERLINE OF THE DISCHARGE OUTLET OF THE FAN, BRIDGING THE FLEXIBLE DUCT CONNECTOR) FOR ALL FAN HEADS, FOR AXIAL AND CENTRIFUGAL FANS UNITS OPERATING AT 2 INCHES OR GREATER TOTAL STATIC PRESSURE AND AS SHOWN ON DRAWINGS. SPRING DEFLECTION SHALL BE SAME AS THE SUPPORT ISOLATORS.
2. PIPING RISER ISOLATION: PROVIDE PIPE RISER RESILIENT ANCHORS, SPRING MOUNTS AND RESILIENT PIPE GUIDES CAPABLE OF DISTRIBUTING THE LOADS WITHIN THE BUILDING DESIGN LIMITS AT THE SUPPORT POINTS.
3. HORIZONTAL PIPING VIBRATION ISOLATION: PROVIDE TYPE 8a OR 8b SPRING HANGERS FOR PIPING CONNECTED TO VIBRATION ISOLATED EQUIPMENT FOR ALL PIPING IN MECHANICAL ROOMS OR THE FOLLOWING MINIMUM HORIZONTAL DISTANCES FROM THE ISOLATED EQUIPMENT: UP TO 6" – 50 FEET (1 1/2" MINIMUM DEFLECTION), 8" AND LARGER – 100 FEET (2 1/2" MINIMUM DEFLECTION), WHICHEVER IS GREATER, AND AS SHOWN ON DRAWINGS. THE FIRST 4 HANGERS FROM THE ISOLATED EQUIPMENT SHALL BE TYPE 8b.
4. DUCTWORK VIBRATION ISOLATION: PROVIDE TYPE 8a OR 8b SPRING HANGERS FOR DUCTWORK WITH A CROSS SECTION OF 2 SQUARE FEET OR GREATER CONNECTED TO AIR HANDLING UNITS, RETURN OR RELIEF FANS, AND VIBRATION ISOLATED EQUIPMENT FOR ALL SUCH DUCTWORK IN MECHANICAL ROOMS OR FOR A MINIMUM HORIZONTAL DISTANCE OF 100 FEET FROM THE ISOLATED EQUIPMENT, WHICHEVER IS GREATER, AND AS SHOWN ON DRAWINGS (3/4" MINIMUM DEFLECTION).
5. IF SPAN DOES NOT EXCEED 20 FT, SPRING DEFLECTION MAY BE 1.0 IN AND TYPE D BASE MAY BE USED. FOR SPANS GREATER THAN 20 FT, USE SPRING DEFLECTION INDICATED AND TYPE E BASE.

BASE TYPES:

BASE TYPE A – NO BASE, ISOLATORS ATTACHED DIRECTLY TO EQUIPMENT.
BASE TYPE B – STRUCTURAL, STEEL RAILS OR BASE.
BASE TYPE C – CONCRETE INERTIA BASE.
BASE TYPE D – CURB – MOUNTED ALUMINUM BASE WITH 1" DEFL. SPRING ISOLATORS
BASE TYPE E – CURB – MOUNTED STEEL BASE WITH ADJUSTABLE 1", 2" OR 3" DEFL. SPRING ISOLATORS

ISOLATOR TYPES:

ISOLATOR TYPE 1a – ELASTOMERIC ISOLATION PAD.
ISOLATOR TYPE 1b – ELASTOMERIC ISOLATION PAD WITH STEEL LOAD BEARING PLATE.
ISOLATOR TYPE 2 – ELASTOMERIC FLOOR ISOLATOR.
ISOLATOR TYPE 3 – FREE STANDING SPRING FLOOR ISOLATOR.
ISOLATOR TYPE 4 – RESTRAINED SPRING ISOLATOR.
ISOLATOR TYPE 5 – THRUST RESTRAINT.
ISOLATOR TYPE 6 – AIR SPRING.
ISOLATOR TYPE 7 – ELASTOMERIC HANGERS.
ISOLATOR TYPE 8a – SPRING HANGERS.
ISOLATOR TYPE 8b – SPRING HANGERS WITH VERTICAL-LIMIT STOP.

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PUMP SCHEDULE

UNIT IDENTIFICATION		SYSTEM SERVED	LOCATION	TYPE	COUPLING TYPE	WATERFLOW GPM	FLUID TYPE	COLDEST SYSTEM OPERATING TEMP. °F. FOR PUMP SELECTION	PUMP HEAD FT.	MINIMUM EFFICIENCY %	MOTOR			MODULATION / CONTROL TYPE	ELECTRICAL				MODEL NUMBER	KEYED NOTES
DES.	NO.										BHP	HP	RPM		VOLTS	PHASE	SCCR KA (NOTE 4)	OPTIONS / ACCESSORIES		
HPLP	1	GEOTHERMAL	MECH 203	VERTICAL INLINE	CLOSED	52	WATER	40	74	51	1.9	3	1739	VFC	208	3	5	---	E-80 1.5X1.5X9.5B	
HPLP	2	GEOTHERMAL	MECH 203	VERTICAL INLINE	CLOSED	52	WATER	40	74	51	1.9	3	1739	VFC	208	3	5	---	E-80 1.5X1.5X9.5B	

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBER ARE BELL & GOSSETT UNLESS OTHERWISE NOTED.
3. FLUID TYPE: W = WATER, PGXX = PROPYLENE GLYCOL SOLUTION XX PERCENTAGE OF GLYCOL, EGXX = ETHYLENE GLYCOL SOLUTION XX PERCENTAGE OF GLYCOL.
4. CONTROLLER (E.G. VARIABLE FREQUENCY CONTROLLER, MOTOR STARTER) FOR SPECIFIED EQUIPMENT SHALL BE MANUFACTURED AND MARKED PER NEC WITH A MINIMUM SHORT CIRCUIT CURRENT RATING AS INDICATED.

HVAC SYSTEM EXPANSION TANK SCHEDULE

UNIT IDENTIFICATION		SYSTEM SERVED	ESTIMATED TOTAL SYSTEM VOLUME GALLON	TYPE	FLUID TYPE	SYSTEM FILL VALVE OR GLYCOL PUMP PRESSURE SETTING PSIG	OPERATING PRESSURES AT EXPANSION TANK		SYSTEM OPERATING TEMPERATURES		EXPANSION VOLUME GALLONS	ACCPETANCE FACTOR	MINIMUM TANK VOLUME GALLONS	DIMENSIONS		MODEL NUMBER	KEYED NOTES
DES.	NO.						PRE-CHARGE PSIG	MAX (OPERATING) PSIG	MINIMUM °F	MAXIMUM °F				DIAMETER INCHES	HEIGHT INCHES		
ET	1	GEOTHERMAL	1400	DIAPHRAGM	W	12	18	51	35	95	12	0.5	25	20	30	B-100	

GENERAL NOTES:
1. MODEL NUMBERS ARE BELL & GOSSETT UNLESS OTHERWISE NOTED.
2. THE CONTRACTOR SHALL PRE-CHARGE THE TANK TO THE VALUE INDICATED IN THE SCHEDULE. FOR TANKS THAT ARE SUPPLIED PRE-CHARGED BY THE MANUFACTURER, THE CONTRACTOR SHALL CONFIRM THE PRESSURE AND MAKE ADJUSTMENTS AS REQUIRED.
3. FLUID TYPE: W = WATER, PGXX = PROPYLENE GLYCOL SOLUTION XX PERCENTAGE OF GLYCOL, EGXX = ETHYLENE GLYCOL SOLUTION XX PERCENTAGE OF GLYCOL.

AIR & DIRT SEPARATOR SCHEDULE

UNIT IDENTIFICATION		INLET PIPE SIZE	OUTLET PIPE SIZE	MAX SYSTEM FLOW (GPM)	MAX PRESSURE DROP CLEAN (FT HD.)	BUNDLE REMOVAL CLEARANCE NOTE 3 (INCHES)	OPERATING WEIGHT (LBS)	MODEL NO.	KEYED NOTES
DES.	NO.								
AS	1	2	2	52	0.60	16	107	VDN	

GENERAL NOTES:
1. MODEL NUMBERS ARE SPIROTHERM UNLESS OTHERWISE NOTED.
2. SEPARATOR FLANGE CONNECTION MUST BE A MINIMUM OF THE PIPE DIAMETER SIZE OF WHICH THE SEPARATOR IS INSTALLED.
3. MINIMUM BUNDLE REMOVAL CLEARANCE IS MEASURED FROM CENTERLINE OF INLET/OUTLET PIPING. PROVIDE CLEARANCE BELOW UNIT TO DIMENSION LISTED TO ALLOW REMOVAL OF HEAD AND ELEMENT BUNDLE.
4. REFER TO PUMP SCHEDULE FOR SYSTEM FLOW.

WATER SOURCE HEAT PUMP SCHEDULE

			FAN			LOOP WATER			COOLING MODE (85 °F ENT. WATER TEMP.)					HEATING MODE (40 °F ENT. WATER TEMP.)					COMPRESSORS				FILTER				ELECTRICAL							
									AIR		TOTAL			AIR		TOTAL																	
DES.	NO.	NOMINAL SIZE (TONS)	AIRFLOW CFM	ESP IN. W.G.	HP	FLOW GPM	FLUID TYPE	MAX W.P.D. FT. HEAD	E.A.T. °F	L.A.T. °F	CAPACITY MBH	THR MBH	MINIMUM E.E.R.	E.A.T. °F	L.A.T. °F	CAPACITY MBH	THA MBH	MINIMUM C.O.P.	NO. OF COMP.	R.L.A. EA.	L.R.A. EA.	ARRANGEMENT	FILTER TYPE	MERV	CLEAN FILTER P.D.	DIRTY FILTER P.D.	VOLTS	PHASE	FLA	MOP	SCCR KA	OPTIONS / ACCESSORIES	MODEL NUMBER	KEYED NOTES
WAHP	1	1.5	650	0.8	0.25	5	W	13.8	78	55	19.5	23.4	17	65	80	14	10.1	3.6	1	7.4	33	HORIZONTAL	THROWAWAY	13	0.30	1.00	208	1	9.2	15	5	B	50PC	
WAHP	2	3.5	1380	0.6	0.50	10	W	31.4	78	55	42.1	50.8	16.6	65	80	29	20.5	3.4	1	11.2	84	HORIZONTAL	THROWAWAY	13	0.30	1.00	208	3	15.6	25	5	B	50PC	
WAHP	3	1	375	0.5	0.10	3	W	15	78	55	11.8	14.7	14.1	65	80	8.7	6	3.2	1	4.6	27.9	HORIZONTAL	THROWAWAY	13	0.30	1.00	208	1	5.6	15	5	B	50PC	
WAHP	4	2	850	0.5	0.25	6	W	24.2	78	55	25.8	30.8	17.7	65	80	17.7	12.8	3.6	1	7.1	55.4	HORIZONTAL	THROWAWAY	13	0.30	1.00	208	3	8.9	15	5	B	50PC	
WAHP	5	3	1200	0.2	0.50	9	W	22.5	78	55	38.8	46.5	17.1	65	80	26.7	19.3	3.6	1	10.4	73	HORIZONTAL	THROWAWAY	13	0.30	1.00	208	3	14.8	25	5	B	50PC	
WAHP	6	6	2100	0.5	0.75	16	W	29.2	78	55	67.6	81.5	16.6	65	80	50	35.7	3.5	1	19.2	136	HORIZONTAL	THROWAWAY	13	0.30	1.00	208	3	24.7	45	5	B	50PC	
WAHP	7	1	375	0.1	0.10	3	W	15	78	55	11.8	14.7	14.1	65	80	8.7	6	3.2	1	4.6	27.9	HORIZONTAL	THROWAWAY	13	0.30	1.00	208	1	5.6	15	5	B	50PC	

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE CARRIER UNLESS OTHERWISE NOTED.
3. FLUID TYPE: W = WATER, PGXX = PROPYLENE GLYCOL SOLUTION XX PERCENTAGE OF GLYCOL, EGXX = ETHYLENE GLYCOL SOLUTION XX PERCENTAGE OF GLYCOL.
4. INTERNAL STATIC PRESSURE VALUE SHALL INCLUDE WET COIL PRESSURE DROP, EXTERNAL PRESSURE INCLUDES DIRTY FILTER PRESSURE DROP AS SCHEDULED.

KEYED NOTES:
1. PROVIDE HEAT PUMP LOOP MOTORIZED ISOLATION VALVE.

ENERGY RECOVERY UNIT SCHEDULE (A)

UNIT IDENTIFICATION		SUPPLY FAN						EXHAUST FAN					HEAT EXCHANGER (SUMMER)						HEAT EXCHANGER (WINTER)					
						MOTOR					MOTOR		SUPPLY SIDE			EXHAUST SIDE			SUPPLY SIDE			EXHAUST SIDE		
DES.	NO.	CFM	MIN. OA CFM	ESP"	CONROL TYPE	BHP	HP	CFM	ESP"	CONTROL TYPE	BHP	HP	E.A.T. °F	L.A.T. °F	A.P.D. IN. WG.	E.A.T. °F	L.A.T. °F	EFFIC. (%)	E.A.T. °F	L.A.T. °F	A.P.D. IN. WG.	E.A.T. °F	L.A.T. °F	EFFIC. (%)
ERV	1	1930	1930	0.50	AUTO	0.9	1	1770	0.75	AUTO	1.1	1.5	90	84	1.50	80	86	50	-2	34	1.50	60	22	50

ENERGY RECOVERY UNIT SCHEDULE (B)

UNIT IDENTIFICATION		OUTSIDE AIR FILTERS		RETURN FILTERS		SA/RA CONFIG.	EA/OA CONFIG.	ELECTRICAL						MODEL NUMBER	KEYED NOTES
DES.	NO.	MERV	SP" TOTAL	MERV	SP" TOTAL			VOLTS	PHASE	FLA	MOP	SCCR KA	OPTIONS/ ACCESSORIES		
ERV	1	13	0.65	8	0.65	END/END	TOP/END	208	1	16	20	5	B	ECV-20-P	

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE GREENHECK UNLESS OTHERWISE NOTED.
3. COORDINATE UNIT CONFIGURATION WITH PLANS IN ORDER TO ALLOW FOR PROPER SERVICE ACCESS.
4. DESIGN MINIMUM OUTSIDE AIRFLOW CFM (VENTILATION) LISTED IS BASED ON THE ESTIMATED MAXIMUM OCCUPANT LOAD.
5. REFER TO TEMPERATURE CONTROL DRAWINGS FOR OUTSIDE AIR CONTROL SEQUENCE.

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No. 6201068182
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Project Number 21018

Issue	Date
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Sheet M7.11

ELECTRIC CENTRIFUGAL FAN CABINET UNIT HEATER SCHEDULE

UNIT IDENTIFICATION		CAPACITY	AIR			HEATING ELEMENT		DIMENSIONS			RECESS DEPTH	MODULATION /	ELECTRICAL						MODEL	KEYED
DES.	NO.	MBH	AIRFLOW CFM	E.D.B. °F	L.D.B. °F	1ST STAGE KW	TOTAL KW	LENGTH INCHES	HEIGHT INCHES	DEPTH INCHES	INCHES	CONTROL TYPE	VOLTS	PHASE	FLA	MOP	SCCR KA	OPTIONS / ACCESSORIES	NUMBER	NOTES
ECUH	101	15.2	250	40	96	5	5	33	29	9	9	AUTO	208	3	17.6	25	5	B	6333D052033	
ECUH	103	0.5	100	40	45	1	1	9	12	4	0	AUTO	120	1	12.5	20	5	B	E3055T2DWB	
ECUH	116A	61	750	40	115	18	18	66	29	9	9	AUTO	208	3	52.6	70	10	B	6366D182033	
ECUH	116B	77	1000	40	111	24	24	79	29	9	9	AUTO	208	3	70.1	90	10	B	6379D242033	
ECUH	117	1.8	100	40	57	1	1	9	12	4	0	AUTO	120	1	12.5	20	5	B	E3055T2DWB	
ECUH	129	39	750	40	88	12	12	66	29	9	9	AUTO	208	3	40.1	60	10	B	6366D122033	
ECUH	131	0.5	100	40	45	1	1	9	12	4	0	AUTO	120	1	12.5	20	5	B	E3055T2DWB	

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE TRANE UNLESS OTHERWISE NOTED.

POWER VENTILATOR SCHEDULE - PART A

UNIT IDENTIFICATION								MOTOR				CURB HEIGHT	MODULATION /	ELECTRICAL				MODEL	KEYED
DES.	NO.	SYSTEM SERVED	TYPE	AIRFLOW CFM	T.S.P. IN. W.G.	TIP SPEED FPM	FAN RPM	BHP	HP	RPM	DRIVE TYPE	INCHES	CONTROL TYPE	VOLTS	PHASE	SCCR KA (NOTE 3)	OPTIONS / ACCESSORIES	NUMBER	NOTES
EF	1	APPARATUS BAY EXHAUST	CENTRIFUGAL UPBLAST	2100	0.50	3486	1224	0.21	0.50	1725	DIRECT	18	ECM	120	1	5	B	CUE-141-VG	
EF	2	TAILPIPE SOURCE CAPTURE	UTILITY SET						5.00	3480	DIRECT	18	AUTO	208	3	5	B	TEV-559-60	1
EF	3	KITCHEN HOOD	CENTRIFUGAL UPBLAST	500	0.50	4139	1300	0.04	0.10	1725	DIRECT	18	ECM	120	1	5	B	CUE-90-VG	2

POWER VENTILATOR SCHEDULE - PART B

UNIT IDENTIFICATION			UNIT INLET Lw BY OCTAVE BAND								MODEL	KEYED
DES.	NO.	SYSTEM SERVED	63 Hz (DB)	125 Hz (DB)	250 Hz (DB)	500 Hz (DB)	1000 Hz (DB)	2000 Hz (DB)	4000 Hz (DB)	8000 Hz (DB)	NUMBER	NOTES
EF	1	APPARATUS BAY EXHAUST	70	78	76	70	63	64	56	50	CUE-141-VG	
EF	2	TAILPIPE SOURCE CAPTURE									TEV-559-60	1
EF	3	KITCHEN HOOD	66	66	62	55	52	51	47	40	CUE-90-VG	2

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE GREENHECK UNLESS OTHERWISE NOTED.
3. CONTROLLER (E.G. VARIABLE FREQUENCY CONTROLLER, MOTOR STARTER) FOR SPECIFIED EQUIPMENT SHALL BE MANUFACTURED AND MARKED PER NEC WITH A MINIMUM SHORT CIRCUIT CURRENT RATING AS INDICATED.

KEYED NOTES
1. FAN TO BE PROVIDED BY SOURCE CAPTURE SYSTEM MANUFACTURER AS PART OF PACKAGED SYSTEM.
2. FAN OPERATION TO BE CONTROLLED BY HOOD AND INTERLOCKED TO MAU OPERATION. REFER TO CONTROLS DRAWINGS.

ELECTRIC MAKE-UP AIR UNIT SCHEDULE

UNIT IDENTIFICATION			SUPPLY FAN		ELECTRIC HEATING COIL				FILTER SECTION	MAXIMUM UNIT DIMENSIONS			TOTAL UNIT ELECTRICAL						MODEL	KEYED
DES.	NO.	AREA SERVED	AIRFLOW CFM	E.S.P. IN. W.G.	AIR TEMP. E.A.T. °F	AIR TEMP. L.A.T. °F	CAPACITY MBH	COIL SIZE kW	TYPE	LENGTH INCHES	HEIGHT INCHES	WIDTH INCHES	VOLTS	PHASE	FLA	MCA / MOP	SCCR KA	OPTIONS / ACCESSORIES	NUMBER	NOTES
MAU	1	KITCHEN HOOD	500	0.20	0	60	32.4	10	PLEATED	44	16	21	208	3	29	0	5	B	FER	

GENERAL NOTES:
1. REFER TO SCHEDULE GENEARL NOTES.
2. MODEL NUMBERS ARE THERMOELEC UNLESS OTHERWISE NOTED
3. DESIGN MINIMUM OUTSIDE AIRFLOW CFM (VENTILATION) LISTED IS BASED ON THE ESTIMATED MAXIMUM OCCUPANT LOAD. REFER TO TEMPERATURE CONTROL DRAWINGS FOR OUTSIDE AIR CONTROL SEQUENCE.

INTAKE HOOD SCHEDULE

UNIT IDENTIFICATION				THROAT SIZE	THROAT VELOCITY	STATIC PRESSURE DROP	HOOD SIZE			CURB HEIGHT	HOOD	MODEL	KEYED
DES.	NO.	SYSTEM SERVED	CFM	INCHES	FPM	IN. W.G.	WIDTH INCHES	LENGTH INCHES	HEIGHT INCHES	INCHES	CONSTRUCTION	NUMBER	NOTES
IH	1	TRANSPIRED COLLECTOR BYPASS	2430	24x24	608	0.10	48	36	19	18	GALVANIZED	FGI-24X24	

GENERAL NOTES:
1. MODEL NUMBERS ARE GREENHECK UNLESS OTHERWISE NOTED.
2. PROVIDE WITH BIRD SCREEN.

ELECTRIC COIL SCHEDULE

UNIT IDENTIFICATION				DUCT SIZE (IN.)			FINAL AIR TEMPERATURE		ELECTRICAL				MODEL	KEYED
DES.	NO.	CAPACITY MBH	AIRFLOW CFM	WIDTH	HEIGHT	COIL LOAD kW	°F	MODULATION / CONTROL TYPE	VOLTS	PHASE	SCCR KA	OPTIONS / ACCESSORIES	NUMBER	NOTES
EHC	1	63	1900	24	18	18.5	60	SCR	208	3	10	B	IDHE	

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE GREENHECK UNLESS OTHERWISE NOTED.

DESTRATIFICATION FAN SCHEDULE

UNIT IDENTIFICATION		FAN DIAMETER		MODULATION /	ELECTRICAL				MODEL	KEYED
DES.	NO.	INCHES	MOTOR HP	CONTROL TYPE	VOLTS	PHASE	SCCR KA	OPTIONS / ACCESSORIES	NUMBER	NOTES
F	1	56	0.1	SOLID STATE	120	1	5	---	56201CLSK	1
F	2	56	0.1	SOLID STATE	120	1	5	---	56201CLSK	1
F	3	56	0.1	SOLID STATE	120	1	5	---	56201CLSK	1

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE MARLEY ENGINEERED PRODUCTS UNLESS OTHERWISE NOTED.

KEYED NOTES:
1. PROVIDE SOLID STATE WALL CONTROLLER.

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Sheet M7.12

TEMPERATURE CONTROL - SYMBOLS LIST

SCHEMATIC SYMBOLS

SYMBOL	DESCRIPTION
AFC	AIR FLOW CONTROLLER
AQ	AQUASTAT, STRAP ON BULB
CO2	CARBON DIOXIDE SENSOR – WALL MOUNTED
CO2	CARBON DIOXIDE SENSOR – DUCT MOUNTED
CO	CARBON MONOXIDE SENSOR – WALL MOUNTED
CO	CARBON MONOXIDE SENSOR – DUCT MOUNTED
CS	CURRENT SWITCH
CT	CURRENT TRANSMITTER
	DAMPER – INLET VANES
	DAMPER – OPPOSED BLADE
	DAMPER – PARALLEL BLADE
M	DAMPER MOTOR
M	DAMPER MOTOR W/ POSITIVE POSITIONER
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DPS	DIFFERENTIAL PRESSURE SWITCH
EP	ELECTRIC–PNEUMATIC RELAY
EPT	ELECTRIC TO PNEUMETIC TRANSDUCER
CM	FIRE ALARM SYSTEM, ADDRESSABLE CONTROL MODULE
IM	FIRE ALARM SYSTEM, ADDRESSABLE INTERFACE MODULE
FMS	FLOW MEASURING STATION
FM	FLOW METER
FS	FLOW SWITCH
FZ	FREEZESTAT
F	GAUGE – FLOW
P	GAUGE – PRESSURE
T	GAUGE – TEMPERATURE
	GUARD FOR STAT OR SENSOR
	HUMIDIFIER
H	HUMIDISTAT OR HUMIDITY SENSOR (AS DEFINED ON TC DRAWINGS)
H	HUMIDITY SENSOR, DUCT MOUNTED
LVL	LEVEL SWITCH OR TRANSMITTER
LS	LIMIT SWITCH
	LINE – ELECTRIC
	LINE – PNEUMATIC
M	MAIN CONTROL AIR SUPPLY
M/S	MOTOR STARTER
OS	OCCUPANCY SENSOR
R	PILOT LIGHT OR BEACON R – RED LENS A – AMBER LENS B – BLUE LENS G – GREEN LENS
PE	PNEUMATIC–ELECTRIC SWITCH
PS	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
R	RELAY, ELECTRIC
N	SELECTOR SWITCH, (N=NUMBER OF POSITIONS)
AI	SIGNAL – DDC/BAS, ANALOG INPUT
AO	SIGNAL – DDC/BAS, ANALOG OUTPUT
DI	SIGNAL – DDC/BAS, DIGITAL INPUT
DO	SIGNAL – DDC/BAS, DIGITAL OUTPUT
AI	SIGNAL – PACKAGED EQUIPMENT, ANALOG INPUT
AO	SIGNAL – PACKAGED EQUIPMENT, ANALOG OUTPUT
DI	SIGNAL – PACKAGED EQUIPMENT, DIGITAL INPUT
DO	SIGNAL – PACKAGED EQUIPMENT, DIGITAL OUTPUT

SCHEMATIC SYMBOLS (CONT.)

SYMBOL	DESCRIPTION
DD	SMOKE DETECTOR – DUCT MOUNTED
SD	SMOKE DETECTOR – SPACE MOUNTED
S/S	START/STOP RELAY
SPT	STATIC PRESSURE TRANSMITTER
SP	STATIC PRESSURE SENSOR OR PROBE
SW	SWITCH
T	TEMPERATURE SENSOR – RIGID ELEMENT IN WELL
T	TEMPERATURE SENSOR – STRAP ON BULB
T	TEMPERATURE SENSOR – DUCT MOUNTED AVG ELEMENT
T	TEMPERATURE SENSOR – DUCT MOUNTED RIGID ELEMENT
T	THERMOSTAT OR TEMPERATURE SENSOR (AS DEFINED ON TC DRAWINGS)
T N	THERMOSTAT FOR NIGHT SETBACK
TMR	TIMER SWITCH
XF	TRANSFORMER
	VALVE – 2 WAY CONTROL VALVE
	VALVE – 3 WAY CONTROL VALVE
M	VALVE – 2 WAY CONTROL W/ POSITIONER
M	VALVE – 3 WAY CONTROL W/ POSITIONER
VFC	VARIABLE FREQUENCY CONTROLLER
VS	VELOCITY SENSOR
VIB	VIBRATION SWITCH
V	VOLTAGE SENSOR

WIRING SYMBOLS

SYMBOL	DESCRIPTION
	AUDIBLE DEVICE (AS DEFINED ON TC DRAWINGS)
M/S	COIL – MOTOR STARTER CONTACTOR
R	COIL – RELAY
TDR	COIL – TIME DELAY RELAY
VFC	COIL – VARIABLE SPEED DRIVE CONTACTOR
	COIL – EP OR SOLENOID VALVE
	CONTACT – INSTANT OPERATING, NO
	CONTACT – INSTANT OPERATING, NC
	CONTACT – TIMED AFTER COIL IS ENERGIZED, NOTC
	CONTACT – TIMED AFTER COIL IS ENERGIZED, NCTO
	CONTACT – TIMED AFTER COIL IS DE–ENERGIZED, NOTO
	CONTACT – TIMED AFTER COIL IS DE–ENERGIZED, NCTC
	GROUND
	MOTOR, SINGLE PHASE
R	PILOT LIGHT OR BEACON R – RED LENSE A – AMBER LENS B – BLUE LENSE G – GREEN LENS
R	PILOT LIGHT, WITH PUSH–TO–TEST
	PUSH BUTTON – MOMENTARY CONTACT, NO
	PUSH BUTTON – MOMENTARY CONTACT, NC
	PUSH BUTTON – MOMENTARY CONTACT, NO & NC
	PUSH BUTTON – MOMENTARY, NO (MUSHROOM HEAD)
	PUSH BUTTON – MOMENTARY, NC (MUSHROOM HEAD)

WIRING SYMBOLS (CONT.)

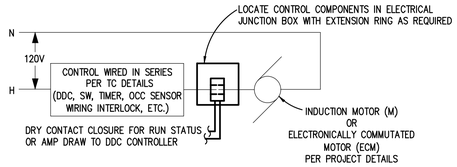
SYMBOL	DESCRIPTION
1 2	SWITCH – 2 POSITION SELECTOR
H O A	SWITCH – 3 POSITION SELECTOR HAND/OFF/AUTO
	SWITCH – FLOW (AIR, WATER, ETC.), NO
	SWITCH – FLOW (AIR, WATER, ETC.), NC
	SWITCH – LIMIT, NO
	SWITCH – LIMIT, NO, HELD CLOSED
	SWITCH – LIMIT, NC
	SWITCH – LIMIT, NC, HELD OPEN
	SWITCH – LIQUID LEVEL, NO
	SWITCH – LIQUID LEVEL, NC
	SWITCH – MANUAL SPST, NO
	SWITCH – MANUAL DPST, NO
	SWITCH – MANUAL SPST, NC
	SWITCH – MANUAL DPST, NC
	SWITCH – MANUAL SPDT
	SWITCH – MANUAL DPDT
	SWITCH – PRESSURE & VACUUM, NO
	SWITCH – PRESSURE & VACUUM, NC
	SWITCH – TEMPERATURE ACTUATED, NO
	SWITCH – TEMPERATURE ACTUATED, NC
	THERMAL OVERLOAD, SINGLE PHASE
OLs	THERMAL OVERLOAD CONTACTS – 3 PHASE
	TRANSFORMER
	WIRE TERMINATION AT DEVICE
	WIRE TO WIRE TERMINATION
	WIRING NOT CONNECTED

ABBREVIATIONS

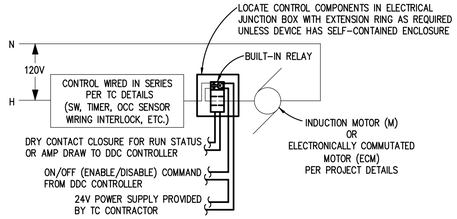
ABBREVIATION	DESCRIPTION
BAS	BUILDING AUTOMATION SYSTEM
DDC	DIRECT DIGITAL CONTROL
TC	TEMPERATURE CONTROLS
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
NOTO	NORMALLY OPEN TIMED OPEN
NOTC	NORMALLY OPEN TIMED CLOSED
NCTO	NORMALLY CLOSED TIMED OPEN
NCTC	NORMALLY CLOSED TIMED CLOSED
SPST	SINGLE POLE SINGLE THROW
SPDT	SINGLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DPDT	DOUBLE POLE DOUBLE THROW

NOTES:

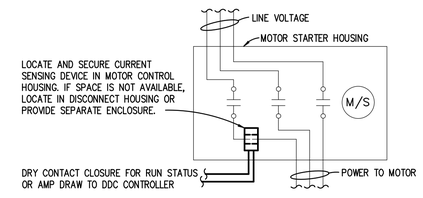
1. SOME SYMBOLS & ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT.
2. REFER TO MECHANICAL STANDARDS ON DRAWING M0.1 FOR ADDITIONAL SYMBOLS & ABBREVIATIONS THAT MAY BE USED ON TEMPERATURE CONTROL DRAWINGS.



1-PHASE POWER APPLICATION - DDC MONITORING



1-PHASE POWER APPLICATION - COMBO DDC MONITORING & CONTROL



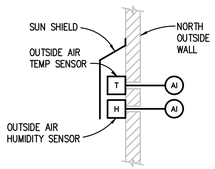
3-PHASE POWER APPLICATION - DDC MONITORING

CURRENT SWITCH INSTALLATION DETAILS

TYPICAL

NOTES:

1. CURRENT SWITCH (CS) OR CURRENT TRANSDUCER (CT) AMP MONITORING AS APPLICABLE PER CONTROL DETAILS SHALL BE INSTALLED FOR DDC SYSTEM STATUS INDICATION OF FAN OR PUMP OPERATION. APPROPRIATE TIME DELAY FOR STATUS FEEDBACK UPON DDC START AND STOP COMMANDS SHALL BE INCLUDED WITH THE DDC LOGIC TO AVOID NUISANCE OPERATIONAL ALARMS.
2. REVIEW EQUIPMENT SHOP DRAWINGS TO DETERMINE POTENTIAL AMPERAGE RANGE OF FAN OR PUMP OPERATION FOR AMPERAGE TRIP SETTING REQUIREMENTS PRIOR TO SELECTING APPROPRIATE CURRENT SWITCH (MINIMUM SPEED AMPERAGE FOR FPTU WITH ECM CAN BE VERY LOW).
3. FOR ECM CURRENT SWITCH APPLICATIONS: PROVIDE CURRENT SWITCH RATED FOR ECM OPERATION WITH AMPERAGE TRIP SETTING HIGHER THAN TRICKLE/IDLE/STANDBY AMPERAGE ASSOCIATED WITH ECM WHEN OFF AND AMPERAGE TRIP SETTING LOWER THAN THE MINIMUM SPEED OPERATION OF FAN OR PUMP AS SET BY THE TAB CONTRACTOR.
4. FOR INDUCTION MOTOR CURRENT SWITCH APPLICATIONS (AS APPLICABLE): AMPERAGE TRIP SETTING SHALL BE ADJUSTABLE TO ACCOMMODATE VFC MINIMUM SPEED SETTING, TO DETECT FAN BELT LOSS, OR TO DETECT PUMP COUPLING DETACHMENT.
5. WHEN FAN OR PUMP IS ON AND NOT IN ALARM, DDC SYSTEM SHALL TOTALIZE RUN TIME HOURS FOR OPERATOR INFORMATION FROM BUILDING AUTOMATION SYSTEM OPERATOR INTERFACE.

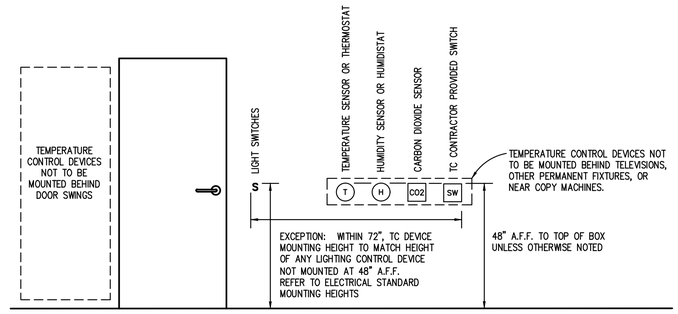


OA SENSOR INSTALLATION DETAIL

NO SCALE

NOTES:

1. TC CONTRACTOR HAS THE OPTION OF USING EXISTING OA TEMP AND HUMIDITY SENSORS AS AVAILABLE FOR BUILDING.
2. CALCULATE OA ENTHALPY OR DEW POINT TEMPERATURE AS REQUIRED PER SEQUENCE OF OPERATION REQUIREMENTS.
3. BROADCAST OUTSIDE AIR TEMPERATURE, HUMIDITY, AND CALCULATED OA ENTHALPY OR DEWPOINT TEMPERATURE, AS REQUIRED, THROUGH BAS COMMUNICATION NETWORK TO CONTROLLERS REQUIRING INFORMATION FOR DDC PROGRAMMING LOGIC.



