

STRUCTURAL GENERAL NOTES

GENERAL

- THIS BUILDING HAS BEEN DESIGNED AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MICHIGAN BUILDING CODE, 2015 EDITION.
- THE OWNER WILL EMPLOY QUALIFIED SPECIAL INSPECTORS TO PERFORM INSPECTIONS IN ACCORDANCE WITH CHAPTER 17 OF THE MICHIGAN BUILDING CODE, EXCEPT AS NOTED BELOW. SPECIAL INSPECTIONS WILL BE PERFORMED FOR THE FOLLOWING:
 - STEEL.
 - STEEL SPECIAL INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH AISC 360.
- WHEN "PROFESSIONAL ENGINEER" IS REFERRED TO IN THE FOLLOWING NOTES, IT DENOTES A LICENSED PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF MICHIGAN, QUALIFIED TO PERFORM THE WORK.
- THE CONTRACTOR SHALL VISIT THE SITE TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS. THE OWNERS REQUIREMENTS FOR ACCESS TO THE SITE AND CONTINUED OPERATIONS DURING CONSTRUCTION.
- THE PLAN, DETAIL DIMENSIONS & ELEVATIONS RELATIVE TO THE EXISTING STRUCTURE HAVE BEEN TAKEN FROM AVAILABLE DRAWINGS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY SUCH DIMENSIONS, ELEVATIONS & DETAILS AS NECESSARY AND MAKE APPROVED ADJUSTMENTS PRIOR TO CONSTRUCTION OR ORDERING OF MATERIAL.
- THE CONTRACTOR SHALL SUBMIT STRUCTURAL STEEL SHOP DRAWINGS PRIOR TO FABRICATION. THE CONTRACTOR SHALL ALSO SUBMIT MATERIAL REQUIREMENTS AND CONCRETE MIX DESIGNS. ALLOW (2) WEEKS FOR ENGINEER REVIEW.
- THE STRUCTURE SHALL BE CONSIDERED TO BE IN AN UNSTABLE CONDITION UNTIL ALL FLOOR AND WALL ARE COMPLETED. CONTRACTOR SHALL PROVIDE TEMPORARY BRACING FOR STABILITY AND TO RESIST LATERAL LOADS DURING ERECTION.

DIVISION 5 - STRUCTURAL STEEL

- THE LATEST REVISION OF THE FOLLOWING CODES GOVERN THE DESIGN, DETAILING, FABRICATION AND ERECTION OF ALL STRUCTURAL STEEL.
 - AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) AISC 360, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS.
 - AISC 303, CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES.
- STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING ASTM MATERIAL SPECIFICATIONS:
 - W AND WT SHAPES: ASTM A992, GRADE 50 (Fy = 50 KSI).
 - MISCELLANEOUS SHAPES AND PLATES: ASTM A36 (Fy = 36 KSI).
 - PIPE: ASTM A53, GRADE B, TYPE E OR S (Fy = 35 KSI).
 - HOLLOW STRUCTURAL SECTIONS: ASTM A500, GRADE C (Fy = 50 KSI).
 - ALL COLUMN ANCHOR RODS SHALL BE ASTM F1554 (Fy = 36 KSI).
- ALL WELDING SHALL BE PERFORMED USING THE ELECTRIC ARC METHOD IN ACCORDANCE WITH THE LATEST REVISION OF THE AMERICAN WELDING SOCIETY (AWS) D1.1 "STRUCTURAL WELDING CODE". E70XX ELECTRODES CONFORMING TO AWS A5.1 OR A5.5 SHALL BE USED FOR SHIELDED METAL ARC METHOD & Fx-ECXX FLUX - ELECTRODE COMBINATION CONFORMING TO AWS A5.17 FOR SUBMERGED ARC METHOD.
- ALL BOLTS SHALL BE 3/4" DIAMETER ASTM F3125 GRADE A325 TYPE N BOLTS. ALL BOLTED CONNECTIONS SHALL BE SNUG-TIGHT BEARING TYPE BOLTS UNLESS NOTED OTHERWISE.
- THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS SHOWING SIZES, DESIGN VALUES, MATERIALS, DIMENSIONS AND CONNECTIONS.
- ALL CONNECTIONS NOT SPECIFICALLY DETAILED, SHALL BE DESIGNED AND DETAILED UNDER THE DIRECT SUPERVISION OF A PROFESSIONAL ENGINEER. DETAILING SHALL BE PERFORMED USING RATIONAL ENGINEERING DESIGN AND STANDARD PRACTICE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE GENERAL DETAILS SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY AND DO NOT INDICATE THE REQUIRED NUMBER OF BOLTS OR WELD SIZES, UNLESS SPECIFICALLY NOTED.
- PROVIDE "SLIP-CRITICAL" CONNECTIONS AT BRACING, WHERE BOLTS ARE IN TENSION AND AT MOMENT CONNECTIONS.
- ALL BEAM CONNECTIONS ARE TO CONFORM TO AISC STANDARD TWO ANGLE WEB CONNECTIONS CAPABLE OF SUPPORTING 66% OF THE TOTAL UNIFORM LOAD CAPACITY OF THE BEAM OR FOR LOADS INDICATED ON DRAWING. NO CONNECTION SHALL CONSIST OF LESS THAN TWO 3/4" DIAMETER BOLTS OR A WELD DEVELOPING LESS THAN 10 KIPS.
- DESIGN HORIZONTAL AND VERTICAL BRACING END CONNECTIONS FOR LOADS INDICATED ON THE DRAWINGS OR 50% OF THE TENSILE CAPACITY OF THE MEMBER WHICHEVER IS GREATER.
- ALL FIELD CONNECTIONS SHALL BE BOLTED UNLESS NOTED OTHERWISE. FIELD WELDING IS NOT ALLOWED EXCEPT WHERE SPECIFICALLY INDICATED OR APPROVED.
- ALL BOLTS, NUTS AND WASHERS ARE TO BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A-123
- ALL SHOP AND FIELD WELDS SHALL BE VISUALLY INSPECTED PER AWS D1.1. ALL DEFICIENT OR NON CONFORMING ITEMS SHALL BE REPORTED TO THE ENGINEER WHO WILL DETERMINE THE CORRECTIVE ACTION REQUIRED.
- ALL BEAMS SHALL BE FABRICATED WITH THE NATURAL CAMBER UP. PROVIDE CAMBERS AS INDICATED ON THE DRAWINGS.
- PROVIDE AND HAVE IN PLACE ADEQUATE LATERAL BRACING AND VERTICAL SUPPORTS FOR THE SAFE ERECTION AND TRUE ALIGNMENT OF THE STRUCTURAL STEEL. THIS CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR THE SAFE ERECTION AND TEMPORARY BRACING OF STRUCTURAL STEEL.
- VERIFY NUMBER AND SIZE OF OPENINGS IN ROOF, WALLS AND FLOOR WITH ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS. SEE DETAILS, AND SPECIFICATIONS, FOR STRUCTURAL REQUIREMENTS. VERIFY ALL INFORMATION WITH THE APPROPRIATE CONTRACTOR.
- ALL DIMENSIONS RELATED TO STRUCTURAL STEEL USED TO SUPPORT EQUIPMENT OR FRAME OPENINGS SHALL BE VERIFIED WITH CERTIFIED AND APPROVED SHOP DRAWINGS OF PURCHASED EQUIPMENT PRIOR TO DETAILING AND FABRICATION.
- ALL STEEL IN IS TO BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A-123.

DESIGN CRITERIA

MICHIGAN BUILDING CODE 2015 (ASCE 7-10)
RISK CATEGORY III

MAINTENANCE PLATFORM LOADS

- UNIFORM LIVE LOAD 40 PSF
- UNIFORM DEAD LOAD 10 PSF
- CONDENSER CU-1 3,100 LBS
- CONDENSER CU-2 2,250 LBS

WIND LOADS

- BASIC WIND SPEED 120 MPH (3 SEC GUST)
- EXPOSURE CATEGORY B
- COMPONENTS AND CLADDING PER ASCE 7

SEISMIC DESIGN DATA

- SITE CLASS D
- RESPONSE COEFFICIENTS SDs = 0.11
SD1 = 0.064
- SEISMIC DESIGN CATEGORY A

ABBREVIATIONS

@	AT
A.B.	ANCHOR BOLT
ADDL	ADDITIONAL
A.F.F.	ABOVE FINISHED FLOOR
B.C.	BOTTOM CHORD
B.O.	BOTTOM OF
B.O.D.	BOTTOM OF DECK
B.O.F.	BOTTOM OF FOOTING
B.O.S.	BOTTOM OF STEEL
B.O.T.	BOTTOM OF TRUSS
B.S.	BOTH SIDES
BM	BEAM
BOTT	BOTTOM
BRG	BEARING
C.L.	CENTERLINE
CJ	CONTROL JOINT
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
CSJ	CONSTRUCTION JOINT
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DL	DEAD LOAD
DWG	DRAWING
E.F.	EACH FACE
EA	EACH
ELEV	ELEVATION
EQ	EQUAL
EX	EXISTING
F.S.	FAR SIDE
F.V.	FIELD VERIFY
FIN	FINISH
FLG	FLANGE
FLR	FLOOR
FDN	FOUNDATION
FT	FOOT
FTG	FOOTING
GAGE	GAGE
G.L.	GIRT LINE
H.P.	HIGH POINT
HORIZ	HORIZONTAL
K	KIPS
LG	LONG
L.P.	LOW POINT
LL	LIVE LOAD
LL.H.	LONG LEG HORIZONTAL
LL.V.	LONG LEG VERTICAL
LN	LINE
L.S.H.	LONG SIDE HORIZONTAL
MAX	MAXIMUM
MTL	METAL
MIN	MINIMUM
MISC	MISCELLANEOUS
N.S.	NEAR SIDE
N.T.S.	NOT TO SCALE
NO	NUMBER
O.C.	ON CENTER
OPP	OPPOSITE
PC	PIECE
PL	PLATE
PLCS	PLACES
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
REF	REFERENCE
REINF	REINFORCED, -ING, EMENT
REQD	REQUIRED
SCHED	SCHEDULE
SECT	SECTION
SIM	SIMILAR
SPA	SPACES
STD	STANDARD
STL	STEEL
T.O.	TOP OF
T.O.C.	TOP OF CONCRETE
T.O.F.	TOP OF FOOTING
T.O.M.	TOP OF MASONRY
T.O.S.	TOP OF STEEL
TYP	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
VERT	VERTICAL
W.P.	WORK POINT
W/	WITH
WWR	WELDED WIRE REINFORCEMENT



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MANLY MILES
REPLACE SPLIT CHILLER SYSTEM

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CP22055

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ARCH. CHARLAND
MECH. GEORGE
ELEC. HOWARD
CIVIL
L.A. WILBER
INT. DES.
CONST.REP. CRUZ
APPR. DURKIN
DATE 4/12/2024
SCALE 12" = 1'-0"
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STRUCTURAL
GENERAL NOTES

S-1

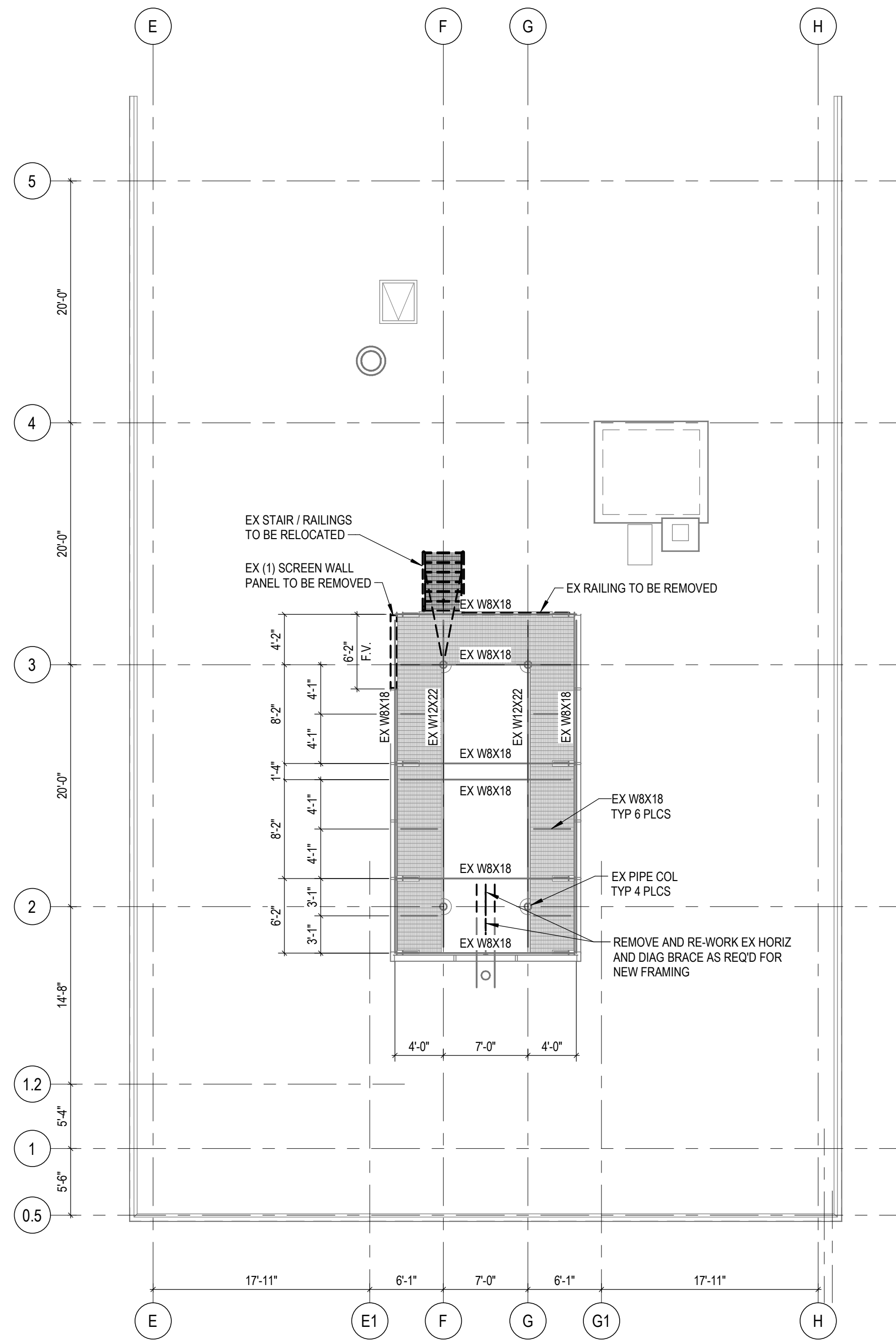


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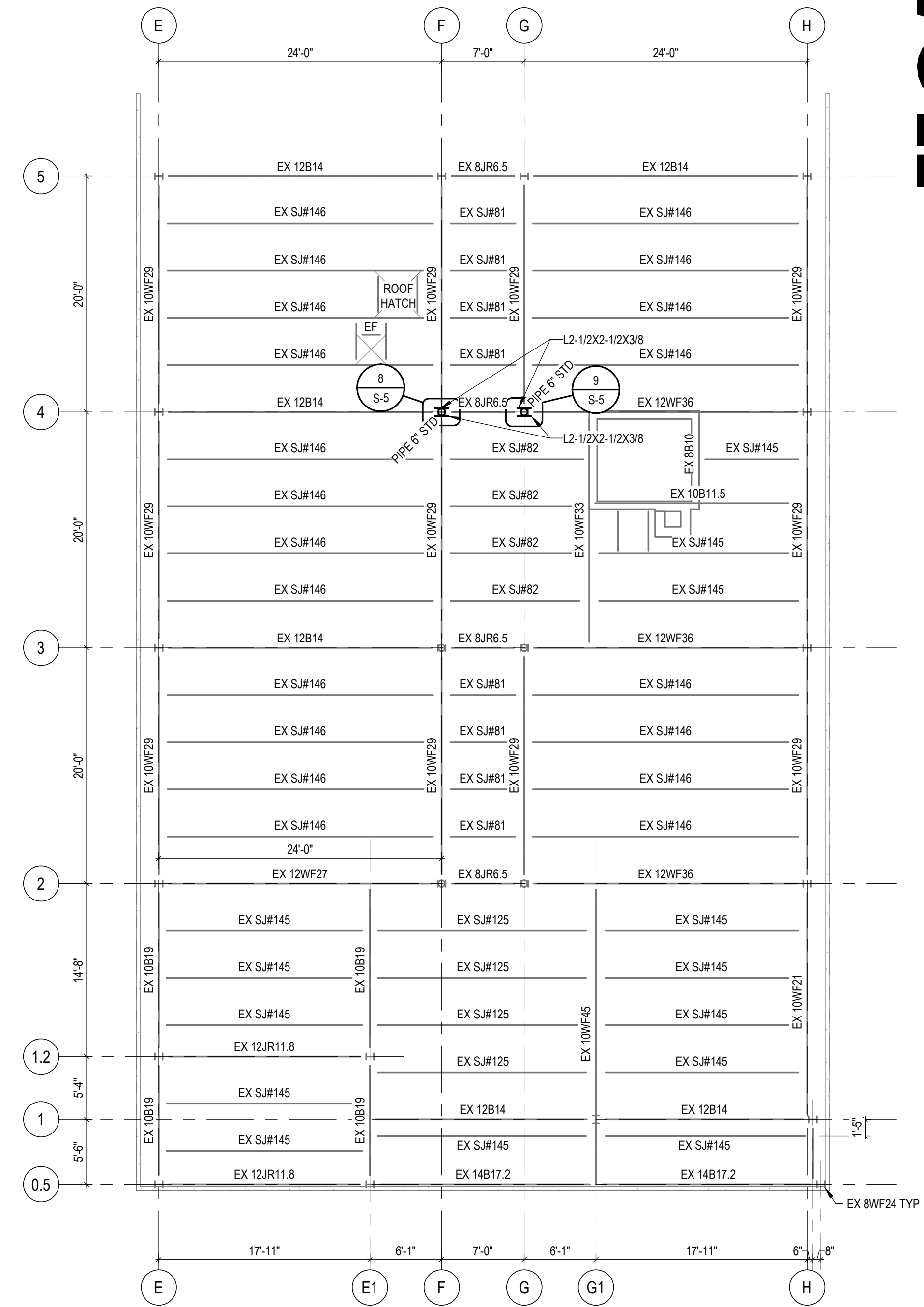
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GRILLAGE FRAMING DEMO PLAN
SCALE: 1/8" = 1'-0"