TC DEVICE STANDARD MOUNTING HEIGHTS DETAIL

NO SCALE

TC GENERAL NOTES

1. THESE GENERAL NOTES SHALL BE APPLICABLE FOR ALL TEMPERATURE CONTROL (TC) DRAWINGS.
2. "PROVIDE" IS DEFINED AS "FURNISH AND INSTALL".
3. TEMPERATURE CONTROLS CONTRACTOR (TC CONTRACTOR) SHALL BE RESPONSIBLE TO COMPLY WITH ALL APPLICABLE CODES AND STANDARDS.
4. FOR TEMPERATURE CONTROL DRAWINGS ONLY: ALL DETAILED INFORMATION IDENTIFIED WITH HEAVY LINE WEIGHT SHALL BE PROVIDED BY TC CONTRACTOR. ALL OTHER INFORMATION IDENTIFIED WITH LIGHT LINE WEIGHT SHALL BE PROVIDED BY OTHER TRADES.
5. ALL CONTROL SCHEMATICS AND WIRING DIAGRAMS ARE FOR THE CLARIFICATION OF EQUIPMENT INTERLOCKING FUNCTIONS AND THE INTERFACE OF VARIOUS CONTRACTORS' WORK AND SHALL NOT BE MISTAKEN AS SHOP DRAWINGS FOR ACTUAL INSTALLATION.
6. TC CONTRACTOR SHALL PROVIDE DDC CONTROLLERS AS REQUIRED TO MEET INTENT OF DESIGN DOCUMENTS. REFER TO THE PLANS FOR THE DDC FUNCTIONS THAT APPLY TO EACH MECHANICAL SYSTEM.
7. ALL TC PROVIDED COMPONENTS AND ALL TC CONTRACTOR INSTALLED WIRING SHALL BE LABELED PER SPECIFICATIONS.
8. ALL WIRING AND SYSTEM CONTROL VOLTAGES SHALL BE IN ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S RECOMMENDATION AND THE ELECTRICAL SPECIFICATIONS.
9. VARIABLE FREQUENCY CONTROLLER, FAN AND PUMP MOTOR STARTERS, STARTER WIRING, CONTROL VOLTAGE TRANSFORMERS AND ASSOCIATED POWER WIRING SHALL BE PROVIDED BY OTHER TRADES.
10. DUCT SMOKE DETECTORS SHALL BE FURNISHED, INSTALLED AND WIRED TO THE FIRE ALARM SYSTEM BY THE ELECTRICAL CONTRACTOR. ELECTRICAL SHALL PROVIDE FIRE ALARM SYSTEM CONTROL MODULES FOR REQUIRED SAFETIES TO MOTOR STARTERS OR VFC'S AS INDICATED. CONTROL MODULES SHALL BE LOCATED NEAR RESPECTIVE MOTOR STARTERS OR VFCs. TC CONTRACTOR SHALL PROVIDE INTERLOCK WIRING FROM CONTROL MODULES TO MOTOR STARTERS OR VFCs.
11. ALL DDC AND CONTROL INTERLOCK WIRING SHALL BE BY TC CONTRACTOR UNLESS OTHERWISE NOTED. TC CONTRACTOR SHALL COORDINATE WITH VFC AND MOTOR STARTER SUPPLIERS TO DETERMINE EXACT WIRING REQUIREMENTS AND TERMINATION POINTS.
12. ALL DDC AND CONTROL INTERLOCK WIRING BETWEEN COMPONENTS SHALL BE INSTALLED WITHOUT INTERMEDIATE STOPS. WIRE SPLICING AT INTERMEDIATE TERMINAL STRIPS IS NOT ACCEPTABLE.
13. ALL ELECTRICAL WIRING AND RACEWAY SYSTEMS SHALL COMPLY WITH ELECTRICAL SPECIFICATION REQUIREMENTS. WHERE RACEWAY IS REQUIRED, TWO SEPARATE ELECTRICAL RACEWAY SYSTEMS SHALL BE PROVIDED: ONE FOR 120V WIRING AND THE OTHER FOR 24V WIRING.
14. TC CONTRACTOR SHALL BE RESPONSIBLE FOR ALL POWER SUPPLIES REQUIRED FOR TC SYSTEM UNLESS OTHERWISE NOTED. REFER TO ELECTRICAL PANEL SCHEDULES FOR SPARE CIRCUITS OR CIRCUITS DEDICATED TO TEMPERATURE CONTROLS. COORDINATE CIRCUIT USE WITH ELECTRICAL CONTRACTOR.
15. TC CONTRACTOR SHALL VERIFY EXACT LOCATION OF ALL FIELD MOUNTED COMPONENTS.
16. REFER TO TEMPERATURE CONTROLS STANDARD MOUNTING HEIGHTS DETAIL FOR ELEVATIONS OF WALL MOUNTED TEMPERATURE CONTROL DEVICES. PROVIDE WALL MOUNTED DEVICE GUARDS WHERE INDICATED ON TC DETAILS OR AT SPECIFIC LOCATIONS INDICATED ON MECHANICAL FLOOR PLANS.
17. TC CONTRACTOR SHALL PROVIDE AUXILIARY PANELS FOR REQUIRED PANEL MOUNTED EQUIPMENT SUCH AS RELAYS, TRANSDUCERS, CONTROL TRANSFORMERS, ETC. AUXILIARY PANELS SHALL BE LOCATED NEXT TO ASSOCIATED DDC PANEL. DEPENDING ON WIRE QUANTITY OR COMPLEXITY, PROVIDE CONDUITS BETWEEN PANELS OR WIRING THROUGH WITH CONDUIT STUBS ABOVE ALL ASSOCIATED PANELS.
18. REMOTELY MOUNTED FIELD DEVICES SUCH AS RELAYS, CONTROL TRANSFORMERS, ETC., SHALL BE HOUSED IN AN ENCLOSURE PROVIDED BY THE TC CONTRACTOR.
19. CONTROL TRANSFORMERS WHEN REQUIRED SHALL BE SIZED FOR 150% OF ACTUAL LOAD.
20. FREEZESTATS SHALL BE MOUNTED ON UPSTREAM FACE OF COOLING COILS. FREEZESTAT QUANTITY SHALL BE ONE PER 20 SQ. FT OF CROSS SECTIONAL AREA.
21. CURRENT SWITCHES USED FOR OPERATIONAL STATUS SHALL HAVE CURRENT THRESHOLD SETPOINT ADJUSTED TO INDICATE BELT OR DRIVE FAILURE.
22. ALL CONTROL VALVES, CONTROL DAMPERS AND ASSOCIATED CONTROL ACTUATORS IDENTIFIED ON TC DRAWINGS SHALL BE FURNISHED BY TC CONTRACTOR UNLESS OTHERWISE NOTED. DAMPER SIZE AND LOCATIONS ARE INDICATED ON MECHANICAL FLOOR PLAN DRAWINGS.
23. ALL CONTROL VALVES AND DAMPERS FURNISHED BY THE TC CONTRACTOR SHALL BE INSTALLED BY THE MECHANICAL CONTRACTOR. ALL PIPE PENETRATIONS AND BASIC FITTINGS REQUIRED FOR SENSOR INSTALLATIONS SHALL BE PROVIDED BY MECHANICAL CONTRACTOR.
24. DAMPER ACTUATORS SHALL BE INSTALLED BY TC CONTRACTOR WHEN FURNISHED BY TC CONTRACTOR.
25. ALL INSTRUMENTATION TUBING REQUIRED FOR DPS AND DPT COMPONENT INSTALLATIONS SHALL BE PROVIDED BY TC CONTRACTOR.
26. TC CONTRACTOR SHALL FIELD MOUNT ALL REQUIRED "SHIPPED LOOSE" PACKAGED CONTROL COMPONENTS FURNISHED BY EQUIPMENT SUPPLIERS WHERE INDICATED. ALL REQUIRED 24V AND 120V FIELD WIRING SHALL BE PROVIDED BY TC CONTRACTOR UNLESS NOTED OTHERWISE. TC CONTRACTOR SHALL COORDINATE SPECIFIC SYSTEM WIRING REQUIREMENTS WITH PACKAGED EQUIPMENT SUPPLIERS.

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STATE OF MICHIGAN – AARON CHRISTOPHER FRANTZ – ENGINEER – No. 6201068182 – PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: JTH Checked: ACF

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TEMPERATURE CONTROL STANDARDS AND GENERAL NOTES

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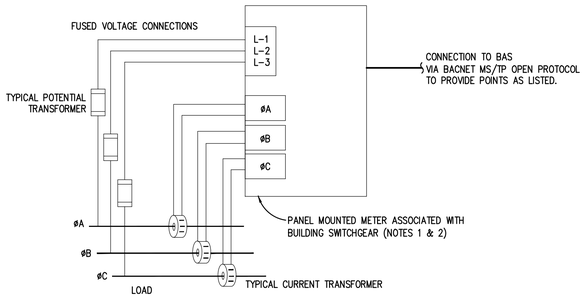


BUILDING ELECTRICAL METERING

NO SCALE

NOTES:

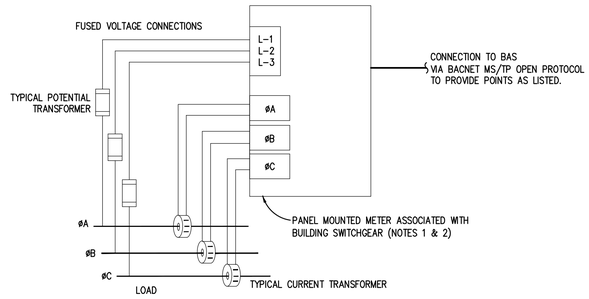
1. APPLICABLE FOR NEW BUILDING ELECTRICAL SUBSTATION INSTALLATIONS. REFER TO ELECTRICAL DETAILS FOR ELECTRICAL SERVICE CAPACITY.
2. METER WITH BACnet INTERFACE CAPABILITY SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR.

SEQUENCE OF OPERATION:

1. METERS SHALL PROVIDE DATA AS REQUIRED FOR THE TWO GRAPHICAL ENERGY DASHBOARDS AS SHOWN ON THIS SHEET.

POINTS LIST:

1. KWH CONSUMPTION
2. KW DEMAND
3. KVAR REACTIVE POWER
4. KVA APPARENT POWER
5. POWER FACTOR
6. VOLTAGE: A TO B, B TO C, A TO C
7. AMPERAGE, EACH PHASE



SOLAR GENERATION METERING

NO SCALE

NOTES:

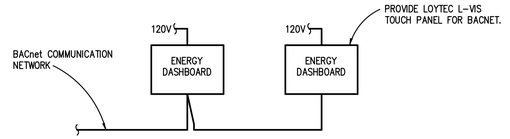
1. APPLICABLE FOR NEW BUILDING ELECTRICAL SUBSTATION INSTALLATIONS. REFER TO ELECTRICAL DETAILS FOR ELECTRICAL SERVICE CAPACITY.
2. METER WITH BACnet INTERFACE CAPABILITY SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR.

SEQUENCE OF OPERATION:

1. METERS SHALL PROVIDE DATA AS REQUIRED FOR THE TWO GRAPHICAL ENERGY DASHBOARDS AS SHOWN ON THIS SHEET.

POINTS LIST:

1. KWH PRODUCTION
2. KVAR REACTIVE POWER
3. KVA APPARENT POWER
4. POWER FACTOR
5. VOLTAGE: A TO B, B TO C, A TO C
6. AMPERAGE, EACH PHASE



GRAPHICAL ENERGY DASHBOARD

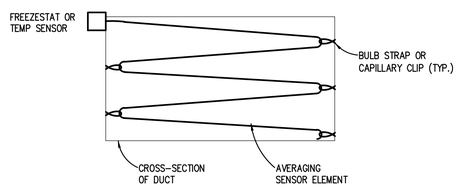
TYPICAL

NOTES:

1. REFER TO MECHANICLA DRAWINGS FOR LOCATION.

SEQUENCE OF OPERATION:

1. DDC SHALL PROVIDE ENERGY DASHBOARD TO INDICATE BUILDING POWER GENERATION AND DEMAND (CURRENT AND TOTALED).
   1.1. TOTALS SHALL BE DAILY, MONTHLY, ANNUALLY, AND LIFETIME.

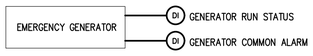


AVERAGING ELEMENT INSTALLATION DETAIL

TYPICAL

NOTES:

1. FREEZESTAT QUANTITY SHALL BE ONE PER 20 SQ. FT. OF CROSS-SECTIONAL AREA.
2. AVERAGING DDC SENSOR QUANTITY SHALL BE SUFFICIENT TO COVER AND SENSE THE CROSS-SECTIONAL AREA.
3. PROVIDE REQUIRED CAPILLARY STRAP OR CLIPS TO SUPPORT SENSOR TO PREVENT VIBRATION FROM AIR MOVEMENT.
4. PROVIDE PROTECTION AT EACH CAPILLARY STRAP OR CLIP TO PREVENT ABRASION TO CAPILLARY.



EMERGENCY GENERATOR MONITORING

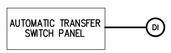
TYPICAL

NOTES:

1. DRY CONTACTS FOR REMOTE SYSTEM MONITORING SHALL BE PROVIDED WITH GENERATOR SYSTEM. COORDINATE WIRING REQUIREMENTS WITH SYSTEM SUPPLIER.
2. REFER TO DRAWINGS FOR GENERATOR SYSTEM SYSTEM PANEL LOCATION.

SEQUENCE OF OPERATION:

1. DDC SHALL MONITOR EACH GENERATOR SYSTEM FOR FOR BAS DISPLAY OF COMMON ALARM AND RUNNING STATUS.



AUTOMATIC TRANSFER SWITCH MONITORING

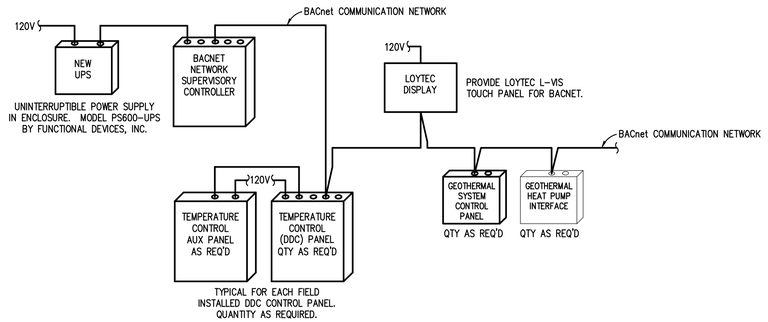
TYPICAL

NOTES:

1. DRY CONTACTS FOR REMOTE TRANSFER SWITCH MONITORING SHALL BE PROVIDED WITH SYSTEM. COORDINATE WIRING REQUIREMENTS WITH SYSTEM SUPPLIER.
2. REFER TO ELECTRICAL DRAWINGS FOR AUTOMATIC TRANSFER SWITCH (ATS) LOCATIONS.

SEQUENCE OF OPERATION:

1. DDC SHALL MONITOR EACH ATS CONTACT FOR BAS DISPLAY INDICATING "ON COMMERCIAL POWER" AND "ON GENERATOR POWER."



DDC SYSTEM ARCHITECTURE

NO SCALE

NOTES:

1. REFER TO TEMPERATURE CONTROL SCHEMATICS FOR THE REQUIRED DDC POINTS ASSOCIATED FOR EACH SYSTEM.
2. THE TC CONTRACTOR SHALL PROVIDE THE BUILDING AUTOMATION SYSTEM (BAS) FOR HVAC SYSTEMS AND ASSOCIATED AND/OR RELATED CONTROLS AND BACNET INTEGRATION OF HVAC AND RELATED SYSTEMS AND EQUIPMENT. THE TEMPERATURE CONTROLS (TC) CONTRACTOR SHALL PROVIDE THE ASSOCIATED COMPONENTS AS INDICATED.
3. TC CONTRACTOR SHALL DETERMINE DDC PANEL QUANTITY BASED ON POINT DENSITIES AND AVAILABLE MOUNTING SPACE, PANEL COMPONENTS, CONFIGURATION AND SIZE REQUIREMENTS WITH THE OWNER'S REPRESENTATIVE (OR ARCHITECT).
4. THE TC CONTRACTOR SHALL COORDINATE TERMINATION REQUIREMENTS FOR POWER SUPPLY TO HVAC SYSTEM CONTROLS AND COMMUNICATION WIRING FOR BAS INTEGRATION TO HVAC AND RELATED SYSTEMS AND EQUIPMENT. TC CONTRACTOR SHALL PROVIDE REQUIRED PROGRAMMING FOR HVAC SYSTEM CONTROLS. TC CONTRACTOR SHALL LOCATE DDC PANELS AND COORDINATE WITH OTHER TRADES.
5. TC CONTRACTOR SHALL PROVIDE REQUIRED 120V POWER SUPPLIES FROM SPARE CIRCUITS IDENTIFIED ON ELECTRICAL PANEL SCHEDULES. COORDINATE WITH ELECTRICAL CONTRACTOR. REFER TO ELECTRICAL DRAWINGS FOR PANEL SCHEDULES AND PANEL LOCATIONS.
6. TC CONTRACTOR SHALL PROVIDE 24V TRANSFORMERS AS REQUIRED FOR DDC CONTROLLERS LOCATED IN MECHANICAL OR ELECTRICAL ROOMS – COORDINATE LOCATIONS. MAXIMUM TRANSFORMER SIZE SHALL BE 100VA. PROVIDE ENCLOSURE(S) FOR TRANSFORMERS.
7. TC CONTRACTOR SHALL BE RESPONSIBLE TO INTEGRATE PROJECT RELATED HVAC CONTROLLERS PROVIDED BY EQUIPMENT MANUFACTURERS AS SHOWN ON M8 DRAWINGS FOR CONTROL BY BUILDING OPERATORS.
8. TC CONTRACTOR SHALL PROVIDE TIME OF DAY SCHEDULING FUNCTIONS, TRENDING, ALARM MONITORING, AND TREND DATA FOR CONTROLLERS THAT REQUIRE THEM.
9. BUILDING DDC NETWORK SHALL BE CONNECTED TO THE LOYTEC DISPLAY FOR OWNER'S USE TO MONITOR SYSTEMS/SUBSYSTEMS, TIME OF DAY SCHEDULES, ALARM REPORTS, CHANGE SETPOINTS, ETC. TC CONTRACTOR SHALL PROVIDE NETWORK COMMUNICATION CONTROLLER PANEL COMPATIBLE FOR THIS CONNECTION.
10. TC CONTRACTOR SHALL PROVIDE INTEGRATION OF 3RD PARTY HVAC EQUIPMENT CONTROLLERS PROVIDED BY HVAC EQUIPMENT MANUFACTURERS.
11. TC CONTRACTOR SHALL PROVIDE AUXILIARY PANEL FOR GAUGES, TRANSMITTERS, RELAYS, POWER TRANSFORMERS, ETC.
12. TC CONTRACTOR SHALL PROVIDE GRAPHICS ASSOCIATED WITH FIELD INSTALLED AND 3RD PARTY BACNET DDC CONTROLLERS FOR THE HVAC SYSTEM AND ASSOCIATED AND/OR RELATED CONTROLS.
13. BACNET NETWORK SUPERVISORY CONTROLLER, GENERATOR ATS MONITOR, AND ECUH CONTROLLER SHALL BE POWERED FROM UPS.

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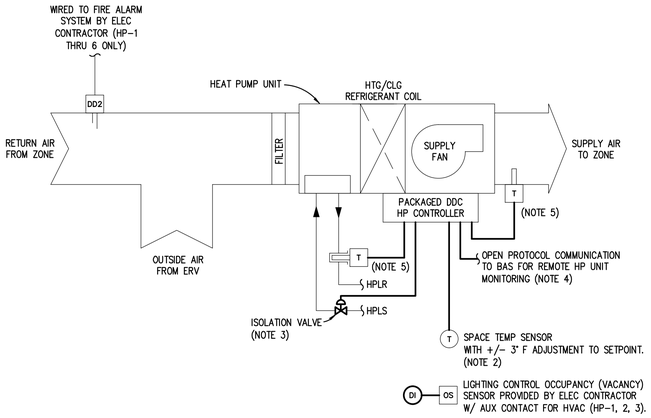


GEOTHERMAL HEAT PUMP UNIT CONTROL

TYPICAL

NOTES:

1. REFER TO SHEET METAL PLANS FOR QUANTITY OF UNITS AND LOCATIONS OF ASSOCIATED ZONE SPACE TEMP SENSORS.
2. SPACE TEMP SENSOR FURNISHED BY HEAT PUMP UNIT SUPPLIER AND FIELD INSTALLED BY TC CONTRACTOR. REFER TO FLOOR PLANS FOR LOCATION.
3. TC CONTRACTOR SHALL PROVIDE CONTROL VALVE FOR WATER SOURCE LOOP ISOLATION VALVE AND WIRE TO PACKAGED CONTROLS. SELECT VALVE TO ACHIEVE THE SCHEDULED FLOW RATE. COORDINATE CONTROL SIGNAL REQUIREMENTS AND TERMINATIONS WITH HEAT PUMP UNIT SUPPLIER.
4. OPEN PROTOCOL COMMUNICATION PREFERENCE IS BACNET.
5. TC CONTRACTOR SHALL FIELD INSTALL DISCHARGE AIR TEMP AND LEAVING WATER TEMP SENSORS FURNISHED BY HEAT PUMP UNIT SUPPLIER. COORDINATE WIRING REQUIREMENTS.

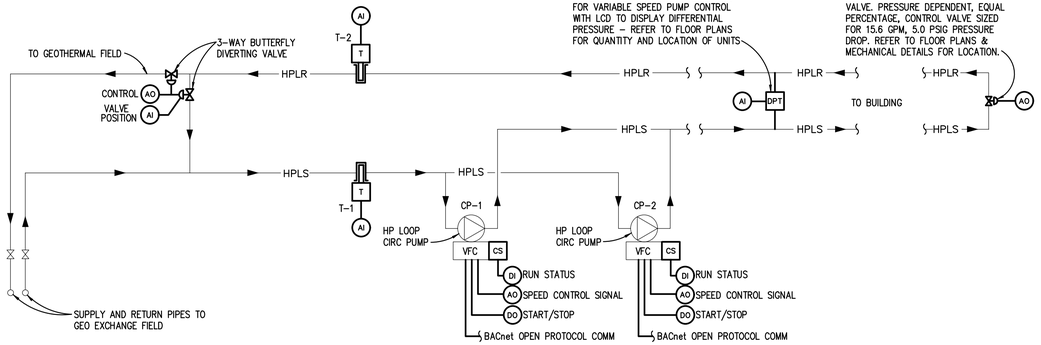
SEQUENCE OF OPERATION – GEOTHERMAL HEAT PUMP UNIT (TYPICAL):

NOTE: HEAT PUMP UNIT SHALL INCLUDE PACKAGED CONTROLS. THE FOLLOWING SEQUENCE DESCRIBES THE BAS INTERFACE AND OTHER INTERLOCKING FUNCTIONS WHERE APPLICABLE.

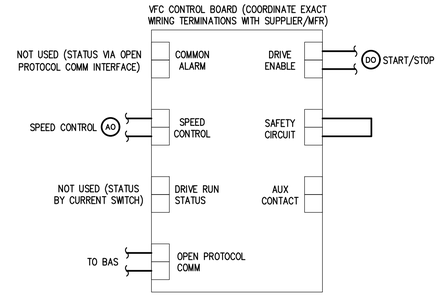
1. HEAT PUMP UNIT FAN SHALL RUN CONTINOUSLY IN OCCUPIED MODE. HEAT PUMP UNIT FAN SHALL CYCLE ON & OFF IN UNOCCUPIED MODE TO MAINTAIN REPSECTIVE ZONE HEATING OR COOLING SETPOINT. BAS SHALL CONTROL OCCUPIED/UNOCCUPIED/STANDBY MODES THRU BAS INTEGRATION BASED ON SCHEDULED OCC/UNOCC SCHEDULING AND OCCUPANCY (VACANCY) SENSOR MONITORING FOR STANDBY MODE. UPON INTEGRATION COMMUNICATION FAILURE, THE HEAT PUMP DEFAULT SHALL BE OCCUPIED MODE.
2. HEAT PUMP UNIT COMPRESSOR SHALL CYCLE ON & OFF TO MAINTAIN RESPECTIVE ZONE HEATING OR COOLING SETPOINT. BAS SHALL CONTROL OCCUPIED/UNOCCUPIED/STANDBY MODES THRU BAS INTEGRATION BASED ON SCHEDULED OCC/UNOCC SCHEDULING AND OCCUPANCY (VACANCY) SENSOR MONITORING FOR STANDBY MODE. UPON INTEGRATION COMMUNICATION FAILURE, THE HEAT PUMP DEFAULT SHALL BE OCCUPIED MODE.
3. WHEN SPACE TEMP RISES ABOVE COOLING SETPOINT, THE HEAT PUMP UNIT CONTROLLER SHALL SWITCH REVERSING VALVE TO COOLING MODE, OPEN WATER SOURCE HEAT PUMP LOOP VALVE AND ACTIVATE COMPRESSOR TO ACHIEVE SETPOINT.
4. WHEN SPACE TEMP FALLS BELOW HEATING SETPOINT; THE HEAT PUMP UNIT CONTROLLER SHALL SWITCH REVERSING VALVE TO HEATING MODE (FAIL SAFE POSITION), OPEN WATER SOURCE HEAT PUMP LOOP VALVE AND ACTIVATE COMPRESSOR TO ACHIEVE SETPOINT.
5. FOR INITIAL SETUP, ZONE SPACE TEMPERATURE (GLOBAL) SETPOINTS SHALL BE AS FOLLOWS:

   HEATING OCCUPIED SETPOINT = 71°F
   HEATING STANDBY SETPOINT = 69°F
   HEATING UNOCCUPIED SETPOINT = 60°F
   COOLING OCCUPIED SETPOINT = 75°F
   COOLING STANDBY SETPOINT = 77°F
   COOLING UNOCCUPIED SETPOINT = 85°F

   OCCUPIED SPACE TEMPERATURE SETPOINTS SHALL BE ADJUSTABLE THRU LOCAL SPACE TEMPERATURE SENSOR. UNOCCUPIED SETPOINTS SHALL BE ADJUSTABLE THRU BAS INTEGRATION
6. HEAT PUMP UNIT CONTROLLER SHALL OVERRIDE COMPRESSOR AS REQUIRED TO PREVENT DISCHARGE AIR TEMPERATURE FROM DROPPING BELOW LOW LIMIT SETPOINT OF 45°F FOR COOLING MODE AND 65°F FOR HEATING MODE.
7. WHEN HEAT PUMP IS DEACTIVATED, THE WATER SOURCE HEAT PUMP LOOP VALVE SHALL REMAIN CLOSED.
8. DUCT SMOKE DETECTOR(S) SHALL DEACTIVATE SF AND EF WHEN PRODUCTS OF COMBUSTION ARE DETECTED.
9. HEAT PUMP UNIT DIAGNOSTICS SHALL BE COMMUNICATED TO BAS THROUGH OPEN PROTOCOL CONNECTION. COORDINATE WITH HEAT PUMP UNIT SUPPLIER THE STATUS AND ALARM INFORMATION THAT IS AVAILABLE TO MONITOR.



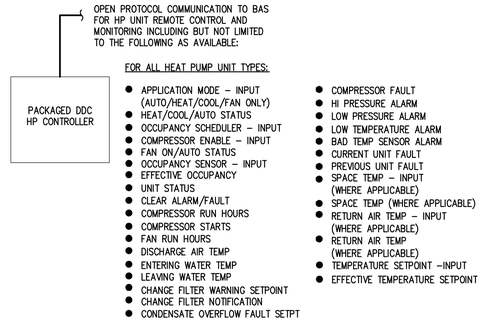
GEO-THERMAL HEAT PUMP LOOP CONTROL



HEAT PUMP LOOP PUMPS CP-1 & 2

TYPICAL

NOTE: WIRING DETAIL IDENTIFIES INTENT AND DOES NOT INDICATE ACTUAL WIRING REQUIREMENTS. CONSULT WITH VFC SUPPLIER FOR THE ACTUAL WIRING REQUIREMENTS.



HEAT PUMP UNIT BAS INTEGRATION

TYPICAL

NOTES:

1. OPEN PROTOCOL COMMUNICATION PREFERENCE IS LONWORKS. BACNET IS ALTERNATIVE CHOICE IF LONWORKS IS NOT AN AVAILABLE OPTION WITH THE HP PACKAGED CONTROLS.
2. COORDINATE WITH HEAT PUMP UNIT SUPPLIER FOR EXACT SETPOINT AND MONITOR POINTS AVAILABLE THROUGH OPEN PROTOCOL INTERFACE FOR EACH SPECIFIC HEAT PUMP UNIT TYPE.

SEQUENCE OF OPERATION

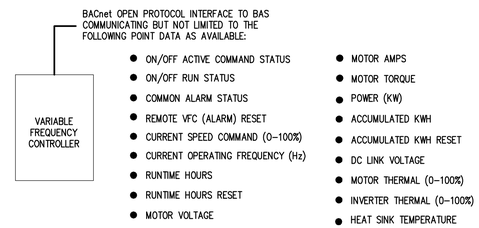
GEOTHERMAL HEAT PUMP LOOP SYSTEM:

NOTE: ALL SETPOINTS AND TIME INTERVALS SETPOINTS DESCRIBED IN SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).

1. HEAT PUMP LOOP SYSTEM SHALL BE ACTIVATED FOR CONTINUOUS OPERATION DURING BUILDING OCCUPANCY. BUILDING IS OCCUPIED 24/7.
2. HEAT PUMP LOOP CIRC PUMPS CP-1 & 2 SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. ONE OF THE TWO PUMPS SHALL BE ACTIVATED BY DDC TO OPERATE CONTINUOUSLY. THE OTHER WILL SERVE AS STANDBY.
3. DDC SHALL ALTERNATE PUMP OPERATION BASED ON RUNTIME HOURS OR AT THE BEGINNING OF EACH MONTH – OPERATOR SELECTABLE.
4. DDC SHALL MONITOR OPERATING STATUS OF EACH PUMP. UPON PUMP FAILURE, DDC SHALL ACTIVATE FAILURE ALARM AND AUTOMATICALLY START THE STANDBY PUMP.
5. VFC COMMON FAILURE ALARM FOR EACH CIRC PUMP SHALL BE MONITORED BY DDC THRU BACNET OPEN PROTOCOL COMMUNCIATION AT RESPECTIVE PUMP VFC.
6. DDC SHALL MODULATE THE VARIABLE SPEED DRIVE OF ACTIVATED HEAT PUMP LOOP CIRC PUMP TO MAINTAIN LOOP DIFFERENTIAL PRESSURE SETPOINT TO BE DETERMINED AT SYSTEM BALANCING.
7. HEAT PUMP LOOP SUPPLY TEMPERATURE MAY VARY BETWEEN 34°F FOR FULL HEATING DEMAND AND 90°F FOR FULL COOLING DEMAND. 3-WAY DIVERTING VALVE CONTROL WITH DEADBAND LOGIC OF 50°F TO 70°F SHALL BE USED TO BYPASS THE GEOTHERMAL FIELD FOR INCREASED ENERGY EFFICIENCY DURING PERIODS WHEN SIMULTANEOUS HEATING AND COOLING IS REQUIRED WITHIN THE BUILDING. DDC SHALL MODULATE 3-WAY DIVERTING VALVE AS FOLLOWS:

   A. WHEN HEAT PUMP LOOP SUPPLY TEMP (T-1) DROPS BELOW 50°F, DDC SYSTEM SHALL MODULATE THE DIVERTING VALVE WITH DIRECT ACTING CONTROL TO MAINTAIN A HEAT PUMP LOOP SUPPLY TEMP (T-1) OF 50°F. WHEN LOOP SUPPLY TEMP DROPS BELOW SETPOINT, BYPASS VALVE SHALL BE MODULATED OPEN TO GEOTHERMAL FIELD. WHEN LOOP SUPPLY TEMP RISES ABOVE SETPOINT, BYPASS VALVE SHALL BE MODULATED CLOSED TO BYPASS GEOTHERMAL FIELD.

   B. WHEN HEAT PUMP LOOP SUPPLY TEMP (T-1) RISES ABOVE 70°F, DDC SYSTEM SHALL MODULATE THE DIVERTING VALVE WITH REVERSE ACTING CONTROL TO MAINTAIN A HEAT PUMP LOOP SUPPLY TEMP (T-1) OF 70°F. WHEN LOOP SUPPLY TEMP RISES ABOVE SETPOINT, BYPASS VALVE SHALL BE MODULATED OPEN TO GEOTHERMAL FIELD. WHEN LOOP SUPPLY TEMP DROPS BELOW SETPOINT, BYPASS VALVE SHALL BE MODULATED CLOSED TO BYPASS GEOTHERMAL FIELD.
8. DDC SHALL MONITOR 3-WAY DIVERTING VALVE POSITION FOR DIAGNOSTIC PURPOSES.



VFC BACnet INTERFACE & MONITORING REQUIREMENTS

TYPICAL FOR NEW FAN & PUMP VFCs

NOTE:

TC CONTRACTOR SHALL COORDINATE BACnet OPEN PROTOCOL WIRE TERMINATION REQUIREMENTS AND POINT INTEGRATION CAPABILITIES WITH VFC SUPPLIER/MANUFACTURER AND PROVIDE APPROPRIATE BAS COMPONENTS FOR COMMUNICATION INTERFACE TO BAS.

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LICENSED PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: JTH Checked: ACF

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

TEMPERATURE CONTROLS

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115 1/2 E. LIBERTY STREET
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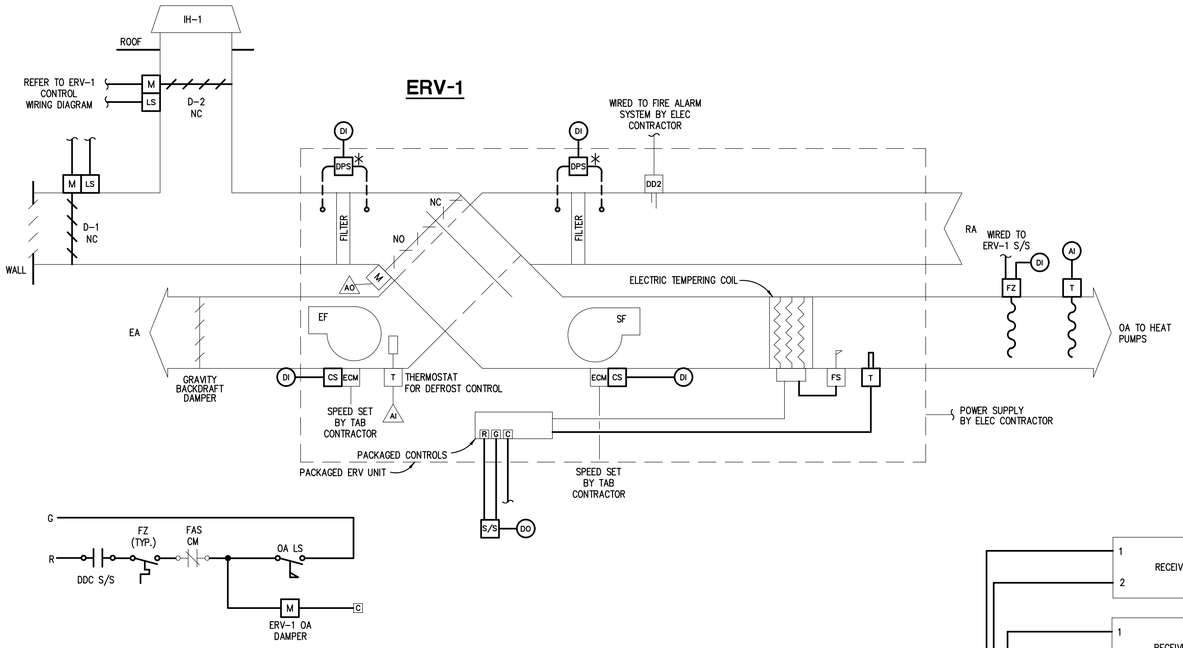
COLLABORATIVE ARCHITECTURE

Sheet M8.03



ERV-1 CONTROL WIRING

ERV-1 CONTROLS

NOTES:

1. ✳ INDICATES PANEL MOUNTED COMPONENT.
2. DAMPERS SHALL BE FURNISHED AND FACTORY INSTALLED BY TC CONTRACTOR. TC CONTRACTOR SHALL PROVIDE DAMPER ACTUATORS.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE FIRE ALARM SYSTEM COMPONENTS AND WIRING FROM FIRE ALARM PANEL TO CONTROL MODULE (CM). TC CONTRACTOR SHALL PROVIDE WIRING FROM CONTROL MODULE TO SAFETY CIRCUIT.
4. COORDINATE WIRING, TERMINATION, CONTROL, AND I/O REQUIREMENTS WITH EQUIPMENT MANUFACTURER. SPECIFIC CONTROL REQUIREMENTS MAY DIFFER SLIGHTLY DEPENDING ON EQUIPMENT MANUFACTURER.
5. TC CONTRACTOR SHALL ADJUST DPSs BASED ON THE FILTER MANUFACTURER'S LOADED FILTER DATA.

SEQUENCE OF OPERATION

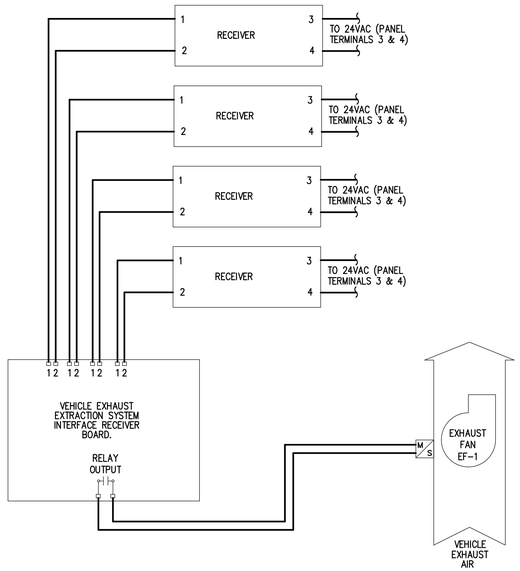
ENERGY RECOVERY UNIT CONTROL:

NOTE: ALL SETPOINTS, RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME INTERVALS DESCRIBED IN SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION. ALL CONTROL LOOPS SHALL BE ENABLED AND DISABLED BASED ON SYSTEM STATUS TO PREVENT LOOP WINDUP.

1. ERV-1 (SF AND EF), SHALL HAVE START/STOP CAPABILITY FROM THE DDC/BAS SYSTEM. BAS TIME OF DAY SHALL SCHEDULE THE FAN TO RUN CONTINUOUSLY.
2. SFs AND EF STATUSES SHALL BE MONITORED BY DDC SYSTEM THRU RESPECTIVE CURRENT SWITCHES. ALL CURRENT SWITCHES SHALL PROVIDE FEEDBACK TO ENABLE TEMPERATURE CONTROLS. ABNORMAL STATUS CONDITION FOR ANY FAN SHALL ACTIVATE AN ALARM AT THE BAS.
3. WHEN RUNNING, ERV-1 OA DAMPER SHALL OPEN, ERV-1 SF & EF SHALL RUN. ERV-1 SHALL PROVIDE DISCHARGE AIR BASED ON OA TEMPERATURE AND RA TEMPERATURE FROM THE SPACE. DDC SHALL MODULATE OA DAMPERS D-1 AND D-2 AS DESCRIBED BELOW:

   3.1. DDC SHALL POLL WATER SOURCE HEAT PUMPS FOR OPERATING MODE. WHEN MAJORITY OF HEAT PUMPS ARE IN HEATING MODE, DDC SHALL OPEN D-1 AND CLOSE D-2. WHEN MAJORITY OF HEAT PUMPS ARE IN COOLING MODE, DDC SHALL CLOSE D-1 AND OPEN D-2.

4. WHEN ERV-1 IS ACTIVATED, PACKAGED CONTROLS SHALL MODULATE ELECTRIC HEATING COIL TO MAINTAIN A DISCHARGE AIR TEMPERATURE OF 55° F.
5. ERV-1 PACKAGED DEFROST CYCLE SHALL BE ACTIVATED WHEN ERV-1 PLATE EXHAUST AIR TEMPERATURE DROPS BELOW FACTORY SETPOINT.
6. DDC SHALL MONITOR ALL SENSORS AND DEVICES FOR BAS DISPLAY.
7. DUCT SMOKE DETECTOR(S) SHALL DEACTIVATE SF AND EF WHEN PRODUCTS OF COMBUSTION ARE DETECTED.
8. ERV-1 OA AND RA FILTER STATUSES SHALL BE MONITORED BY DDC SYSTEM THRU DIFFERENTIAL PRESSURE SWITCHES. FILTER STATUS ALARMS SHALL BE MONITORED BY DDC SYSTEM. TC CONTRACTOR SHALL ADJUST DPS AND DP SETPOINT BASED ON MANUFACTURER'S FILTER LOADED FILTER INFORMATION.
9. IF ERV-1 IS DEACTIVATED, OA DAMPER SHALL CLOSE, AND ALL FANS SHALL TURN OFF.



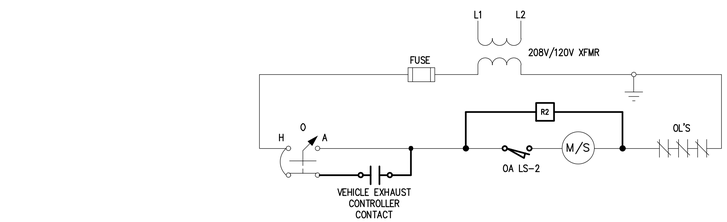
VEHICLE EXHAUST EF-1 SYSTEM WIRING

NOTE:

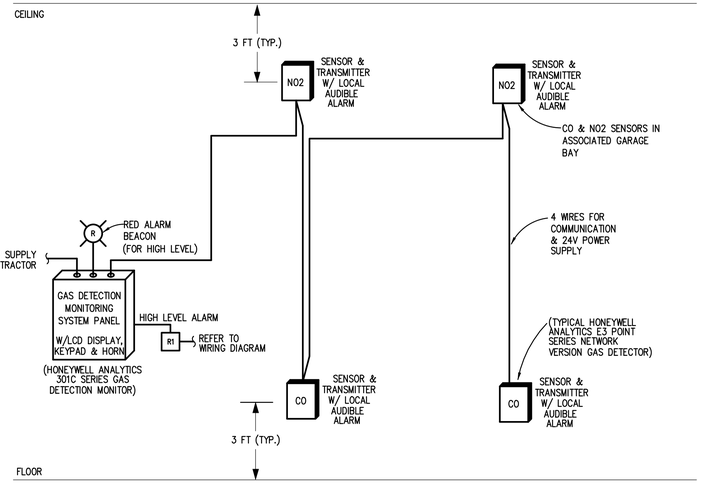
1. CONTRACTOR SHALL PROVIDE INTERLOCK WIRING AS INDICATED. COORDINATE WIRING REQUIREMENTS WITH EQUIPMENT SUPPLIER.

SEQUENCE OF OPERATION:

1. EXHAUST FAN SHALL BE STARTED AND STOPPED BY VEHICLE EXHAUST SYSTEM CONTROLLER WHENEVER AN EXHAUST HOSE IS PLACED INTO USE.
2. WIRING INTERLOCK SHALL OPEN VENTILATION OUTSIDE AIR DAMPER ASSOCIATED WITH EF-1.



EF-1 M/S WIRING



GAS DETECTION MONITORING SYSTEM CONTROLS

ASSOCIATED WITH GARAGE AREA

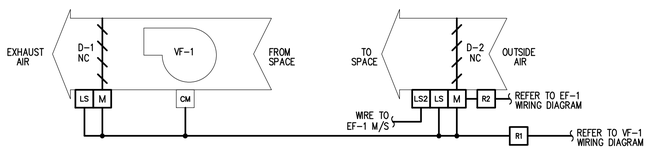
NOTES:

1. REFER TO MECHANICAL FLOOR PLANS FOR SENSORS AND DEVICE QUANTITIES & LOCATIONS.
2. TC CONTRACTOR SHALL PROVIDE GAS DETECTION MONITORING SYSTEM & SENSORS AS SPECIFIED.
3. THE REPRESENTATIVE OF THE GAS DETECTION SYSTEM MANUFACTURER SHALL PROVIDE RESPECTIVE CO AND NO2 ALARM LIMITS FOR THE OPERATION AND PROGRAMMING OF THE CONTROLLER.
4. PER MMC-2015, CO SHALL NOT EXCEED 25PPM AND NO2 SHALL NOT EXCEED 3PPM.
5. GAS DETECTION SYSTEM REPRESENTATIVE SHALL PROVIDE ENGINEERED DRAWINGS WITH SUBMITTAL.

SEQUENCE OF OPERATION

NOTE: ALL SETPOINTS, RESET SCHEDULE SETPOINTS, DEADBANDS, AND TIME INTERVALS DESCRIBED IN SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

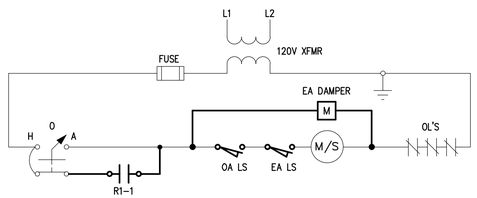
1. WHEN THE GAS DETECTION SYSTEM IS IN "NORMAL" MODE (NO GAS DETECTED), VF-1 SHALL REMAIN OFF.
2. WHEN GAS IS DETECTED, PURGE MODE SHALL BE ACTIVATED BY GAS DETECTION SYSTEM'S DRY CONTACT CLOSURE FOR HIGH LIMIT ALARM. CONTROL RELAY R1 IS ENERGIZED, INTERLOCK WIRING OPENS THE DAMPERS, WHEN LIMIT SWITCHES MAKE, VF-1 SHALL BE ENERGIZED.
3. WHEN GAS DETECTION SYSTEM'S CONTACT CLOSES, RELAY R1'S CONTACTS OPEN, VF-1 IS DE-ENERGIZED AND DAMPERS SHALL CLOSE.
4. IN PURGE MODE, VF-1 SHALL RUN UNTIL THE GAS DETECTION SYSTEM IS RESET BACK TO NORMAL OPERATION.



PURGE VENT FAN VF-1 CONTROL WIRING

SERVES THE APPARATUS BAY

SEQUENCE OF OPERATION: REFER TO GAS DETECTION MONITORING SEQUENCE OF OPERATION.



VF-1 M/S WIRING

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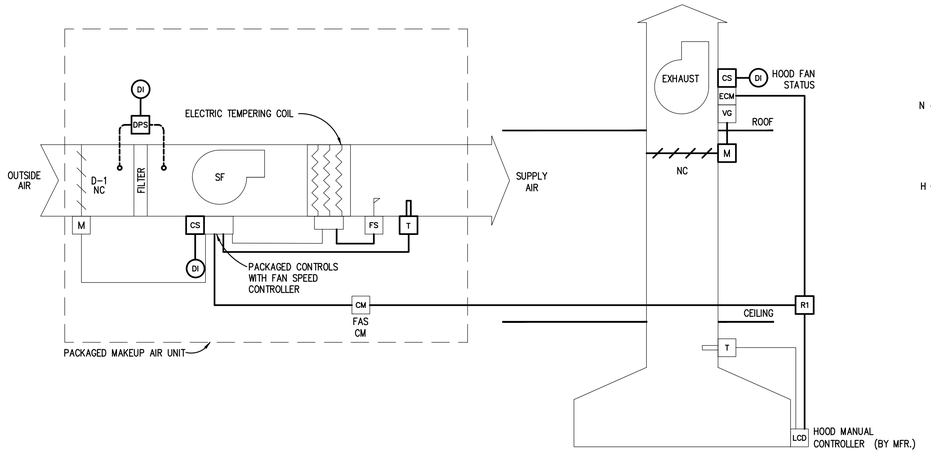
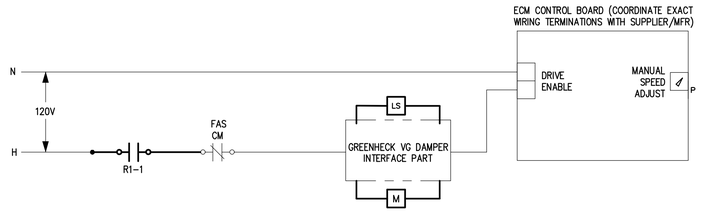
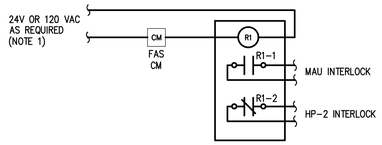




GREENHECK VG ECM WIRING

NOTE:

1. WIRING DETAIL IDENTIFIES INTENT AND DOES NOT INDICATE ACTUAL WIRING REQUIREMENTS. CONSULT WITH ECM SUPPLIER FOR THE ACTUAL WIRING REQUIREMENTS.
2. MOUNT CURRENT SWITCH ON MOTOR LEADS.



KITCHEN EXHAUST HOOD CONTROL

NOTES:

1. INDICATES INDOOR PANEL MOUNTED COMPONENT. COORDINATE PANEL LOCATION WITH ARCHITECT.
2. TC CONTRACTOR SHALL COORDINATE WITH THE AUTHORITY HAVING JURISDICTION WHETHER EXHAUST WILL RUN AFTER FIRE SUPPRESSION SYSTEM ACTIVATION
3. TC CONTRACTOR SHALL COORDINATE WIRING AND TERMINATION REQUIREMENTS WITH SUPPLIERS.
4. TC CONTRACTOR SHALL PROVIDE WIRING FROM FIRE SUPPRESSION SYSTEM FOR INTERLOCK WIRING AND SIGNAL TO THE FSE CONTROLLER. COORDINATE WIRING AND TERMINATION REQUIREMENTS WITH SUPPLIER.

SEQUENCE OF OPERATION

NOTES:

1. ALL SETPOINTS, RESET SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS. APPROPRIATE DEADBANDS SHALL BE USED TO PREVENT SHORT CYCLING SITUATIONS. ALL MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.

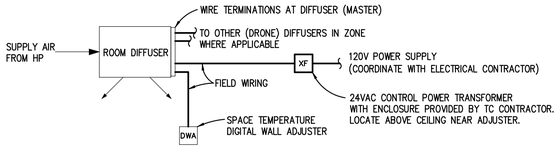
SEQUENCE OF OPERATION:

1. KITCHEN HOOD IS MANUALLY ACTIVATED BY KITCHEN USER THROUGH MFR'S HUMAN MACHINE INTERFACE (HMI) OR HOOD THERMOSTAT(S).
2. WHEN DDC CURRENT SWITCH SENSES THAT THE HOOD FAN IS ENERGIZED, DDC SHALL COMMAND MAU TO ACTIVATE..
3. WHEN DDC CURRENT SWITCH SENSES THAT THE HOOD FAN IS DE-ENERGIZED, DDC SHALL COMMAND MAU TO DEACTIVATE.
4. WHEN MAU-1 SF IS ACTIVATED, PACKAGED CONTROLLER SHALL MODULATE ELECTRIC HEATING COIL TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT OF 65F.
5. IF FIRE SUPPRESSION SYSTEM ACTIVATES, FAS CM INTERLOCK RELAY SHALL SIGNAL MAU AND HP-2 TO DEACTIVATE REGARDLESS OF WHETHER THE KITCHEN EXHAUST FAN IS RUNNING OR NOT. INTEGRAL HOOD ELECTRICAL SHUTDOWN SHALL DEACTIVATE POWER TO RANGE/OVEN.

KITCHEN HOOOD SYSTEM INTERLOCK WIRING

NOTE:

1. COORDINATE VOLTAGE REQUIREMENTS, WIRING, ETC. WITH ELECTRICAL TRADES. HOOD FIRE SUPPRESSION SYSTEM WILL BE WIRED TO FIRE ALARM SYSTEM (FAS). NORMALLY OPEN CONTACT SHALL BE PROVIDED BY ELECTRICAL TRADES FOR FAN INTERLOCK REQUIREMENTS TO BE PROVIDED BY TC CONTRACTOR.

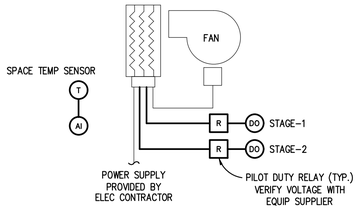


VAV DIFFUSER FIELD WIRING

TYPICAL – REFER TO FLOOR PLANS FOR QUANTITY, LOCATIONS AND ZONES

NOTES:

1. SPACE TEMPERATURE DIGITAL WALL ADJUSTER FURNISHED BY DIFFUSER SUPPLIER.
2. TEMPERATURE CONTROLS CONTRACTOR SHALL FIELD MOUNT SYSTEM CONTROL COMPONENTS AND PROVIDE FIELD WIRING. COORDINATE EXACT FIELD WIRING AND TERMINATION REQUIREMENTS WITH DIFFUSER MANUFACTURER.
3. REFER TO FLOOR PLANS FOR SPACE TEMP DIGITAL WALL ADJUSTER LOCATIONS.



ELECTRIC CUH CONTROL

TYPICAL

NOTES: REFER TO FLOOR PLANS FOR QUANTITY AND LOCATION OF UNITS. COORDINATE WIRING REQUIREMENTS AND TERMINATIONS WITH EQUIPMENT SUPPLIER.

SEQUENCE OF OPERATION:

1. DDC SHALL ENABLE/DISABLE 1ST & 2ND STAGE HEATING FOR CUH AS REQUIRED TO MAINTAIN SPACE TEMP SETPOINT OF 68F DURING BLDG OCCUPANCY AND 55F DURING BUILDING UNOCCUPANCY. SETPOINTS SHALL BE ADJUSTABLE THRU LOYTEC TOUCHSCREEN.

2. ASHRAE 90.1-2013 FOR VESTIBULES ONLY:

2.1. DDC SHALL ENABLE/DISABLE 1ST & 2ND STAGE HEATING FO CUH AS REQUIRED TO MAINTAIN SPACE TEMPERATURE SETPOINT OF 60F. DDC SHALL PROVIDE 2F DEADBAND FOR CONTROL.

2.2. WHEN OUTSIDE AIR TEMPERATURE INCREASES ABOVE 45F, DDC SHALL DISABLE CONTROL OF THE CUH.

3. FOR ECUH-116A, 116B, AND 129 ONLY:

3.1. WHEN AUTOMATIC TRANSFER SWITCH MONITORING INDICATED BUILDING IS ON GENERATOR POWER, DDC SHALL DISABLE ECUH-116A, 116B, AND 129.

TCA ARCHITECTURE + PLANNING + DESIGN

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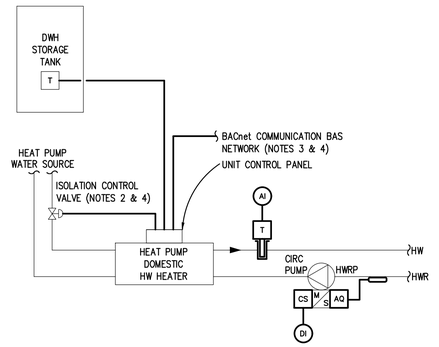
Sheet M8.05



HEAT PUMP DHW SYSTEM MONITORING & CONTROL

NOTES:

1. TC CONTRACTOR SHALL PROVIDE FIELD WIRING FROM STORAGE TANK SENSOR TO HEAT PUMP CONTROL PANEL.

2. TC CONTRACTOR SHALL PROVIDE FIELD WIRING FROM WATER SOURCE ISOLATION VALVE FURNISED BY WATER HEATER SUPPLIER AND INSTALLED BY MECHANICAL/PLUMBING CONTRACTOR.

3. TC CONTRACTOR SHALL PROVIDE BACnet COMMUNICATION WIRING FROM WATER HEATER PACKAGED CONTROLS FOR 3RD PARTY INTEGRATION WITH BUILDING AUTOMATION SYSTEM (BAS). POINTS TO MAP TO THE BAS SHALL INCLUDE, BUT NOT BE LIMITED TO: SCHEDULED START/STOP, UNIT ON/OFF STATUS, DWH TEMPTERATURE SETPOINT, DWH TEMPERATURE, AND UNIT FAILURE. COORDINATE AVAILABLE CONTROL AND MONITORING DATABASE THAT IS AVAILABLE WITH HEAT PUMP UNIT SUPPLIER

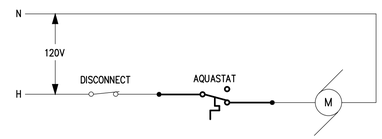
SEQUENCE OF OPERATION:

1. HEAT PUMP DOMESTIC WATER HEATER PACKAGED CONTROLS SHALL

2. DDC SHALL ENABLE DOMESTIC HW CIRC PUMP BASED ON TIME SCHEDULE. AQUASTAT SHALL CYCLE HW RETURN CIRC PUMP ON/OFF PER SETPOINT. DDC STATUS SHALL BE USED FOR VISUAL CYCLING OF PUMP AND TO TOTALIZE RUNTIME.

3. DDC SYSTEM SHALL MONITOR DOMESTIC HW SYSTEM SUPPLY TEMP FOR REMOTE SYSTEM DIAGNOSTIC CAPABILITY BY OWNER AND FOR LOW TEMPERATURE ALARM OF 120° F AND HIGH TEMPERATURE ALARM OF 135° F.

4. AQUASTAT SHALL START PUMP WHEN WATER TEMPERATURE FALLS BELOW SETPOINT. SET AQUASTAT AT 2°F BELOW SYSTEM HW SETPOINT.



DOM HW CP WIRING

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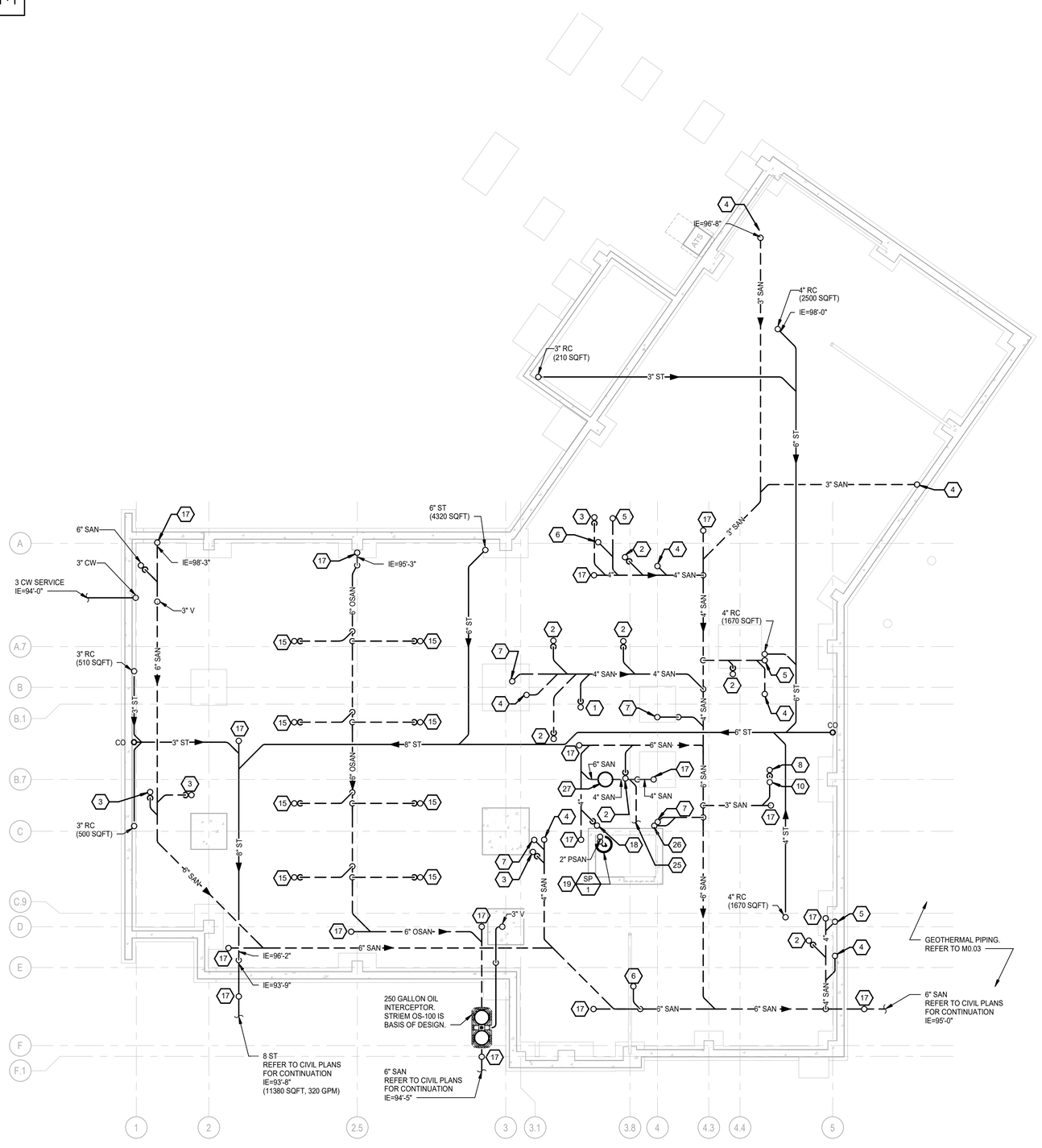
Sheet M8.06

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



PROJECT TRUE

UNDERGROUND PLUMBING PLAN

SCALE: 1/8" = 1'-0" FINISHED FLOOR ELEVATION = 100'-0" = 795.00'

PLUMBING GENERAL NOTES:

1 THESE DRAWINGS ARE DIAGRAMMATIC, AND REPRESENT THE GENERAL INTENT AND ARRANGEMENT OF SYSTEMS. THEY ARE NOT TO BE CONSIDERED FABRICATION/COORDINATION/SHOP DRAWINGS. COORDINATION WITH OTHER TRADES IS REQUIRED. PROVIDE THE ADDITIONAL FITTINGS AND OFFSETS THAT WILL BE REQUIRED TO COMPLETE EACH SYSTEM AND TO AVOID INTERFERENCES WITH ALL OTHER SYSTEMS INCLUDING THE STRUCTURE, SHEET METAL, OTHER PIPING SYSTEMS, ELECTRICAL CONDUITS, BUS DUCTS, CABLE TRAY, LIGHT FIXTURES, ETC. AND/OR OTHER SPACE CONSTRAINTS.

2 INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.

3 PIPING SHALL NOT BE INSTALLED ABOVE ELECTRICAL TRANSFORMERS, SWITCHBOARDS, PANELBOARDS OR MOTOR CONTROL CENTERS.

4 COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT, AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.

5 PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.

6 REFER TO ARCHITECTURAL PLANS FOR DIMENSIONED LOCATIONS OF PLUMBING FIXTURES.

7 HOT AND COLD WATER PIPING RUN-OUTS TO LAVATORIES AND SINKS SHALL BE 1/2" UNLESS OTHERWISE NOTED.

8 PLUMBING VENT PIPING THROUGH ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF PARAPET.

9 PROVIDE CODE REQUIRED CLEARANCE FOR ALL CLEANOUTS INSTALLED IN SANITARY WASTE AND VENT PIPING.

10 MINIMUM UNDERGROUND PIPE SIZE SHALL BE 3".

11 WATER SERVICE ENTRANCE PIPING SHALL BE BURIED WITH DEPTH OF COVER OVER TOP OF PIPE OF AT LEAST 72", OR WITH TOP OF PIPE AT LEAST 12" BELOW LEVEL OF MAXIMUM FROST PENETRATION, OR AS REQUIRED BY AUTHORITIES HAVING JURISDICTION, WHICHEVER IS DEEPEST.

CONSTRUCTION KEY NOTES:

1 2" SAN TO FLOOR DRAIN.

2 3" SAN TO FLOOR DRAIN.

3 4" SAN TO FLOOR DRAIN.

4 3" SAN TRANSITION TO 1 1/2" SAN ABOVE FLOOR.

5 4" SAN TO WC.

6 3" SAN.

7 4" SAN.

8 3" SAN TO SS.

9 1 1/2" SAN TO LAV/SINK.

10 2" V.

12 2" SAN TO LAV'S.

13 2" V, 3" VTR.

14 4" V, 4" VTR.

15 4" OSAN TO TRENCH DRAIN.

16 DOMESTIC WATER SERVICE METER AND BACKFLOW ASSEMBLY. REFER TO DOMESTIC WATER METER PIPING DIAGRAM ON DRAWING P6.02 FOR FURTHER DETAIL.

17 TO CLEANOUT.

18 4" STANDPIPE DRAIN.

19 REFER TO ELEVATOR SUMP PUMP PIPING DIAGRAM ON DRAWING P6.02 FOR FURTHER DETAIL.

20 ROUTE 4" PROPANE GAS FROM STORAGE TANK TO GENERATOR. PROVIDE ISOLATION VALVE AND PRESSURE REGULATOR (IF NECESSARY). VERIFY CONNECTION LOCATIONS PRIOR TO INSTALLATION.

21 2" SAN TO TRENCH DRAIN.

22 1/2" CW, 1/2" HW & 1/2" HWR IN WALL TO SINK. ROUTE TROUGH CASEWORK CHASE.

23 ROUTE 1/2 CW TO OB-1 THRU CODE APPROVED BACKFLOW PREVENTER TO SERVE COFFEE MAKER. ROUTE IW FROM EQUIPMENT AND BFP NEAREST SINK DRAIN. REFER TO INDIRECT WASTE DRAIN DETAIL ON DRAWING P6.01. COORDINATE MOUNTING HEIGHT OF OUTLET BOX WITH EQUIPMENT.

24 ROUTE 1/2 CW TO OB-1 THRU CODE APPROVED BACKFLOW PREVENTER TO SERVE ICE MACHINE. ROUTE IW FROM BFP TO NEARET SINK DRAIN. REFER TO INDIRECT WASTE DRAIN DETAIL ON DRAWING P6.01. COORDINATE MOUNTING HEIGHT OF OUTLET BOX WITH EQUIPMENT.

25 4" SAN TO TRENCH DRAIN CATCH BASIN.

26 3" SAN TO JUST ABOVE FLOOR. TRANSITION TO 2" SAN TO WASHING MACHINE DRAIN BOX.

27 PROVIDE STRIEM AARDVARK AA-4 SOLIDS INTERCEPTOR. INCLUDE SR-24 RISER IF NECESSARY.

28 1/2 A TO HOSE REEL.

29 PROVIDE DEDICATED SUPPLY VALVE AND ROUTE 1/2" HW FROM SINK HW LINE TO DISHWASHER. ROUTE WASTE FROM DISHWASHER CONNECTION TO SINK WASTE.

30 1 1/2" CW TO WALL MOUNTED THREADED MALE CONNECTION FOR APPARATUS FILL. COORDINATE EXACT TERMINATION WITH OWNER.

31 INSTALL DOWNSPOUT NOZZLE 18" ABOVE GRADE TO TO CENTER OF INLET.

32 INSTALL WALL HYRDRANT 18" ABOVE GRADE TO TO CENTER OF INLET.

33 ROUTE 1" COLD CONDENSATE FROM HVAC UNIT TO NEAREST FLOOR DRAIN

34 PROVIDE HEAT TRACE FROM DRAIN BODY TO FROST LINE DEPTH OF 42" BELOW GRADE.

35 PROVIDE HEAT TRACE FROM DRAIN BODY TO DOWNSPOUT OUTLET OUTLET.

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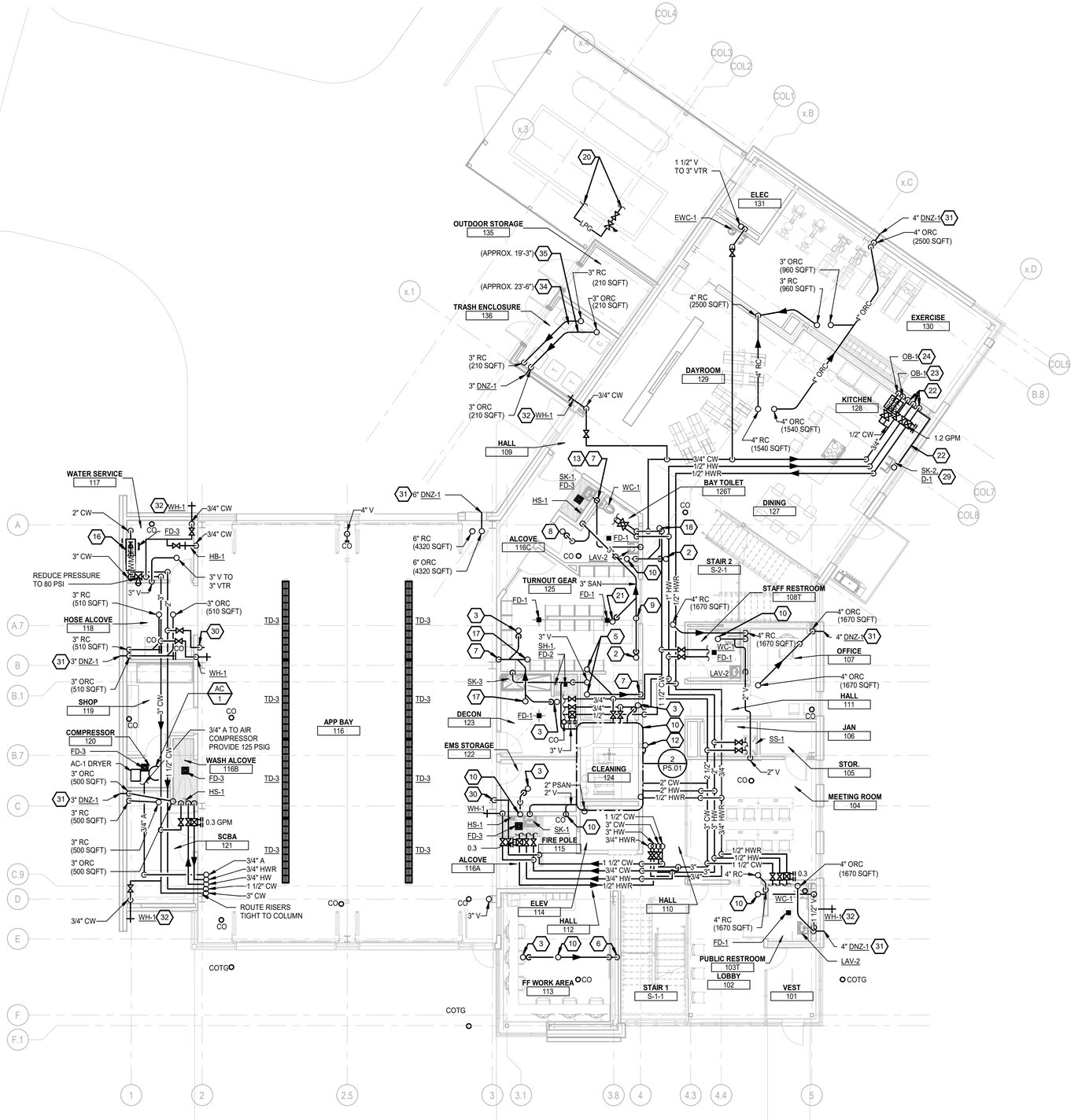
2415 S HURON PKWY
ANN ARBOR, MI 48104

UNDERGROUND PLUMBING PLAN

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
T: (734) 663 - 1910
F: (866) 732 - 2168
www.a3c.com

Sheet
P2.00

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



FIRST LEVEL PLUMBING PLAN

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

PROJECT TRUE

PLUMBING GENERAL NOTES:

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5 PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.

6 REFER TO ARCHITECTURAL PLANS FOR DIMENSIONED LOCATIONS OF PLUMBING FIXTURES.

7 HOT AND COLD WATER PIPING RUN-OUTS TO LAVATORIES AND SINKS SHALL BE 1/2" UNLESS OTHERWISE NOTED.

8 PLUMBING VENT PIPING THROUGH ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF PARAPET.

9 PROVIDE CODE REQUIRED CLEARANCE FOR ALL CLEANOUTS INSTALLED IN SANITARY WASTE AND VENT PIPING.

10 MINIMUM UNDERGROUND PIPE SIZE SHALL BE 3".

11 WATER SERVICE ENTRANCE PIPING SHALL BE BURIED WITH DEPTH OF COVER OVER TOP OF PIPE OF AT LEAST 72", OR WITH TOP OF PIPE AT LEAST 12" BELOW LEVEL OF MAXIMUM FROST PENETRATION, OR AS REQUIRED BY AUTHORITIES HAVING JURISDICTION, WHICHEVER IS DEEPEST.

CONSTRUCTION KEY NOTES:

1 2" SAN TO FLOOR DRAIN.

2 3" SAN TO FLOOR DRAIN.

3 4" SAN TO FLOOR DRAIN.

4 3" SAN TRANSITION TO 1 1/2" SAN ABOVE FLOOR.

5 4" SAN TO WC.

6 3" SAN.

7 4" SAN.

8 3" SAN TO SS.

9 1 1/2" SAN TO LAV/SINK.

10 2" V.

12 2" SAN TO LAV'S.

13 2" V, 3" VTR.

14 4" V, 4" VTR.

15 4" OSAN TO TRENCH DRAIN.

16 DOMESTIC WATER SERVICE METER AND BACKFLOW ASSEMBLY. REFER TO DOMESTIC WATER METER PIPING DIAGRAM ON DRAWING P6.02 FOR FURTHER DETAIL.

17 TO CLEANOUT.

18 4" STANDPIPE DRAIN.

19 REFER TO ELEVATOR SUMP PUMP PIPING DIAGRAM ON DRAWING P6.02 FOR FURTHER DETAIL.

20 ROUTE 4" PROPANE GAS FROM STORAGE TANK TO GENERATOR. PROVIDE ISOLATION VALVE AND PRESSURE REGULATOR (IF NECESSARY). VERIFY CONNECTION LOCATIONS PRIOR TO INSTALLATION.

21 2" SAN TO TRENCH DRAIN.

22 1/2" CW, 1/2" HW & 1/2" HWR IN WALL TO SINK. ROUTE TROUGH CASEWORK CHASE.

23 ROUTE 1/2 CW TO OB-1 THRU CODE APPROVED BACKFLOW PREVENTER TO SERVE COFFEE MAKER. ROUTE IW FROM EQUIPMENT AND BFP NEAREST SINK DRAIN. REFER TO INDIRECT WASTE DRAIN DETAIL ON DRAWING P6.01. COORDINATE MOUNTING HEIGHT OF OUTLET BOX WITH EQUIPMENT.