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

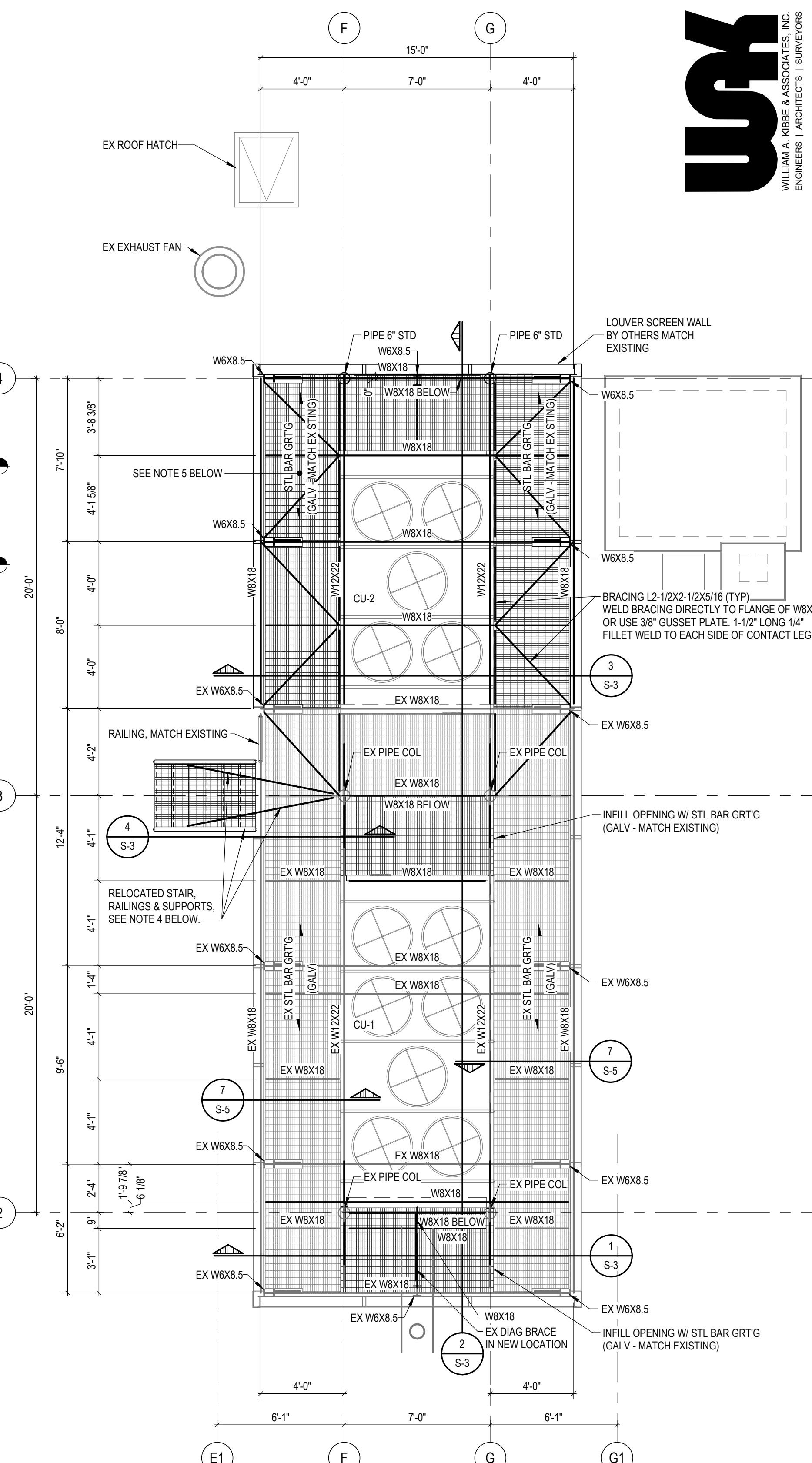
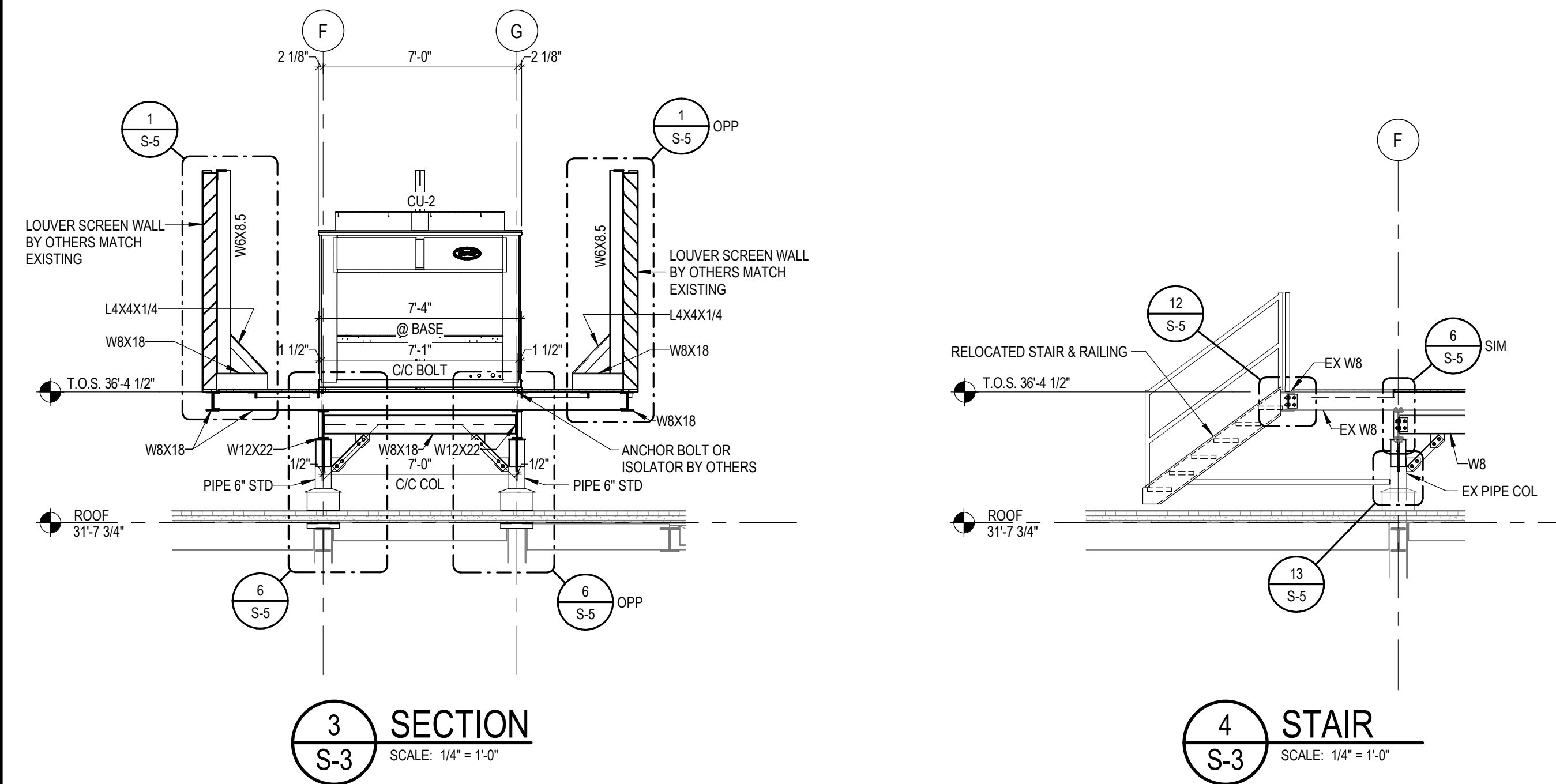
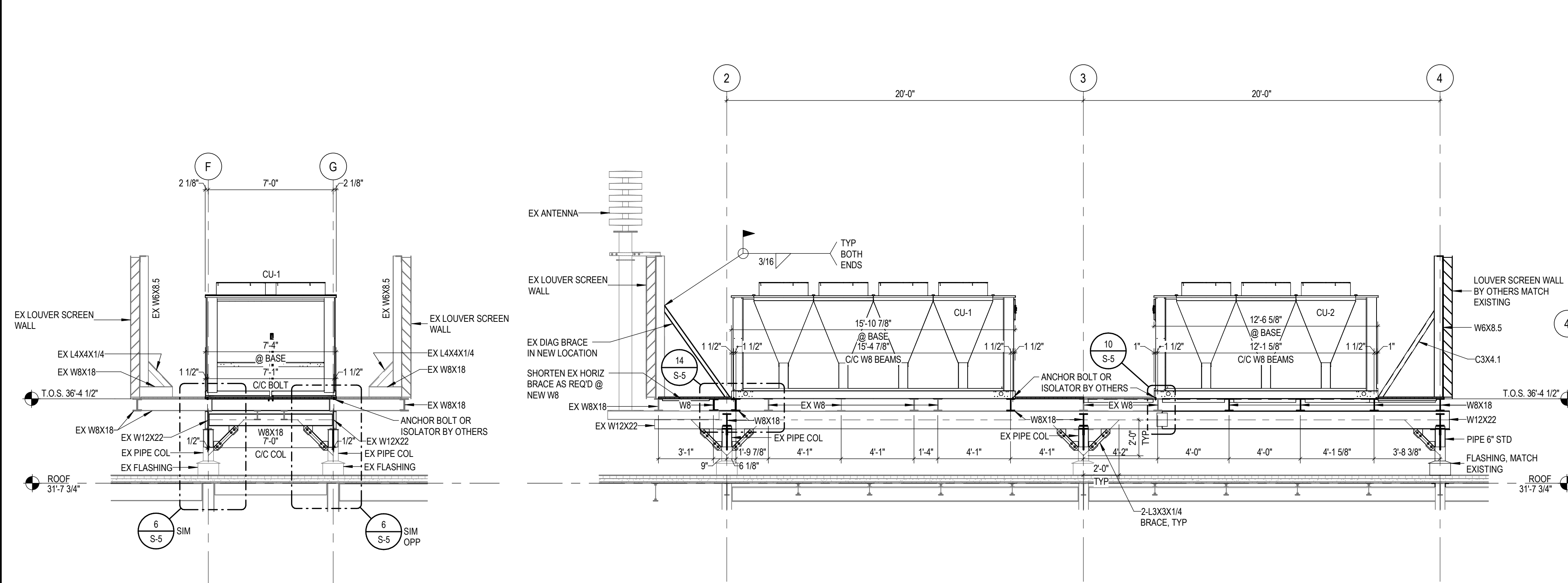
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EX ROOF FRAMING
PLAN & GRILLAGE
FRAMING DEMO PLAN

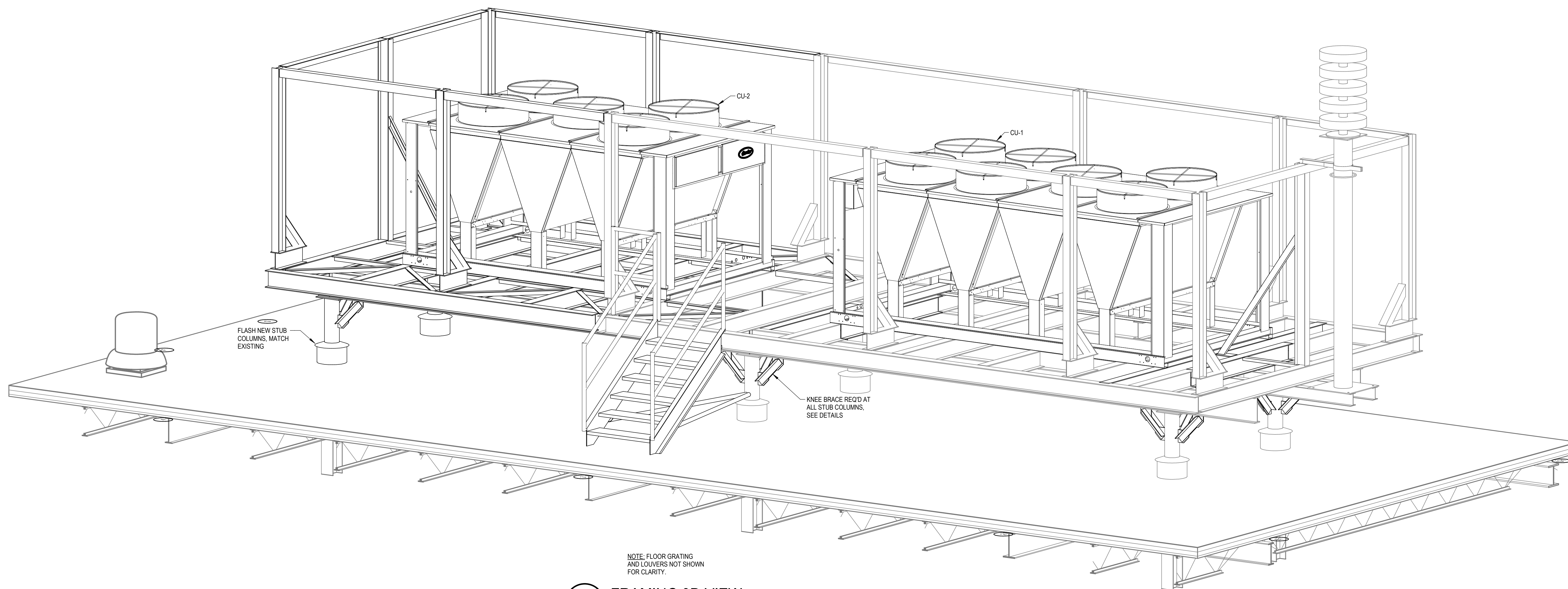
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2 OF 15

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- NOTES:**
1. BASE BID - EXISTING SCREEN WALL TO REMAIN. NO NEW SCREEN WALL. GUARDRAIL REQUIRED AT EDGE OF PLATFORM IN ABSENCE OF SCREEN WALL.
 2. ALTERNATE - REMOVE EXISTING SCREEN WALL AND REPLACE WITH NEW SCREEN WALL ALL AROUND.
 3. ALL STEEL TO BE HOT DIPPED GALVANIZED. PROVIDE GALVANIZING REPAIR PAINT AS REQUIRED ON ALL NEW AND EXISTING STEEL DAMAGED OR MARRED DURING DEMOLITION AND/OR ERECTION.
 4. THE CONTRACTOR IS TO INSPECT STAIR AND SUPPORT STEEL FOR ADEQUATE REMAINING SECTION FOR STRENGTH AND WELDING. IF EXISTING STEEL IS NOT ADEQUATE, REPLACE WITH LIKE.
 5. ALL STEEL GRATING TO BE GALVANIZED WELDED BAR GRATING WITH 1"x3/16" BEARING BARS @ 1 3/16" O.C. AND CROSS BARS @ 4" O.C., MINIMUM.
 6. ALL WORK AND WALKWAYS MUST COMPLY WITH MSU STANDARD ROOF PROTECTION DURING THE WHOLE LENGTH OF THE PROJECT TIMELINE.

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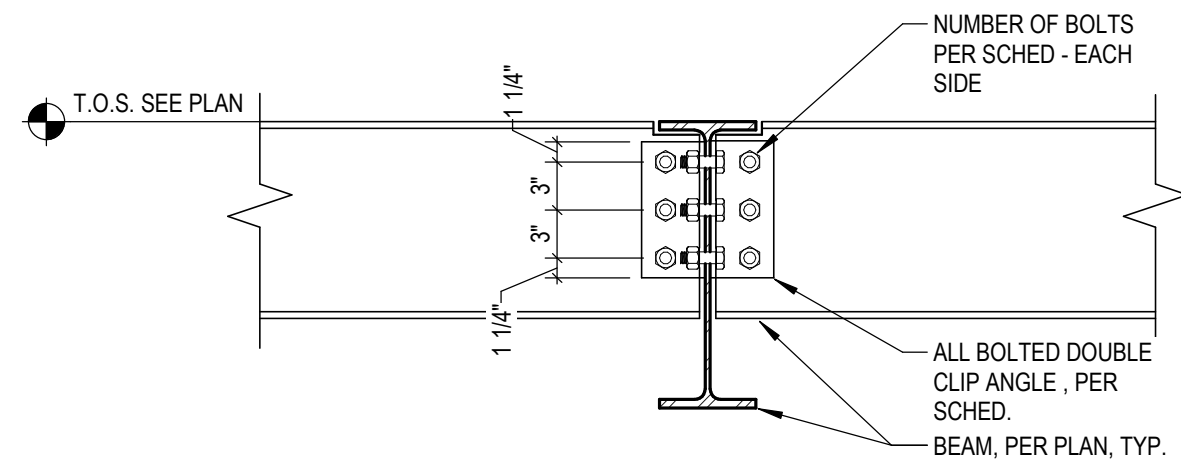
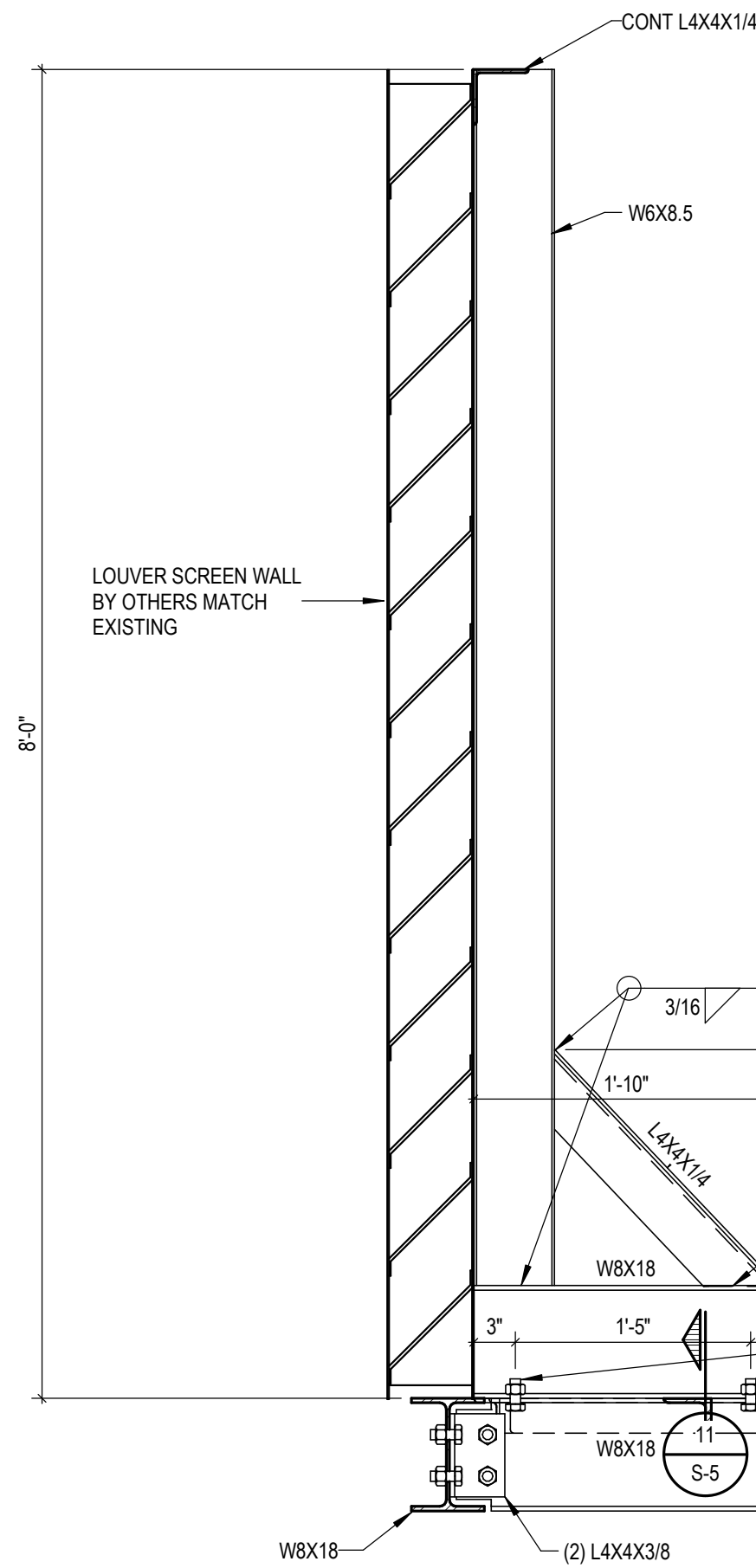
1 FRAMING 3D VIEW
S-4

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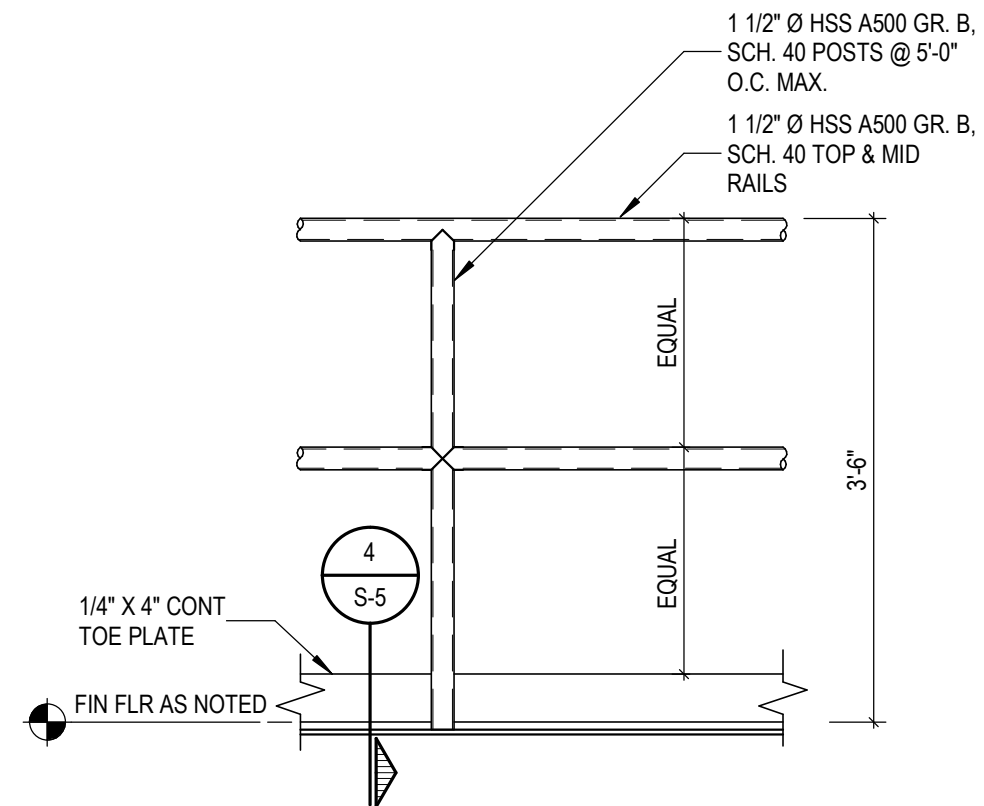
FRAMING 3D VIEW

S-4
4 OF 15

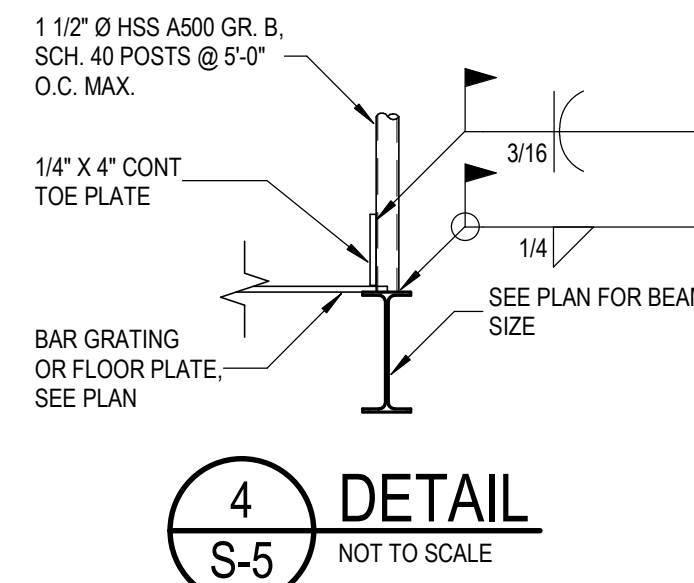


BEAM CONNECTION TABLE			
BEAM SIZE	NUMBER OF BOLTS & SIZE	BOLT TYPE	CLIP ANGLES
W6X	(2) 3/4" Ø	A325N	(2) L 4X4X3/8

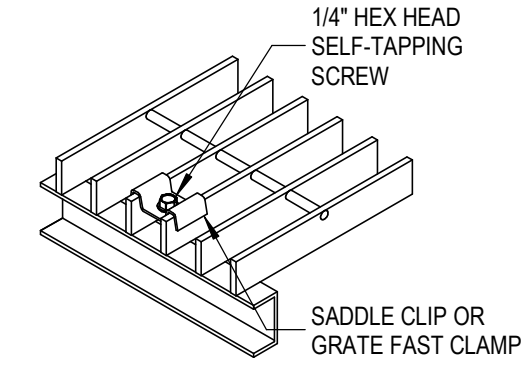
2 BEAM CONNECTION TABLE
S-5 NOT TO SCALE



3 GUARDRAIL DETAIL
S-5 NOT TO SCALE

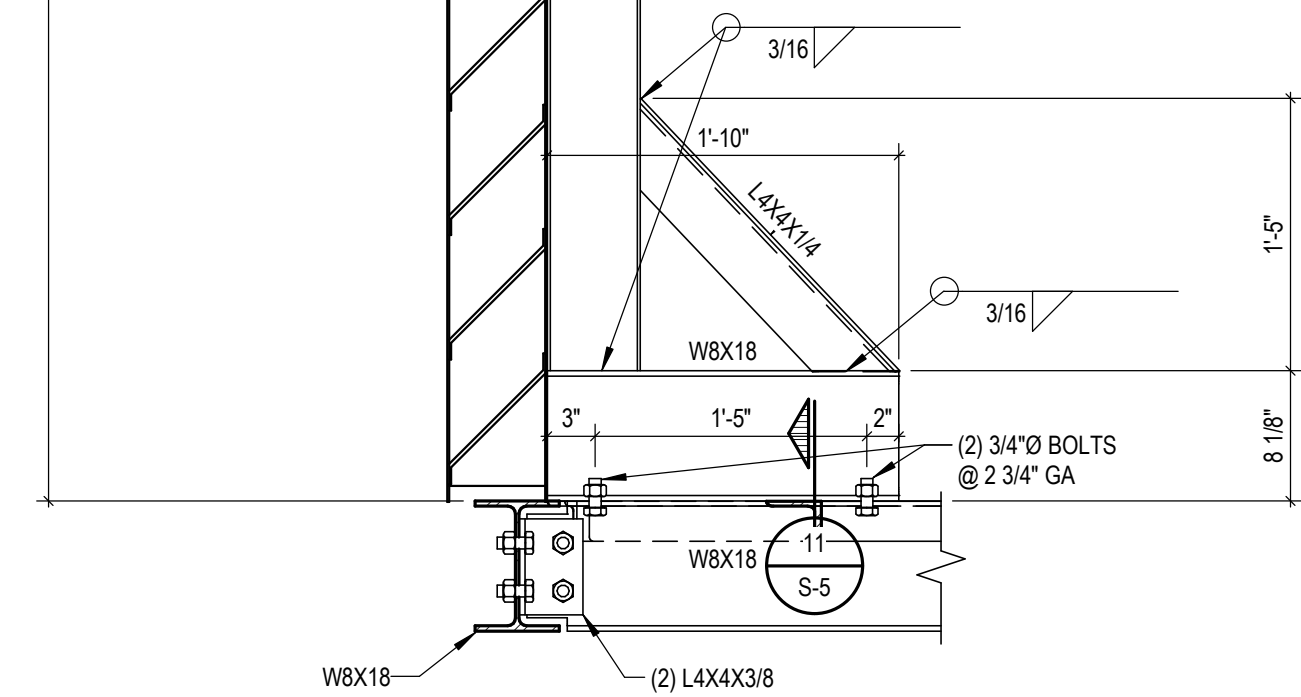


4 DETAIL
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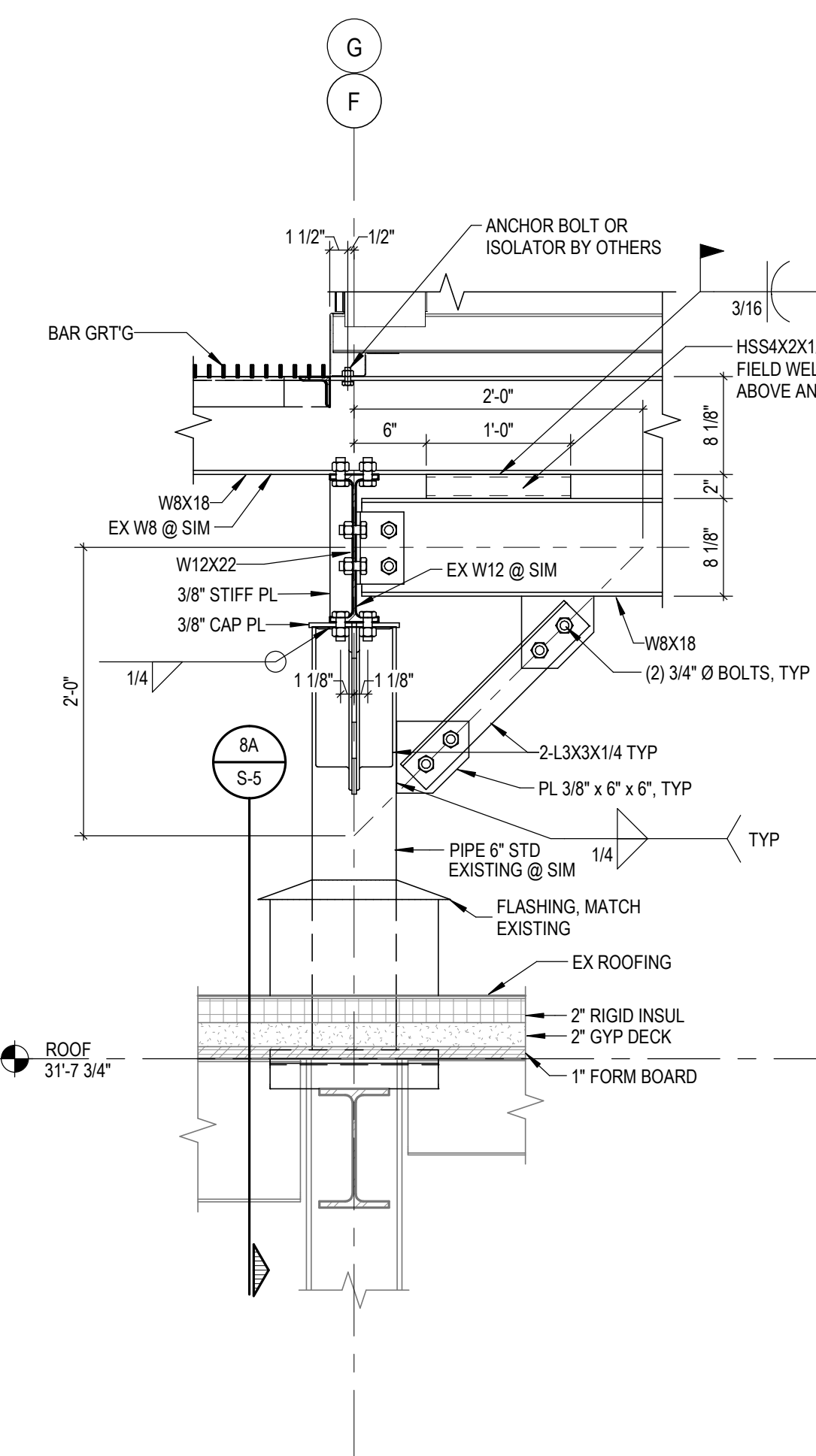


5 GRATING ANCHOR DETAIL
S-5 NOT TO SCALE

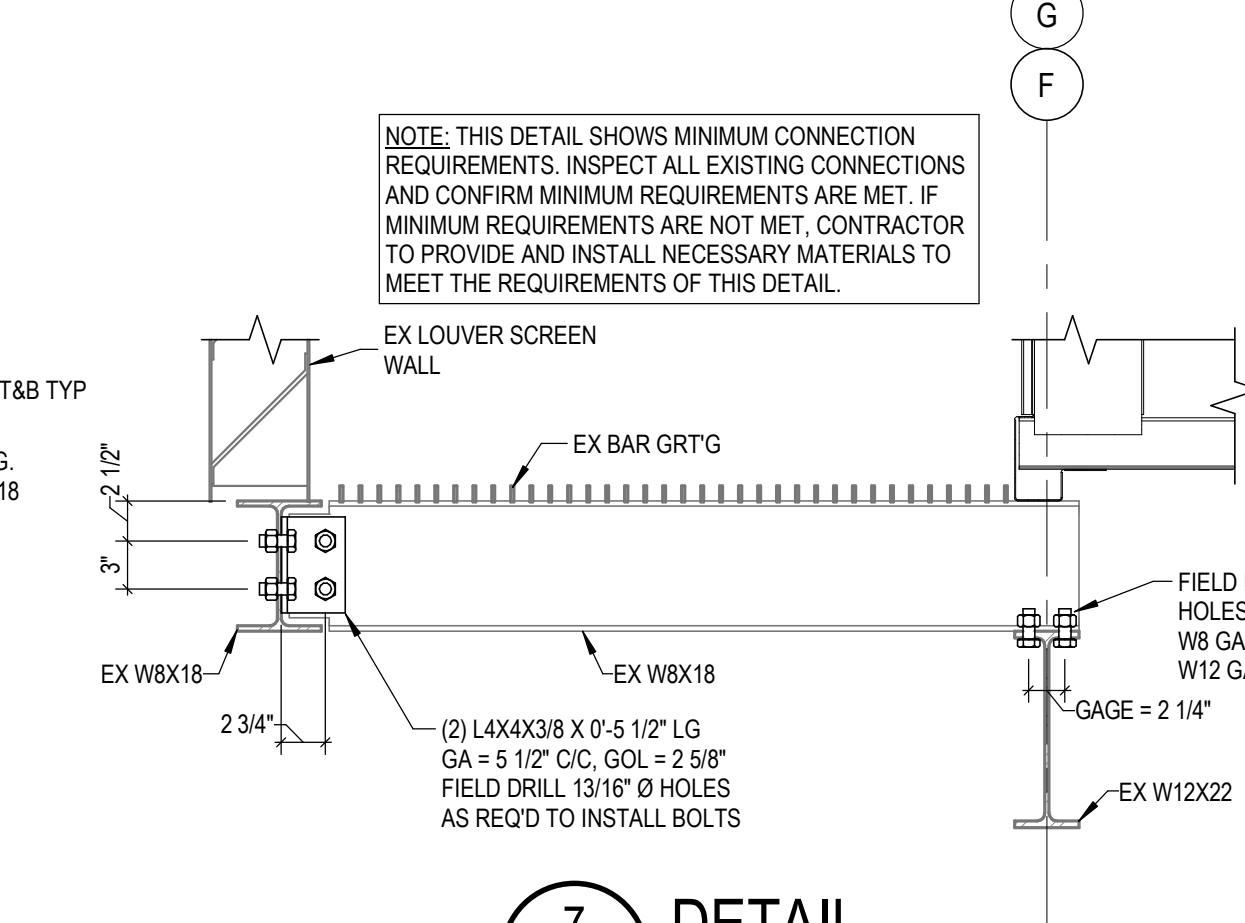
NOTE: MINIMUM (2) ANCHORS AT EACH END OF SECTION SADDLE & SCREW TO BE STAINLESS STEEL