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30 1 1/2" CW TO WALL MOUNTED THREADED MALE CONNECTION FOR APPARATUS FILL. COORDINATE EXACT TERMINATION WITH OWNER.

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32 INSTALL WALL HYRDRANT 18" ABOVE GRADE TO TO CENTER OF INLET.

33 ROUTE 1" COLD CONDENSATE FROM HVAC UNIT TO NEAREST FLOOR DRAIN

34 PROVIDE HEAT TRACE FROM DRAIN BODY TO FROST LINE DEPTH OF 42" BELOW GRADE.

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AARON CHRISTOPHER FRANTZ
ENGINEER
No. 6201068182
LICENSED PROFESSIONAL ENGINEER

Project Number	21018

Issue	Date
SCHEMATIC DESIGN	03/04/22
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: ACF Checked: ACF

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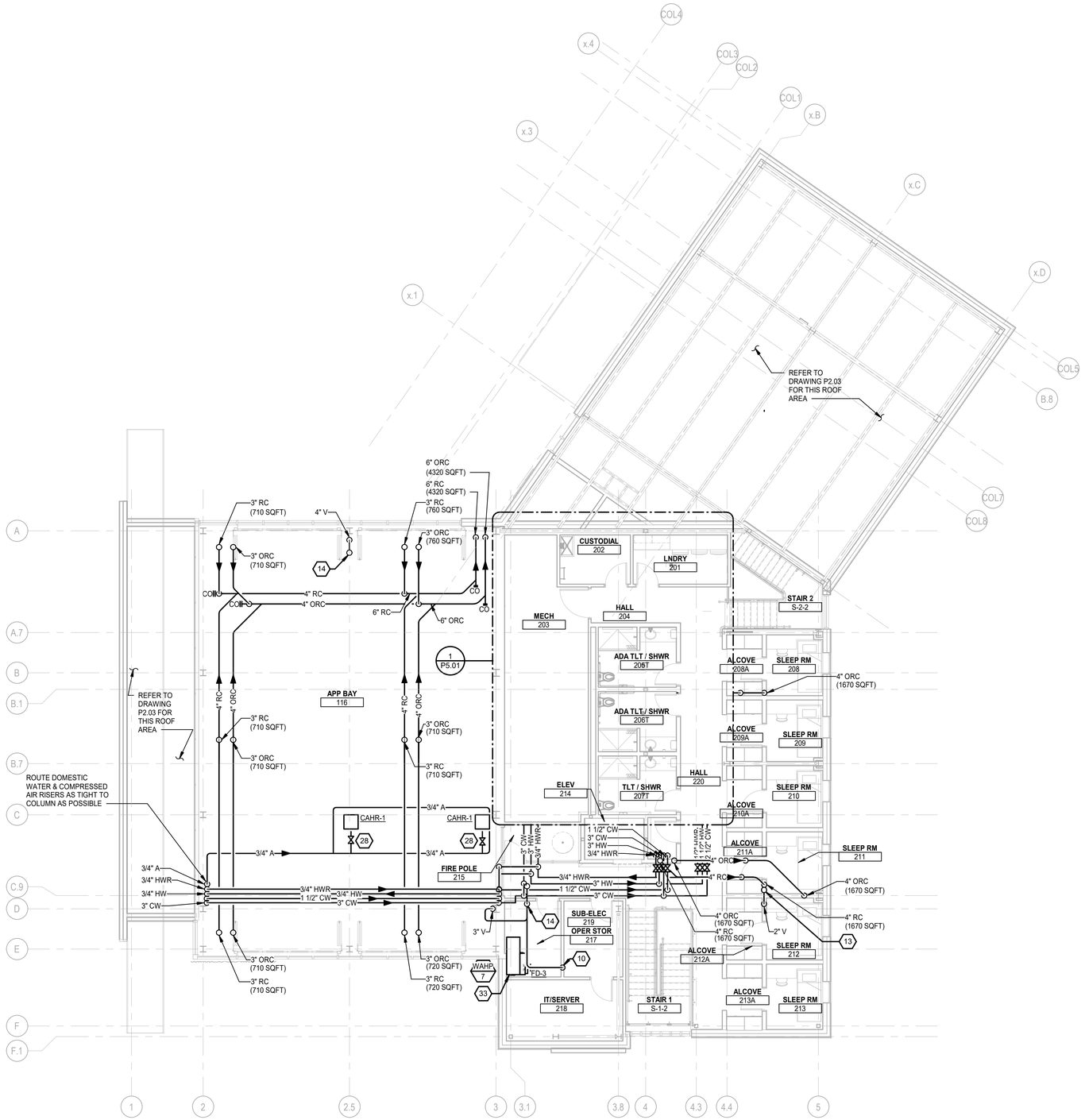

SECOND LEVEL PLUMBING PLAN

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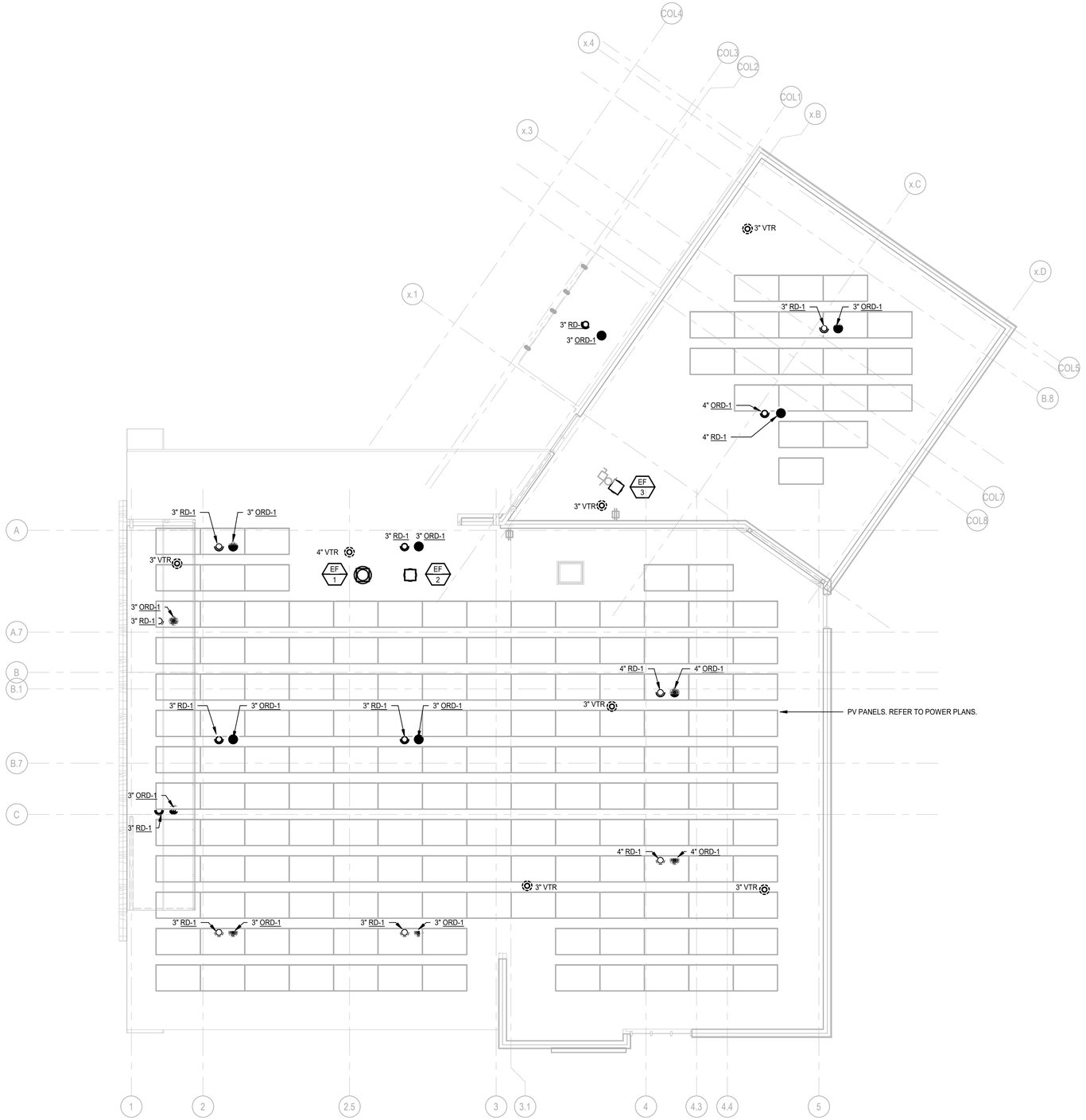

ROOF PLUMBING PLAN

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Drawn: ACF Checked: ACF

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6 REFER TO MANUFACTURERS INSTALLATION INSTRUCTION FOR TRENCH DRAIN INSTALLATION REQUIREMENTS.
7 2" CW, 2" HW (105 DEGREES) TO WASHER EXTRACTOR. REFER TO MANUFACTURER'S INTALLATION INSTRUCTIONS FOR UTILITY CONNECTIONS.
8 4" STANDPIPE DRAIN.
9 4" SAN TO WATER CLOSET.
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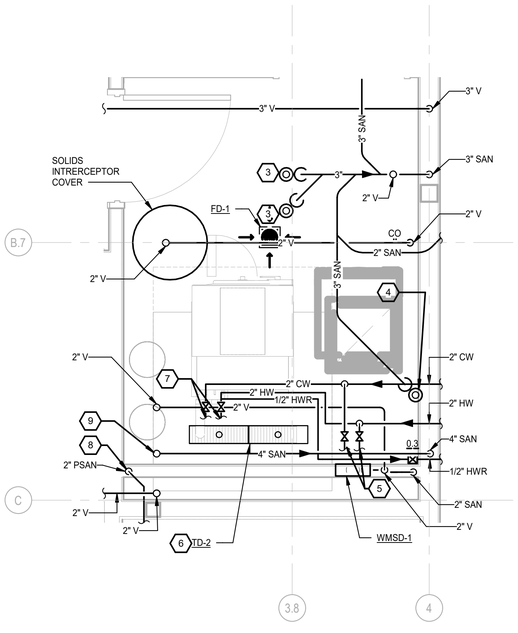

2 P2.01 **CLEANING 124 ENLARGED PLUMBING PLAN**
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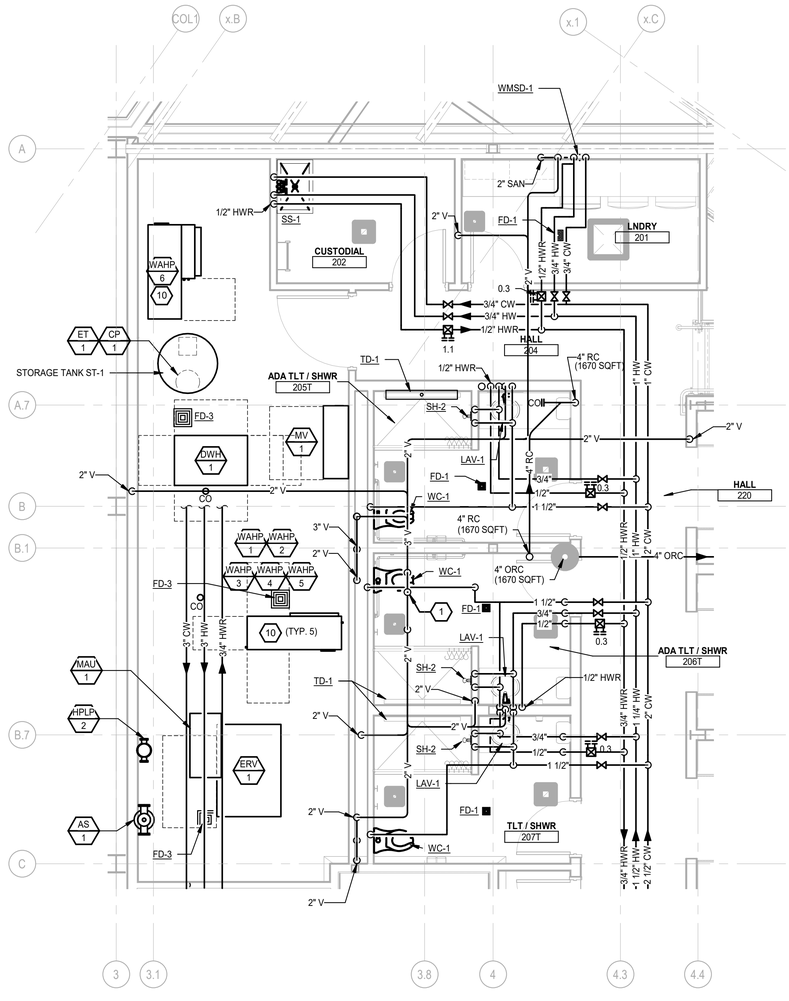

1 P2.02 **SECOND LEVEL ENLARGED PLUMBING PLAN**
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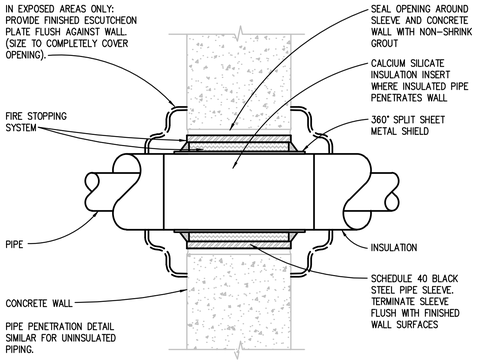
Sheet P5.01

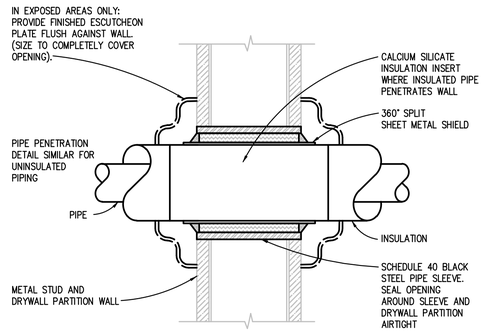
10/11/2024 11:48:36 AM BIM 360://20-43 Ann Arbor FS4/2021-0121-AAFS4-MEP-V21.rvt



DETAIL INDICATES THE INSTALLATION REQUIREMENTS FOR A FIRE RATED ASSEMBLY. FOR A NON-FIRE RATED ASSEMBLY PACK SLEEVED OPENING WITH INSULATION MATERIAL AND CAULK WITH NON-HARDENING SEALANT.

FIRE RATED AND NON-FIRE RATED POURED CONCRETE OR BLOCK WALL PIPE PENETRATION DETAIL

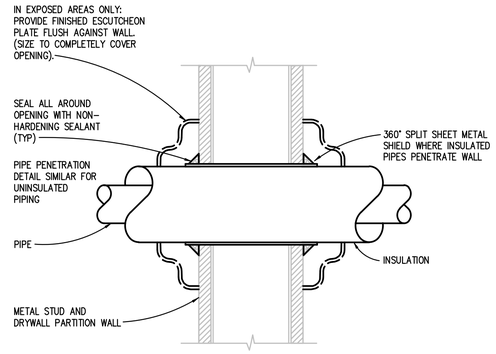
NO SCALE



DETAIL INDICATES THE INSTALLATION REQUIREMENTS FOR A FIRE RATED ASSEMBLY. FOR A NON-FIRE RATED ASSEMBLY PACK SLEEVED OPENING WITH INSULATION MATERIAL AND CAULK WITH NON-HARDENING SEALANT.

FIRE RATED AND NON-FIRE RATED METAL STUD AND DRYWALL PARTITION WALL PIPE PENETRATION DETAIL

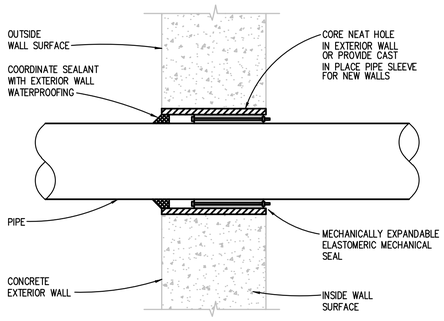
NO SCALE



THIS DETAIL DOES NOT APPLY TO HEATING PIPING 2" AND LARGER. FOR HEATING PIPING 2" AND LARGER REFER TO "FIRE RATED AND NON-FIRE RATED METAL STUD AND DRYWALL PARTITION WALL PIPE PENETRATION DETAIL"

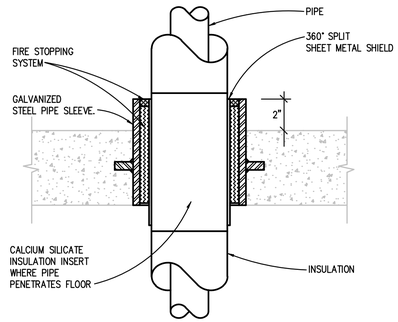
NON-FIRE RATED METAL STUD AND DRYWALL PARTITION WALL PIPE PENETRATION DETAIL

NO SCALE



EXTERIOR BELOW GRADE WALL PIPE PENETRATION DETAIL

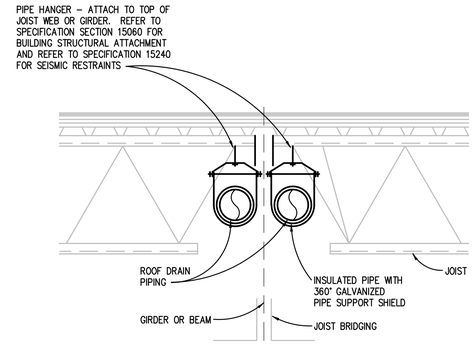
NO SCALE



NEW FLOOR PIPE PENETRATION DETAIL

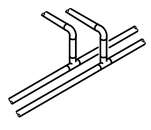
NO SCALE

NOTE: PIPES ENCASED IN WALLS EXEMPT FROM THIS DETAIL.



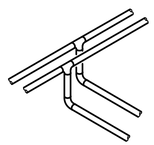
ROOF DRAIN PIPING DETAIL

NO SCALE



BRANCH CONNECTION OFF TOP

APPLIES TO THE FOLLOWING SYSTEMS:
DOMESTIC WATER



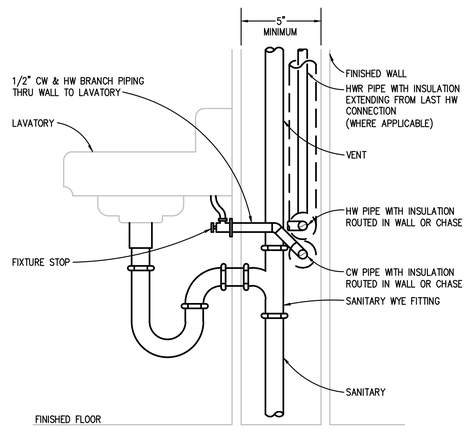
BRANCH CONNECTION OFF BOTTOM

APPLIES TO THE FOLLOWING SYSTEMS:
(NOT APPLICABLE IN PLUMBING DIVISION)

NOTE: BOTTOM AS INDICATED OR SIDE CONNECTION IS ACCEPTABLE. CONNECTION ABOVE CENTERLINE OF MAINS IS NOT ACCEPTABLE.

TYPICAL BRANCH TAKE-OFF CONNECTION PIPING DETAIL

NO SCALE



TYPICAL LAVATORY DETAIL

NO SCALE

ARCHITECTURE + PLANNING + DESIGN

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PBA Project No: 2021-0121

STATE OF MICHIGAN
AARON CHRISTOPHER FRANTZ
ENGINEER
No. 6201068182
LICENSED PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: ACF Checked: ACF

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

PLUMBING DETAILS

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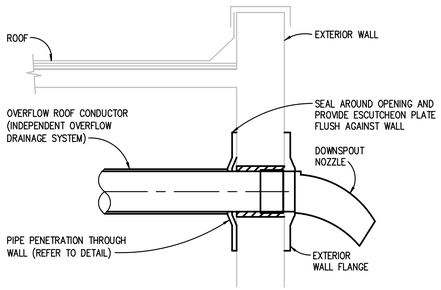
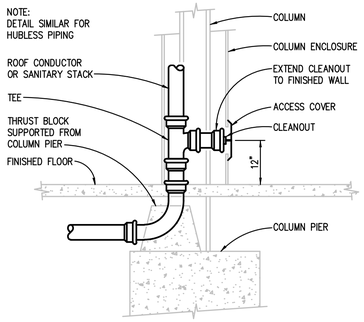
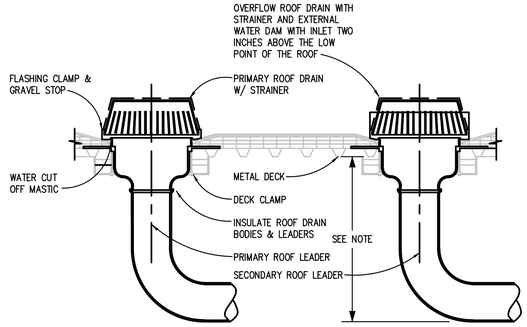


OVERFLOW DISCHARGE NOZZLE DETAIL
NO SCALE



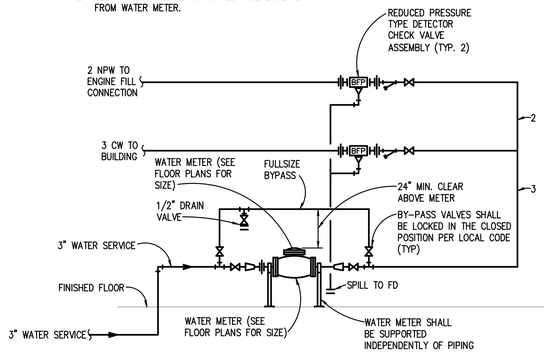
ROOF CONDUCTOR AND SANITARY STACK BASE CONNECTION DETAIL
NO SCALE



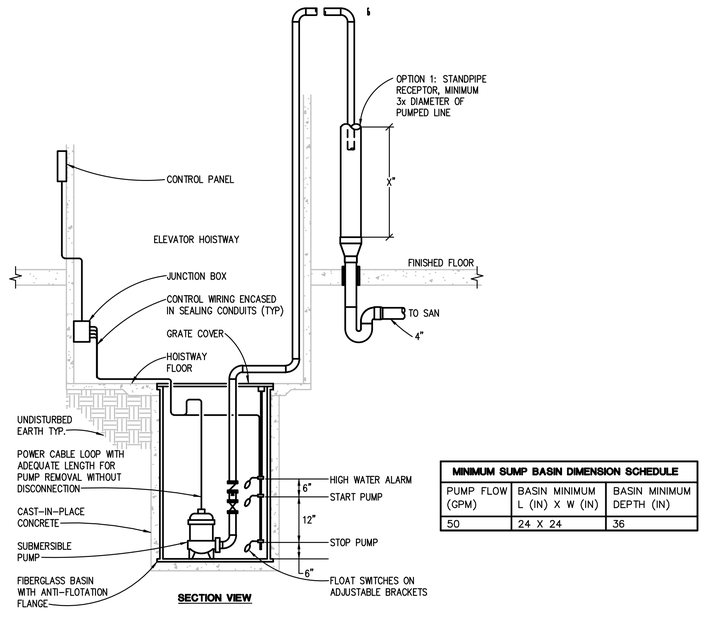
NOTE:
DIMENSION FOR 6" ROOF DRAIN FROM BOTTOM OF DECK TO BOTTOM OF PIPE SHALL BE MAXIMUM OF 20". DIMENSION FOR 8" ROOF DRAIN SHALL BE A MAXIMUM OF 22". DIMENSION FOR 10" ROOF DRAIN SHALL BE A MAXIMUM OF 26".

DOUBLE ROOF SUMP DETAIL
NO SCALE

NOTES:
1. FOR 4" AND LARGER WATER SERVICES SHALL BE ROLLED OFF AT A 45° ANGLE FROM CENTERLINE OF WATER METER.
2. ALL PIPING SHALL BE SUPPORTED INDEPENDENTLY FROM WATER METER.



DOMESTIC WATER METER PIPING DIAGRAM
NO SCALE



SECTION VIEW

MINIMUM SUMP BASIN DIMENSION SCHEDULE		
PUMP FLOW (GPM)	BASIN MINIMUM L (IN) X W (IN)	BASIN MINIMUM DEPTH (IN)
50	24 X 24	36

ELEVATOR SUMP PUMP PIPING DIAGRAM
NO SCALE

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Sheet
P6.02

PLUMBING PIPING & VALVE APPLICATION SCHEDULE

PIPE SIZE (INCHES)	MATERIAL: SOFT COPPER TYPE K	HARD COPPER TYPE L	HARD COPPER TYPE M	CARBON STEEL (SCHED. 40)	CARBON STEEL (STD.)	GALV. STEEL (SCHED. 40)	STAINLESS STEEL (SCHED. 10)	PEX	PE PIPE	PE SHEATHED CARBON STEEL PIPE	CSST	PRESSURE CONNECTIONS: NO-HUB CISP	PVC TYPE DWV	PP DRAINAGE PIPE	COPPER TYPE DWV	DUCTILE IRON PIPE	SOLDERED	BRAZED	WELDED	THREADED	FLANGED	GROOVED	INSERT & CRIMP	FUSION	PRESSURE-SEAL	MECHANICALLY-FORMED TEE	MECHANICAL JOINT	PUSH-ON-JOINT	GRAVITY DWV CONNECTIONS: SOLVENT WELDED	SOLDERED	FUSION	CISP HUBLESS	HEAVY-DUTY HUBLESS	ISOLATION VALVES: BALL	AGA BALL	GENERAL SERVICE BUTTERFLY	LUBRICATED PLUG	GATE	KEYED NOTES
ABOVEGROUND DOMESTIC WATER (POTABLE AND NON-POTABLE) ON DISTRIBUTION SIDE OF METER - MIN. WORKING PRESS. & TEMP.: 125 PSIG AT 200 DEG F																																							
UP TO 4		X															X	X			X	X												X		X			A
ABOVEGROUND SANITARY WASTE & VENT - MIN. WORKING PRESS.: 10-FOOT HEAD OF WATER																																							
1-1/2 TO 15												X																					X						
ABOVEGROUND PUMPED SANITARY WASTE - MIN. WORKING PRESS.: 125 PSIG																																							
UP TO 2		X															X	X																X					
ABOVEGROUND INDIRECT SANITARY WASTE - MIN. WORKING PRESS.: 10-FOOT HEAD OF WATER																																							
UP TO 8			X												X																X								
UNDERGROUND SANITARY WASTE & VENT - MIN. WORKING PRESS.: 10-FOOT HEAD OF WATER																																							
3 TO 12												X																					X						
3 TO 12													X																	X										
UNDERGROUND PUMPED SANITARY WASTE - MIN. WORKING PRESS.: 125 PSIG																																							
UP TO 2-1/2		X															X	X																					
ABOVEGROUND COLD CONDENSATE DRAIN - MIN. WORKING PRESSURE: 10 FT. HEAD OF WATER																																							
ALL SIZES			X												X		X	X								X													
ABOVEGROUND STORM DRAINAGE - MIN. WORKING PRESS.: 10-FOOT HEAD OF WATER																																							
3 TO 15												X																					X						
UNDERGROUND STORM DRAINAGE - MIN. WORKING PRESS.: 10-FOOT HEAD OF WATER																																							
3 TO 12												X																					X						
3 TO 12													X																	X										

GENERAL NOTES

1. 'X' INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A PIPING SYSTEM, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
2. DISSIMILAR-METAL PIPING JOINTS: CONSTRUCT JOINTS USING DIELECTRIC FITTINGS COMPATIBLE WITH BOTH PIPING MATERIALS.
   a. NPS 2 AND SMALLER: USE DIELECTRIC NIPPLE/WATERWAY.
   b. NPS 2-1/2 AND LARGER: USE DIELECTRIC FLANGE KITS.
3. USE UNIONS OR FLANGES AT VALVE AND EQUIPMENT CONNECTIONS.
4. PLUMBING EQUIPMENT DRAINS, VENTS, SAFETY VALVE PIPING, BLOWDOWN PIPING AND THE LIKE SHALL BE SAME PIPING MATERIAL AS ASSOCIATED PIPING SYSTEM.
5. GROOVED END VALVES MAY BE USED WITH GROOVED PIPING.

KEYED NOTES

A. GROOVED AND FLANGED FITTINGS, JOINTS, AND COUPLINGS, IF INDICATED AS AN ACCEPTABLE SELECTION, MAY BE USED IN ACCESSIBLE LOCATIONS ONLY FOR THIS PIPING SYSTEM. ACCESSIBLE LOCATIONS ARE DEFINED AS EXPOSED CONSTRUCTION OR ABOVE LAY-IN CEILINGS.
B. JOINTS ARE NOT PERMITTED ON UNDERGROUND WATER PIPING.
C. USE CAST IRON DRAINAGE PATTERN (DURHAM) FITTINGS.
D. INSTALL IN CONTAINMENT JACKET, REFER TO SPECIFICATIONS.
E. VALVES, UNIONS, AND FLANGED JOINTS MAY BE USED IN ACCESSIBLE LOCATIONS ONLY, EXCLUDING CEILINGS USED AS AIR PLENUMS. ACCESSIBLE LOCATIONS ARE DEFINED AS EXPOSED CONSTRUCTION OR ABOVE LAY-IN CEILINGS. USE ONLY STEEL WELDED FITTINGS AND WELDED JOINTS IN CEILING USED AS AIR PLENUMS.
F. NO JOINTS ALLOWED UNDERGROUND.

ABOVEGROUND PLUMBING PIPE & ACCESSORY INSULATION APPLICATION SCHEDULE

	INSULATION MATERIAL & THICKNESS (INCHES): FLEXIBLE ELASTOMERIC	FIBERGLASS	MINERAL WOOL	POLYISOCYANURATE	PHENOLIC	CELLULAR GLASS	CALCIUM SILICATE	FIELD-APPLIED JACKET MATERIAL: ALUMINUM	STAINLESS STEEL	PVC	SELF-ADHESIVE (FOR OUTDOOR APPLICATIONS)	PVDC (INDOOR)	PVDC (OUTDOOR)	KEYED NOTES
INDOOR PIPE SYSTEM AND SIZE (INCHES)														
DOMESTIC COLD WATER	1	1						X		X				A
DOMESTIC HOT WATER SUPPLY & RETURN 140 DEG F AND LESS:														
NPS 1-1/4 AND SMALLER	1	1						X		X				A
NPS 1-1/2 AND LARGER	1.5	1.5						X		X				A
STORM WATER & OVERFLOW	1	1						X		X				A
ROOF DRAIN AND OVERFLOW DRAIN BODIES	1	1												
CONDENSATE AND EQUIPMENT DRAIN PIPING BELOW 60 DEG F	0.75	1												
FLOOR DRAINS, TRAPS AND SANITARY DRAIN PIPING WITHIN 10 FEET OF DRAIN RECEIVING CONDENSATE AND EQUIPMENT DRAIN WATER BELOW 60 DEG F	0.75	1						X		X				A

UNLESS OTHERWISE INDICATED OR SCHEDULED, DO NOT INSULATE THE FOLLOWING:
- FIRE SUPPRESSION PIPING
- UNDERGROUND PIPING
- LABORATORY GAS AND VACUUM PIPING
- MEDICAL GAS AND VACUUM PIPING
- FUEL GAS PIPING
- FUEL OIL PIPING

GENERAL NOTES

1. 'X' OR THICKNESS IN INCHES INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A SYSTEM, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
2. INSULATE PIPING WITHIN AIR HANDLING EQUIPMENT THE SAME AS INDOOR PIPING. PROVIDE ALUMINUM OR STAINLESS STEEL JACKET.

KEYED NOTES

A. PROVIDE FIELD APPLIED JACKET FOR PIPING EXPOSED IN EQUIPMENT ROOMS, STORAGE ROOMS, JANITORS CLOSETS, RECEIVING ROOMS, TEST AREAS, CIRCULATION AREAS AND SUCH AREAS SUBJECT TO DAMAGE, WITHIN 10 FEET (3 METERS) OF FINISHED FLOOR.
B. PROVIDE MANUFACTURER'S RECOMMENDED PROTECTIVE COATING FOR FLEXIBLE ELASTOMERIC THERMAL INSULATION.

SCHEDULES GENERAL NOTES:

TYPICAL FOR ALL SCHEDULE SHEETS:

1. REFER TO ELECTRICAL STANDARD SCHEDULES, ONE LINE DIAGRAM AND PANEL SCHEDULES FOR ADDITIONAL ELECTRICAL INFORMATION
2. PROVIDE THE FOLLOWING FACTORY-WIRED ELECTRICAL OPTIONS/ACCESSORIES WHERE INDICATED IN SCHEDULE:
   - A – NON-FUSED DISCONNECT SWITCH
   - B – UNIT SHALL BE SINGLE POINT ELECTRICAL CONNECTION WITH FACTORY INSTALLED DISCONNECTING MEANS AND ALL REQUIRED STARTERS AND CONTROLS
   - C – SERVICE RECEPTACLE
   - D – FUSED DISCONNECT SWITCH
   - E – COMBINATION STARTER
   - F – UNIT SHALL HAVE (2) SINGLE POINT CONNECTIONS WITH FACTORY INSTALLED DISCONNECTING MEANS AND ALL REQUIRED STARTERS AND CONTROLS. (1) CONNECTION SHALL BE FOR CONDENSING SECTION AND (1) CONNECTION SHALL BE FOR THE REMAINDER OF THE UNIT.
3. FOR MODULATION/CONTROL TYPE COLUMN, "VFC" INDICATES VARIABLE FREQUENCY CONTROLLERS, "AUTO" INDICATES AUTOMATIC OPERATION (CONTROLLED BY TEMPERATURE CONTROLS OR SELF CONTAINED CONTROLS), "MANUAL" INDICATES HAND OPERATION.
4. IF VARIABLE FREQUENCY CONTROLLERS ARE INDICATED TO BE PROVIDED AND ARE NOT INSTALLED INTEGRAL TO THE UNIT, VARIABLE FREQUENCY CONTROLLERS SHALL BE SUPPLIED BY THE MECHANICAL CONTRACTOR (UNLESS OTHERWISE NOTED) AND INSTALLED BY THE ELECTRICAL CONTRACTOR INCLUDING THE LINE SIDE AND LOAD SIDE WIRING TO THE MOTOR AND INCLUDING MISCELLANEOUS STEEL REQUIRED FOR THE SUPPORT AND MOUNTING OF THE VFC. REFER TO FLOOR PLANS FOR LOCATION.
5. WHERE EQUIPMENT IS INDICATED TO HAVE A SINGLE POINT ELECTRICAL CONNECTION, THAT EQUIPMENT SHALL COME COMPLETE WITH FACTORY INSTALLED STARTERS, MOTOR OVERLOAD PROTECTION, CONTACTORS, FUSING AND ALL NECESSARY INTERNAL WIRING AND CONTROLS. PROVIDE A FACTORY MOUNTED UNIT DISCONNECTING MEANS WHERE THE ELECTRICAL CONTRACTOR SHALL MAKE SINGLE POINT CONNECTION. INSTALL PACKAGED EQUIPMENT SUCH THAT THE ELECTRICAL CONNECTION AND CONTROLS ARE ACCESSIBLE AND HAVE CLEARANCES MEETING THE NATIONAL ELECTRICAL CODE.
6. WHERE PACKAGED EQUIPMENT IS PROVIDED, NAMEPLATE MUST INDICATE MAXIMUM OVERCURRENT PROTECTION BY HACR RATED CIRCUIT BREAKERS OR FUSES. IF FUSE PROTECTION ONLY IS INDICATED, PROVIDE A FUSIBLE DISCONNECT AND FUSES WITH THE UNIT.
7. WHERE EQUIPMENT IS DESIGNATED BY MANUFACTURER AND MODEL NUMBER, THIS IS THE BASIS OF DESIGN. IF THE CONTRACTOR ELECTS TO PROVIDE EQUIPMENT BY OTHER SPECIFIED MANUFACTURERS OR PROPOSED ALTERNATE EQUIPMENT BY THE BASIS OF DESIGN MANUFACTURER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REVISIONS TO ELECTRICAL REQUIREMENTS, STRUCTURAL LOADING, OR ARCHITECTURAL APPURTENANCES AND SHALL INCLUDE THE COST OF SUCH REVISIONS IN HIS BID.
8. WHERE EQUIPMENT IS SCHEDULED TO INCLUDE A SERVICE RECEPTACLE, PROVIDE A FACTORY MOUNTED SERVICE RECEPTACLE WITH APPROPRIATE FUSES AND TRANSFORMERS CONNECTED ON THE LINE SIDE OF THE UNIT DISCONNECT. PROVIDE A NAMEPLATE ON THE DISCONNECT SWITCH INDICATING THE PRESENCE OF LIVE POWER TO THE SERVICE RECEPTACLE WHEN THE UNIT DISCONNECT IS IN THE OFF POSITION.
9. SIZE ALL EQUIPMENT FEEDERS BASED ON THE LISTED MOP (MAXIMUM OVERCURRENT PROTECTION). REFER TO THE FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE ON THE ELECTRICAL STANDARD SCHEDULES SHEET.