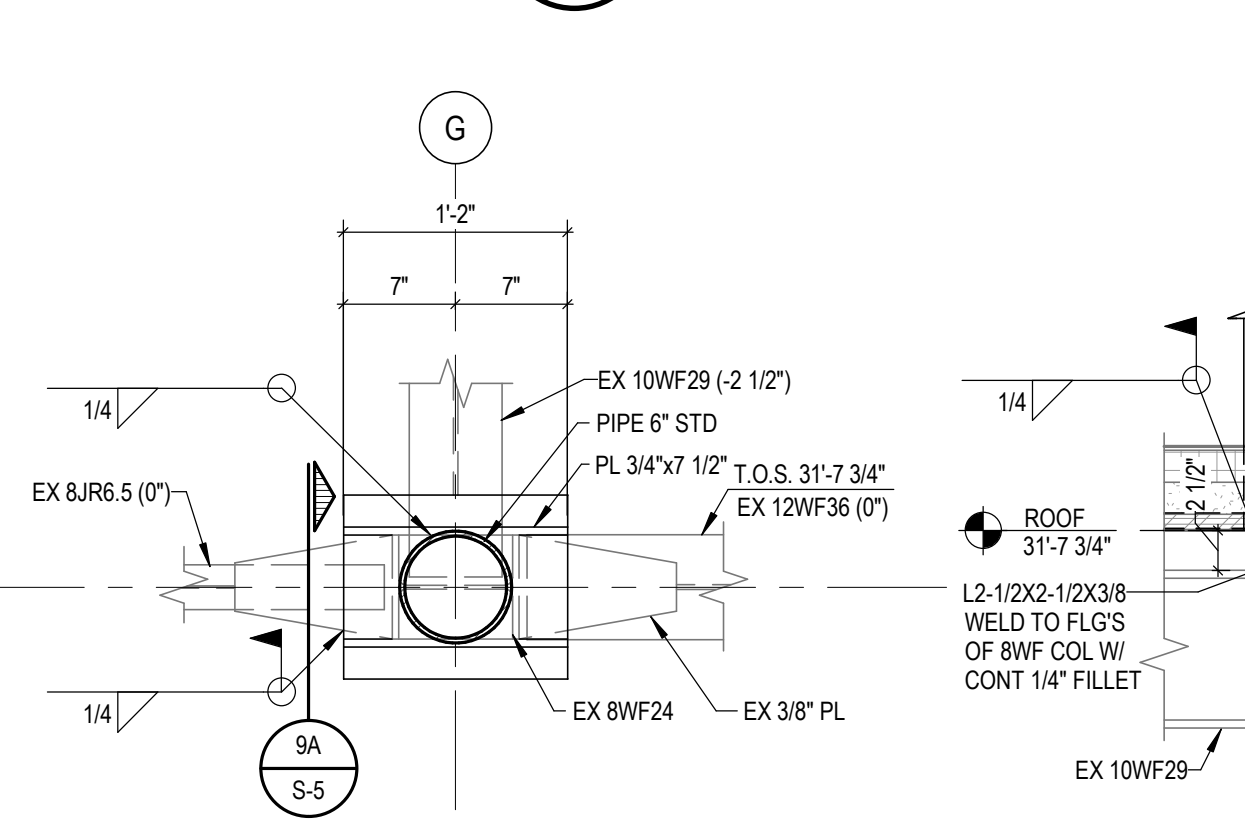
1 DETAIL
S-5 SCALE: 1" = 1'-0"



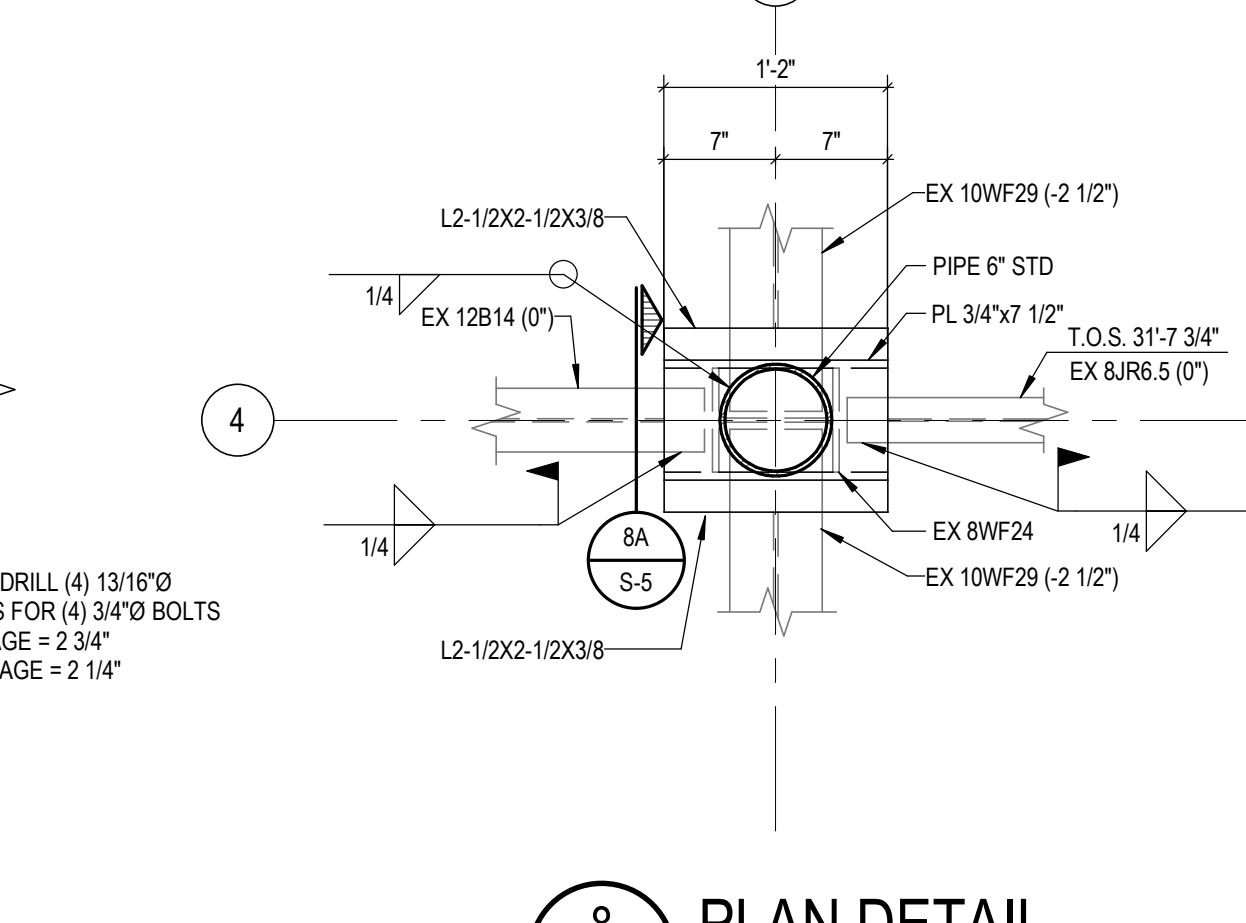
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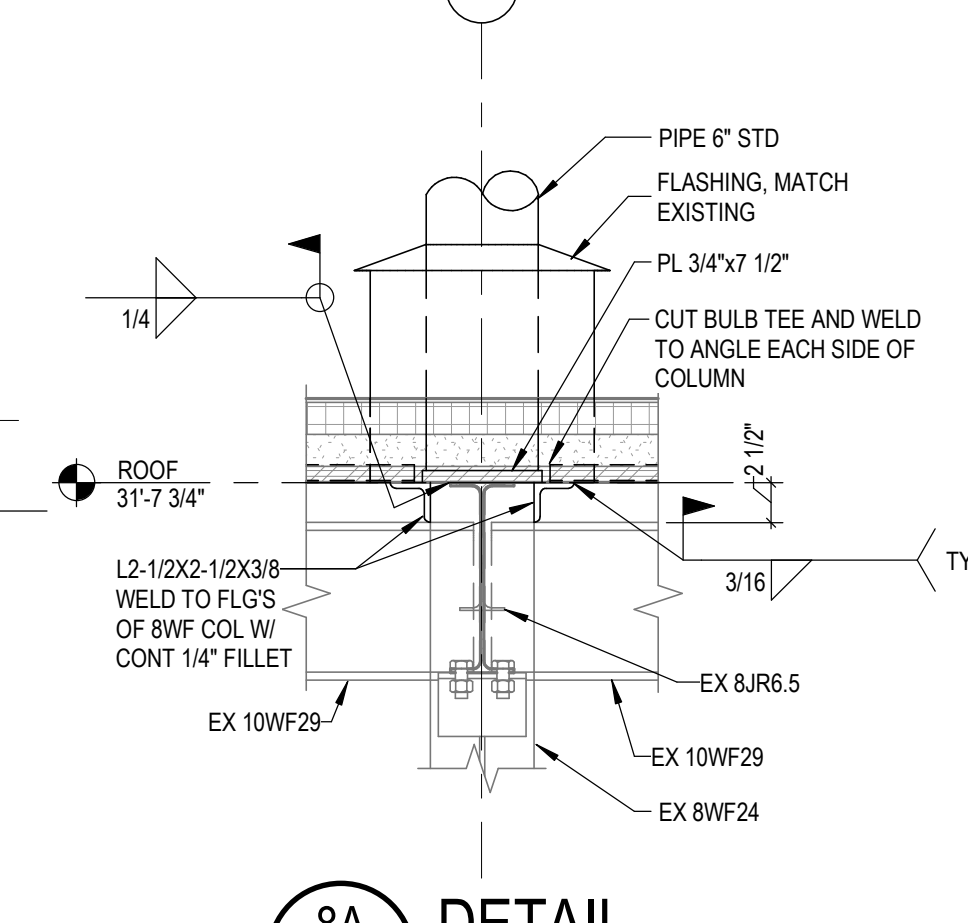
7 DETAIL
S-5 SCALE: 1" = 1'-0"



9 PLAN DETAIL
S-5 SCALE: 1" = 1'-0"



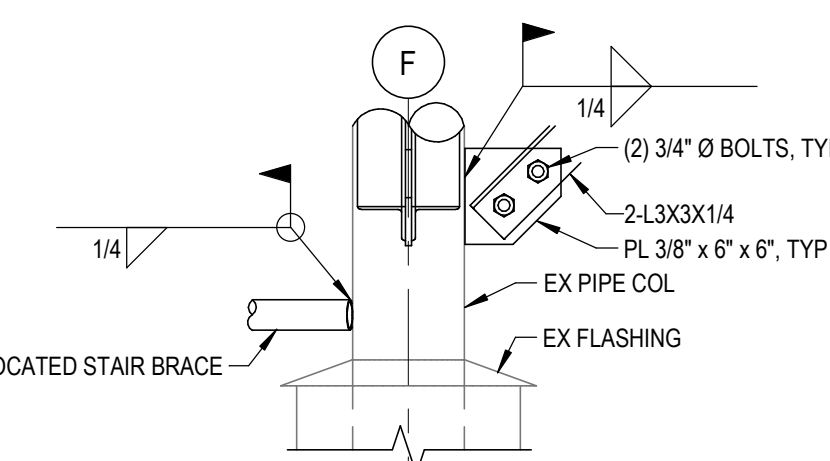
8 PLAN DETAIL
S-5 SCALE: 1" = 1'-0"



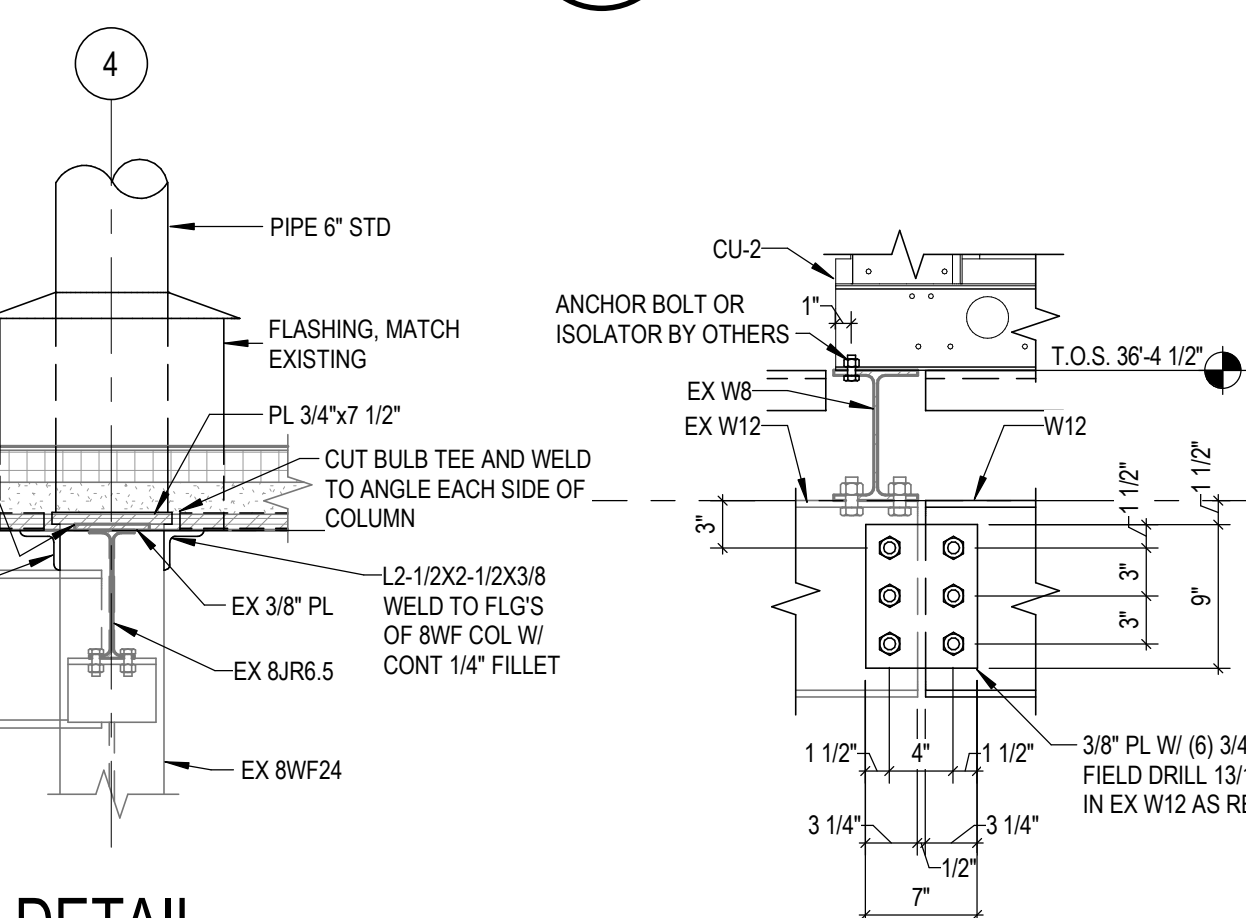
8A DETAIL
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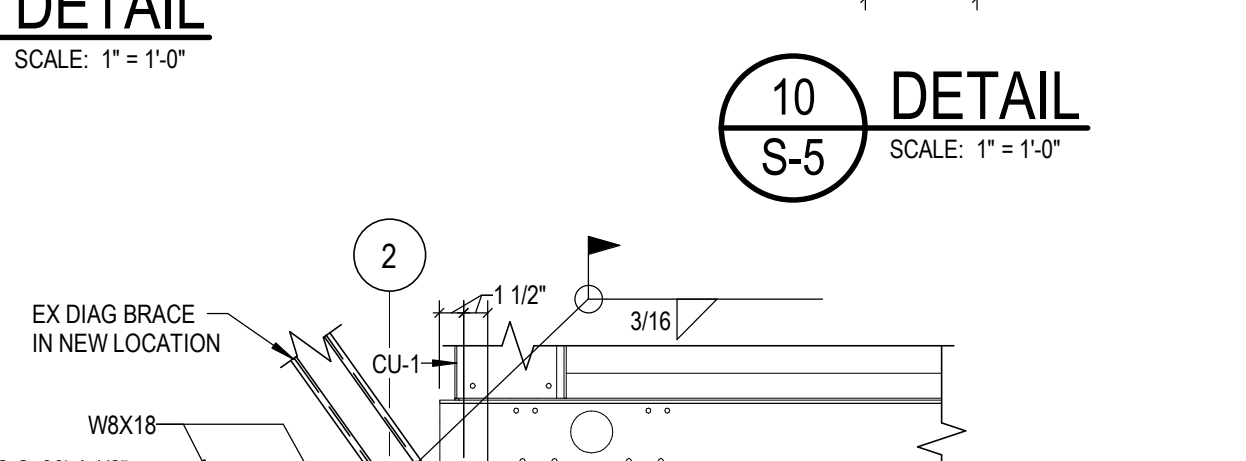
12 DETAIL
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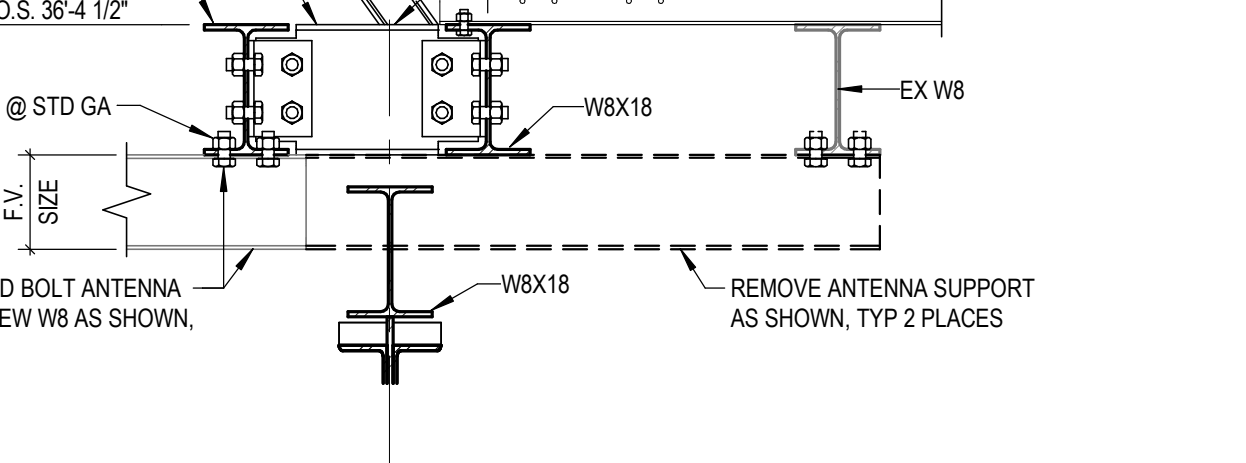
13 DETAIL
S-5 SCALE: 1" = 1'-0"