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COLLABORATIVE ARCHITECTURE

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WATER SOURCE HEAT PUMP WATER HEATER SCHEDULE

UNIT IDENTIFICATION	HEATING CAPACITY @ 54°F SOURCE MBH	COOLING CAPACITY MBH	KW INPUT	RECOVERY GPH	E.W.T. °F	L.W.T. °F	MODULATION/ CONTROL TYPE	ELECTRICAL						MODEL NUMBER	KEYED NOTES
								VOLTS	PHASE	FLA	MOP	SCCR KA	OPTIONS/ ACCESSORIES		
DWH-1	118	95	12	174	40	140	AUTO	208	3	33	40	5	B	WHP125	1

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE LOCHINVAR UNLESS OTHERWISE NOTED.

KEYED NOTES:
1. PROVIDE LOCHINVAR HP250G 250 GALLON STORAGE TANK ST-1.

DOMESTIC HOT WATER SYSTEM EXPANSION TANK SCHEDULE

UNIT IDENTIFICATION	SYSTEM SERVED	ESTIMATED TOTAL SYSTEM VOLUME GALLONS	TYPE	OPERATING PRESSURES AT EXPANSION TANK			SYSTEM OPERATING TEMPERATURES		EXPANSION VOLUME GALLONS	ACCEPTANCE FACTOR	MINIMUM TANK VOLUME GALLONS	DIMENSIONS		MODEL NUMBER	KEYED NOTES
				INITIAL PSIG	PRE-CHARGE PSIG	MAX (OPERATING) PSIG	MINIMUM °F	MAXIMUM °F				DIAMETER INCHES	HEIGHT INCHES		
ET-1	DWH-1	325	DIAPHRAGM	40	35	69.4	40	140	4.5	0.35	14.3	16	34	PTA-60V	

GENERAL NOTES:
1. MODEL NUMBERS ARE BELL & GOSSETT UNLESS OTHERWISE NOTED.
2. THE CONTRACTOR SHALL PRE-CHARGE THE TANK TO THE VALUE INDICATED IN THE SCHEDULE. FOR TANKS THAT ARE SUPPLIED PRE-CHARGED BY THE MANUFACTURER, THE CONTRACTOR SHALL CONFIRM THE PRESSURE AND MAKE ADJUSTMENTS AS REQUIRED.

THERMOSTATIC MIXING VALVE SCHEDULE

UNIT IDENTIFICATION	MINIMUM FLOW GPM	MAXIMUM FLOW GPM	PRESSURE DROP AT MAXIMUM FLOW PSIG	MODEL NUMBER	KEYED NOTES
MV-1	0.5	27	25	1NB-LF	

GENERAL NOTES:
1. MODEL NUMBERS ARE LEONARD UNLESS OTHERWISE NOTED.

PLUMBING CONNECTION SCHEDULE

UNIT IDENTIFICATION	CW INCHES	HW INCHES	SAN INCHES	OSAN INCHES	VENT INCHES	KEYED NOTES
WC-1	1 1/2	–	4	–	2	
LAV-1	1/2	1/2	1 1/2	–	1 1/2	1
LAV-2	1/2	1/2	1 1/2	–	1 1/2	1
SK-1	1/2	1/2	1 1/2	–	1 1/2	1
SK-2	1/2	1/2	1 1/2	–	1 1/2	1
SK-3	1/2	1/2	1 1/2	–	1 1/2	1
SS-1	3/4	3/4	3	–	–	
WF-1	3/4	3/4	–	–	–	
EWC-1	1/2	–	1 1/2	–	1 1/2	
HB-1	3/4	–	–	–	–	
WH-1	3/4	–	–	–	–	
SH-1	3/4	3/4	–	–	–	1
SH-2	3/4	3/4	–	–	–	1
FD-1	–	–	3	–	–	
FD-2	–	–	2	–	–	
FD-3	–	–	4 OR 6 REFER TO FLOOR PLANS	–	–	
TD-1	–	–	–	–	–	
TD-2	–	–	4	4	–	

GENERAL NOTES:
1. INDIVIDUAL WATER LINE BRANCHES, WASTE LINES, VENTS, AND TRAPS FOR CONNECTION TO INDIVIDUAL FIXTURES, FIXTURE FITTINGS, AND SPECIALTIES SHALL BE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE OR AS INDICATED ON DRAWINGS, WHICHEVER IS GREATER.

KEYED NOTES:
1. PROVIDE MIXING VALVE.

SCHEDULES GENERAL NOTES:

TYPICAL FOR ALL SCHEDULE SHEETS:

1. REFER TO ELECTRICAL STANDARD SCHEDULES, ONE LINE DIAGRAM AND PANEL SCHEDULES FOR ADDITIONAL ELECTRICAL INFORMATION
2. PROVIDE THE FOLLOWING FACTORY-WIRED ELECTRICAL OPTIONS/ACCESSORIES WHERE INDICATED IN SCHEDULE:
   - A – NON-FUSED DISCONNECT SWITCH
   - B – UNIT SHALL BE SINGLE POINT ELECTRICAL CONNECTION WITH FACTORY INSTALLED DISCONNECTING MEANS AND ALL REQUIRED STARTERS AND CONTROLS
   - C – SERVICE RECEPTACLE
   - D – FUSED DISCONNECT SWITCH
   - E – COMBINATION STARTER
   - F – UNIT SHALL HAVE (2) SINGLE POINT CONNECTIONS WITH FACTORY INSTALLED DISCONNECTING MEANS AND ALL REQUIRED STARTERS AND CONTROLS. (1) CONNECTION SHALL BE FOR CONDENSING SECTION AND (1) CONNECTION SHALL BE FOR THE REMAINDER OF THE UNIT.
3. FOR MODULATION/CONTROL TYPE COLUMN, "VFC" INDICATES VARIABLE FREQUENCY CONTROLLERS, "AUTO" INDICATES AUTOMATIC OPERATION (CONTROLLED BY TEMPERATURE CONTROLS OR SELF CONTAINED CONTROLS), "MANUAL" INDICATES HAND OPERATION.
4. IF VARIABLE FREQUENCY CONTROLLERS ARE INDICATED TO BE PROVIDED AND ARE NOT INSTALLED INTEGRAL TO THE UNIT, VARIABLE FREQUENCY CONTROLLERS SHALL BE SUPPLIED BY THE MECHANICAL CONTRACTOR (UNLESS OTHERWISE NOTED) AND INSTALLED BY THE ELECTRICAL CONTRACTOR INCLUDING THE LINE SIDE AND LOAD SIDE WIRING TO THE MOTOR AND INCLUDING MISCELLANEOUS STEEL REQUIRED FOR THE SUPPORT AND MOUNTING OF THE VFC. REFER TO FLOOR PLANS FOR LOCATION.
5. WHERE EQUIPMENT IS INDICATED TO HAVE A SINGLE POINT ELECTRICAL CONNECTION, THAT EQUIPMENT SHALL COME COMPLETE WITH FACTORY INSTALLED STARTERS, MOTOR OVERLOAD PROTECTION, CONTACTORS, FUSING AND ALL NECESSARY INTERNAL WIRING AND CONTROLS. PROVIDE A FACTORY MOUNTED UNIT DISCONNECTING MEANS WHERE THE ELECTRICAL CONTRACTOR SHALL MAKE SINGLE POINT CONNECTION. INSTALL PACKAGED EQUIPMENT SUCH THAT THE ELECTRICAL CONNECTION AND CONTROLS ARE ACCESSIBLE AND HAVE CLEARANCES MEETING THE NATIONAL ELECTRICAL CODE.
6. WHERE PACKAGED EQUIPMENT IS PROVIDED, NAMEPLATE MUST INDICATE MAXIMUM OVERCURRENT PROTECTION BY HACR RATED CIRCUIT BREAKERS OR FUSES. IF FUSE PROTECTION ONLY IS INDICATED, PROVIDE A FUSIBLE DISCONNECT AND FUSES WITH THE UNIT.
7. WHERE EQUIPMENT IS DESIGNATED BY MANUFACTURER AND MODEL NUMBER, THIS IS THE BASIS OF DESIGN. IF THE CONTRACTOR ELECTS TO PROVIDE EQUIPMENT BY OTHER SPECIFIED MANUFACTURERS OR PROPOSED ALTERNATE EQUIPMENT BY THE BASIS OF DESIGN MANUFACTURER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REVISIONS TO ELECTRICAL REQUIREMENTS, STRUCTURAL LOADING, OR ARCHITECTURAL APPURTENANCES AND SHALL INCLUDE THE COST OF SUCH REVISIONS IN HIS BID.
8. WHERE EQUIPMENT IS SCHEDULED TO INCLUDE A SERVICE RECEPTACLE, PROVIDE A FACTORY MOUNTED SERVICE RECEPTACLE WITH APPROPRIATE FUSES AND TRANSFORMERS CONNECTED ON THE LINE SIDE OF THE UNIT DISCONNECT. PROVIDE A NAMEPLATE ON THE DISCONNECT SWITCH INDICATING THE PRESENCE OF LIVE POWER TO THE SERVICE RECEPTACLE WHEN THE UNIT DISCONNECT IS IN THE OFF POSITION.
9. SIZE ALL EQUIPMENT FEEDERS BASED ON THE LISTED MOP (MAXIMUM OVERCURRENT PROTECTION). REFER TO THE FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE ON THE ELECTRICAL STANDARD SCHEDULES SHEET.

SEWAGE PUMP AND SUMP PUMP SCHEDULE

UNIT IDENTIFICATION	SYSTEM SERVED	SIMPLEX OR DUPLEX	PUMP					BASIN				MODULATION/ CONTROL TYPE	ELECTRICAL				MODEL NUMBER	KEYED NOTES
			QUANTITY	FLOW EACH GPM	W.P.D. FT. HEAD	HP EACH	RPM	CONSTRUCTION	DIAMETER INCHES	DEPTH INCHES	COVER TYPE		VOLTS	PHASE	SCCR KA	OPTIONS/ ACCESSORIES		
SP-1	ELEVATOR PIT	SIMPLEX	1	50	15	0.33	1750	CONCRETE	24	36	OPEN GRATE	AUTO	115	1	5		2EC0311L	

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE BELL & GOSSETT UNLESS OTHERWISE NOTED.

PUMP SCHEDULE

UNIT IDENTIFICATION	SYSTEM SERVED	LOCATION	TYPE	COUPLING TYPE	WATERFLOW GPM	FLUID TYPE	COLDEST SYSTEM OPERATING TEMP. °F FOR PUMP SELECTION	PUMP HEAD FT.	OVERLOAD GPM	HP	MODULATION/ CONTROL TYPE	ELECTRICAL				MODEL NUMBER	KEYED NOTES
												VOLTS	PHASE	SCCR KA	OPTIONS/ ACCESSORIES		
CP-1	HWR	MECH 203	INLINE	CLOSE	3.9	WATER	40	10.5	NON-OVERLOADING	1/12	AUTO	115	1	5		ECOCIRC XL 20-35	

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBER ARE BELL & GOSSETT UNLESS OTHERWISE NOTED.
3. FLUID TYPE: W = WATER, PGXX = PROPYLENE GLYCOL SOLUTION XX PERCENTAGE OF GLYCOL, EGXX = ETHYLENE GLYCOL SOLUTION XX PERCENTAGE OF GLYCOL.
4. CONTROLLER (E.G. VARIABLE FREQUENCY CONTROLLER, MOTOR STARTER) FOR SPECIFIED EQUIPMENT SHALL BE MANUFACTURED AND MARKED PER NEC WITH A MINIMUM SHORT CIRCUIT CURRENT RATING AS INDICATED.

AIR COMPRESSOR SCHEDULE

UNIT NUMBER	SIMPLEX OR DUPLEX	TYPE	DELIVERY PRESSURE PSIG	CAPACITY S.C.F.M.	COMPRESSOR(S)						MODULATION/ CONTROL TYPE	ELECTRICAL			MODEL NUMBER	KEYED NOTES
					S.C.F.M. EACH	HP EACH	RPM	LENGTH INCHES	DIAMETER INCHES	GALLONS		VOLTS	PHASE	SCCR KA		
AC-1	SIMPLEX	RECIPROCATING	125	17.2	17.2	5	658	35	28	80	AUTO	208	1	5	QP-5	1

GENERAL NOTES:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE QUINCY UNLESS OTHERWISE NOTED.

KEYED NOTES:
1. INCLUDE ZEKS HTB-18 HIGH TEMP DRYER AND ZEKS ZFC-22-G & ZFC-22-H FILTERS.

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Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: ACF Checked: ACF

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Sheet P7.02

ELECTRICAL SYMBOL LIST (NOTE: SOME SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT.)

SYMBOL	DESCRIPTION
FX (NL)	FIXTURE TYPE (NL INDICATES NIGHT LIGHT)
	LIGHTING FIXTURE
	DIRECT/INDIRECT LIGHTING FIXTURE
	EMERGENCY LIGHTING FIXTURE
	LIGHTING FIXTURE
	WALL MOUNTED LIGHTING FIXTURE
	LIGHTING FIXTURE
	RECESSED OR SURFACE MOUNTED DIRECTIONAL LIGHTING FIXTURE
	PENDANT LIGHTING FIXTURE
	WALL SCONCE
	LIGHTING TRACK
	TRACK LIGHTING FIXTURE
	POLE MOUNTED LIGHTING FIXTURE
	POLE MOUNTED LIGHTING FIXTURE - POST TOP
	BOLLARD LIGHTING FIXTURE
	EMERGENCY LIGHTING UNIT
	EXIT LIGHTING FIXTURE WITH DIRECTIONAL ARROWS (SHADED AREA INDICATES FACE)
	EXIT LIGHTING FIXTURE WITH DIRECTIONAL ARROWS (SHADED AREA INDICATES FACE)
	EXIT LIGHTING FIXTURE - WALL MOUNTED
	EXIT/EMERGENCY LIGHTING COMBO
ALCR	AUTOMATIC LOAD CONTROL RELAY
BCELTS	BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH
LC	LIGHTING CONTROL DEVICE - REFER TO LIGHTING CONTROL SCHEDULE
XX	ROOM CONTROL DESIGNATION - REFER TO LIGHTING CONTROL SCHEDULE
S	SINGLE POLE TOGGLE SWITCH
S_2	TWO POLE TOGGLE SWITCH
S_3	3 WAY TOGGLE SWITCH
S_4	4 WAY TOGGLE SWITCH
K	KEY OPERATED SWITCH
K_3	3 WAY KEY OPERATED SWITCH
K_4	4 WAY KEY OPERATED SWITCH
D	DIMMER SWITCH
D_O	DIMMER OCCUPANCY SENSOR SWITCH
D_L	LOW VOLTAGE DIMMER SWITCH
D_3	3 WAY DIMMER SWITCH
SP	PILOT SWITCH
TWC	TWO-WAY COMMUNICATION SYSTEM CALL STATION
TWCD	TWO-WAY COMMUNICATION SYSTEM AUTO DIALER
TWCA	TWO-WAY COMMUNICATION SYSTEM ANNUNCIATOR & COMMUNICATION PANEL
TWCP	TWO-WAY COMMUNICATION SYSTEM POWER SUPPLY WITH BATTERY BACK-UP
TWCDP	TWO-WAY COMMUNICATION SYSTEM AUTO DIALER POWER SUPPLY WITH BATTERY BACK-UP
RGP	REMOTE GENERATOR ANNUNCIATOR PANEL
ATS	AUTOMATIC TRANSFER SWITCH
UPS	UNINTERRUPTIBLE POWER SUPPLY
CSX	LOW VOLTAGE CONTROL STATION "X" INDICATES TYPE

SYMBOL	DESCRIPTION
	SINGLE / DUPLEX RECEPTACLE OUTLET "X" INDICATES TYPE
	SINGLE / DUPLEX RECEPTACLE OUTLET CONTROLLED BY AUTOMATIC CONTROL DEVICE / SYSTEM
	QUAD RECEPTACLE OUTLET
	ABOVE COUNTER DUPLEX RECEPTACLE (SIMILAR FOR TAMPER RESISTANT, QUADS, EMERGENCY AND GFI RECEPTACLES)
	DUPLEX RECEPTACLE-GROUND FAULT CIRCUIT INTERRUPTER
	DEAD FRONT-GROUND FAULT CIRCUIT INTERRUPTER
	DUPLEX EMERGENCY RECEPTACLE OUTLET
	ABOVE COUNTER TAMPER RESISTANT RECEPTACLE OUTLET
	QUAD TAMPER RESISTANT RECEPTACLE OUTLET
	TAMPER RESISTANT RECEPTACLE OUTLET
	DUPLEX UPS RECEPTACLE
	DUPLEX RECEPTACLE WITH 2 USB PORTS OUTLET
	USB 4 PORT CHARGING STATION
	CEILING MOUNTED DUPLEX / QUAD RECEPTACLE
	POWER POLE
	WALL / CEILING MOUNTED SPECIAL RECEPTACLE - REFER TO ELECTRICAL STANDARD SCHEDULES
	MULTI-OUTLET SURFACE RACEWAY
"X"	MULTI-SERVICE DROP SEE ELECTRICAL DETAILS AND DIAGRAMS SHEET "X" INDICATES TYPE
PTX	POKE-THROUGH ASSEMBLY "X" INDICATES TYPE
FBX	FLOOR SERVICE FITTING "X" INDICATES TYPE
AFX	ACCESS FLOOR SERVICE FITTING "X" INDICATES TYPE
RX	CORD REEL "X" INDICATES TYPE
S_3	DUAL SWITCHING FOR INNER/OUTER LAMPS OF FLUORESCENT LIGHT FIXTURES
$S_{3\,3}$	3-WAY DUAL SWITCHING FOR INNER/OUTER LAMPS OF FLUORESCENT LIGHT FIXTURES
$S_{4\,4}$	4-WAY DUAL SWITCHING FOR INNER/OUTER LAMPS OF FLUORESCENT LIGHT FIXTURES
S_T	DIGITAL TIME SWITCH
S_I	ILLUMINATED TOGGLE SWITCH FOR CONTROL OF LIGHTING ON CRITICAL POWER-ILLUMINATED WHEN SWITCH IS IN "OFF" POSITION
S_L	LOW VOLTAGE SWITCH
S_O	OCCUPANCY SENSOR
S_{O2}	OCCUPANCY SENSOR - REFER TO ELECTRICAL STANDARD SCHEDULE
OS X	OCCUPANCY SENSOR - REFER TO ELECTRICAL STANDARD SCHEDULES - "X" INDICATES TYPE
CP	CONTROL PANEL
	MOTOR
VFC	VARIABLE FREQUENCY CONTROLLER
	MANUAL CONTROLLER
	MAGNETIC CONTROLLER
	COMBINATION MAGNETIC CONTROLLER

SYMBOL	DESCRIPTION
	NON-FUSIBLE DISCONNECT SWITCH
	FUSIBLE DISCONNECT SWITCH
CB	ENCLOSED CIRCUIT BREAKER
	PUSH BUTTON STATION
J	JUNCTION BOX
	HARD WIRE POWER CONNECTION
	GROUND ROD
	GROUND CONNECTION
HH	HANDHOLE
X	CONDUIT SLEEVE WITH BUSHINGS LENGTH AS REQUIRED "X" INDICATES CONDUIT SIZE
	CONDUIT UP
	CONDUIT DOWN
	EMPTY BOX FOR FUTURE TELECOMMUNICATION OUTLET
	EMPTY BOX FOR FUTURE TELECOMMUNICATION OUTLET MOUNTED 8" ABOVE COUNTERTOP
	EMPTY BOX FOR FUTURE CEILING MOUNTED TELECOMMUNICATION OUTLET
X	TELECOMMUNICATION OUTLET "X" INDICATES TYPE
X	TELECOMMUNICATION OUTLET MOUNTED 8" ABOVE COUNTERTOP "X" INDICATES TYPE
X	TELECOMMUNICATION CEILING MOUNTED OUTLET "X" INDICATES TYPE
	TELECOMMUNICATION BACKBOARD
TGB	TELECOMMUNICATION GROUNDING BUS BAR
TMGB	TELECOMMUNICATION MAIN GROUNDING BUS BAR
IC	INTERCOM OUTLET
S	SPEAKER
S	SPEAKER - WALL MOUNTED
MIC	MICROPHONE
VC	VOLUME CONTROL
	SIGNALING BELL
	SINGLE FACE CLOCK - CEILING MOUNTED
	SINGLE FACE CLOCK - WALL MOUNTED
	DOUBLE FACE CLOCK - CEILING MOUNTED
S	DOUBLE FACE COMBINATION CLOCK/SPEAKER CEILING MOUNTED
	DOUBLE FACE CLOCK - WALL MOUNTED
S	DOUBLE FACE COMBINATION CLOCK/SPEAKER WALL MOUNTED
T/C	TIME CLOCK
C	CONTACTOR
P	PHOTOCELL
TT	TWIST TIMER

REFER TO ELECTRICAL STANDARD SCHEDULES

SYMBOL	DESCRIPTION
	SECURITY CAMERA
MD	MOTION DETECTOR
K	SECURITY KEY SWITCH
DC	DOOR CONTACT
KP	KEY PAD
CR	CARD READER
DB	DURESS PUSH BUTTON STATION
DE	DELAYED EGRESS
REX	REQUEST TO EXIT STATION
PP	AUTOMATIC DOOR PUSH PAD OPERATOR
DO	DOOR OPERATOR
DA	DOOR ACTUATOR
AC	ACCESS CONTROL STATION
ACCP	ACCESS CONTROL CONTROL PANEL
ACCP	ACCESS CONTROL POWER SUPPLY
	CIRCUIT BREAKER
	DRAWOUT CIRCUIT BREAKER MANUALLY/ OPERATED
E	DRAWOUT CIRCUIT BREAKER ELECTRICALLY/ OPERATED
	SWITCH
	AUTOMATIC OR MANUAL TRANSFER SWITCH
	FUSE
	TRANSFORMER
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	LIGHTNING ARRESTOR
X	PANELBOARD "X" INDICATES PANELBOARD NAME
	GROUND
	STRESS CONE TERMINATION
K	SECURITY KEY INTERLOCK
G	ENGINE GENERATOR
M	UTILITY METER
EMU	ELECTRONIC METERING UNIT
A	AMMETER
V	VOLTMETER
AS	AMMETER SWITCH
VS	VOLTMETER SWITCH
SPD	SURGE PROTECTIVE DEVICE
CR	CONTROL RELAY
TDR	TIME DELAY RELAY
	THERMAL OVERLOAD RELAY
	NORMALLY OPEN CONTACTS
	NORMALLY CLOSED CONTACTS
	N.O. PUSH BUTTON SINGLE CIRCUIT
	N.C. PUSH BUTTON SINGLE CIRCUIT
X-X	CABLE VAULT "X-X" INDICATES TYPE

SYMBOL	DESCRIPTION
	DISTRIBUTION PANEL
GB	GROUND BUS
PB	PLUG IN BUSWAY
FB	FEEDER BUSWAY
F	MANUAL FIRE ALARM BOX
SD	SMOKE DETECTOR
DD	DUCT SMOKE DETECTOR
CO	CARBON MONOXIDE DETECTOR
RT	REMOTE TEST STATION (FOR DUCT DETECTOR)
TD	THERMAL DETECTOR
BD	PROJECTED BEAM DETECTOR
F	FIRE ALARM BELL
F	FIRE ALARM AUDIBLE NOTIFICATION APPLIANCE
XX	FIRE ALARM VISUAL NOTIFICATION APPLIANCE "XX" INDICATES CANDELA RATING IF NO RATING SHOWN, APPLIANCE IS 15cd
XX	FIRE ALARM COMBINATION VISUAL/ AUDIBLE "XX" INDICATES CANDELA RATING IF NO RATING SHOWN, APPLIANCE IS 15cd
F XX	FIRE ALARM COMBINATION VISUAL/ AUDIBLE NOTIFICATION APPLIANCE - CEILING MOUNTED "XX" INDICATES CANDELA RATING IF NO RATING SHOWN, APPLIANCE IS 15cd
XX	FIRE ALARM VISUAL NOTIFICATION APPLIANCE CEILING MOUNTED "XX" INDICATES CANDELA RATING IF NO RATING SHOWN, APPLIANCE IS 15cd
F	FIRE ALARM AUDIBLE NOTIFICATION APPLIANCE - CEILING MOUNTED
F	FIREFIGHTERS PHONE JACK
FACP	FIRE ALARM CONTROL PANEL
FAA	FIRE ALARM ANNUNCIATOR PANEL
NAC	NOTIFICATION APPLIANCE CIRCUIT EXTENDER PANEL
IM	ADDRESSABLE MONITORING MODULE
CM	ADDRESSABLE CONTROL MODULE
TS	TAMPER SWITCH
FS	FLOW SWITCH
DR	MAGNETIC DOOR RELEASE
	BRANCH CIRCUIT PANEL BOARD
	LOAD CENTER
	MOTOR CONTROL CENTER
T	TRANSFORMER

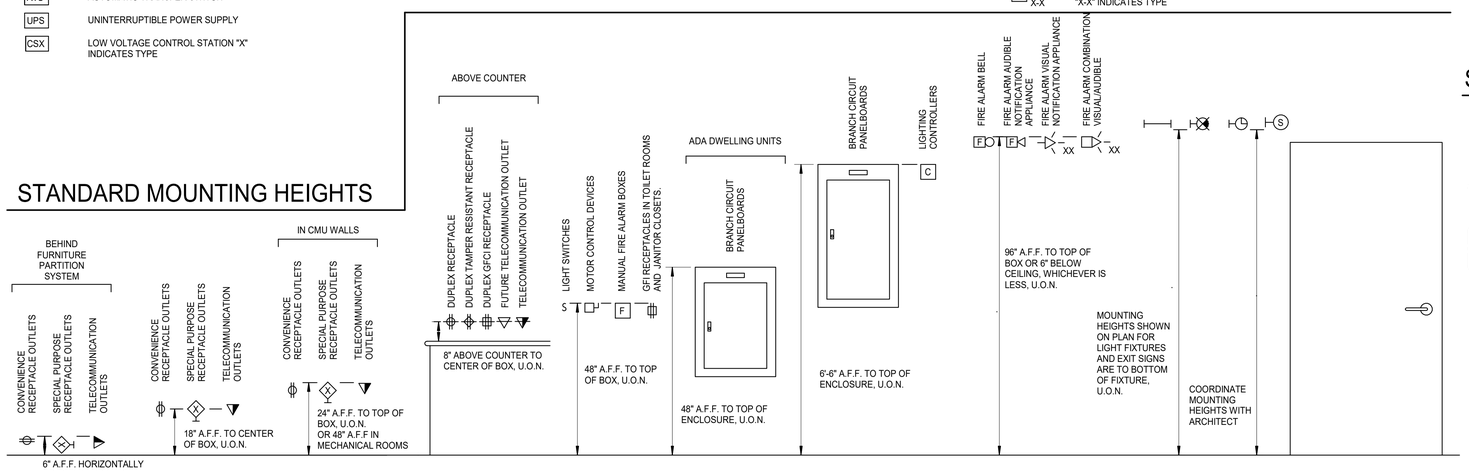
ELECTRICAL DRAWING INDEX

ELECTRICAL ABBREVIATION LIST

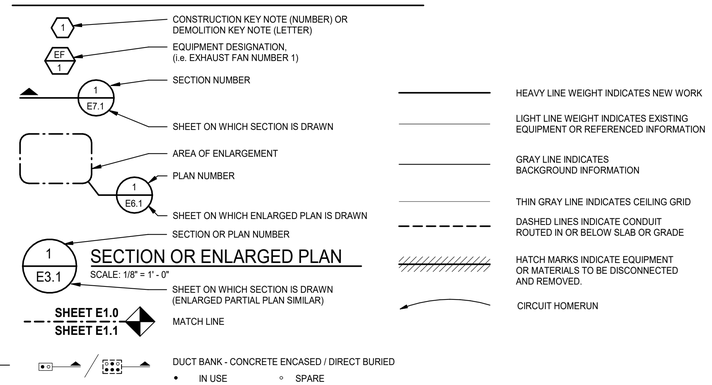
ABBREVIATION	DESCRIPTION
A	AMPERES
AER	ARC ENERGY REDUCTION
AF	AMPERES FRAME (BREAKER RATING)
AFCI	ARC FAULT CIRCUIT INTERRUPTER
A.F.F.	ABOVE FINISH FLOOR
AIC	AMPS INTERRUPTING CAPACITY
AL	AUDIENCE LEFT
ALCR	AUTOMATIC LOAD CONTROL RELAY
AR	AUDIENCE RIGHT
AT	AMPERES TRIP (BREAKER SETTING)
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
BCELTS	BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH
BKR	BREAKER
BPS	BOLTED PRESSURE SWITCH
C	CONDUIT
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CT	CURRENT TRANSFORMER
DEMO	DEMOLITION
DIM	DIMENSION
DISC	DISCONNECT
DP	DISTRIBUTION PANEL
DS	DOWNSTAGE
DWG	DRAWING
EBU	EMERGENCY BATTERY UNIT
EC	ELECTRICAL CONTRACTOR
ELEC	ELECTRICAL
EM/ EMERG	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
EO	ELECTRICALLY OPERATED
EPO	EMERGENCY POWER OFF
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
FA	FIRE ALARM
FLA	FULL LOAD AMPS
FLR	FLOOR
FOH	FRONT OF HOUSE
FSEC	FOOD SERVICE EQUIPMENT CONTRACTOR
FU	FUSE
G/GRD/EG	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
HOA	HAND-OFF-AUTO
HP	HORSEPOWER
HV	HIGH VOLTAGE
HZ	HERTZ
IG	ISOLATED GROUND
JB	JUNCTION BOX
KA	THOUSAND AMP
KV	KILOVOLT
KVA	KILOVOLT - AMPERES
KW	KILOWATT
KWH	KILOWATT - HOURS
LA	LIGHTING ARRESTOR
LP	LIGHTING PANEL
LDP	LIGHTING DISTRIBUTION PANEL

ABBREVIATION	DESCRIPTION
MAX	MAXIMUM
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDP	MAIN DISTRIBUTION PANEL
MECH	MECHANICAL
MIN	MINIMUM
MISC.	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MOP	MAXIMUM OVERCURRENT PROTECTION
MTD	MOUNTED
MTG	MOUNTING
MTR	MOTOR
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NF	NON-FUSIBLE
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
P	POLE
PB	PUSHBUTTON STATION
PH	PHASE
PT	POTENTIAL TRANSFORMER
PDP	POWER DISTRIBUTION PANEL
RECEPT.	RECEPTACLE
RDP	RECEPTACLE DISTRIBUTION PANEL
RP	RECEPTACLE PANEL
RSC	RIGID STEEL CONDUIT
SCCA	SHORT CIRCUIT CURRENT RATING
SCHED	SCHEDULE
SPD	SURGE PROTECTION DEVICE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TB	TERMINAL BOX
TELECOM	TELECOMMUNICATIONS
TR	TAMPER RESISTANT
TTP	TELEPHONE TERMINAL BACKBOARD
TYP	TYPICAL
U.O.N.	UNLESS OTHERWISE NOTED
US	UPSTAGE
V	VOLTS
W	WIRE OR WATTS
WG	WIRE GUARD
WP	WEATHERPROOF
WR	WEATHER RESISTANT
XFMR	TRANSFORMER
XP	EXPLOSION PROOF
(E)	EXISTING
(R)	RELOCATED

STANDARD MOUNTING HEIGHTS



STANDARD METHODS OF NOTATION



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ELECTRICAL STANDARDS AND DRAWING INDEX

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10/11/2024 11:00:46 AM BIM 360://20-43 Ann Arbor FS4/2021-0121-AAFS4-MEP-V21.rvt

FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE - GENERAL PURPOSE

OVERCURRENT DEVICE RATING (AMPERES)	COPPER CONDUCTORS						KEYED NOTES	ALUMINUM CONDUCTORS					
	WIRE SIZE (AWG OR KCMIL)		CONDUIT SIZE					WIRE SIZE (AWG OR KCMIL)		CONDUIT SIZE			
	PHASE & NEUTRAL	GROUND	SINGLE PHASE 2 WIRE+G (1PH, 1N, 1G)	SINGLE PHASE 3 WIRE+G (2PH, 1N, 1G)	THREE PHASE 3 WIRE+G (3PH, 1G)	THREE PHASE & NEUTRAL 4 WIRE+G (3PH, 1N, 1G)		PHASE & NEUTRAL	GROUND	SINGLE PHASE 3 WIRE+G (2PH, 1N, 1G)	THREE PHASE 3 WIRE+G (3PH, 1G)	THREE PHASE & NEUTRAL 4 WIRE+G (3PH, 1N, 1G)
15-20	12	12	3/4"	3/4"	3/4"	3/4"		N/A	N/A	N/A	N/A	N/A	
25-30	10	10	3/4"	3/4"	3/4"	3/4"		N/A	N/A	N/A	N/A	N/A	
35-40	8	10	3/4"	3/4"	3/4"	3/4"		N/A	N/A	N/A	N/A	N/A	
45-50	8 (6)	10	3/4"	3/4"	3/4"	3/4"	1	N/A	N/A	N/A	N/A	N/A	
60	6 (4)	10	3/4" (1")	3/4" (1")	3/4" (1")	1" (1 1/4")	1	N/A	N/A	N/A	N/A	N/A	
70	4	8	1"	1 1/4"	1 1/4"	1 1/4"		N/A	N/A	N/A	N/A	N/A	
80	4 (3)	8	1"	1 1/4"	1 1/4"	1 1/4"	1	N/A	N/A	N/A	N/A	N/A	
90-100	3 (2)	8	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1	1	6	1 1/2"	1 1/4"	1 1/2"	
110	2 (1)	6	-	1 1/4"	1 1/4"	1 1/4" (1 1/2")	1	1/0	4	1 1/2"	1 1/2"	2"	
125	1 (1/0)	6	-	1 1/4" (1 1/2")	1 1/4" (1 1/2")	1 1/2"	1	2/0	4	1 1/2"	1 1/2"	2"	
150	1/0	6	-	1 1/2"	1 1/2"	1 1/2"		3/0	4	2"	2"	2 1/2"	
175	2/0	6	-	2"	2"	2"		4/0	4	2"	2"	2 1/2"	
200	3/0	6	-	2"	2"	2 1/2"		250	4	2"	2"	3"	
225	4/0	4	-	2"	2"	2 1/2"		300	2	2 1/2"	2 1/2"	3"	
250	250	4	-	2 1/2"	2 1/2"	2 1/2"		350	2	2 1/2"	2 1/2"	3"	
300	350	4	-	2 1/2"	2 1/2"	3"		500	2	3"	3"	3 1/2"	
350	500	3	-	3"	3"	3"		2-4/0	2-1/0	2-2"	2-2"	2-2"	
400	500	3	-	3"	3"	3"		2-250	2-1/0	2-2 1/2"	2-2 1/2"	2-2 1/2"	
450	2-4/0	2-2	-	2-2"	2-2"	2-2 1/2"		2-300	2-1/0	2-2 1/2"	2-2 1/2"	2-3"	
500	2-250	2-2	-	2-2 1/2"	2-2 1/2"	2-2 1/2"		2-350	2-1/0	2-2 1/2"	2-2 1/2"	2-3"	
600	2-350	2-1	-	2-2 1/2"	2-2 1/2"	2-3"		2-500	2-2/0	2-3"	2-3"	2-3 1/2"	
700	2-500	2-1/0	-	2-3"	2-3"	2-3"		2-600	2-3/0	2-3"	2-3"	2-3 1/2"	
800	2-500	2-1/0	-	2-3"	2-3"	2-3 1/2"		3-400	3-3/0	3-3"	3-3"	3-3 1/2"	
1000	3-400	3-2/0	-	3-3"	3-3"	3-3"		3-600	3-4/0	-	4-3"	4-3 1/2"	
1200	3-600	3-3/0	-	3-3 1/2"	3-3 1/2"	3-3 1/2"		4-500	4-250	-	4-3"	4-3 1/2"	
1600	4-600	4-4/0	-	4-3 1/2"	4-3 1/2"	4-3 1/2"		5-600	5-350	-	5-3 1/2"	5-4"	
2000	5-600	5-250	-	5-3 1/2"	5-3 1/2"	5-3 1/2"		6-600	6-400	-	6-3 1/2"	6-4"	

GENERAL NOTES:
1. CONTRACTOR TO SIZE FEEDERS AND BRANCH CIRCUITS BASED ON THIS SCHEDULE AND OVER CURRENT DEVICE SIZE, UNLESS NOTED OTHERWISE.
2. CONTRACTOR MAY COMBINE 20A CIRCUITS AS NOTED IN SPECIFICATION.
3. CONDUCTORS ARE BASED ON THHN/THWN UP TO AND INCLUDING #4/0. LARGER THAN #4/0 ARE BASED ON TYPE XHHW.
4. CONDUIT SIZES ARE VALID FOR EMT OR RGS. CONDUIT SIZES SHALL BE ADJUSTED AS REQUIRED FOR OTHER TYPES OF CONDUIT.
5. ELECTRICAL CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR AND PROVIDE REQUIRED WIRE SIZES TO ACCOMMODATE MECHANICAL EQUIPMENT LUG SIZES.
6. SIZE OF DISCONNECT SWITCH LOCATED AT EQUIPMENT SHALL BE SIZED BASED UPON OVERCURRENT PROTECTION OF THAT DEVICE.
7. OBTAIN APPROVAL FROM ENGINEER PRIOR TO INSTALLING DIFFERENT SIZE/QUANTITY OF CONDUCTORS TO OBTAIN AN EQUIVALENT AMPACITY.
8. SPLICE FROM ALUMINUM TO COPPER PRIOR TO ENTERING EQUIPMENT LISTED FOR USE WITH COPPER CONDUCTORS ONLY OR USE COPPER CONDUCTORS FOR THE ENTIRE LENGTH OF FEEDER.
9. N/A = NOT ACCEPTABLE

KEYED NOTES:
1. CONDUCTORS ARE BASED ON 90°C, 600V. INSULATED WIRE APPLIED AT 75°C FOR TERMINATION RATED 60/75°C OR 75°C. FOR TERMINATION RATED AT 60°C, USE CONDUCTORS AND CONDUIT SIZES INDICATED IN PARENTHESES.

DRY TYPE DISTRIBUTION TRANSFORMER CIRCUIT SIZING SCHEDULE

TRANSFORMER KVA	PRIMARY (480V)	SECONDARY (208Y/120 VOLT)									KEYED NOTES
	OVERCURRENT PROTECTION	OVERCURRENT PROTECTION	CONDUCTOR SIZE (AWG OR KCMIL)						GROUNDING ELECTRODE CONDUCTOR		
			PHASE & NEUTRAL		SUPPLY SIDE BONDING JUMPER		CONDUIT (4W + SSBJ)				
			COPPER	ALUMINUM	COPPER	ALUMINUM	COPPER	ALUMINUM	COPPER	ALUMINUM	
9	20A	30A	10	NA	8	NA	3/4"	NA	8	NA	
15	25A	60A	6	NA	8	NA	1"	NA	8	NA	1
30	45A	100A	3	1	8	6	1 1/4"	1 1/2"	8	6	1
45	70A	175A	2/0	4/0	4	2	2"	2 1/2"	4	2	
75	125A	300A/225A	350 / 4/0	500 / 300	2	1/0	3"	3 1/2"	2	1/0	2
112 1/2	175A	400A	600	2-250	1/0	2	3 1/2"	2-2 1/2"	1/0	1/0	
150	225A	600A	2-350	2-500	2-2	2-1/0	2-3"	2-3 1/2"	2/0	4/0	
225	350A	800A	2-600	3-400	2-1/0	3-1/0	2-3 1/2"	3-3"	3/0	4/0	
300	500A	1200A	3-600	4-500	3-1/0	4-1/0	3-3 1/2"	4-3 1/2"	3/0	250	
500	800A	1600A	4-600	5-600	4-1/0	5-3/0	4-3 1/2"	5-3 1/2"	3/0	250	

GENERAL NOTES:
1. TRANSFORMERS AND FEEDERS ARE BASED ON 480 VOLT, 3 PHASE, 3 WIRE PRIMARY AND 208Y/120 VOLT, 3 PHASE, 4 WIRE, SECONDARY.
2. ALUMINUM CONDUCTORS ARE PERMITTED ONLY IF INCLUDED IN FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE.
3. PRIMARY OVERCURRENT PROTECTION IS SIZED AT 125% OF TRANSFORMER FULL LOAD CURRENT. PROVIDE PRIMARY OVERCURRENT DEVICE SELECTION TO ALLOW TRANSFORMER IN-RUSH CURRENT AND PROTECT BASED ON THE ANSI DAMAGE CURVE. IF MANUFACTURER REQUIRES PRIMARY OVERCURRENT GREATER THAN 125% (NOT TO EXCEED 250%) THEN PRIMARY FEEDER SHALL BE INCREASED ACCORDINGLY.
4. SECONDARY CONDUCTOR BASED ON TEN FOOT MAXIMUM LENGTH (NEC 240.21(C)(2)). IF CONDUCTORS ARE LONGER THAN TEN FOOT, REQUIREMENTS IN NEC 240.21(C)(6) MUST BE MET. IN NO CASE SHALL CONDUCTORS BE LONGER THAN TWENTY-FIVE FEET.

KEYED NOTES:
1. CONDUCTORS ARE BASED ON 90°C, 600V. INSULATED WIRE APPLIED AT 75°C FOR TERMINATION RATED 60/75°C OR 75°C.
2. THE SMALLER SIZE IS TO BE USED TO FEED 225A PANELBOARDS.

BRANCH CIRCUIT VOLTAGE DROP WIRING SCHEDULE FOR SINGLE PHASE CIRCUITS

BRANCH CIRCUIT RATING (A)	WIRE SIZE (AWG)	MAXIMUM BRANCH CIRCUIT LENGTH (IN FEET)				
		120V	208V	240V	277V	480V
20A	12	83	143	165	191	331
20A	10	128	222	256	295	511
20A	8	201	348	402	464	804
20A	6	313	542	625	721	1250
30A	10	85	148	170	197	341
30A	8	134	232	268	309	536
30A	6	208	361	417	481	833
30A	4	313	542	625	721	1250

GENERAL NOTES:
1. THE ABOVE TABLE VALUES ARE BASED ON COPPER CONDUCTORS, IN STEEL CONDUIT, WITH A LOAD POWER FACTOR OF 0.85 PER NEC CHAPTER 9, TABLE 9.
2. PROVIDE BRANCH CIRCUIT CONDUCTORS AS INDICATED IN THE TABLE ABOVE FOR ALL LIGHTING AND RECEPTACLE BRANCH CIRCUITS. WHERE BRANCH CIRCUITS SERVE DEDICATED EQUIPMENT, THE CONTRACTOR MAY PERFORM VOLTAGE DROP CALCULATIONS BASED ON ACTUAL EQUIPMENT CONNECTED LOAD AND PROVIDE CONDUCTORS APPROPRIATELY SIZED TO LIMIT VOLTAGE DROP TO A MAXIMUM OF 3%.
3. CONDUCTOR SIZES ARE BASED ON MAXIMUM OF 9 CURRENT CARRYING CONDUCTORS IN A SINGLE CONDUIT.
4. LIMITS FOR CONDUCTOR LENGTHS SHOWN ARE BASED ON A MAXIMUM BRANCH CIRCUIT LOADING OF 64% OF THE BRANCH BREAKER RATING AND A MAXIMUM OF 3 PERCENT VOLTAGE DROP TO COMPLY WITH ASHRAE 90.1 AND THE NEC. FOR CIRCUITS LOADED GREATER THAN 64% OF BRANCH BREAKER RATING, THE CONTRACTOR SHALL PROVIDE CONDUCTORS APPROPRIATELY SIZED TO LIMIT VOLTAGE DROP TO 3%.

FLOOR SERVICE FITTING SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER (SEE NOTE #2)	MODEL	DEVICE CONFIGURATION	FLANGE/COVER MATERIAL & COLOR	SERVICE PLATE TYPE	MINIMUM DEPTH	MAXIMUM CONDUIT
FB4D	MULTI FUNCTION FOUR GANG, MULTI SERVICE, STAMPED STEEL FOR SLAB ON GRADE APPLICATIONS, RECESSED FLOOR BOX. 2 DUPLEX RECEPTACLES AND 2 TELECOM OUTLETS, CARPET/TILE INSERT COVER.	WIREMOLD	RFB4E-OG	2D / 2T	ARCHITECT SELECTED	F	3 1/2"	2"

GENERAL NOTES:
1. PROVIDE 1 1/4"C. FROM EACH TELECOM FLOOR BOX (GANG) TO ACCESSIBLE LOCATION IN CEILING.
2. OTHER ACCEPTABLE MANUFACTURERS ARE STEEL CITY, OR HUBBELL-RACO.
3. ALL PRODUCTS IN THIS SCHEDULE SHALL MEET AND EXCEED THE UL514A or UL514C SCRUB WATER EXCLUSION REQUIREMENT.
4. COORDINATE ALL TELECOM AND A/V OUTLETS WITH COMMUNICATIONS AND A/V CONTRACTORS.

PF = PARTITION FEED
D = DUPLEX RECEPTACLE
T = 2 TELECOM OPENINGS

BS = BRASS
AL = ALUMINUM
BK = BLACK
GY = GRAY (CONCRETE)
BZ = BRONZE
NK = NICKEL

FR = FLIP LID/RECTANGULAR
SL = SLIDES
F = FLIP COVER

NOTE: SOME SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT

RACEWAY / CONDUCTOR / CABLE APPLICATION SCHEDULE

	WIRE			RACEWAY												CABLE/CORD						
	COPPER, TYPE THHN/THWN-2	COPPER, TYPE XHHW-2	ALUMINUM, TYPE XHHW-2 (100A AND ABOVE ONLY)	ELECTRICAL METALLIC TUBING (EMT)	INTERMEDIATE METAL CONDUIT (IMC)	RIGID STEEL CONDUIT (RSC)	PVC COATED RIGID STEEL CONDUIT	RIGID NON-METALLIC CONDUIT (RNC) TYPE EPC-40	RIGID NON-METALLIC CONDUIT (RNC) TYPE EPC-80	HIGH DENSITY POLYETHYLENE (HDPE) SCHEDULE 40	HIGH DENSITY POLYETHYLENE (HDPE) SCHEDULE 80	REINFORCED THERMOSET RESIN CONDUIT (RTRC) TYPE AG	REINFORCED THERMOSET RESIN CONDUIT (RTRC) TYPE BG	FLEXIBLE METAL CONDUIT (FMC)	LIQUID TIGHT FLEXIBLE METAL CONDUIT (LFMC)	SURFACE RACEWAY	METAL CLAD TYPE CABLE WITH INSULATED GROUND WIRE (TYPE MC)	VFC CABLE	TRAY CABLE (TYPE TC)	TRAY CABLE EXPOSED RUNS (TYPE TC-ER)	PHOTOVOLTAIC CABLE (TYPE PV)	POWER LIMITED CABLE
FEEDERS - EXTERIOR																						
EXPOSED, SURFACE MOUNTED TO STRUCTURE		X	X		X	X	X					X										
EXPOSED, WITH FREESTANDING SUPPORT		X	X		X	X	X					X										
CONCEALED IN RETAINING WALL OR SIMILAR ELEMENT		X	X			X	X	X	X													
BELOW PARKING LOTS AND ROADWAYS		X	X				X		X		X		X									
BELOW GREEN SPACE		X	X				X	X		X			X									
WITHIN 5' OF FOUNDATION WALL		X	X			X	X															
ROOFTOPS (WHEN APPROVED BY ENGINEER)		X	X		X	X	X															
FEEDERS - INTERIOR																						
CONCEALED, ACCESSIBLE CEILINGS	X		X	X	X																	
CONCEALED, INACCESSIBLE CEILINGS	X		X	X	X																	
CONCEALED IN GYPSUM BOARD PARTITION WALLS	X		X	X	X																	
CONCEALED IN CMU WALLS	X		X	X	X																	
EXPOSED, BELOW 10' AFF AND SUBJECT TO DAMAGE	X		X		X	X	X															
EXPOSED, BELOW 10' AFF AND NOT SUBJECT TO DAMAGE	X		X	X	X																	
EXPOSED, ABOVE 10' AFF UNFINISHED SPACES	X		X	X	X																	
EXPOSED, FINISHED SPACES	X		X													X						
BELOW SLAB ON GRADE	X		X			X	X	X	X													
DAMP AND WET LOCATIONS	X		X		X	X	X	X														
BRANCH CIRCUITS - EXTERIOR																						
EXPOSED, SURFACE MOUNTED TO STRUCTURE		X			X	X	X		X													
EXPOSED, WITH FREESTANDING SUPPORT		X			X	X	X															
CONCEALED IN RETAINING WALL OR SIMILAR ELEMENT		X				X	X	X														
BELOW PARKING LOTS AND ROADWAYS		X				X	X	X		X												
BELOW GREEN SPACE		X						X														
WITHIN 5' OF FOUNDATION WALL		X				X	X															
ROOFTOPS (WHEN APPROVED BY ENGINEER)		X				X	X	X														
BRANCH CIRCUITS - INTERIOR																						
CONCEALED, ACCESSIBLE CEILINGS	X				X	X											X					
CONCEALED, INACCESSIBLE CEILINGS	X				X	X																
CONCEALED IN GYPSUM BOARD PARTITION WALLS	X				X	X									X		X					
CONCEALED IN CMU WALLS	X				X	X																
EXPOSED, BELOW 10' AFF AND SUBJECT TO DAMAGE	X					X	X	X														
EXPOSED, BELOW 10' AFF AND NOT SUBJECT TO DAMAGE	X				X	X										X						
EXPOSED, ABOVE 10' AFF UNFINISHED SPACES	X				X	X																
EXPOSED, FINISHED SPACES	X															X						
BELOW SLAB ON GRADE	X							X														
EMBEDDED IN ELEVATED CONCRETE SLAB	X							X														
DAMP AND WET LOCATIONS	X				X	X	X	X								X						
SPECIAL APPLICATIONS																						
SERVICE ENTRANCE - UNDERGROUND		X	X				X	X	X	X	X											
SERVICE ENTRANCE - ABOVE GROUND		X	X	X	X	X																
CONNECTION BETWEEN VFC AND MOTORS (KEYED NOTE 1)																		X				
CLASS 1 CONTROL CIRCUITS	X			X	X	X													X	X		
CLASS 2 CONTROL CIRCUITS	X			X	X	X													X	X		X
CLASS 3 CONTROL CIRCUITS	X			X	X	X													X	X		X
CONNECTIONS TO TRANSFORMERS, MOTORS AND VIBRATING EQUIPMENT		X														X						
PHOTOVOLTAIC PANELS																					X	

GENERAL NOTES:
1. TRANSITION FROM PVC/HDPE AND PROVIDE RIGID STEEL OR RTRC SWEEPS WHERE CONDUITS PENETRATE WALLS, CONCRETE SLABS, CONCRETE BASES, AND ASPHALT.
2. REFER TO SPECIFICATIONS FOR RESTRICTIONS ON MC/AC CABLE INSTALLATION.
3. EMT SHALL NOT BE USED ON THE EXTERIOR OF A BUILDING OR IN AREAS SUBJECT TO DAMAGE BELOW 10' AFF.
4. INSTALL SURFACE RACEWAYS ONLY WHERE SHOWN ON DRAWINGS.

KEYED NOTES:
1. NON-ARMORED CABLE SHALL BE INSTALLED IN RACEWAY. ARMORED CABLE SHALL BE INSTALLED IN TRAY OR FREE-AIR AS APPLICABLE.
2. CONDUIT AND BUILDING WIRE ALLOWED WHEN ENCASED IN MINIMUM 2" CONCRETE.
3. EMERGENCY FEEDERS IN OCCUPANCIES THAT ARE UNDER 700.10(D) SHALL HAVE A TWO HOUR RATING. RATING SHALL BE OBTAINED BY ROUTING CONDUIT AND BUILDING WIRE IN SPRINKLERED SPACE, IN A TWO HOUR SHAFT, OUTSIDE OF THE BUILDING, IN A LISTED TWO HOUR RATED RACEWAY, OR UNDER A MINIMUM OF 2" OF CONCRETE; OR BY USING A LISTED TWO-HOUR RATED CABLE ASSEMBLY.

SPECIAL RECEPTACLES

TYPE	DESCRIPTION
Type 2	250V, 20A, SINGLE PHASE, LOCKING RECEPTACLE, 2 POLE, 3 WIRE (NEMA L6-20R)
Type 7	125/250V SINGLE PHASE RECEPTACLE, 3 POLE, 4 WIRE (NEMA 14-30R)
Type 8	125/250V SINGLE PHASE RECEPTACLE, 3 POLE, 4 WIRE (NEMA 14-50R)

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Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: SMB Checked: SMB

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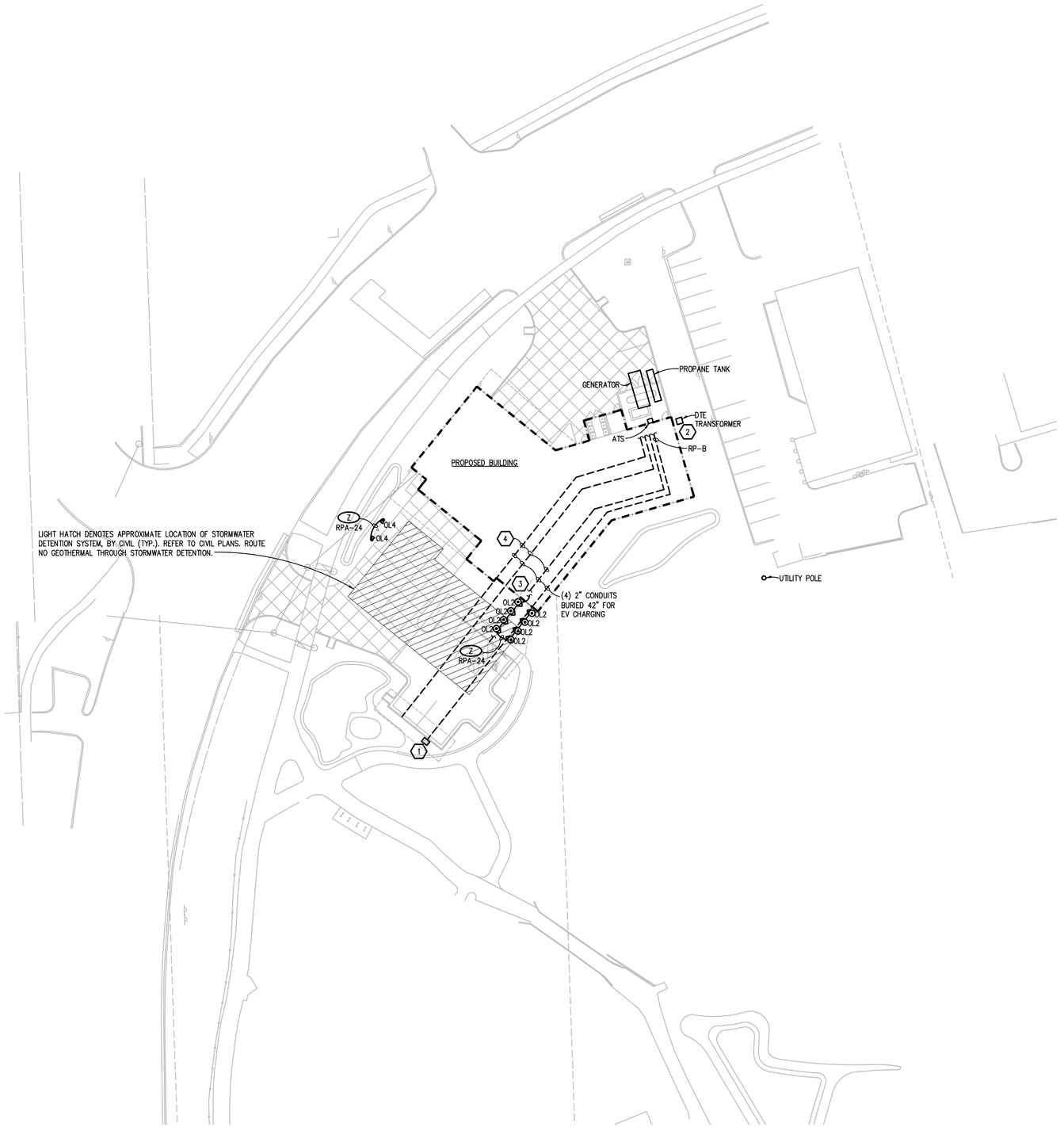
Sheet E0.02

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE. 1"



ELECTRICAL SITE PLAN
SCALE: 1" = 30'

SITE PLAN GENERAL NOTES:

1. THESE NOTES ARE GENERIC GUIDELINES ONLY. ELECTRICAL CONTRACTOR'S PERSONNEL ON SITE SHALL BE THOROUGHLY FAMILIAR WITH THE PUBLISHED SPECIFICATIONS FOR EXACT DESCRIPTIONS OF SCOPE, METHODS, AND MATERIAL.
2. THESE DRAWINGS REPRESENT THE GENERAL EXTENT AND ARRANGEMENT OF SYSTEMS. COORDINATE EXACT EQUIPMENT LOCATIONS, ELEVATIONS, AND FINAL CONNECTION REQUIREMENTS. PROVIDE EACH SYSTEM COMPLETE, INCLUDING ALL NECESSARY COMPONENTS, FITTINGS AND OFFSETS.
3. CONDUCT A SURVEY TO IDENTIFY ALL UNDERGROUND UTILITIES. CALL 811 PRIOR TO EXCAVATION.
4. UTILITIES SHOWN ON THESE DRAWINGS ARE FOR REFERENCE ONLY. COORDINATE EXACT LOCATION OF ALL EXISTING UTILITIES, AND ROUTING OF ALL NEW UNDERGROUND UTILITIES PRIOR TO EXCAVATION.
5. DEWATER TRENCHES PRIOR TO INSTALLATION OF CONDUITS. PROVIDE WATER TIGHT FITTINGS ON ALL UNDERGROUND CONDUITS.
6. COORDINATE DEMOLITION WORK, AND ELECTRICAL AND TELEPHONE SERVICES TO THE SITE, WITH THE RESPECTIVE LOCAL UTILITY COMPANY REPRESENTATIVES PRIOR TO COMMENCEMENT OF WORK. INCLUDE ALL ASSOCIATED COST/FEES BY THE UTILITY COMPANIES IN THE BID PRICE.
7. INSTALL UNDERGROUND CONDUITS 42" BELOW FINISHED GRADE, MINIMUM, UNLESS NOTED OTHERWISE.
8. COORDINATE SERVICE SHUT-DOWNS WITH ALL TRADES INVOLVED ON SITE AND OBTAIN WRITTEN AUTHORIZATION FROM OWNER 72 HOURS PRIOR TO ANY ELECTRICAL AND/OR TELEPHONE SHUT-DOWN.
9. REMOVE ALL DE-ENERGIZED CONDUCTORS FROM SITE AT COMPLETION OF THE PROJECT.
10. OUTDOOR LIGHTING BRANCH CIRCUIT WIRING SHALL BE MINIMUM #8 AWG CONDUCTORS (XHHW-2), IN MINIMUM 1" DIA. CONDUIT, UNLESS NOTED OTHERWISE.
11. SPARE CONDUITS SHALL INCLUDE PULL STRING AND SHALL BE TERMINATED WITH A CAP.
12. EXCAVATE THE ENTIRE LENGTH OF TRENCH TO PROPERLY SET DUCT ELEVATIONS.

(#) CONSTRUCTION KEY NOTES:

1. EV CHARGER PROVIDED BY OWNER. COORDINATE FINAL BREAKER SIZE AT PANEL WITH EV MANUFACTURER.
2. DTE TO CONFIRM UTILITY POLE MOUNTED OR PAD MOUNTED TRANSFORMER INSTALLATION. ELECTRICAL CONTRACTOR TO PROVIDE ALTERNATE COST FOR TRANSFORMER PAD IF REQUIRED.
3. COORDINATE LOCATION OF LOW VOLTAGE POWER SUPPLY.
4. PROVIDE ADDITIONAL CONDUITS FOR FUTURE EV CHARGERS.

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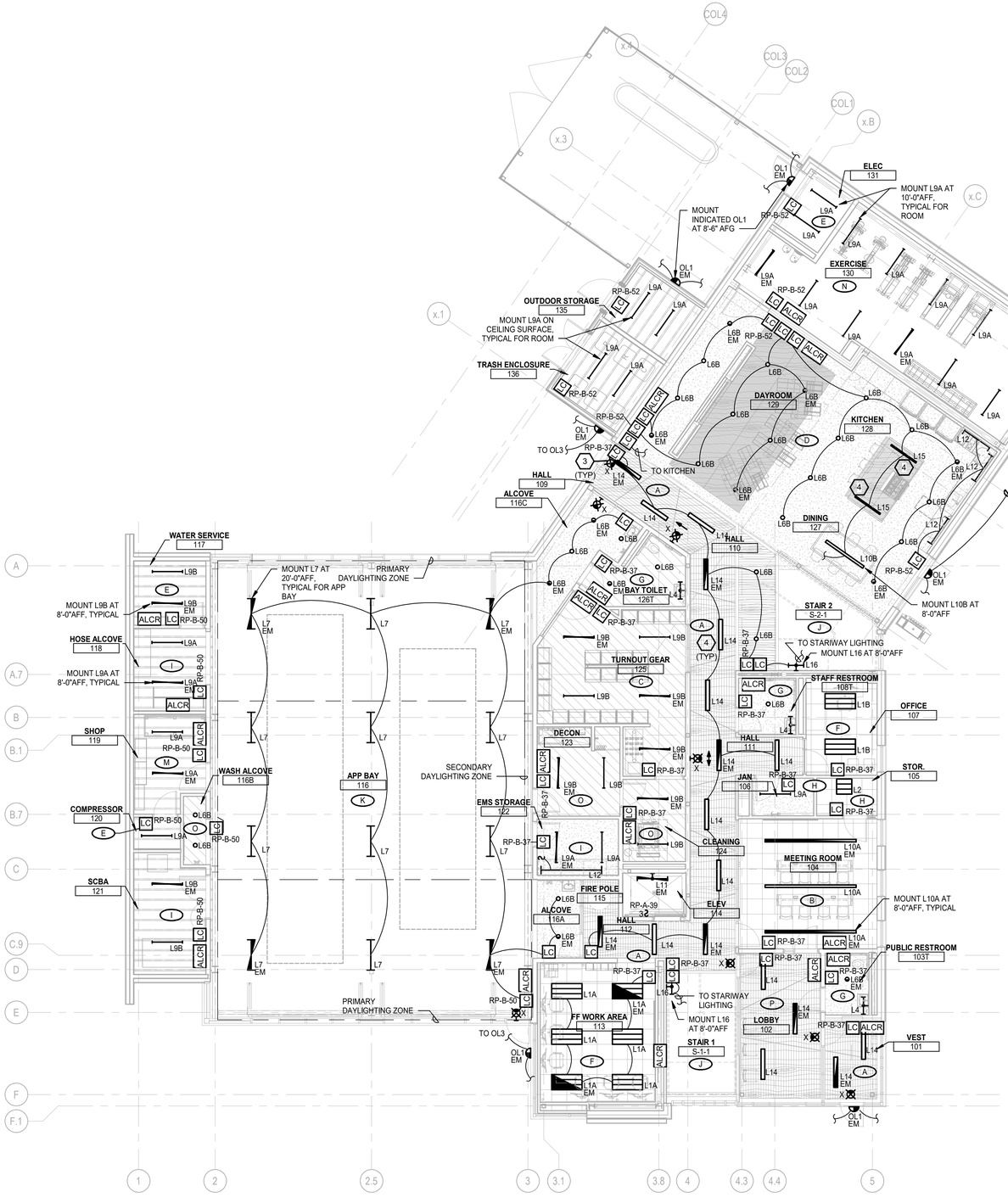

FIRST LEVEL LIGHTING PLAN

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

PROJECT TRUE

ELECTRICAL GENERAL NOTES:

1 THESE DRAWINGS REPRESENT THE GENERAL EXTENT AND ARRANGEMENT OF SYSTEMS. COORDINATE EXACT EQUIPMENT LOCATIONS, ELEVATIONS, AND FINAL CONNECTION REQUIREMENTS. PROVIDE EACH SYSTEM COMPLETE, INCLUDING ALL NECESSARY COMPONENTS, FITTINGS AND OFFSETS.

2 INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.

3 COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT, AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.

4 PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.

5 TRANSFORMER SECONDARY CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH TRANSFORMER CIRCUIT SIZING SCHEDULE SHOWN ON "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS OTHERWISE NOTED.

6 MOTOR CIRCUIT PROTECTION SHALL BE SIZED IN ACCORDANCE WITH MOTOR CIRCUIT SIZING SCHEDULES SHOWN ON "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS OTHERWISE NOTED.

7 COORDINATE THE MOUNTING HEIGHTS OF DEVICES WITH ARCHITECTURAL ELEVATIONS AND THE TRADES INSTALLING THE WORK.

8 COORDINATE EXACT LOCATIONS OF ALL FLOOR SERVICE FITTINGS AND POKE-THROUGH ASSEMBLIES WITH FINAL FURNITURE LAYOUT DRAWINGS.

9 REFER TO MECHANICAL SCHEDULE SHEETS FOR ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT. PROVIDE ALL CONNECTIONS, STARTERS, DISCONNECTS, ETC. AS REQUIRED BY SCHEDULES AND WHERE NOTED ELSEWHERE. VERIFY REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH SHOP DRAWINGS SUBMITTALS. NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN EQUIPMENT SUBMITTALS AND ELECTRICAL DRAWINGS. WHERE CIRCUIT SIZES ARE SHOWN ON THE ELECTRICAL DRAWINGS THAT DIFFER FROM WHAT IS INDICATED ON THE MECHANICAL SCHEDULES, PROVIDE THE CIRCUIT OF HIGHER AMPACITY.

10 REFER TO TEMPERATURE CONTROLS SHEETS FOR REQUIRED FIRE ALARM CONTROL MODULES, DUCT SMOKE DETECTORS, AND MOTOR CONTROLLERS. PROVIDE ALL ACCESSORIES INDICATED.

11 THE FIRE ALARM DEVICES SHOWN ON PLAN ARE A PARTIAL REPRESENTATION OF THE FIRE ALARM SYSTEM. PROVIDE THE DESIGN AND INSTALLATION OF A COMPLETE AND FUNCTIONAL FIRE ALARM SYSTEM IN ACCORDANCE WITH THE SPECIFICATIONS, DRAWINGS, AND ALL APPLICABLE CODES. THE FIRE ALARM VENDOR SHALL PROVIDE LAYOUT DRAWINGS INDICATING THE REQUIRED QUANTITIES AND LOCATIONS OF MANUAL PULL STATIONS, NOTIFICATION APPLIANCES, SMOKE AND HEAT DETECTORS, CONTROL MODULES, INTERFACE MODULES, MODULES FOR SPRINKLER FLOW AND TAMPER SWITCHES, ALL CONTROL PANELS, POWER SUPPLIES, AND ADDITIONAL DEVICES AND EQUIPMENT REQUIRED. COORDINATE LOCATIONS OF DEVICES WITH ARCHITECTURAL FINISHES AND REFLECTED CEILING PLANS, INCLUDING ADDITIONAL SMOKE AND HEAT DETECTORS REQUIRED FOR NON-SMOOTH CEILING APPLICATIONS. INCLUDE ALLOWANCES FOR ADJUSTMENT OF DEVICES BY THE ARCHITECT AT THE TIME OF SUBMITTAL TO COORDINATE WITH BUILDING FINISHES AND OTHER CEILING ELEMENTS.

12 REFER TO LIGHTING CONTROL SCHEDULE FOR ROOM CONTROL AND EMERGENCY LIGHTING CIRCUIT CONTROL REQUIREMENTS. DESIGNATION FOR ROOM IS INDICATED AS A LETTERED OVAL SYMBOL.