9A DETAIL
S-5 SCALE: 1" = 1'-0"



10 DETAIL
S-5 SCALE: 1" = 1'-0"



14 DETAIL
S-5 SCALE: 1" = 1'-0"



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FRAMING SECTIONS
AND DETAILS

S-5

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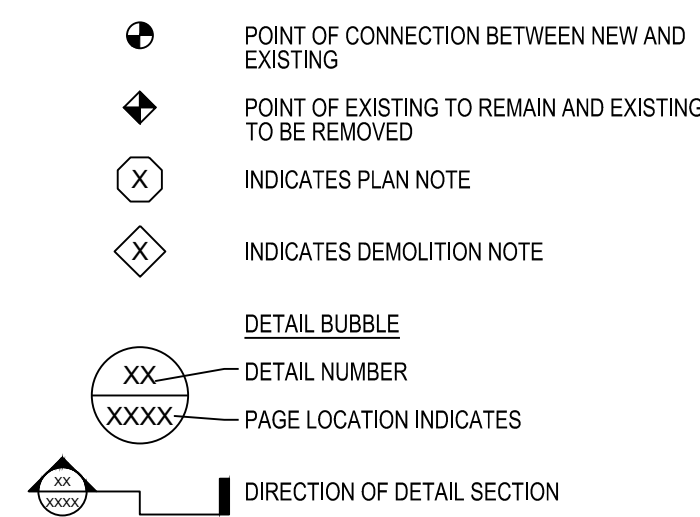
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MECHANICAL ABBREVIATIONS

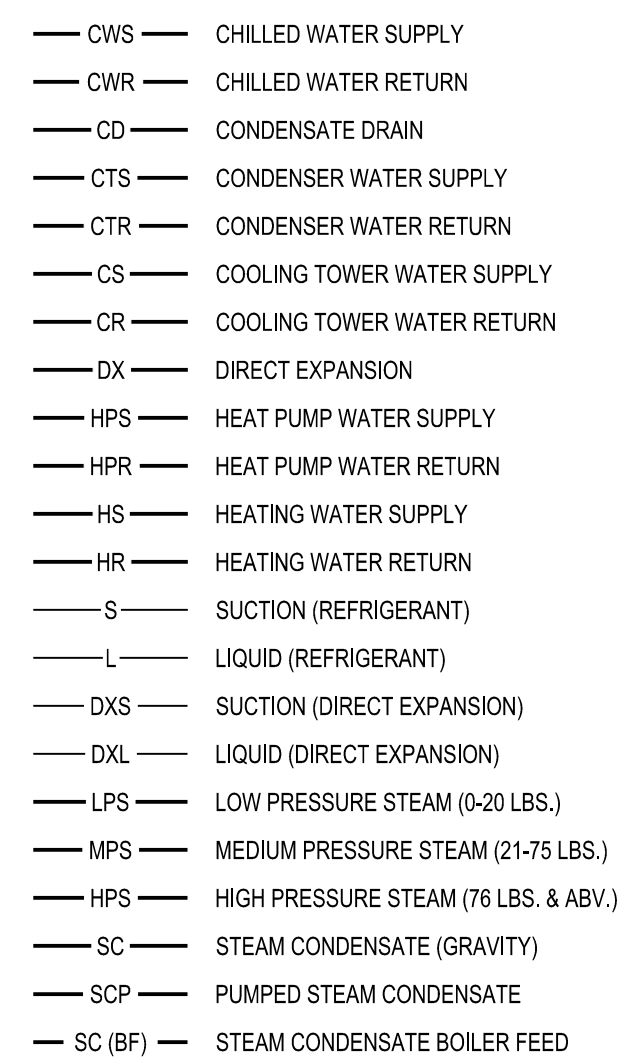
AF	ABOVE FINISH FLOOR	ID	INSIDE DIAMETER
AC	AIR COMPRESSOR	I.E.	INVERT ELEVATION
AHU	AIR HANDLING UNIT	IAH	INTAKE HOOD
AS	AIR SEPARATOR	LAT	LEAVING AIR TEMPERATURE
A.T.C.	ARCHITECTURAL TRADES CONTRACTOR	LH	LATENT HEAT (MBH)
B	BOILER	LWT	LEAVING WATER TEMPERATURE
B.A.S.	BUILDING AUTOMATION SYSTEM	MAX	MAXIMUM
CAF	COMBUSTION AIR FAN	MBH	BTU PER HOUR (THOUSAND)
CC	COOLING COIL	MIN	MINIMUM
CFM	CUBIC FEET PER MINUTE	M.T.C.	MECHANICAL TRADES CONTRACTOR
CHLR	CHILLER	N.C.	NOISE CRITERIA
CHP	CONSOLE HEAT PUMP	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
CONV	CONVECTOR	NTS	NOT TO SCALE
CT	COOLING TOWER	P	PUMP
CU	CONDENSING UNIT	PCR	PUMPED CONDENSATE RETURN
CUH	CABINET UNIT HEATER	PD	PRESSURE DROP
CV	CONTROL VALVE	RCP	RADIANT CEILING PANEL
CWP	CHILLED WATER PUMP	REQD	REQUIRED
DB	DRY BULB	RG	RETURN GRILLE
DFU	DUCT FURNACE	RH	RELATIVE HUMIDITY
DIA	DIAMETER	RLH	RELIEF HOOD
DN	DOWN	RTU	ROOF TOP UNIT
DPR	DAMPER	SD	SUPPLY DIFFUSER
DS	DUCT SILENCER	SE	SUPPLY FAN
EAT	ENTERING AIR TEMPERATURE	SG	SUPPLY GRILLE
EF	EXHAUST FAN	SH	SENSIBLE HEAT (MBH)
EG	EXHAUST GRILLE	SM	SHEET METAL
E.T.C.	ELECTRICAL TRADES CONTRACTOR	SO. FT.	SQUARE FEET
EV	EVAPORATOR	SST	SATURATED SUCTION TEMPERATURE
EWT	ENTERING WATER TEMPERATURE	STR	STRAINER
EXH	EXHAUST	TC	TOTAL COOLING (MBH)
EXIST	EXISTING	TCL	TEMPERATURE CONTROL
FF	FINISH FLOOR	T&P	TEMPERATURE & PRESSURE RELIEF VALVE
FFM	FEET PER MINUTE	TYP	TYPICAL
FN	FEET	UH	UNIT HEATER
FTR	FINNED TUBE RADIATION	VAV	VARIABLE AIR VOLUME BOX
FU	FURNACE	VRH	VARIABLE AIR VOLUME REHEAT BOX
GAL	GALLON	FPVAV	FAN POWERED VARIABLE AIR VOLUME BOX
GFRH	GAS FIRED RADIANT HEATER	V.F.D	VARIABLE FREQUENCY DRIVE
GR	GRILLE	ZD	ZONE DAMPER
H	HUMIDIFIER	X-SA	EXISTING ITEM (EXISTING SUPPLY AIR DUCT) ITEM
HC	HEATING COIL		EXISTING
HD	HEAD (FT)		
HP	HORSE POWER		
HHP	HORIZONTAL HEAT PUMP		
HTG	HEATING		
HVAC	HEATING, VENTILATION, & AIR CONDITIONING		
HWP	HEATING WATER PUMP		
HX	HEAT EXCHANGER		

MECHANICAL SYMBOLS LEGEND

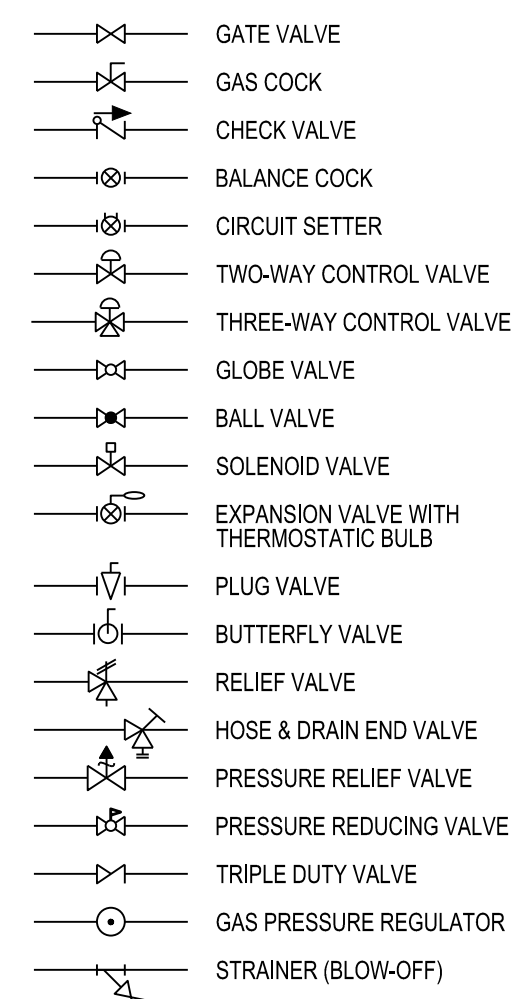
MISCELLANEOUS NOTES



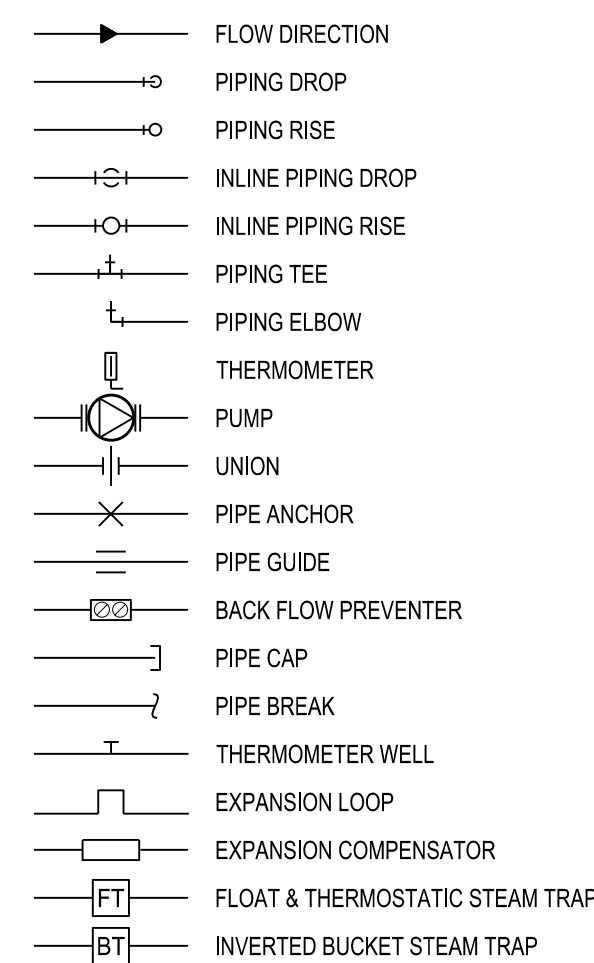
HVAC PIPING



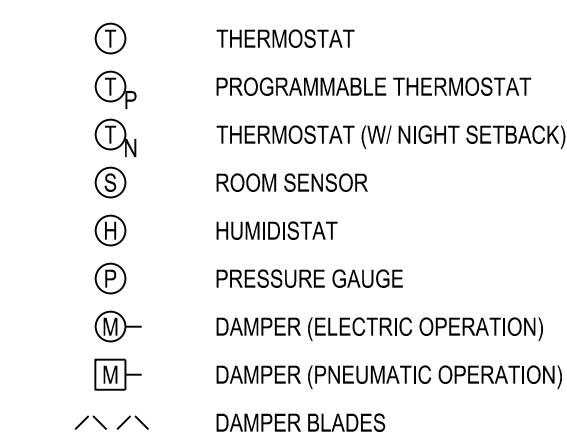
HVAC PIPING VALVES



HVAC PIPING SYMBOLS



TEMPERATURE CONTROL SYMBOLS



GENERAL HVAC NOTES

- NOTIFY OWNER OF ANY PIPING OR DUCTWORK DEMOLITION THAT MAY AFFECT NORMAL OPERATION OF OTHER AREAS.
- FIELD VERIFY LOCATIONS OF EXISTING PIPING THAT MAY CONFLICT WITH NEW CONSTRUCTION AND RELOCATE AS NEEDED.
- CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER DISCIPLINES PRIOR TO CONSTRUCTION TO AVOID CONFLICTS.
- THE CONTRACTOR SHALL FIELD VERIFY THE SIZES, LOCATION, ELEVATIONS, AND DETAILS OF ALL EXISTING CONDITIONS THAT MAY AFFECT THE WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF ALL EQUIPMENT AND MATERIALS IN A "NEW" CONDITION DURING CONSTRUCTION.
- ALL WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS AND SUBCONTRACTORS AS REQUIRED BY LAW.
- ALL WORK SHALL CONFORM TO MICHIGAN MECHANICAL CODE, LATEST APPLICABLE EDITION.
- IF THERE IS CONFLICTING INFORMATION IN THE PLANS OR SPECIFICATIONS THE MORE STRINGENT AND GREATER COST ITEM SHALL BE USED.
- DRAWINGS INDICATE REQUIRED SIZES AND POINTS OF TERMINATION OF PIPES AND DUCTS AND SUGGESTED ROUTES. IT IS NOT INTENTION OF DRAWINGS TO INDICATE ALL NECESSARY OFFSETS. INSTALL WORK IN MANNER TO CONFORM TO STRUCTURE. AVOID OBSTRUCTIONS, PRESERVE HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. DO NOT SCALE FROM DRAWINGS.
- ALL MATERIALS AND INSTALLATIONS SHALL BE IN COMPLIANCE WITH THE LATEST VERSION OF THE MICHIGAN STATE UNIVERSITY "STANDARDS FOR CONSTRUCTION PROJECTS" MANUAL.
- CONTRACTOR TO REMOVE AND REINSTALL CEILING TILES AND CEILING GRID AS NEEDED TO COMPLETE THEIR WORK.
- CONTRACTOR TO CUT AND PATCH EXISTING SHAFT WALL AS NEEDED TO ROUTE REFRIGERANT PIPING. WALL TO BE PATCHED TO MATCH EXISTING. PRIME AND PAINT WALL FLOOR TO CEILING AND CORNER TO CORNER TO MATCH EXISTING.
- CONTRACTOR TO CUT AND PATCH DRYWALL OR PLASTER CEILINGS AS REQUIRED FOR INSTALLATION OF NEW STRUCTURAL ELEMENTS. COORDINATE WITH STRUCTURAL DRAWINGS AND CONTRACTOR FOR LOCATIONS.
- ALL REFRIGERANT SUCTION LINES SHALL BE INSULATED WITH 2.5" FLEXIBLE ELASTOMERIC INSULATION WITH 0.024" THICK SMOOTH ALUMINUM JACKET WITH Z-SHAPED LOCKING SEAM.

MECHANICAL SPECIFICATIONS

- ALL MATERIALS AND WORKMANSHIP SHALL COMPLY WITH ALL APPLICABLE CODES, SPECIFICATIONS, LOCAL ORDINANCES, INDUSTRY STANDARDS UTILITY COMPANY REGULATIONS, MANUFACTURER'S INSTALLATION INSTRUCTIONS, AND MICHIGAN STATE UNIVERSITY STANDARDS FOR CONSTRUCTION.

DRAWINGS

- MECHANICAL DRAWINGS SHOW GENERAL ARRANGEMENT OF ALL PIPING EQUIPMENT AND APPURTENANCES. THEY SHALL BE FOLLOWED AS CLOSELY AS ACTUAL BUILDING CONSTRUCTION AND WORK OF OTHER TRADES WILL PERMIT.
- MECHANICAL WORK SHALL CONFORM TO REQUIREMENTS SHOWN ON ALL DRAWINGS. GENERAL AND STRUCTURAL DRAWINGS SHALL TAKE PRECEDENCE OVER MECHANICAL DRAWINGS.
- BECAUSE OF SMALL SCALE OF MECHANICAL DRAWINGS IT IS NOT POSSIBLE TO INDICATE ALL OFFSETS, FITTINGS AND ACCESSORIES WHICH MAY BE REQUIRED. CONTRACTOR SHALL INVESTIGATE STRUCTURAL AND FINISH CONDITIONS AFFECTING WORK AND SHALL ARRANGE HIS WORK ACCORDINGLY, PROVIDING SUCH FITTINGS, VALVES AND ACCESSORIES AS MAY BE REQUIRED TO MEET SUCH CONDITIONS.

MINOR DEVIATIONS

- FOR PURPOSE OF CLARITY AND LEGIBILITY, DRAWINGS ARE ESSENTIALLY DIAGRAMMATIC ALTHOUGH SIZE AND LOCATION OF EQUIPMENT AND PIPING ARE DRAWN TO SCALE WHEREVER POSSIBLE. VERIFY CONTRACT DOCUMENT INFORMATION AT SITE.
- DRAWINGS INDICATE REQUIRED SIZES AND POINTS OF TERMINATION OF PIPES AND DUCTS AND SUGGESTED ROUTES. IT IS NOT INTENTION OF DRAWINGS TO INDICATE ALL NECESSARY OFFSETS. INSTALL WORK IN MANNER TO CONFORM TO STRUCTURE. AVOID OBSTRUCTIONS, PRESERVE HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. DO NOT SCALE FROM DRAWINGS.

BALANCING

- TEST AND BALANCE TO BE COMPLETED BY MICHIGAN STATE UNIVERSITY.
- PRE AND POST CONSTRUCTION WATER BALANCE TO BE COMPLETED.

LOUVERED ROOFTOP EQUIPMENT SCREENS

LOUVERED ROOF TOP EQUIPMENT SCREENS

PART 1 - GENERAL

1.1 SUMMARY

- Section Includes:
 - Fixed, extruded-aluminum louvered roof top equipment screens
 - See Structural Drawings for structural framing supporting lower sections.
- PERFORMANCE REQUIREMENTS

1.2 PERFORMANCE REQUIREMENTS

- Design: Design louvers, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.
- Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.
 - Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.

1.3 SUBMITTALS

- Product Data: For each type of product indicated.
- Shop Drawings: For equipment screens and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- Samples: For each type of metal finish required.
- Submittal: For louvers indicated to comply with structural performance requirements and design criteria indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.
- Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.
- Fasteners: Use types and sizes to suit unit installation conditions.
 - For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

2.2 FABRICATION, GENERAL

- Join concealed frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 EXTRUDED-ALUMINUM ROOF TOP EQUIPMENT SCREEN

- Horizontal Blade Louvered Roof Top Equipment Screen
 - Basis-of-Design Product: Architectural Louvers Co. (Harray, LLC); Model V6JN4. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:
 - Manufacturers of equivalent products submitted and approved in accordance with MSU Product Substitution Procedures.
 - Louver Blade Depth: 6 inches (150 mm)
 - Blade Spacing: 4 inch centers
 - Blade Profile: Narrow profile plain blade without center baffle.
 - Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
 - Framing Support Nominal Thickness: Not less than 0.125 inch (3.2 mm)
 - Louver Performance Requirements:
 - Free Area: Not less than 11.3 sq. ft. (1.05 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver assembly.
 - Horizontal Drag Coefficient: Not greater than 0.31 on a cross sectional profile, allowing for a 69% reduction in wind load imposed horizontally upon supporting structural framing.

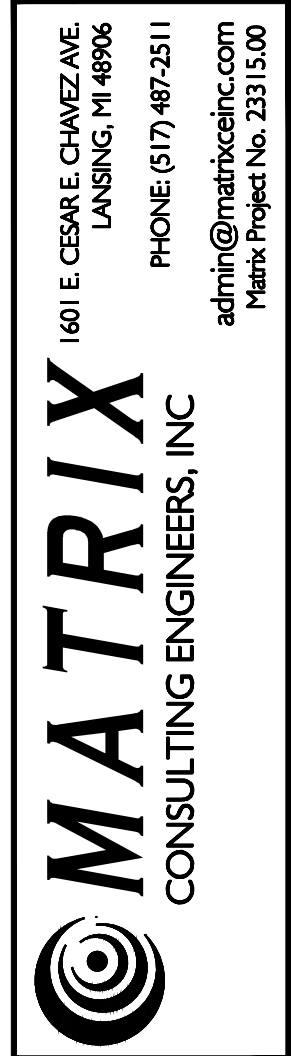
2.4 ALUMINUM FINISHES

- High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

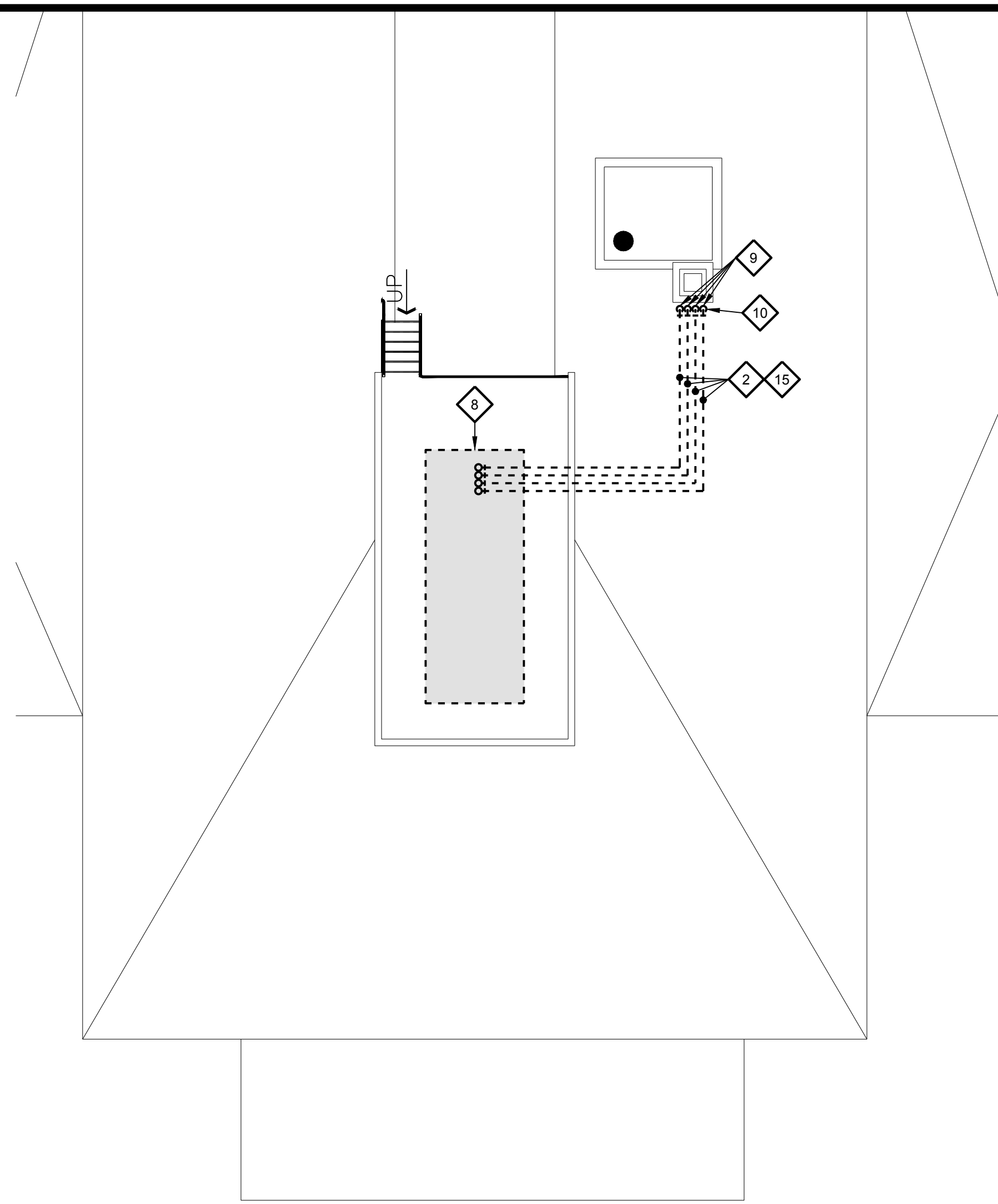
- Locate and place equipment screens level, plumb, and at indicated alignment with adjacent work.
- Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- Provide perimeter reveals and openings of uniform width to allow for thermal expansion, as indicated.
- Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.



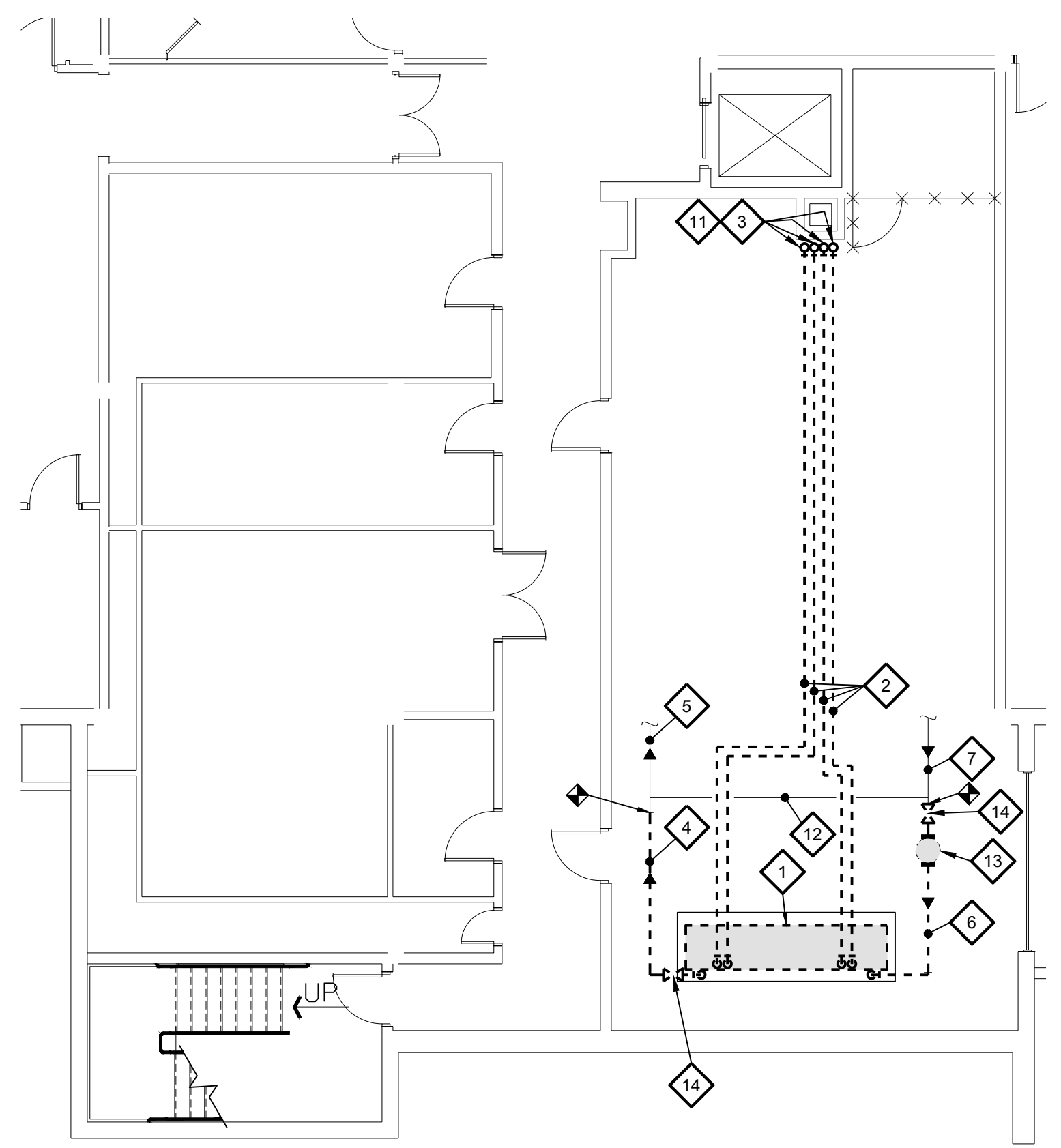
CAPITAL PROJ. NO.
CP22055

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MECH.	GOERGE
ELEC.	HOWARD
CIVIL	
L.A.	WILBER
INT. DES.	
CONST. REP.	CRUZ
APPR.	DURKIN
DATE	4/12/2024
SCALE	AS NOTED
ISSUED	
ISSUED FOR BIDS	4/22/2024

MECHANICAL SYMBOLS
GENERAL NOTES
AND DETAILS



PARTIAL ROOF PLAN - PIPING DEMOLITION
 SCALE: 1/8" = 1'-0"



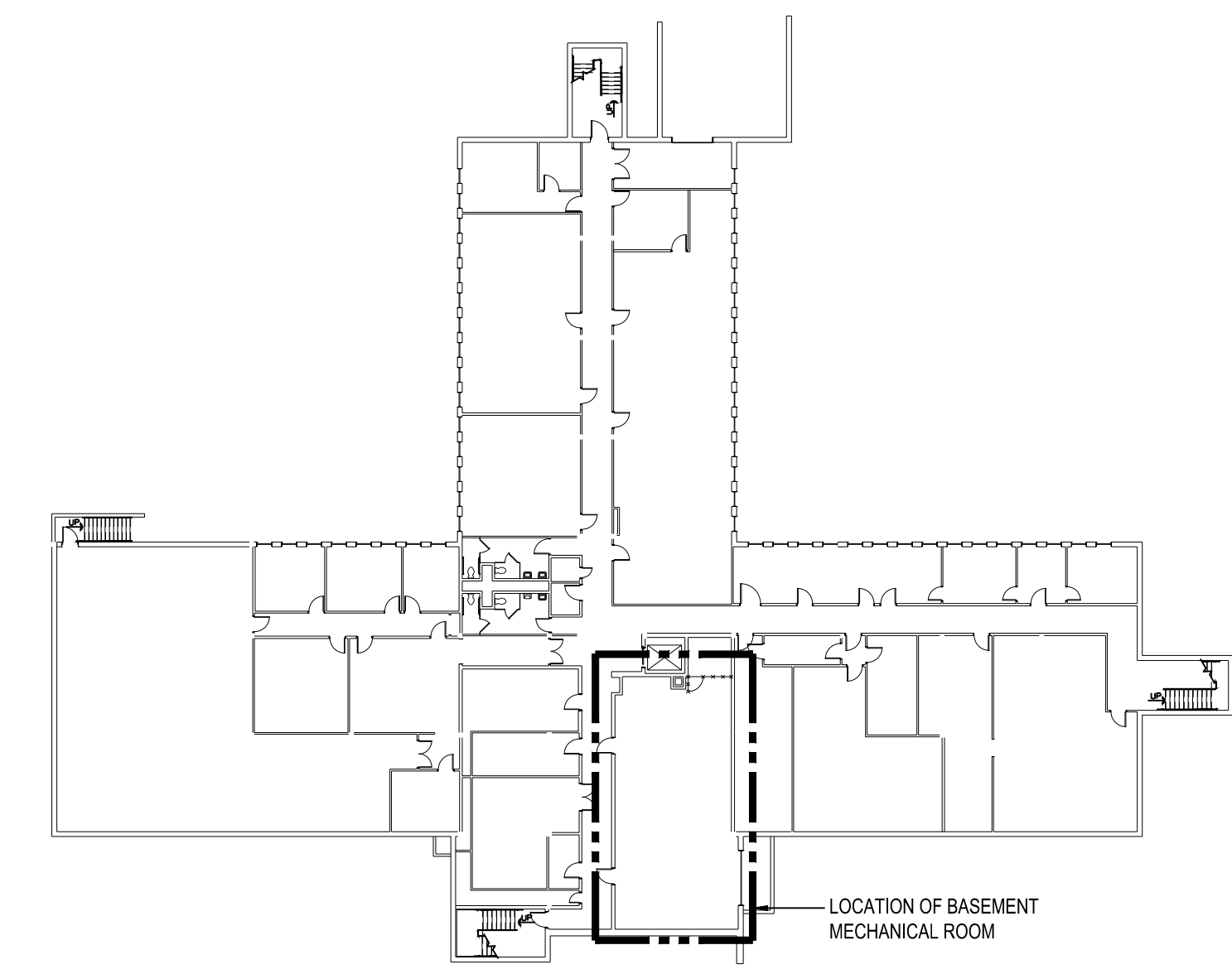
PARTIAL BASEMENT PLAN - PIPING DEMOLITION
 SCALE: 1/8" = 1'-0"

DEMOLITION NOTES

- 1 REMOVE EXISTING CHILLER. EXISTING PAD TO REMAIN.
- 2 REMOVE EXISTING REFRIGERANT PIPING.
- 3 REMOVE EXISTING REFRIGERANT PIPING UP SHAFT TO ROOF.
- 4 REMOVE EXISTING CWS PIPING TO EXTENTS SHOWN.
- 5 EXISTING CWS PIPING TO REMAIN.
- 6 REMOVE EXISTING CWR PIPING TO EXTENTS SHOWN.
- 7 EXISTING CWR PIPING TO REMAIN.
- 8 REMOVE EXISTING CONDENSER. STRUCTURE TO REMAIN FOR NEW UNIT. REFER TO STRUCTURAL PLANS.
- 9 REMOVE EXISTING REFRIGERANT PIPING DOWN SHAFT TO BASEMENT MECHANICAL ROOM.
- 10 REMOVE EXISTING PIPE CURB.
- 11 GENERAL TRADES CONTRACTOR TO OPEN CHASE FOR DEMO OF EXISTING PIPING AND INSTALLATION OF NEW PIPING ON FLOORS 1, 2, AND 3. PATCH OPENINGS AND PAINT TO MATCH SURROUNDING FINISHES.
- 12 EXISTING BYPASS/DECOUPLER LINE TO REMAIN.
- 13 REMOVE EXISTING CHILLER CIRCULATING PUMP.
- 14 REMOVE EXISTING ISOLATION VALVE.
- 15 REMOVE EXISTING ROOF PIPE SUPPORTS.