CONSTRUCTION KEY NOTES:

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ARCHITECTURE + PLANNING + DESIGN

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PBA Project No.: 2021.0121

STATE OF MICHIGAN
ERIC MICHAEL GRAETTINGER
ENGINEER
No. 6201052164
LICENSED PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: SMB Checked: SMB

City Of Ann Arbor
NEW FIRE STATION 4
2415 S HURON PKWY
ANN ARBOR, MI 48104

FIRST LEVEL LIGHTING PLAN

A3C COLLABORATIVE ARCHITECTURE
115 1/2 E. LIBERTY STREET
ANN ARBOR, MI 48104
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F: (866) 732 - 2168
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Sheet E2.01

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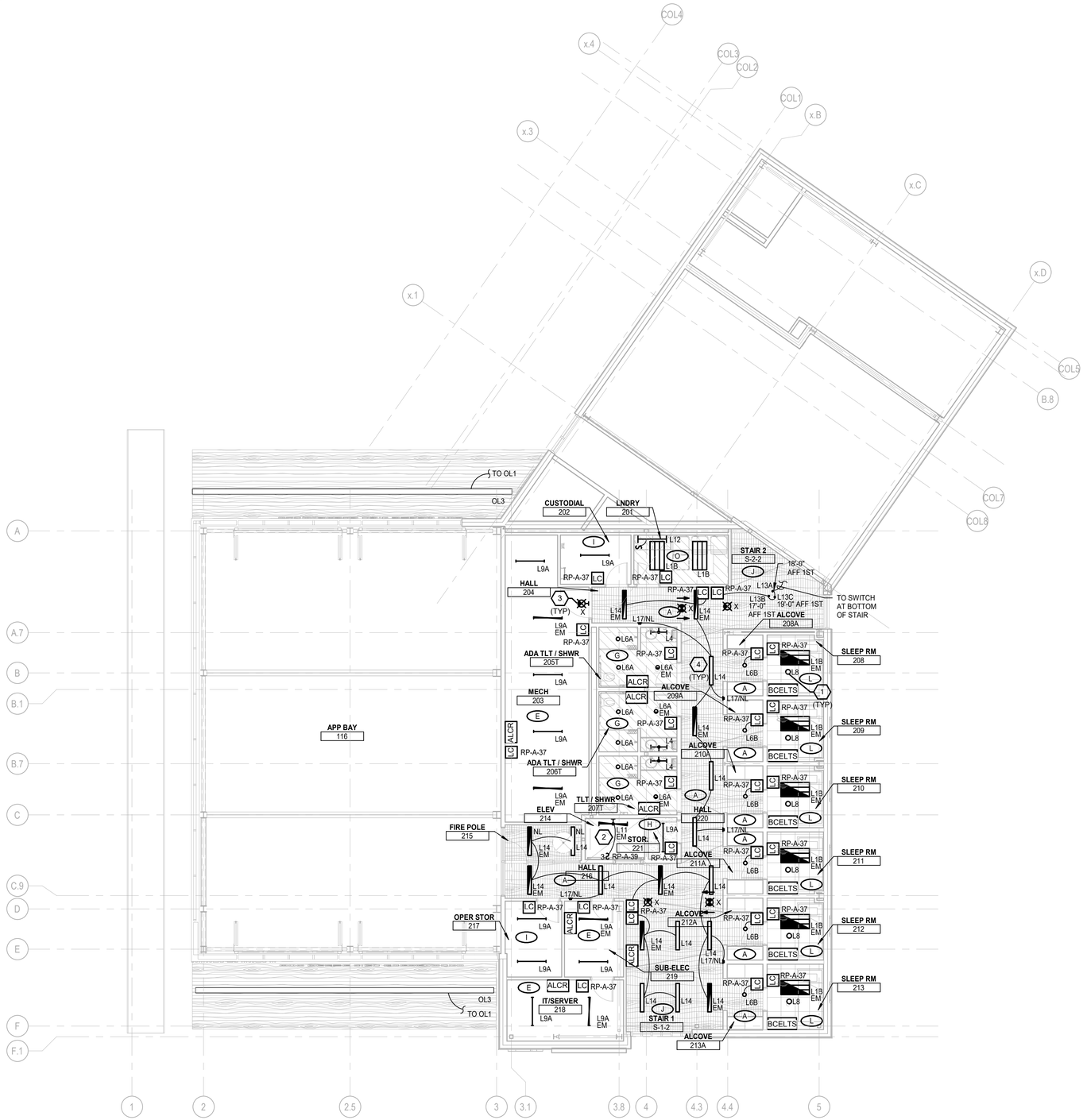

SECOND LEVEL LIGHTING PLAN

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PROJECT TRUE

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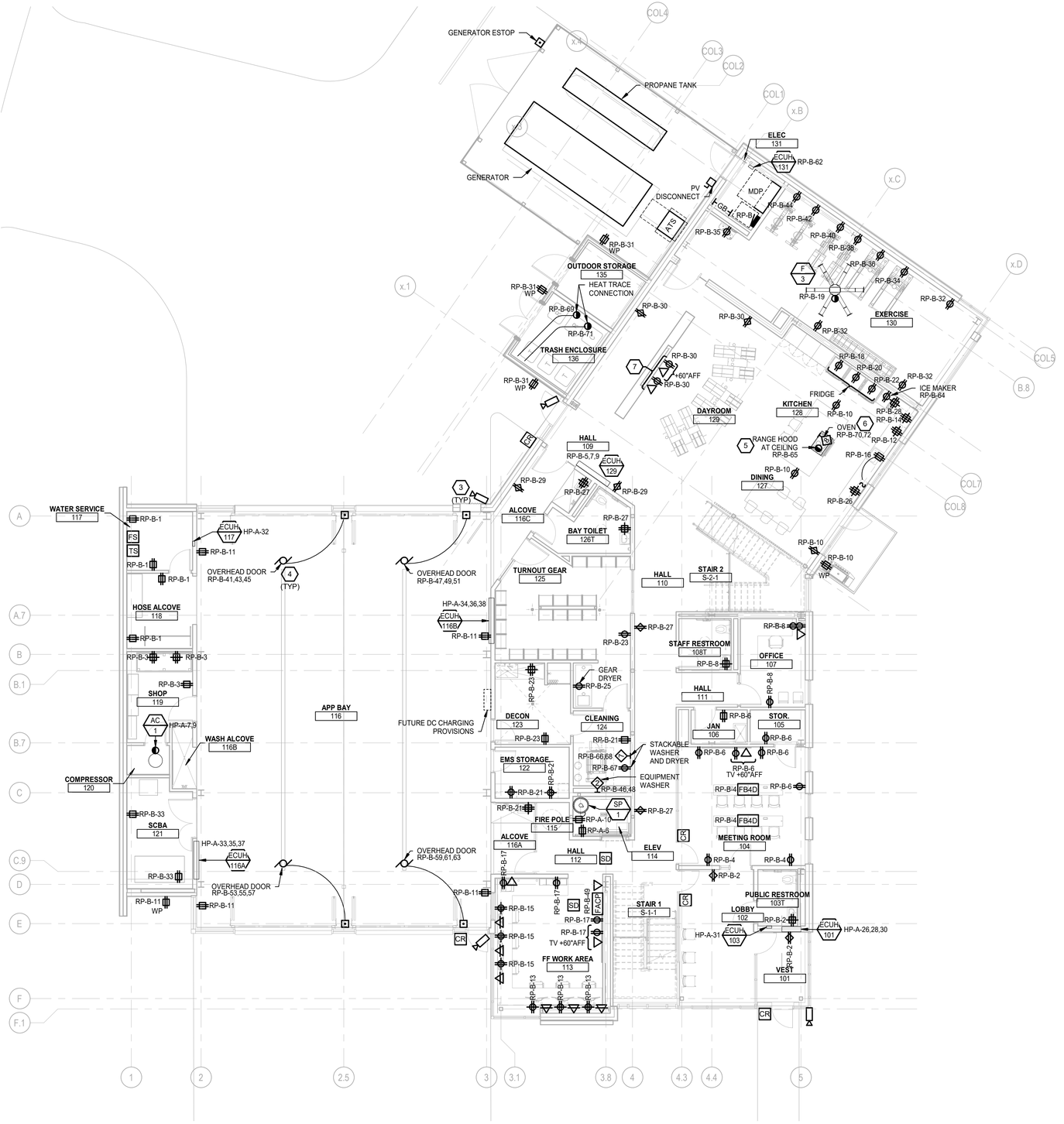

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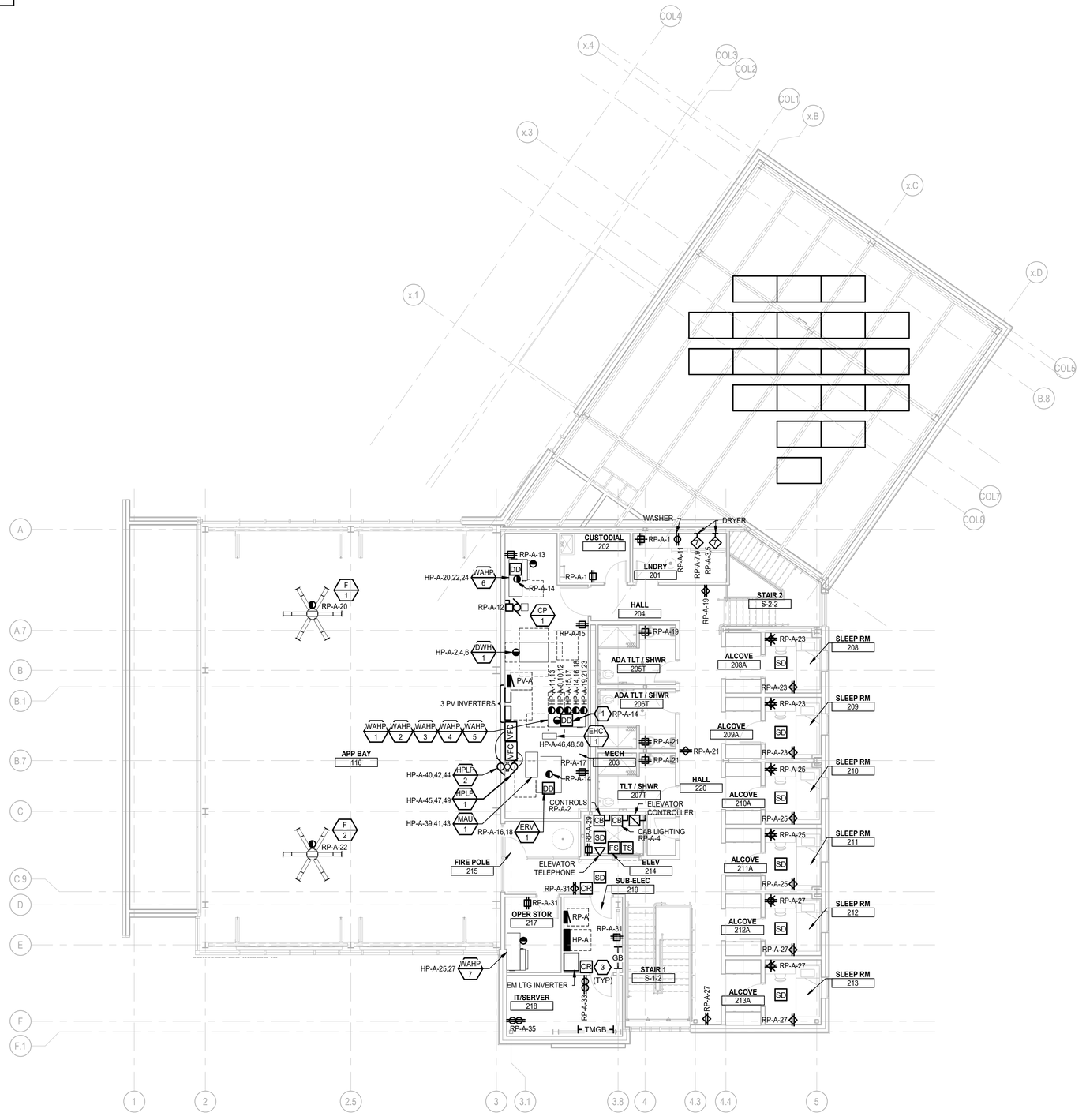

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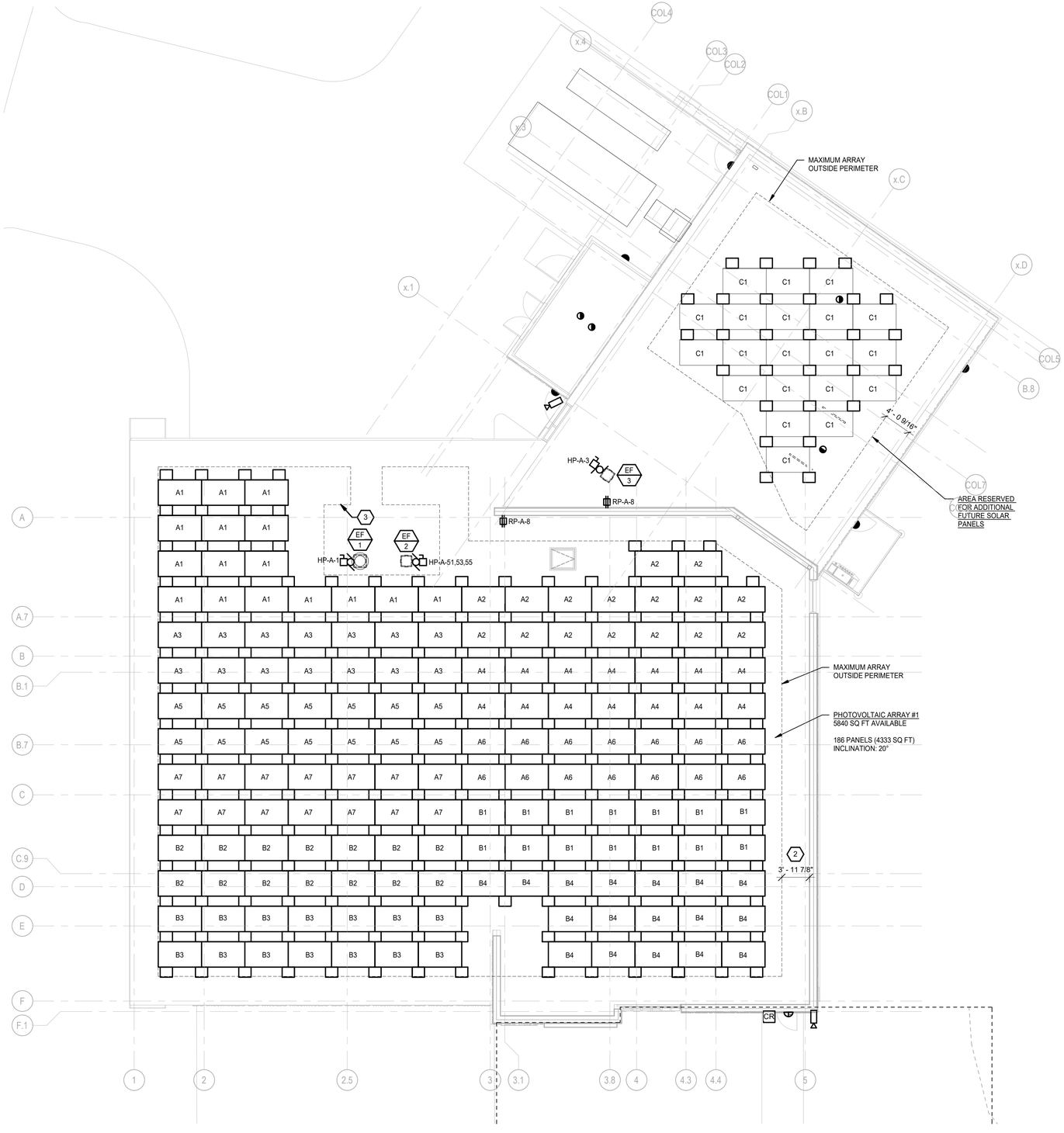

ROOF ELECTRICAL PLAN - MAIN BUILDING

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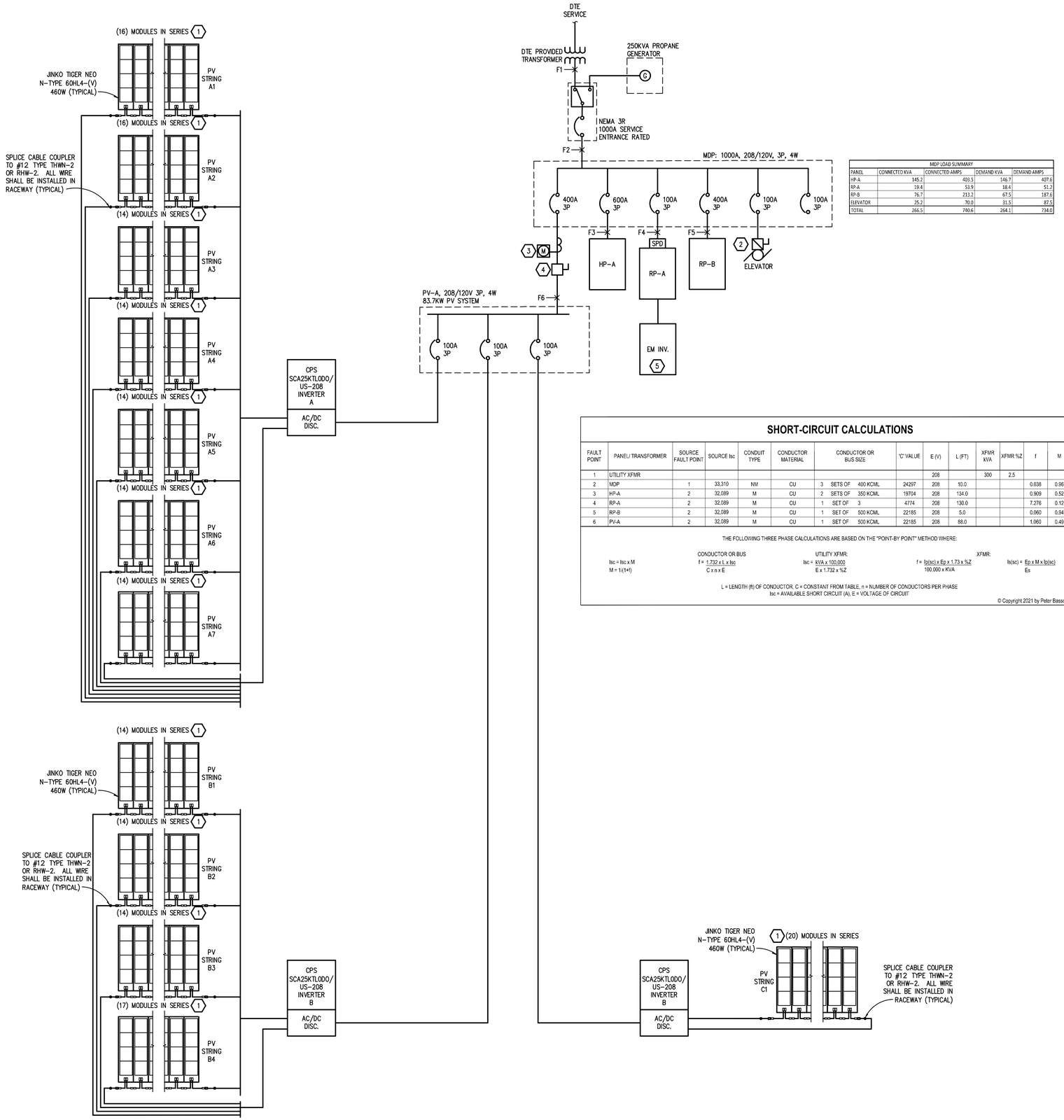

MDP LOAD SUMMARY				
PANEL	CONNECTED KVA	CONNECTED AMPS	DEMAND KVA	DEMAND AMPS
HP-A	145.2	403.5	146.7	407.6
RP-A	19.4	53.9	18.4	51.2
RP-B	76.7	213.2	67.5	187.6
ELEVATOR	25.2	70.0	31.5	87.5
TOTAL	266.5	740.6	264.1	734.0

SHORT-CIRCUIT CALCULATIONS

FAULT POINT	PANEL/ TRANSFORMER	SOURCE FAULT POINT	SOURCE Isc	CONDUIT TYPE	CONDUCTOR MATERIAL	CONDUCTOR OR BUS SIZE	'C' VALUE	E (V)	L (FT)	XFMR kVA	XFMR %Z	f	M	Isc
1	UTILITY XFMR							208		300	2.5			33,310
2	MDP	1	33,310	NM	CU	3 SETS OF 400 KCML	24297	208	10.0			0.038	0.98	32,089
3	HP-A	2	32,089	M	CU	2 SETS OF 350 KCML	19704	208	134.0			0.909	0.52	16,813
4	RP-A	2	32,089	M	CU	1 SET OF 3	4774	208	130.0			7.276	0.12	3,877
5	RP-B	2	32,089	M	CU	1 SET OF 500 KCML	22185	208	5.0			0.060	0.94	30,266
6	PV-A	2	32,089	M	CU	1 SET OF 500 KCML	22185	208	88.0			1.060	0.49	15,578

THE FOLLOWING THREE PHASE CALCULATIONS ARE BASED ON THE "POINT-BY POINT" METHOD WHERE:

Isc = Isc x M
M = 1/(1+f)

CONDUCTOR OR BUS: f = 1.732 x L x Isc / C x n x E

UTILITY XFMR: Isc = kVA x 100,000 / E x 1.732 x %Z

XFMR: f = Ip(sc) x Ep x 1.73 x %Z / 100,000 x KVA

Is(sc) = Ep x M x Ip(sc) / Es

L = LENGTH (ft) OF CONDUCTOR, C = CONSTANT FROM TABLE, n = NUMBER OF CONDUCTORS PER PHASE
Isc = AVAILABLE SHORT CIRCUIT (A), E = VOLTAGE OF CIRCUIT

DIAGRAM GENERAL NOTES:

1. THESE DRAWINGS REPRESENT THE GENERAL EXTENT AND ARRANGEMENT OF SYSTEMS. COORDINATE EXACT EQUIPMENT LOCATIONS, ELEVATIONS, AND FINAL CONNECTION REQUIREMENTS. PROVIDE EACH SYSTEM COMPLETE, INCLUDING ALL NECESSARY COMPONENTS, FITTINGS AND OFFSETS.
2. FEEDER AND BRANCH CIRCUIT CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH THE "FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE-GENERAL PURPOSE" ON THE "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS SPECIFICALLY NOTED OTHERWISE.
3. TRANSFORMER SECONDARY CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH THE "TRANSFORMER CIRCUIT SIZING SCHEDULE-GENERAL PURPOSE" ON THE "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS SPECIFICALLY NOTED OTHERWISE.
4. MOTOR CIRCUIT PROTECTION SHALL BE SIZED IN ACCORDANCE WITH THE MOTOR CIRCUIT SIZING SCHEDULES ON THE "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS SPECIFICALLY NOTED OTHERWISE.
5. BASIS OF DESIGN IS SCHNEIDER ELECTRIC DISTRIBUTION EQUIPMENT AND ASCO TRANSFER SWITCHES. IF THE CONTRACTOR ELECTS TO PROVIDE EQUIPMENT FROM OTHER APPROVED MANUFACTURERS, THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE THE LAYOUT AND CLEARANCE REQUIREMENTS IN ALL SPACES CONTAINING ELECTRICAL EQUIPMENT AND PROVIDE EQUIPMENT MEETING THE SPECIFICATIONS AND ACHIEVING CODE REQUIRED CLEARANCES WITHIN THE SPACE PROVIDED.
6. SELECTIVE COORDINATION (PER NEC ARTICLES 517.31(G), 700.32 AND 701.27) IS BASED ON SCHNEIDER ELECTRIC DISTRIBUTION EQUIPMENT AND ASCO TRANSFER SWITCHES. ELECTRICAL CONTRACTOR SHALL SUBMIT SELECTIVE COORDINATION STUDY WITH TIME CURRENT CHARACTERISTIC CURVES (AND TABLES FOR TESTED PAIR INSTANTANEOUS COORDINATION) FOR THE EMERGENCY SYSTEMS. ELECTRICAL CONTRACTORS SHALL RECEIVE APPROVED SHOP DRAWINGS BACK FROM ENGINEER OF RECORD PRIOR TO PURCHASING OR INSTALLING ANY ELECTRICAL DISTRIBUTION EQUIPMENT. BREAKERS MUST BE COORDINATED WITH AUTOMATIC TRANSFER SWITCHES 3-CYCLE WITHSTAND RATING. ALTERNATE MANUFACTURERS SHALL MEET SELECTIVE COORDINATION CRITERIA AT NO ADDITIONAL COST TO THE PROJECT.
7. VARIABLE FREQUENCY CONTROLLERS (VFC) FURNISHED BY MECHANICAL TRADES. ELECTRICAL CONTRACTOR SHALL INSTALL VFC, PROVIDE POWER FEEDER FROM DISTRIBUTION EQUIPMENT TO VFC AND PROVIDE POWER FEEDER FROM VFC TO MOTOR. REFER TO SPECIFICATIONS FOR APPLICATION OF VFC POWER CABLE FROM VFC TO MOTOR.

(#) CONSTRUCTION KEY NOTES:

1. PROVIDE RAPID SHUT DOWN MODULES AS REQUIRED BY NEC 690.12 SIMILAR TO TIGO TS4-A-F.
2. COORDINATE FINAL BREAKER REQUIREMENTS WITH ELEVATOR MANUFACTURER.
3. PROVIDE PV GENERATION METER WITHIN 5FT OF INCOMING SERVICE METER.
4. PROVIDE 400A DISCONNECT SWITCH WITHIN 5FT OF PV GENERATION METER.
5. PROVIDE EMERGENCY LIGHTING INVERTER SIMILAR TO IIS-2250.

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PBA Project No: 2021-0121

STATE OF MICHIGAN
ERIC MICHAEL GRAETTINGER
ENGINEER
No. 6201052164
LICENSED PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: SMB Checked: SMB

City Of Ann Arbor
NEW FIRE STATION 4
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ONE LINE DIAGRAM

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Sheet E5.01

PANELBOARD HP-A

#	LOAD TYPE	DESCRIPTION	CB TYPE	CB	A		B		C		CB	CB TYPE	DESCRIPTION	LOAD TYPE	#
1	M	EF-1		20	1656	4000									2
3	M	EF-3		15			1656	4000			50		DWH-1	NC	4
5	--	SPARE	--	20					0	4000					6
7	NC	AC-1		40	3203	1873									8
9							3203	1873			25		WAHP-2	NC	10
11	NC	WAHP-1		15					957	1873					12
13					957	1069									14
15	NC	WAHP-3		15			583	1069			15		WAHP-4	NC	16
17									583	1069					18
19	NC	WAHP-5		25	1777	2966									20
21							1777	2966			45		WAHP-6	NC	22
23									1777	2966					24
25	NC	WAHP-7		15	583	2114									26
27							583	2114			25		ECUH-101	E	28
29	--	SPARE	--	20					0	2114					30
31	E	ECUH-103		20	1500	1500					20		ECUH-117	E	32
33	E	ECUH-116A		70			6317	8418			90		ECUH-116B	E	34
35									6317	8418					36
37					6317	8418									38
39	NC	MAU-1		40			3483	1273			15		HPLP-2	M	40
41									3483	1273					42
43					3483	1273									44
45	M	HPLP-1		15			1273	6167			70		EHC-1	E	46
47									1273	6167					48
49					1273	6167									50
51	M	EF-2		20			2005	0			20	--	SPARE	--	52
53									2005	0	20	--	SPARE	--	54
55					2005	0					20	--	SPARE	--	56
57	--	SPARE	--	20			0	0			20	--	SPARE	--	58
59	--	SPARE	--	20					0	0	20	--	SPARE	--	60
61	--	SPARE	--	20	0	0					20	--	SPARE	--	62
63	--	SPARE	--	20			0	0			20	--	SPARE	--	64
65	--	SPARE	--	20					0	0	20	--	SPARE	--	66
67	--	SPARE	--	20	0	0					20	--	SPARE	--	68
69	--	SPARE	--	20			0	0			20	--	SPARE	--	70
71	--	SPARE	--	20					0	0	20	--	SPARE	--	72
73	--	SPARE	--	20	0	0					20	--	SPARE	--	74
75	--	SPARE	--	20			0	0			20	--	SPARE	--	76
77	--	SPARE	--	20					0	0	20	--	SPARE	--	78
79	--	SPARE	--	20	0	0					20	--	SPARE	--	80
81	--	SPARE	--	20			0	0			20	--	SPARE	--	82
83	--	SPARE	--	20					0	0	20	--	SPARE	--	84
					52134		48759		44275						
					ØA		ØB		ØC						

PANELBOARD INFORMATION	
VOLTAGE:	208Y/120V
BUS AMPACITY:	600A
MAIN TYPE:	MLO
MINIMUM A.I.C.:	22,000
MOUNTING:	SURFACE

PANELBOARD LOCATION

BRANCH CIRCUIT CONNECTED LOAD		DEMAND FACTOR	CALCULATED LOAD	FEEDER AND OVERCURRENT...
CONTINUOUS LOAD (C):	0	100%	0	125% 0
ELECTRIC HEAT (E)	72046	100%	72046	125% 90057.5
NON-CONTINUOUS LOAD (NC):	56155	100%	56155	100% 56155
KITCHEN LOAD (K):	0		0	100% 0
RECEPT BASE LOAD (R):	0	100%	0	100% 0
RECEPT DEMAND LOAD (R):	0	50%	0	100% 0
LIGHTING LOAD (L):	0	100%	0	125% 0
ADDITIONAL TRACK LIGHTING...				100% 0
MOTORS, HIGHEST LOAD (M):	6016	125 %	7520	100% 7520
MOTORS, REMAINING	10950	100 %	10950	100 % 10950
NOTE: DEMAND AND SIZING INFORMATION IS CALCULATED...		TOTAL (kVA):	**146.67**	
		TOTAL...	**407.12**	TOTAL... **457.11**

NOTES

PANELBOARD RP-A

#	LOAD TYPE	DESCRIPTION	CB TYPE	CB	A		B		C		CB	CB TYPE	DESCRIPTION	LOAD TYPE	#
1	R	RECEPT - LNDRY 201, CUSTODIAL 202		20	360	200					20		ELEVATOR CONTROLS	NC	2
3	R	RECEPT - LNDRY 201 DRYER	GFCI	20			1000	200			20		ELEVATOR CAB LIGHTING	L	4
5									1000	180	20		RECEPT - ELEV 114	R	6
7	R	RECEPT - LNDRY 201 DRYER	GFCI	20	1000	360					20		RECEPT - ROOFTOP	R	8
9							1000	864			20		SP-1	R	10
11	R	RECEPT - LNDRY 201 WASHER	GFCI	20					1200	528	15		CP-1	M	12
13	R	RECEPT - MECH 203		20	180	350					20		MECH EQUIPMENT DUCT DETECTORS	NC	14
15	R	RECEPT - MECH 203		20			180	1664			20		ERV-1	NC	16
17	R	RECEPT - MECH 203		20					180	1664					18
19	R	RECEPT - HALL 204, RM 205T		20	360	528					20		F-1	NC	20
21	R	RECEPT - HALL 220, RM 206T, 207T		20			540	528			20		F-2	NC	22
23	R	RECEPT - SLEEP RM 208-209	AFCI	20					720	170	20		LIGHTING - OUTDOOR SITE	L	24
25	R	RECEPT - SLEEP RM 210-211	AFCI	20	720	0					20	--	SPARE	--	26
27	R	RECEPT - SLEEP RM 212-213, HALL...	AFCI	20			900	0			20	--	SPARE	--	28
29	R	RECEPT - ELEV 214		20					180	0	20	--	SPARE	--	30
31	R	RECEPT - RM 217, 219, HALL 220		20	540	0					20	--	SPARE	--	32
33	R	RECEPT - IT/SERVER 218		20			360	0			20	--	SPARE	--	34
35	R	RECEPT - IT/SERVER 218		20					360	0	20	--	SPARE	--	36
37	L	LIGHTING - RM 204-220		20	1268	0					20	--	SPARE	--	38
39	L	LIGHTING - ELEVATOR		20			113	0			20	--	SPARE FOR TC CONTROLS	--	40
41	--	SPARE	--	20					0	0	20	--	SPARE FOR TC CONTROLS	--	42
					5866		7349		6182						
					ØA		ØB		ØC						

PANELBOARD INFORMATION	
VOLTAGE:	208Y/120V
BUS AMPACITY:	225A
MAIN TYPE:	MLO
MINIMUM A.I.C.:	10,000
MOUNTING:	SURFACE

* PROVIDE INTEGRAL SPD

PANELBOARD LOCATION

BRANCH CIRCUIT CONNECTED LOAD		DEMAND FACTOR	CALCULATED LOAD	FEEDER AND OVERCURRENT...
CONTINUOUS LOAD (C):	0	100%	0	125% 0
ELECTRIC HEAT (E)	0	100%	0	125% 0
NON-CONTINUOUS LOAD (NC):	4934	100%	4934	100% 4934
KITCHEN LOAD (K):	0		0	100% 0
RECEPT BASE LOAD (R):	10000	100%	10000	100% 10000
RECEPT DEMAND LOAD (R):	2184	50%	1092	100% 1092
LIGHTING LOAD (L):	1751.76	100%	1751.76	125% 2189.7
ADDITIONAL TRACK LIGHTING...				100% 0
MOTORS, HIGHEST LOAD (M):	528	125 %	660	100% 660
MOTORS, REMAINING	0	100 %	0	100 % 0
NOTE: DEMAND AND SIZING INFORMATION IS CALCULATED...		TOTAL (kVA):	**18.44**	
		TOTAL...	**51.18**	TOTAL... **52.39**

NOTES

PANELBOARD RP-B

#	LOAD TYPE	DESCRIPTION	CB TYPE	CB	A		B		C		CB	CB TYPE	DESCRIPTION	LOAD TYPE	#
1	R	RECEPT - RM 117, 188		20	720	540					20		RECEPT - RM 101, 102, 103T	R	2
3	R	RECEPT - SHOP 119		20			540	720			20		RECEPT - MEETING RM 104	R	4
5									4816	1080	20		RECEPT - RM 104-106	R	6
7	E	ECUH-129		60	4816	720					20		RECEPT - RM 107, 108T	R	8
9							4816	720			20		RECEPT - DINING 127, EXT 127	R	10
11	R	RECEPT - APP BAY 116, EXT 116		20					900	1000	30		RECEPT - KITCHEN 128	K	12
13	R	RECEPT - FF WORK AREA 113		20	540	1000					20		RECEPT - KITCHEN 128	K	14
15	R	RECEPT - FF WORK AREA 113		20			540	1200			20		DISPOSAL - KITCHEN 128	K	16
17	R	RECEPT - FF WORK AREA 113		20					720	800	20	GFCI	FRIDGE - KITCHEN 128	K	18
19	NC	F-3		20	528	800					20	GFCI	FRIDGE - KITCHEN 128	K	20
21	R	RECEPT - ROM 116A, 122		20			720	800			20	GFCI	FRIDGE - KITCHEN 128	K	22
23	R	RECEPT - RM 123, 125		20					540	0	20	--	SPARE	--	24
25	R	GEAR DRYER 125		20	1920	1000					20		RECEPT - KITCHEN 128	K	26
27	R	RECEPT - HALL 110, RM 126T		20			720	1000			20		RECEPT - KITCHEN 128	K	28
29	R	RECEPT - HALL 109, ALCOVE 115C		20					360	740	20		RECEPT - DAYROOM 129	R	30
31	R	RECEPT - EXT 109, ELEC 131		20	540	540					20		RECEPT - EXERCISE 130	R	32
33	R	RECEPT - SCBA 121		20			360	1000			20		RECEPT - EXERCISE 130	R	34
35	R	EWC-1	GFCI	20					180	1000	20		RECEPT - EXERCISE 130	R	36
37	L	LIGHTING - RM 101-115, 122-126		20	1296	1000					20		RECEPT - EXERCISE 130	R	38
39	NC	LIGHTING - EXTERIOR		20			150	1000			20		RECEPT - EXERCISE 130	R	40
41									1333	1000	20		RECEPT - EXERCISE 130	R	42
43	M	OVERHEAD DOOR 1		20	1333	1000					20		RECEPT - EXERCISE 130	R	44
45							1333	600			20	GFCI	CLEANING 124 WASHER	R	46
47									1333	600					48
49	M	OVERHEAD DOOR 2		20	1333	1465					20		LIGHTING - RM 116-121	L	50
51							1333	586			20		LIGHTING - RM 127-136	L	52
53									1333	342	20		EXTERIOR LIGHTING - BUILDING...	L	54
55	M	OVERHEAD DOOR 3		20	1333	20					20		EXTERIOR LIGHTING - PATH	L	56
57							1333	3328			40		EV CHARGER	E	58
59									1333	3328					60
61	M	OVERHEAD DOOR 4		20	1333	1500					20		ECUH-131	E	62
63							1333	180			20	GFCI	ICE MAKER - KITCHEN 128	K	64
65	M	M - KITCHEN 128 RANGE HOOD		20					1000	1000	20	GFCI	RECEPT - CLEANING 124 DRYER	R	66
67	R	RECEPT - CLEANING 124 WASHER	GFCI	20	1200	1000									68
69	E	PIPE HEAT TRACE		20			500	0			20	GFCI	OVEN - KITCHEN 128	K	70
71	E	PIPE HEAT TRACE		20					400	0					72
73	--	SPARE	--	20	0										74
75	--	SPARE	--	20			0	0			20	--	SPARE	--	76
77	--	SPARE	--	20					0	0	20	--	SPARE	--	78
79	--	SPARE	--	20	0	0					20	--	SPARE FOR GEN BLOCK HEATER	--	80
81	--	SPARE	--	20			0	0			20	--	SPARE FOR TC CONTROLS	--	82
83	--	SPARE	--	20					0	0	20	--	SPARE FOR TC CONTROLS	--	84
					27478		24813		25139						
					ØA		ØB		ØC						

PANELBOARD INFORMATION	
VOLTAGE:	208Y/120V
BUS AMPACITY:	400A
MAIN TYPE:	MLO
MINIMUM A.I.C.:	35,000
MOUNTING:	SURFACE

PANELBOARD LOCATION

BRANCH CIRCUIT CONNECTED LOAD		DEMAND FACTOR	CALCULATED LOAD	FEEDER AND OVERCURRENT...
CONTINUOUS LOAD (C):	0	100%	0	125% 0
ELECTRIC HEAT (E)	23503	100%	23503	125% 29378.75
NON-CONTINUOUS LOAD (NC):	678	100%	678	100% 678
KITCHEN LOAD (K):	7780	65.00%	5057	100% 5057
RECEPT BASE LOAD (R):	10000	100%	10000	100% 10000
RECEPT DEMAND LOAD (R):	14760	50%	7380	100% 7380
LIGHTING LOAD (L):	3709.29	100%	3709.29	125% 4636.61
ADDITIONAL TRACK LIGHTING...				100% 0
MOTORS, HIGHEST LOAD (M):	4000	125 %	5000	100% 5000
MOTORS, REMAINING	13000	100 %	13000	100 % 13000
NOTE: DEMAND AND SIZING INFORMATION IS CALCULATED...		TOTAL (kVA):	**68.33**	
		TOTAL...	**189.66**	TOTAL... **208.54**

NOTES

T C A
ARCHITECTURE + PLANNING + DESIGN

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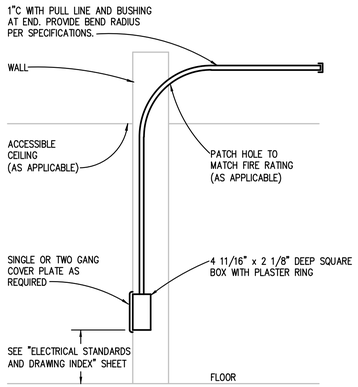
Sheet E5.02

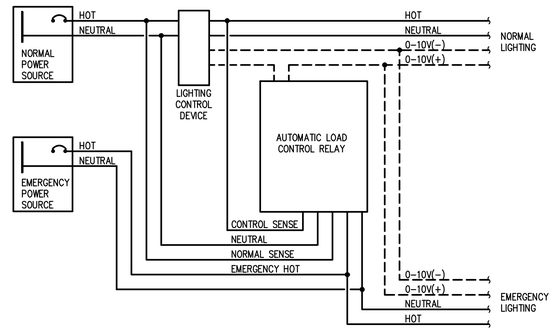


TELECOMMUNICATION OUTLET DETAIL

NO SCALE

NOTES:

1. IF CEILING IN ROOM IS NOT ACCESSIBLE, ROUTE CONDUIT TO NEAREST ACCESSIBLE CEILING IN DIRECTION OF AND WITH PATHWAY OR ACCESS TO TELECOMMUNICATION ROOM.

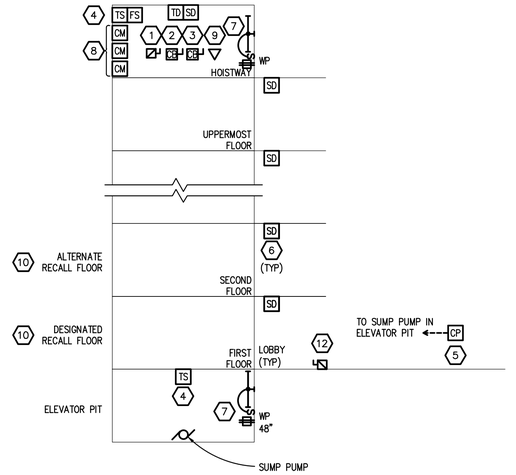


AUTOMATIC LOAD CONTROL RELAY FOR 0-10V DIMMING

NO SCALE

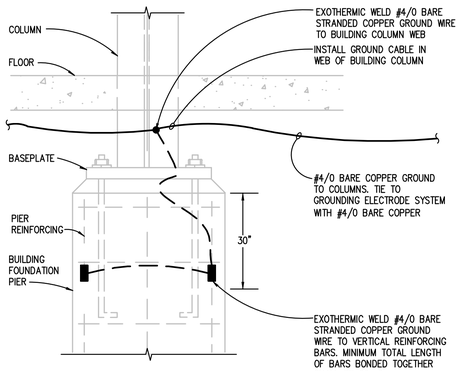
NOTES:

1. BASIS OF DESIGN IS LVS CONTROLS EPC-2-D. REFER TO SPECIFICATIONS FOR APPROVED MANUFACTURERS. ADJUST WIRING AS NECESSARY FOR OTHER APPROVED MANUFACTURERS.
2. PROVIDE ONE AUTOMATIC LOAD CONTROL RELAY FOR EACH CONTROL CIRCUIT.