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

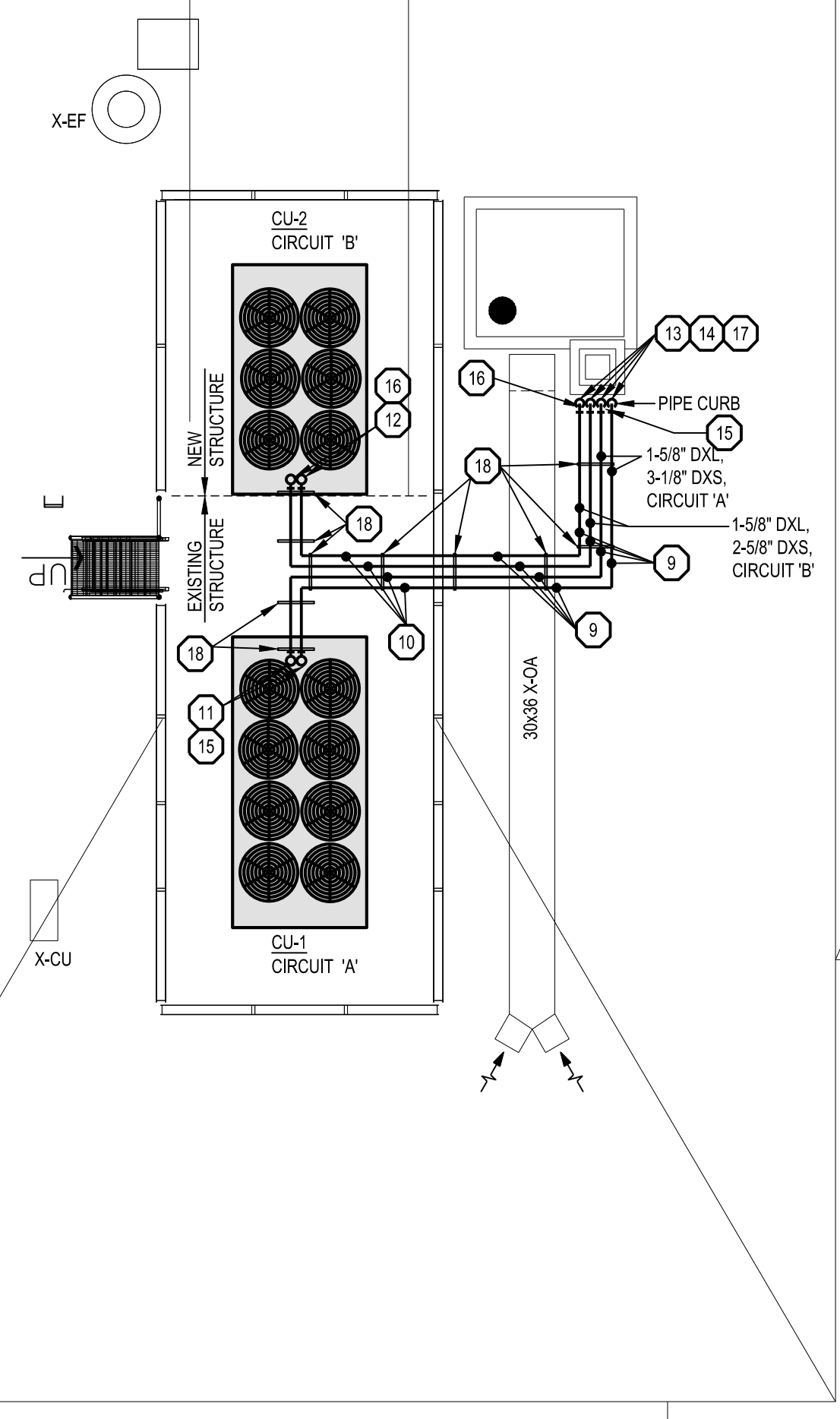
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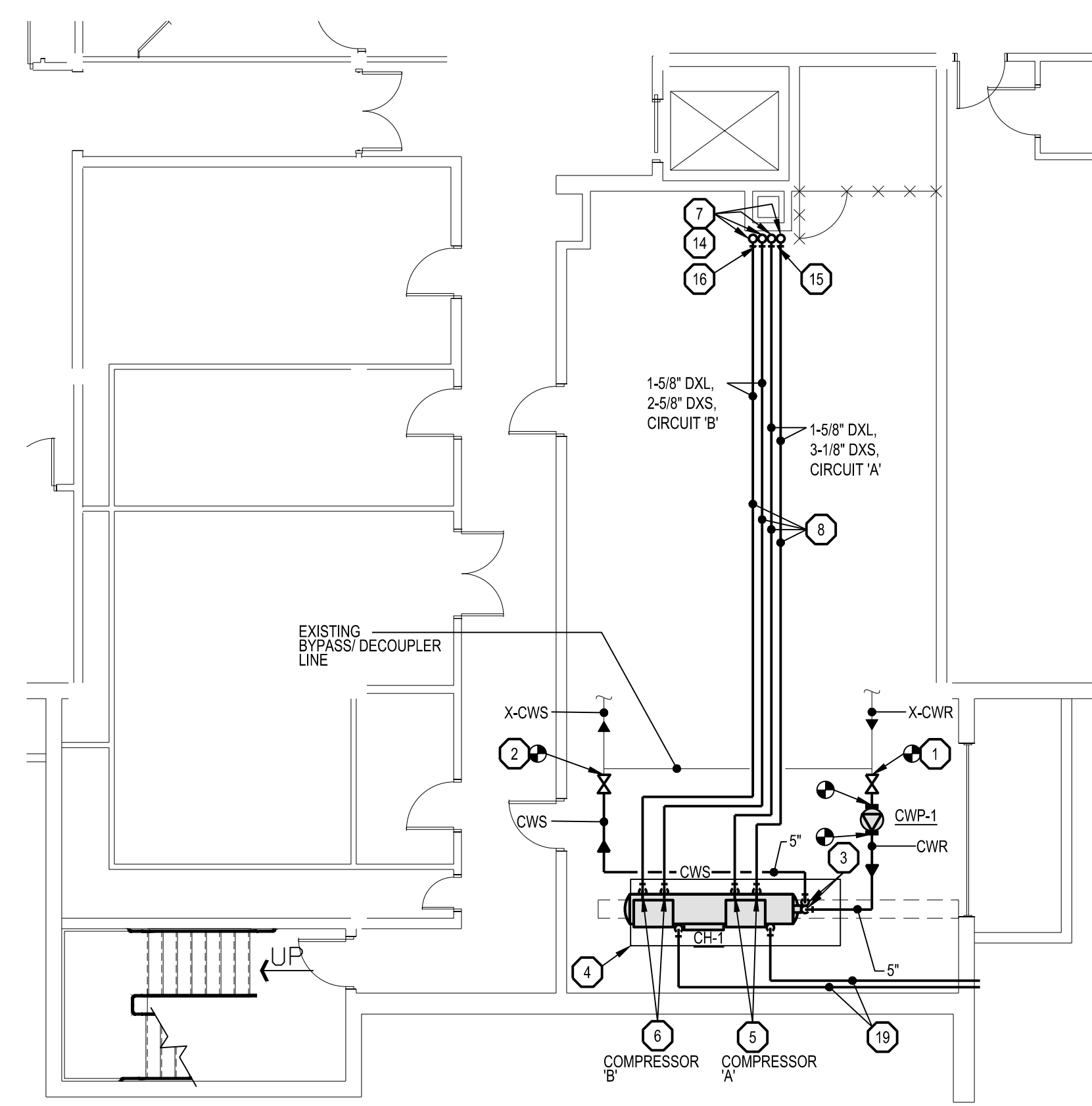
BASEMENT AND ROOF HVAC PLANS NEW

PIPING KEY NOTES

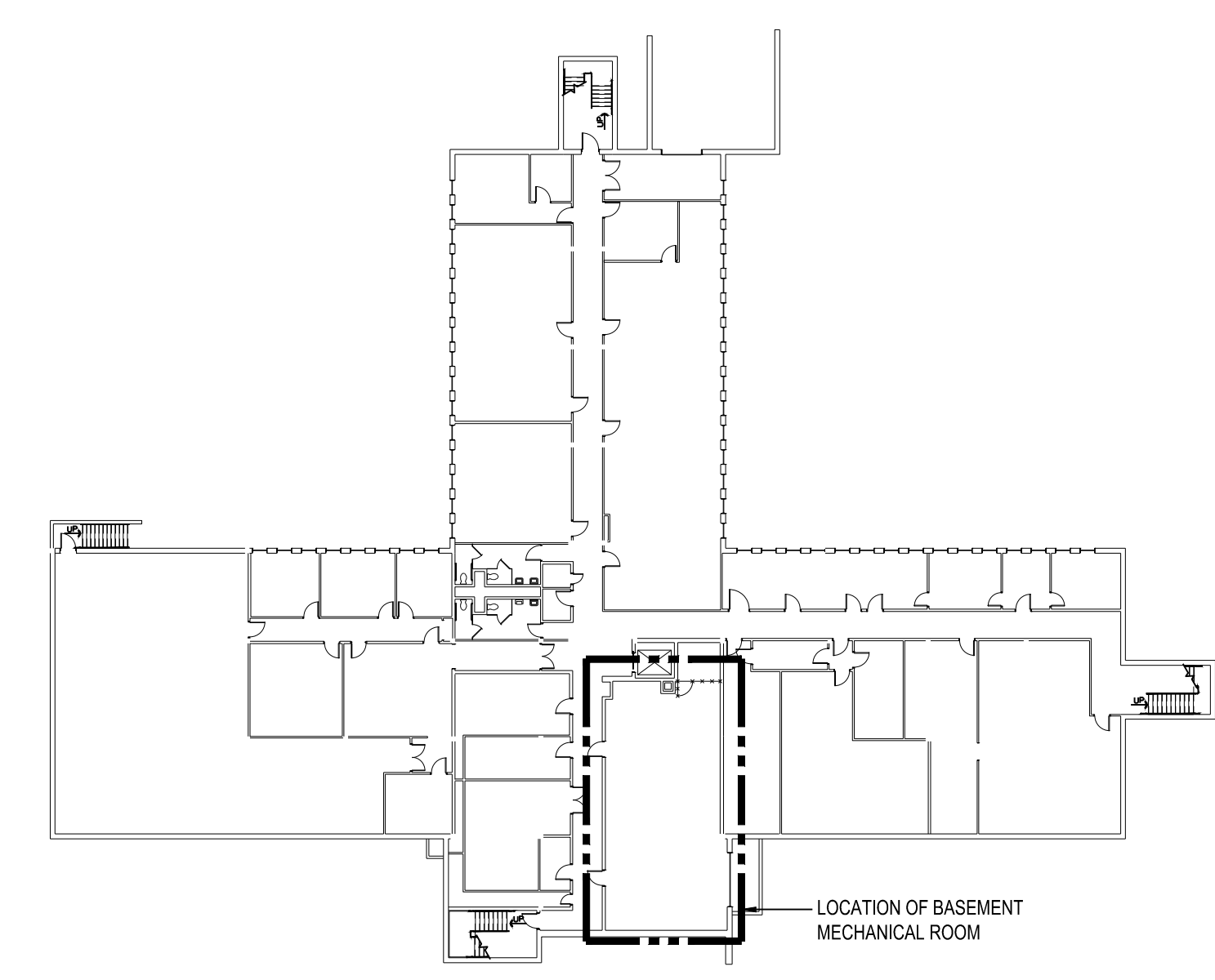
- 1 CONNECT 5" CWR TO X-CWR.
- 2 CONNECT 5" CWS TO X-CWS.
- 3 5" CWS&R DOWN TO CH-1, CONNECT TO CH-1 AS REQUIRED.
- 4 INSTALL NEW CHILLER ON EXISTING CHILLER HOUSEKEEPING PAD.
- 5 NEW REFRIGERANT LINES DOWN TO CH-1 CIRCUIT A COMPRESSOR. CONNECT TO LIQUID AND SUCTION PORTS AS REQUIRED.
- 6 NEW REFRIGERANT LINES DOWN TO CH-1 CIRCUIT B COMPRESSOR. CONNECT TO LIQUID AND SUCTION PORTS AS REQUIRED.
- 7 NEW REFRIGERANT LINES (2 CIRCUITS) UP TO ROOF IN CHASE.
- 8 NEW REFRIGERANT LINES (2 CIRCUITS) RUN AT CEILING OF MECHANICAL ROOM.
- 9 REMOVE AND REPLACE EXISTING PIPE SUPPORTS WITH NEW ROOF PIPE SUPPORTS. SEE DETAIL 6, SHEET M-4. INSTALL NEW REFRIGERANT LINES (2 CIRCUITS) ON NEW PIPE SUPPORTS
- 10 NEW REFRIGERANT LINES (2 CIRCUITS) INSTALLED ON NEW ROOF PIPE SUPPORTS. SEE DETAIL 6, SHEET M-4. SPACE SUPPORTS MAX 5'-0"
- 11 NEW REFRIGERANT LINES UP TO CU-1 CIRCUIT 'A'. CONNECT TO LIQUID AND SUCTION PORTS AS REQUIRED.
- 12 NEW REFRIGERANT LINES UP TO CU-2 CIRCUIT 'B'. CONNECT TO LIQUID AND SUCTION PORTS AS REQUIRED.
- 13 NEW REFRIGERANT LINES (2 CIRCUITS) DOWN TO MECHANICAL ROOM IN CHASE.
- 14 GENERAL TRADES CONTRACTOR TO OPEN CHASE FOR DEMO OF EXISTING PIPING AND INSTALLATION OF NEW PIPING ON FLOORS 1, 2, AND 3. PATCH OPENINGS AND PAINT TO MATCH SURROUNDING FINISHES.
- 15 CIRCUIT 'A' DOUBLE DISCHARGE RISER. SEE DETAILS 1 AND 4, SHEET M-4.
- 16 CIRCUIT 'B' DOUBLE DISCHARGE RISER. SEE DETAILS 1 AND 5, SHEET M-4.
- 17 REMOVE AND REPLACE EXISTING PIPE CURB. SEE DETAIL 7, SHEET M-4.
- 18 NEW ROOF PIPE SUPPORTS. SEE DETAIL 6, SHEET M-4.
- 19 2" REFRIGERANT RELIEF VENT LINE. RUN TO EXTERIOR OF BUILDING.