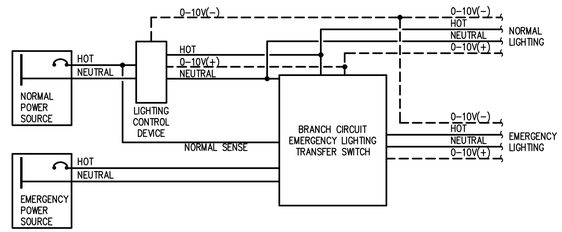
ELEVATOR DETAIL - MACHINE ROOMLESS

NO SCALE



COLUMN GROUNDING DETAIL

NO SCALE

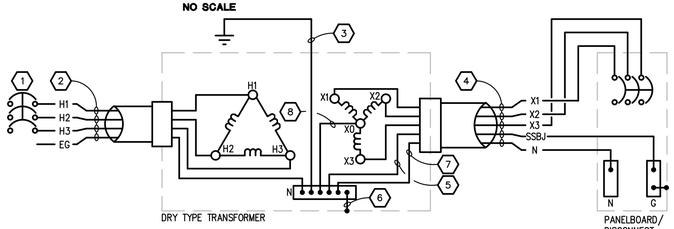


BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH FOR 0-10V DIMMING

NO SCALE

NOTES:

1. BASIS OF DESIGN IS LVS CONTROLS EPC-D-F-ATS. REFER TO SPECIFICATIONS FOR APPROVED MANUFACTURERS. ADJUST WIRING AS NECESSARY FOR OTHER APPROVED MANUFACTURERS.
2. PROVIDE ONE BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH PER SWITCHING CIRCUIT.

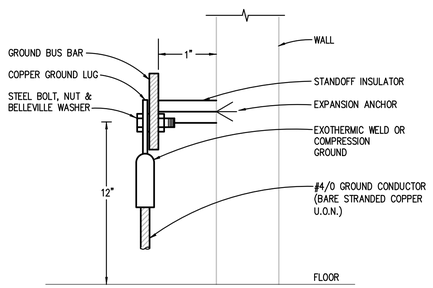


DRY TYPE DISTRIBUTION TRANSFORMER GROUNDING ARRANGEMENT

NO SCALE

(#) KEYED NOTES:

1. 480V, 3ø PRIMARY CIRCUIT BREAKER BASED ON DRY TYPE DISTRIBUTION TRANSFORMER CIRCUIT SIZING SCHEDULE ON ELECTRICAL STANDARD SCHEDULE DRAWING UNLESS OTHERWISE NOTED.
2. PRIMARY FEEDER BASED ON FEEDER AND BRANCH CIRCUIT SIZING TABLE ON ELECTRICAL STANDARD SCHEDULE DRAWING UNLESS OTHERWISE NOTED.
3. GROUNDING ELECTRODE CONDUCTOR TO NEAREST GROUNDING ELECTRODE (i.e. METAL IN GROUND SUPPORT STRUCTURE, METAL WATER PIPE, GROUND RING, OR GROUND BUS). SEE DRY TYPE DISTRIBUTION TRANSFORMER CIRCUIT SIZING SCHEDULE ON ELECTRICAL STANDARD SCHEDULE DRAWING FOR SIZE UNLESS OTHERWISE NOTED.
4. 208Y/120V, 3ø, 4W SECONDARY FEEDER BASED ON DRY TYPE DISTRIBUTION TRANSFORMER CIRCUIT SIZING SCHEDULE ON ELECTRICAL STANDARD SCHEDULE DRAWING UNLESS OTHERWISE NOTED.
5. SUPPLY SIDE BONDING JUMPER.
6. SYSTEM BONDING JUMPER.
7. GROUNDED CONDUCTOR (NEUTRAL).
8. NEUTRAL CONDUCTOR PROVIDED WITH EQUIPMENT.



GROUND BUS DETAIL

NO SCALE

GENERAL NOTES:

1. DETAIL SHOWS GENERAL EXTENT OF WORK AND SHOULD NOT BE CONSIDERED A FABRICATION DRAWING. REFER TO PLANS FOR LOCATIONS OF ROOMS, ELEVATOR SHAFT(S), ETC. COORDINATE REQUIREMENTS WITH ELEVATOR MANUFACTURER AND INSTALLER.
2. PIT LIGHTING SHALL BE IP66, WET LOCATION LISTED. PIT TO BE ILLUMINATED TO 10 FOOT-CANDLES AT FLOOR. (ASME A17.1 2010, 2.2.5.1, 2.8.2.3.4)
3. HOISTWAY MACHINE SPACE LIGHTING SHALL BE IP66, WET LOCATION LISTED AND BE ILLUMINATED TO 19 FOOTCANDLES. (ASME A17.1 2010, 2.7.5.1)
4. ELEVATOR HOISTWAY TO BE DEDICATED FOR ELEVATOR EQUIPMENT ONLY. (ASME A17.1 2010, SECTION 2.8)
5. ELEVATOR THRESHOLD LIGHTING TO BE 10 FOOT-CANDLES MINIMUM. (ASME A17.1 2010, 2.11.10.2)
6. HOISTWAY MACHINE SPACE AND ELEVATOR PIT LIGHTING AND RECEPTACLES SHALL BE SERVED FROM SEPARATE BRANCH CIRCUITS. HOISTWAY MACHINE SPACE LIGHTING AND RECEPTACLES MUST BE SERVED FROM SEPARATE BRANCH CIRCUITS. THE ELEVATOR PIT RECEPTACLES AND LIGHTING CAN BE SERVED FROM THE SAME CIRCUIT AS LONG AS THE LIGHTING IS CONNECTED TO THE LINE SIDE AHEAD OF THE GFCI DEVICE (NEC 620.23, 630.24).
7. ELEVATOR EMERGENCY PHONE MUST BE MONITORED 24 HOURS A DAY BY AUTHORIZED PERSONAL, HAVE THE ABILITY TO BE CALLED REMOTELY, AND STAY OPERATIONAL DURING EMERGENCY CONDITIONS (ASME A17.1 2010 2.27.1.1.1-2.27.1.1.5).
8. REFER TO NEW WORK PLANS FOR ALL CIRCUITING, LIGHTING FIXTURE TYPES, AND LIGHTING FIXTURE QUANTITIES.

(#) KEYED NOTES:

1. DISCONNECT SWITCH OR ENCLOSED CIRCUIT BREAKER CAPABLE OF BEING LOCKED OFF FOR ELEVATOR CONTROLLER. GROUND CONDUCTOR TO BE SAME SIZE AS PHASE CONDUCTORS. COORDINATE EXACT MOUNTING LOCATION AND REQUIREMENTS WITH ELEVATOR CONTRACTOR.
2. PROVIDE 20A/1P ENCLOSED CIRCUIT BREAKER CAPABLE OF BEING LOCKED OFF FOR ELEVATOR CAB LIGHTING. COORDINATE EXACT MOUNTING LOCATION AND REQUIREMENTS WITH ELEVATOR CONTRACTOR.
3. PROVIDE 20A/1P ENCLOSED CIRCUIT BREAKER CAPABLE OF BEING LOCKED OFF FOR ELEVATOR AND AUXILIARY CONTROLS. COORDINATE EXACT MOUNTING LOCATION AND REQUIREMENTS WITH ELEVATOR CONTRACTOR.
4. PROVIDE FIRE ALARM SYSTEM COMPONENTS AS REQUIRED AND PROVIDE CONNECTIONS TO EACH TAMPER AND FLOW SWITCH PROVIDED WITH THE FIRE PROTECTION SYSTEM. COORDINATE EXACT LOCATIONS, QUANTITIES, AND REQUIREMENTS WITH FIRE SUPPRESSION CONTRACTOR.
5. PROVIDE REQUIRED CONDUIT, WIRING, AND CONNECTIONS BETWEEN SUMP PUMP CONTROL PANEL(S) AND SUMP PUMP(S). COORDINATE REQUIREMENTS WITH MECHANICAL TRADES AND SUMP PUMP MANUFACTURER.
6. THE LOBBY ELEVATOR SMOKE DETECTORS SHALL BE WITHIN 21' OF THE DOOR CENTERLINE. FOR LOBBIES WITH CEILINGS HIGHER THAN 15', THE SMOKE DETECTOR SHALL BE INSTALLED WITHIN 60" OF THE TOP OF THE ELEVATOR DOOR. (NFPA 72 2019 21.3.5)
7. COORDINATE GFCI RECEPTACLE, LIGHT SWITCH AND LIGHT FIXTURE PLACEMENT IN PIT/HOISTWAY WITH ELEVATOR MANUFACTURER DRAWINGS AND TRADES. LIGHT SWITCH TO BE LOCATED AT TOP OF LADDER. CIRCUIT GFCI RECEPTACLE AND LIGHT FIXTURE AS INDICATED ON PLAN.
8. FIRE ALARM CONTROL MODULES FOR ELEVATOR RECALL. REFER TO FIRE ALARM MATRIX FOR CONTROL MODULE FUNCTIONALITY. CONTROL MODULES TO BE LOCATED WITHIN 3' OF ELEVATOR CONTROLLER (NFPA 72 2019 21.2.4).
9. PROVIDE TELEPHONE LINE FOR ELEVATOR EMERGENCY PHONE. REFER TO SPECIFICATIONS FOR CABLE TYPE.
10. COORDINATE EXACT DESIGNATED AND ALTERNATE RECALL FLOOR WITH ARCHITECT AND ELEVATOR MANUFACTURER AND INSTALLER.
11. AUXILIARY DISCONNECT MEANS FOR ELEVATOR CONTROLLER WHEN CONTROLLER LOCATED ON ELEVATOR CAR. (ASME A17.1 5.3.1.18.5)

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No. 6201052164
LICENSED PROFESSIONAL ENGINEER

Project Number 21018

Issue	Date
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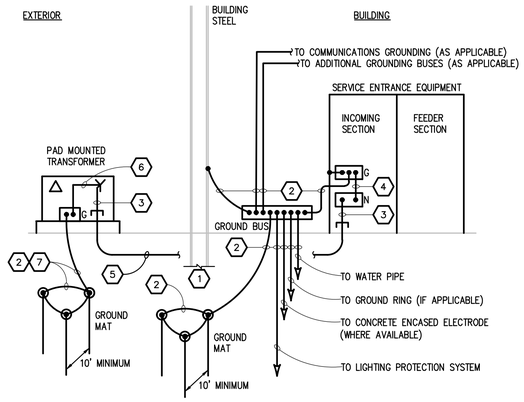
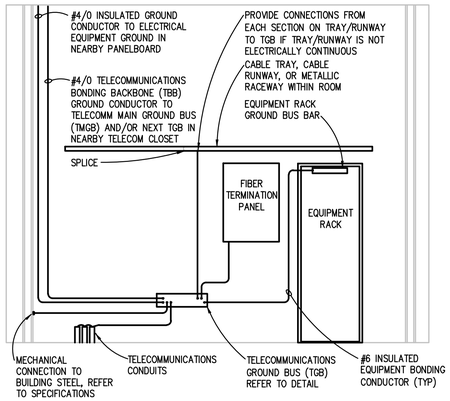


TYPICAL SECONDARY SERVICE ENTRANCE GROUNDING

NO SCALE

(#) KEYED NOTES:

1. METAL IN-GROUND SUPPORT STRUCTURE IN DIRECT CONTACT WITH EARTH VERTICALLY FOR A MINIMUM OF 10FT, WHERE AVAILABLE.
2. GROUNDING ELECTRODE CONDUCTOR, #4/0 COPPER.
3. GROUNDED CONDUCTOR (NEUTRAL), SEE ONE LINE DIAGRAM.
4. MAIN BONDING JUMPER, PROVIDED BY MANUFACTURER AS PART OF LISTED EQUIPMENT SIZED PER NEC 250.28 AND 250.102.
5. SERVICE ENTRANCE PHASE CONDUCTORS AND GROUNDED CONDUCTOR IN CONDUIT. SEE ONE LINE DIAGRAM.
6. CONNECTION FROM GROUNDED SERVICE CONDUCTOR TO GROUNDING ELECTRODE AT THE TRANSFORMER PER NEC 250.24. COORDINATE WITH UTILITY.
7. COORDINATE REQUIREMENTS WITH UTILITY COMPANY PRIOR TO INSTALLATION. PROVIDE ALL NECESSARY GROUND RODS AND CONDUCTORS TO MEET UTILITY COMPANY REQUIREMENTS.



TELECOMMUNICATIONS ROOM GROUNDING DETAIL

NO SCALE

NOTES:

1. ALL GROUNDING SHALL COMPLY WITH NEC ARTICLE 250 AND TIA/EIA-607.
2. CONNECT ALL EQUIPMENT RACKS TO TGB WITH A SEPARATE EQUIPMENT BONDING CONDUCTOR.

SYSTEM OUTPUTS

SYSTEM INPUTS		ANNUNCIATION													NOTIFICATION										FIRE SAFETY											
		INITIATE FIRE ALARM SIGNAL	INITIATE CARBON MONOXIDE ALARM SIGNAL	IDENTIFY ALARM AT FACP	IDENTIFY ALARM AT REMOTE ANNUNCIATOR(S)	ANNUNCIATE SUPERVISORY SIGNAL AT FACP	ANNUNCIATE SUPERVISORY SIGNAL AT REMOTE ANNUNCIATOR(S)	ANNUNCIATE TROUBLE SIGNAL AT FACP	ANNUNCIATE TROUBLE SIGNAL AT REMOTE ANNUNCIATOR(S)	RING TROUBLE BELL (WHEN PROVIDED)	ACTIVATE ELEVATOR LOBBY "FLASH HAT" WARNING	ACTIVATE IN ELEVATOR IN-CAR WARNING SIGNAL	DISPLAY ELEVATOR RECALL STATUS AT ANNUNCIATOR	OPERATE ALARM NOTIFICATION APPLIANCES CONTINUOUSLY	ACTIVATE VOICE/ALARM COMMUNICATION SYSTEM	TRANSMIT ALARM SIGNAL TO REMOTE ALARM RECEIVING STATION	TRANSMIT SUPERVISORY SIGNAL TO REMOTE ALARM RECEIVING STATION	TRANSMIT TROUBLE SIGNAL TO REMOTE ALARM RECEIVING STATION	TRANSMIT ALARM SIGNAL TO BUILDING AUTOMATION SYSTEM	TRANSMIT TROUBLE SIGNAL TO BUILDING AUTOMATION SYSTEM	RECORD EVENTS IN THE SYSTEM MEMORY	DISPLAY STATUS ON SMOKE CONTROL PANEL	UNLOCK ELECTRIC DOOR LOCKS IN DESIGNATED EGRESS PATHS	DISABLE SOUND MASKING, PAGING, OR AUDIO SYSTEMS	RELEASE FIRE AND SMOKE DOORS	TURN ON EGRESS LIGHTING TO FULL BRIGHTNESS	DISABLE AUTOMATIC DOORS	OPEN AUTOMATIC SMOKE EXHAUST DOORS AND MAKE-UP DAMPERS	ACTUATE SMOKE EXHAUST SYSTEM (5 SECOND DELAY)	SHUTDOWN HVAC UNIT SERVING ZONE IN ALARM VIA CONTROL MODULE (INTERLOCK)	SWITCH HVAC EQUIPMENT CONTROLS TO FIRE ALARM MODE	CLOSE SMOKE DAMPERS IN AIR DUCT SYSTEM SERVING ZONE WHERE ALARM WAS INITIATED	RECALL ELEVATOR TO DESIGNATED RECALL LEVEL	ILLUMINATE HOISTWAY LIGHTING
INITIATION	MANUAL FIRE BOX OPERATION	●		●	●										●	●	●				●				●	●	●	●							
	SMOKE DETECTOR OPERATION	●		●	●										●	●	●				●				●	●	●	●							
	CARBON MONOXIDE DETECTOR OPERATION		●												●	●	●				●				●	●	●	●							
	DUCT DETECTOR OPERATION	●		●	●										●	●	●				●				●	●	●	●			●	●	●		
	AUTOMATIC SPRINKLER SYSTEM WATER FLOW OPERATION	●		●	●										●	●	●				●				●	●	●	●							
	SMOKE DETECTION IN AREA SERVED BY SMOKE EXHAUST	●		●	●										●	●	●				●				●	●	●	●		●	●				
	CARBON MONOXIDE DETECTION IN AREA SERVED BY SMOKE EXHAUST		●												●	●	●				●				●	●	●	●		●	●				
	SPRINKLER SYSTEM OPERATION IN THE AREA SERVED BY SMOKE EXHAUST SYSTEM	●		●	●										●	●	●				●				●	●	●	●		●	●				
	SMOKE EXHAUST FAN OPERATING																						●												
	SMOKE DETECTION IN ELEVATOR LOBBY – DESIGNATED RECALL LEVEL	●		●	●								●		●	●	●				●				●	●	●	●							
	SMOKE DETECTION IN ELEVATOR LOBBY – ALL OTHER LEVELS	●		●	●								●		●	●	●				●				●	●	●	●						●	
	SMOKE DETECTION IN ELEVATOR HOISTWAY	●		●	●						●	●	●		●	●	●				●				●	●	●	●						●	
	WATERFLOW IN ELEVATOR HOISTWAY	●		●	●						●		●		●	●	●				●				●	●	●	●						●	
SYSTEM STATUS	ALARM SIGNAL FROM SUPPRESSION SYSTEM	●		●	●										●	●	●				●		●		●	●	●	●							
	SUPERVISORY SIGNAL FROM SUPPRESSION SYSTEM					●	●			●								●					●												
	TROUBLE SIGNAL FROM SUPPRESSION SYSTEM							●	●	●									●		●		●												
	SMOKE DETECTION IN AREA SERVED BY SUPPRESSION SYSTEM	●		●	●										●	●	●				●		●		●	●	●	●		●	●				
	FIRE EXTINGUISHING SYSTEM OPERATION	●		●	●										●	●	●				●		●		●	●	●	●							
	FIRE STANDPIPE SYSTEM OPERATION	●		●	●										●	●	●				●		●		●	●	●	●							
	FIRE PROTECTION SYSTEM VALVE TAMPER OPERATION					●	●			●								●					●												
	DRY PIPE SPRINKLER LOW AIR PRESSURE SWITCH ACTIVATION					●	●			●								●					●												
	PREACTION SPRINKLER LOW AIR PRESSURE SWITCH ACTIVATION					●	●			●								●					●												
	PHASE II RECALL INITIATED BY ELEVATOR CONTROL SYSTEM																																		●
STATUS	OPEN CIRCUIT, SHORT CIRCUIT, OR GROUND FAULT ON INITIATING DEVICE, SIGNALING LINE, OR NOTIFICATION APPLIANCE CIRCUIT.							●	●	●									●		●		●												
	OPENING, TAMPERING, OR REMOVAL OF ALARM-INITIATING DEVICES							●	●	●									●		●		●												
	OPENING, TAMPERING, OR REMOVAL OF SUPERVISORY SIGNAL INITIATING DEVICES							●	●	●									●		●		●												
	LOSS OF PRIMARY POWER OF FACP							●	●	●									●		●		●												
	GROUND OR SIGNAL BREAK IN FACP INTERNAL CIRCUITS							●	●	●									●		●		●												
	ABNORMAL AC VOLTAGE AT THE FACP							●	●	●									●		●		●												
	STANDBY BATTERY CIRCUITRY BREAK							●	●	●									●		●		●												
	FAILURE OF BATTERY CHARGING SYSTEM							●	●	●									●		●		●												
	ABNORMAL POSITION OF ANY SWITCH AT THE FACP							●	●	●									●		●		●												
	ABNORMAL POSITION OF ANY SWITCH AT THE ANNUNCIATOR							●	●	●									●		●		●												
	GENERATOR FAULT							●	●	●									●		●		●												
	GENERATOR SWITCH IN NON AUTOMATIC POSITION							●	●	●									●		●		●												
	GENERATOR RUNNING					●	●											●					●												
	KNOX BOX OPEN					●	●											●					●												
	SMOKE EXHAUST FAN FAILURE					●	●											●					●	●					●						

FIRE ALARM MATRIX

NO SCALE

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Sheet E7.02

INTERIOR LIGHTING CONTROL SCHEDULE

PLAN REFERENCE	ROOM TYPE	LOCAL CONTROL			CONTROL ON / OFF	SENSOR TYPE	TURN ON LIGHTING TO %	BI-LEVEL CONTROL	DAYLIGHT			NO DETECTION PARTIAL OFF		NO DETECTION FULL OFF (MIN)	TIME-CLOCK SCHEDULE	EMERGENCY LIGHTING CIRCUIT CONTROL	HVAC CONTROL	NOTES
		SWITCH TYPE	SWITCH CONTROL	SCENE CONTROL					SIDE LIGHT	TOP LIGHT	MAINTAIN FC LEVEL	REDUCE TO (%)	AT(MIN)					
A	CORRIDOR (ALL OTHER CORRIDORS)	LOW VOLTAGE	ON-OFF	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	FULL 100%	NA	NA	NA	NA	50	10	20	NA	ALCR	NA	
B	CONFERENCE/MEETING/MULTIPURPOSE ROOM	LOW VOLTAGE	ON-OFF-DIM	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	NA	NA	NA	NA	NA	NA	20	NA	ALCR	YES	
C	LOCKER ROOM	LOW VOLTAGE	ON-OFF-DIM	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	INTERMEDIATE STEP 70%	NA	NA	NA	NA	NA	20	NA	ALCR	NA	
D	LOUNGE/BREAKROOM (ALL OTHER LOUNGES/BREAKROOMS)	LOW VOLTAGE	ON-OFF-DIM	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	INTERMEDIATE STEP 70%	NA	NA	NA	NA	NA	20	NA	ALCR	YES	
E	ELECTRICAL/MECHANICAL ROOM	LINE VOLTAGE	ON-OFF	NA	MANUAL ON / MANUAL OFF	NA	FULL 100%	NA	NA	NA	NA	NA	NA	NA	NA	ALCR	NA	
F	OFFICE (ENCLOSED AND >250 SQFT)	LOW VOLTAGE	ON-OFF-DIM	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	INTERMEDIATE STEP 70%	NA	NA	NA	NA	NA	20	NA	NA	NA	
G	RESTROOM (ALL OTHER RESTROOMS)	LOW VOLTAGE	ON-OFF	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	FULL 100%	NA	NA	NA	NA	NA	NA	20	NA	ALCR	NA	
H	STORAGE ROOM (< 50 SQFT)	LOW VOLTAGE	ON-OFF	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	NA	NA	NA	NA	NA	NA	20	NA	ALCR	NA	
I	STORAGE ROOM (≥ 50 FT2 AND ≤ 1000 SQFT)	LOW VOLTAGE	ON-OFF	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	NA	NA	NA	NA	NA	NA	20	NA	ALCR	NA	
J	STAIRWELL	LOW VOLTAGE	ON-OFF-DIM	NA	MANUAL ON / SENSOR OFF	DUAL TECHNOLOGY	FULL 100%	INTERMEDIATE STEP 70%	NA	NA	NA	50	10	20	NA	BCELTS	NA	
K	VEHICULAR MAINTENANCE AREA	LOW VOLTAGE	ON-OFF-DIM	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	INTERMEDIATE STEP 70%	YES	NA	30	NA	NA	20	NA	ALCR	NA	
L	FIRE STATION - SLEEPING QUARTERS	LOW VOLTAGE	ON-OFF-DIM	NA	MANUAL ON / MANUAL OFF	NA	NA	CONTINUOUS DIM	NA	NA	NA	NA	NA	NA	NA	NA	NA	
M	WORKSHOP	LOW VOLTAGE	ON-OFF-DIM	NA	MANUAL ON / SENSOR OFF	DUAL TECHNOLOGY	FULL 100%	INTERMEDIATE STEP 50%	NA	NA	NA	NA	NA	20	NA	NA	NA	
N	GYMNASIUM/FITNESS CENTER (IN AN EXERCISE AREA)	LOW VOLTAGE	ON-OFF-DIM	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	CONTINUOUS DIM	NA	NA	NA	NA	NA	20	NA	ALCR	YES	
O	LAUNDRY/WASHING AREA	LOW VOLTAGE	ON-OFF-DIM	NA	SENSOR ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	INTERMEDIATE STEP 70%	NA	NA	NA	NA	NA	20	NA	ALCR	NA	
P	LOBBY (ALL OTHER LOBBIES)	LOW VOLTAGE	ON-OFF-DIM	NA	MANUAL ON / SENSOR OFF	DUAL TECHNOLOGY	PARTIAL 50%	CONTINUOUS DIM	NA	NA	NA	NA	NA	20	NA	ALCR	NA	

NA = NOT APPLICABLE

NOTE:
1. REFER TO PLANS FOR LOCATION OF LOCAL CONTROL..
2. REFER TO PLANS FOR SCENE CONTROL.
3. REFER TO PLANS FOR PRIMARY AND SECONDARY DAYLIGHT ZONES.
4. PROVIDE EMERGENCY LIGHTING CIRCUIT CONTROL (BCELTS OR ALCR) PER SWITCHING CIRCUIT AS REQUIRED.
5. CONTRACTOR SHALL PROVIDE FLOOR PLAN INDICATING SENSOR AND EQUIPMENT LOCATIONS OF CHOSEN CONTROL SYSTEM.
6. REFER TO LUMINAIRE SCHEDULE FOR FIXTURE CHARACTERISTICS.
7. LIGHTING SENSOR SHALL HAVE CONTACT FOR HVAC CONTROL WHEN A "YES" SELECTION IS MADE IN THE HVAC CONTROL COLUMN.
8. REFER TO TEMPERATURE CONTROL DRAWINGS AND DIAGRAMS FOR ADDITIONAL SENSOR REQUIREMENTS.
9. PROVIDE WIRING CONTROL DIAGRAM FOR APPLICABLE CONTROL SYSTEM(S).

EXTERIOR LIGHTING CONTROL SCHEDULE

PLAN REFERENCE	ROOM TYPE	LOCAL CONTROL		CONTROL ON / OFF	SENSOR TYPE	TURN ON LIGHTING TO %	TIME-CLOCK SCHEDULE	EMERGENCY LIGHTING CIRCUIT CONTROL	NOTES
		SWITCH TYPE	SWITCH CONTROL						
Y	EXTERIOR BUILDING MOUNT	LINE VOLTAGE	ON-OFF	MIX	PHOTOCELL	FULL 100%	OFF MIDNIGHT TO 6AM	ALCR	PROVIDE PHOTOCELL DAYLLIGHT CONTROL TO TURN LIGHTING ON AND OFF BASED ON AVAILBLE DAYLIGHT. TIME CLOCK TO CONTROL FROM MIDNIGHT TO 6AM.
Z	EXTERIOR SITE	LINE VOLTAGE	ON-OFF	MIX	PHOTOCELL	FULL 100%	OFF MIDNIGHT TO 6AM	NA	PROVIDE PHOTOCELL DAYLLIGHT CONTROL TO TURN LIGHTING ON AND OFF BASED ON AVAILBLE DAYLIGHT. TIME CLOCK TO CONTROL FROM MIDNIGHT TO 6AM.

NOTE:
1. REFER TO PLANS FOR LOCATION OF LOCAL CONTROL.
2. REFER TO PLANS FOR SCENE CONTROL.
3. REFER TO PLANS FOR PRIMARY AND SECONDARY DAYLIGHT ZONES.
4. PROVIDE EMERGENCY LIGHTING CIRCUIT CONTROL (BCELTS OR ALCR) PER SWITCHING CIRCUIT AS REQUIRED.
5. CONTRACTOR SHALL PROVIDE FLOOR PLAN INDICATING SENSOR AND EQUIPMENT LOCATIONS OF CHOSEN CONTROL SYSTEM.
6. REFER TO LUMINAIRE SCHEDULE FOR FIXTURE CHARACTERISTICS.
7. LIGHTING SENSOR SHALL HAVE CONTACT FOR HVAC CONTROL WHEN A "YES" SELECTION IS MADE IN THE HVAC CONTROL COLUMN.
8. REFER TO TEMPERATURE CONTROL DRAWINGS AND DIAGRAMS FOR ADDITIONAL SENSOR REQUIREMENTS.
9. PROVIDE WIRING CONTROL DIAGRAM FOR APPLICABLE CONTROL SYSTEM(S).

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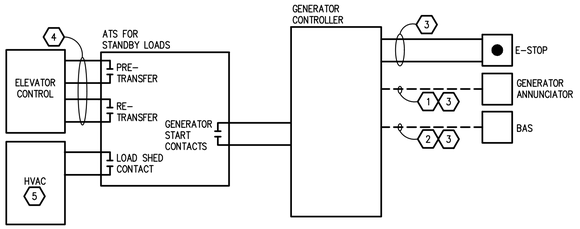

GENERATOR AND ATS CONTROL WIRING CONNECTION DETAIL - OPTIONAL STANDBY ONLY

NO SCALE

NOTES:
1. VERIFY ALL WIRE AND CABLE SPECIFICATIONS WITH GENERATOR SUBMITTAL DRAWINGS, WIRING DIAGRAMS, AND MANUFACTURERS REQUIREMENTS.

(#) KEYED NOTES:

1. PROVIDE SHIELDED TWISTED PAIR (PER MANUFACTURERS RECOMMENDATIONS) AND 2#14 FOR ANNUNCIATOR DC POWER.
2. PROVIDE SHIELDED TWISTED PAIR FOR COMMUNICATION LINK. COORDINATE WITH BAS INTEGRATOR.
3. PROVIDE 2 HOUR CABLE ASSEMBLY OR EQUIVALENT MEANS OF PROTECTION FOR START SIGNAL WIRING.
4. PROVIDE CONDUIT FOR INDICATED WIRING. UNLESS OTHERWISE NOTED, ALL CONTROL WIRING SHALL BE #14 THHN/THWN.
5. PROVIDE DRY CONTACT FROM ATS FOR DDC MONITORING. REFER TO TC DRAWINGS FOR ADDTIONAL INFORMATION.

INTERIOR LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER(S)	WATTAGE	VOLTAGE	LIGHT CHARACTERISTICS	CONTROLS	REMARKS
L1A	2X4 TROFFER	LITHONIA LIGHTING – 2BLT4	34.52	MVOLT	LED, 3500K, 82CRI, 3000L	1% 0–10V DIMMING	
L1B	2X4 TROFFER	LITHONIA LIGHTING – 2BLT4	34.52	MVOLT	LED, 3500K, 82CRI, 4800L	1% 0–10V DIMMING	
L2	2X2 TROFFER	LITHONIA LIGHTING – 2BLT2	24.7	MVOLT	LED, 3500K, 82CRI, 3300L	1% 0–10V DIMMING	
L4	WALL MOUNT VANITY	VISA LIGHTING – CB5518	15	MVOLT	LED, 3500K, 83CRI, 1700L	1% 0–10V DIMMING	
L6A	6" RECESSED DOWNLIGHT	LITHONIA LIGHTING – LDN6	5.8	MVOLT	LED, 3500K, 80CRI, 500L	1% 0–10V DIMMING	
L6B	6" RECESSED DOWNLIGHT	LITHONIA LIGHTING – LDN6	10.4	MVOLT	LED, 3500K, 80CRI, 1000L	1% 0–10V DIMMING	
L7	4' LINEAR	LITHONIA LIGHTING – VAP LED	99	MVOLT	LED, 3500K, 80CRI, 12000L	1% 0–10V DIMMING	
L8	6" RECESSED DOWNLIGHT	LITHONIA LIGHTING – LCP	N.A	120	LED, RED RETROFIT A-LAMP, 3500K	N/A	
L9A	4' UTILITY LINEAR	LITHONIA LIGHTING – CLX	19	MVOLT	LED, 3500K, 80CRI, 3000L	1% 0–10V DIMMING	
L9B	4' UTILITY LINEAR	LITHONIA LIGHTING – CLX	24.75	MVOLT	LED, 3500K, 80CRI, 4000L	1% 0–10V DIMMING	
L10A	12' LINEAR	FOCAL POINT – SEEM 2	22	UNV	LED, 3500K, 80CRI, 375L/FT DIRECT, 250L/FT INDIRECT	1% 0–10V DIMMING	
L10B	6' LINEAR	FOCAL POINT – SEEM 2	22	UNV	LED, 3500K, 80CRI, 375L/FT DIRECT, 250L/FT INDIRECT	1% 0–10V DIMMING	
L11	4' UTILITY LINEAR	LITHONIA LIGHTING – FEM LED	37.8	MVOLT	LED, 3500K, 80CRI, 6000L	1% 0–10V DIMMING	
L12	LINEAR UNDER CABINET	VODE LIGHTING – ZIPONE 707	6.6/FT	MVOLT	LED, 3500K, 80CRI, 836L/FT	1% 0–10V DIMMING	
L13A	18" SUSPENDED DOWNLIGHT	VISA LIGHTING – CP6000 SEQUENCE MINI	10	MVOLT	LED, 3500K, 80CRI, 1100L	1% 0–10V DIMMING	
L13B	24" SUSPENDED DOWNLIGHT	VISA LIGHTING – CP6000 SEQUENCE MINI	14	MVOLT	LED, 3500K, 80CRI, 1500L	1% 0–10V DIMMING	
L13C	12" SUSPENDED DOWNLIGHT	VISA LIGHTING – CP6000 SEQUENCE MINI	7	MVOLT	LED, 3500K, 80CRI, 700L	1% 0–10V DIMMING	
L14	6" LINEAR PENDANT	FINELITE BETTER LIGHTING – HP-6	28.8	120	LED, 3500K, 80CRI, 733L	1% 0–10V DIMMING	
L15	2" LINEAR PENDANT	FINELITE BETTER LIGHTING – HP-2	28.8	120	LED, 3500K, 80CRI, 322L/FT	1% 0–10V DIMMING	
L16	2" WALL MOUNT LINEAR	FINELITE BETTER LIGHTING – HP-2	7/FT	120	LED, 3600k, 80CRI, 612L/FT	1% 0–10V DIMMING	
L17	STEP LIGHTING	BRUCK – HORIZONTAL LOUVER LED STEP LIGHT	10	120	LED, 3000K, 190 LUMENS	1% 0–10V DIMMING	
X	EXIT SIGNAGE, ARCHITECT TO SELECT FINISHES	LITHONIA LIGHTING – EDG/EDGR	3	277	LED, AC ONLY	NA	

GENERAL NOTES:
1. REFER TO SPECIFICATIONS FOR DETAILED LIGHT FIXTURE CUT SHEETS.
2. WATTAGE LISTED IS FROM THE BASIS OF DESIGN MANUFACTURER.
3. FINISH TO BE APPROVED BY INTERIOR DESIGNER, ARCHITECT OR CLIENT.
4. ALL LUMINAIRES TO BE AS SPECIFIED OR EQUAL APPROVED BY PBA AND/OR ILLUMINART.

EXTERIOR LUMINAIRE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER(S)	WATTAGE	VOLTAGE	LIGHT CHARACTERISTICS	CONTROLS	REMARKS
OL1	TRAPEZODIAL WALL PACK	SIGNIFY – GARDCO 111L	12	MVOLT	LED, 4000K, 70CRI, 200mA, SINGLE FUSING, TYPE 2 WIDE THROW	1% 0–10V DIMMING	
OL2	PATH LIGHTING	ALCON LIGHTING – MODEL SPRUCE 9066	2	15	LED, 4000K, 125L	N/A	
OL3	RECESSED LINEAR	COOPER LIGHTING – NEO-RAY	3.0/FT	MVOLT	LED, 4000K, 80CRI, 350L/FT	1% 0–10V DIMMING	
OL4	LED FLOODLIGHT	LITHONIA LIGHTING – D-SERIES DSXF2	75	MVOLT	LED, 4000K, 70CRI, P2 PERFORMANCE PACKAGE	1% 0–10V DIMMING	

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Issue	Date
DESIGN DEVELOPMENT	05/26/23
BIDS/PERMITS	10/11/24

Drawn: SMB Checked: SMB

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