PARTIAL ROOF PLAN - PIPING NEW
SCALE: 1/8" = 1'-0"



PARTIAL BASEMENT PLAN - PIPING NEW
SCALE: 1/8" = 1'-0"

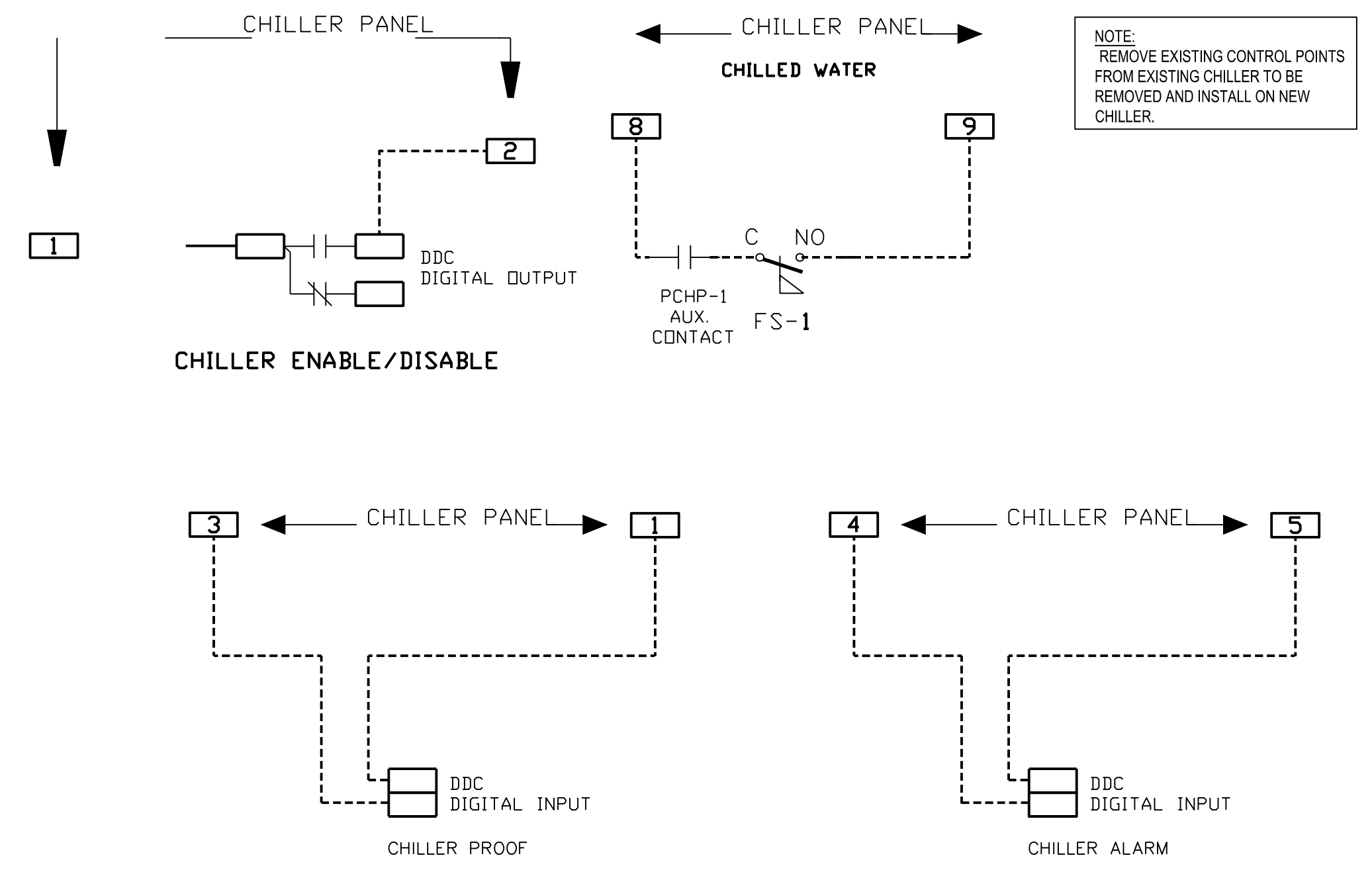


BASEMENT KEY PLAN
SCALE: 1/32" = 1'-0"

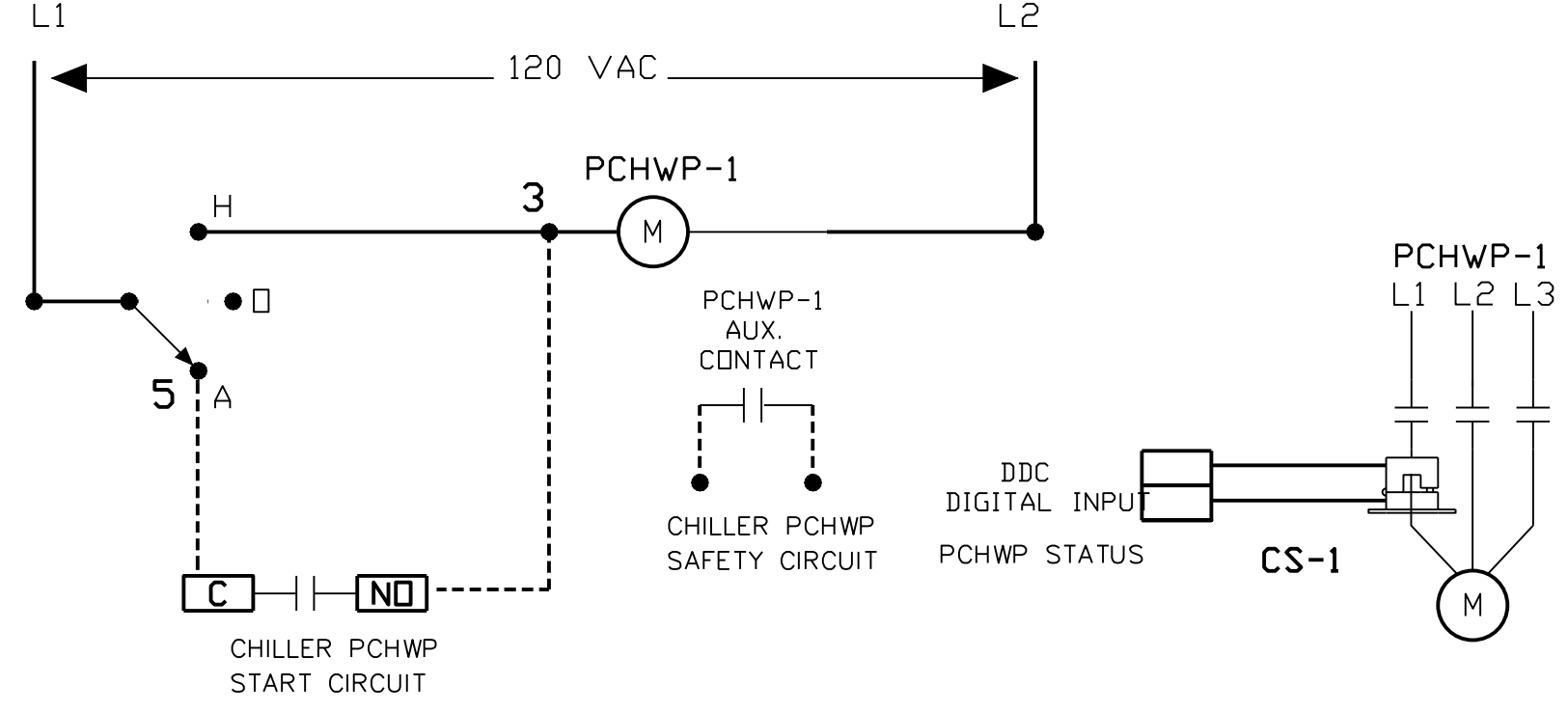
SEQUENCE OF OPERATION

- CHILLED WATER SYSTEM:**
- NOTE: ALL SETPOINTS AND TIME INTERVALS INCLUDING RESET SCHEDULE SETPOINTS DESCRIBED IN SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS). ALL PUMP MOTOR CONTROL SWITCHES SHALL BE IN "AUTO" POSITION.
- CHILLED WATER SYSTEM OPERATION SHALL BE ENABLED BY DDC SYSTEM WHEN OUTDOOR AIR TEMPERATURE IS ABOVE 50 DEG F AND AT LEAST ONE OF THE HVAC'S THAT IS SERVED BY SYSTEM IS ACTIVATED.
 - THE EXISTING CHW CIRCULATING PUMPS P-1 & P-2 SHALL HAVE START/STOP CAPABILITY FROM THE DDC SYSTEM. ONE OF THE TWO PUMPS SHALL BE ACTIVATED BY DDC WHEN SYSTEM IS ENABLED AND IS REQUESTING A PUMP TO RUN. THE OTHER WILL SERVE AS STANDBY. PUMP DE-ACTIVATION WILL OCCURE WHEN THE DDC SYSTEM RECEIVES A SIGNAL FROM THE CHILLER'S PUMP REQUEST POINT TO STOP PUMP OPERATION.
 - DDC SHALL ALTERNATE PUMP OPERATION BASED ON MONTH. EVEN MONTHS THE EVEN NUMBERED PUMP SHALL RUN AND ON ODD MONTHS THE ODD NUMBERED PUMP SHALL RUN.
 - THE CHILLER CHILLED WATER PUMP CWP-1 SHALL BE STARTED AND STOPPED BY THE CHILLER CONTROL PANEL. THE CWP-1 AND CHILLER NEEDS WATER FLOW TO BE MAINTAINED 10 MINUTES AFTER CHILLER IS DISABLED.
 - DDC SHALL MONITOR OPERATING STATUS OF EACH PUMP THRU RESPECTIVE CURRENT SWITCH. UPON PUMP FAILURE (30 SECOND TIME DELAY) DDC SHALL ACTIVATE FAILURE ALARM. DEACTIVATE FAILED PUMP AND AUTOMATICALLY START THE STANDBY PUMP.
 - CHILLER PACKAGED CONTROLS SHALL BE SET FOR REMOTE ENABLE FUNCTION BY OPERATORS.
 - WITH CHW PUMP ACTIVATED, DDC SHALL ACTIVATE CHILLER.
 - WHEN CHW FLOW IS PROVEN BY WATER FLOW SWITCH, SWITCH WIRED IN SERIES WITH PARALLELED PUMP AUXILIARY CONTACTS. CHILLER INTERLOCKS ARE COMPLETE AND THE CHILLER PACKAGED CONTROL PANEL WITH INTEGRAL TEMPERATURE SENSORS SHALL SEQUENCE CHILLER OPERATION TO MAINTAIN THE CHILLER'S CHW SUPPLY SETPOINT OF 44 DEG F (ADJUSTABLE AT CHILLER PANEL).
 - DDC SHALL TOTALIZE SECONDARY CHW BTU CONSUMPTION FOR THE BUILDING BASE ON FLOW METER FM-1 AND SCHWS & R TEMPERATURES TTE-1 & TTE-2 RESPECTIVELY.
 - DDC SHALL MONITOR CHILLER RUN STATUS AND CHILLER FAILURE ALARM.

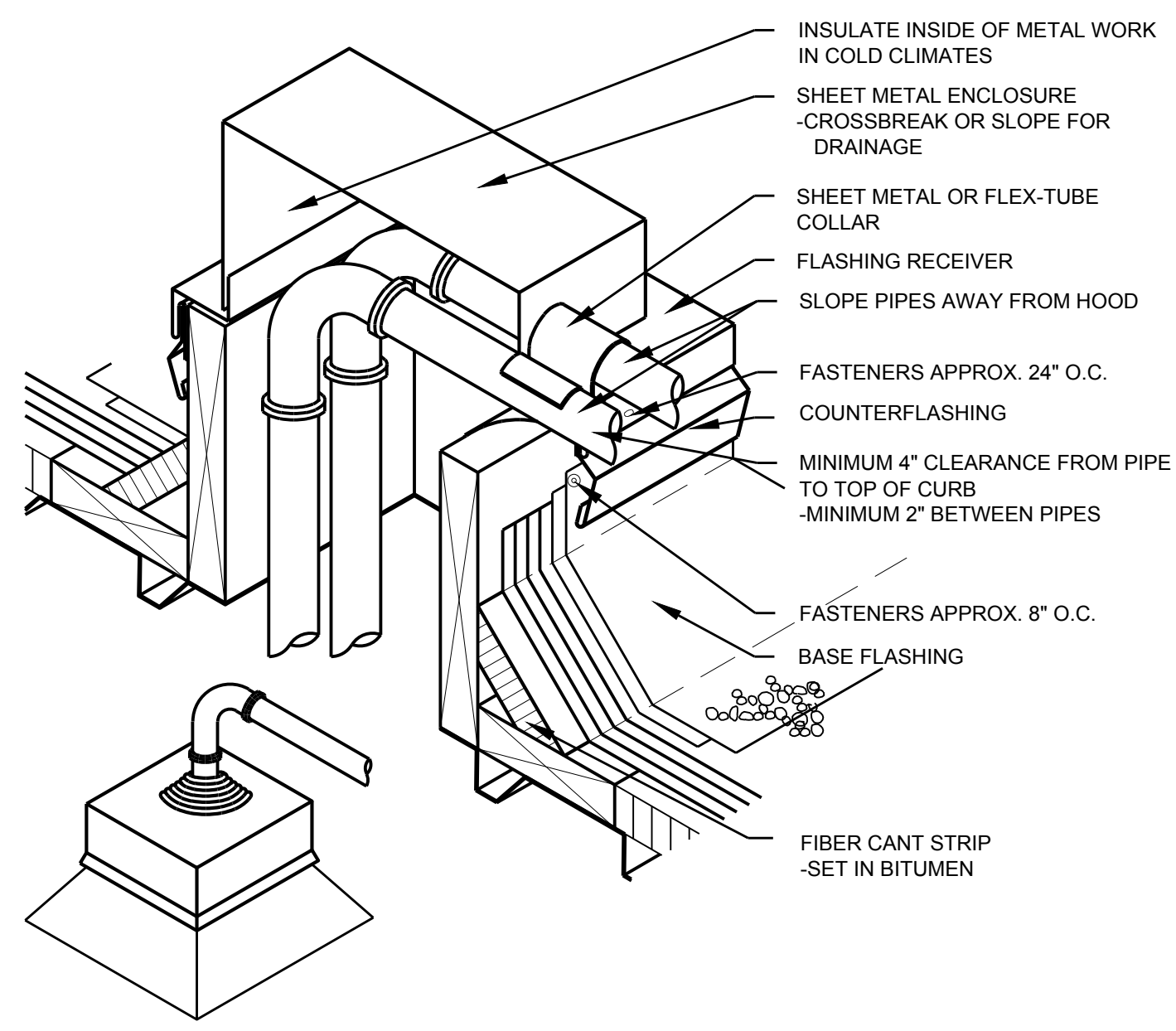
- ALARMING**
- NORMAL**
- PUMP FAILURE
 - CHILLER FAILURE
 - SUPPLY WATER TEMPERATURE
- "ENHANCED" 24/7**
- ALL OF ABOVE IS SYSTEM SERVES CRITICAL AREA



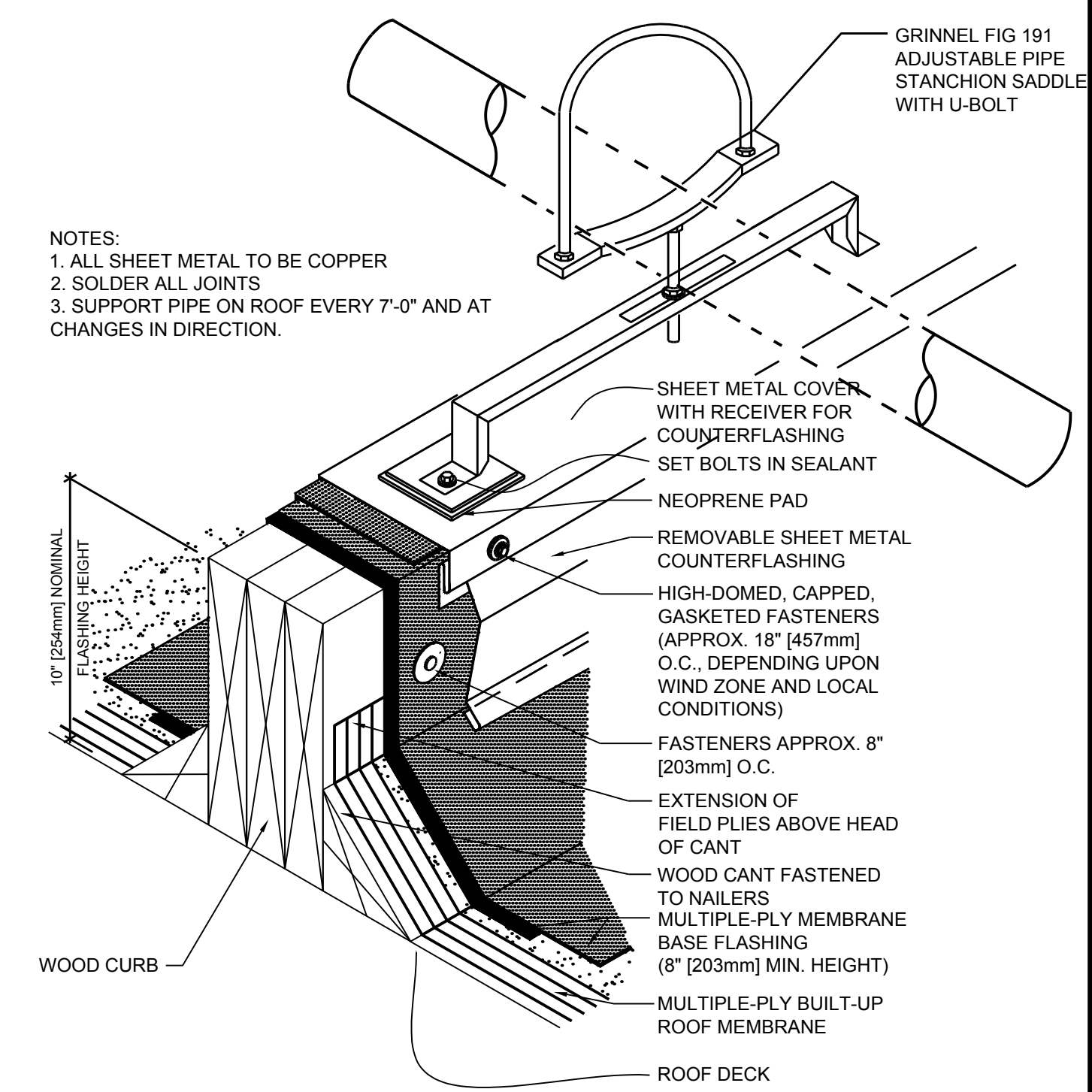
3 TYPICAL CHILLER WIRING DETAIL
SCALE: NTS
ALL WIRING TO BE #14 AWG.
TYPICAL FOR CHILLER - 1 & 2



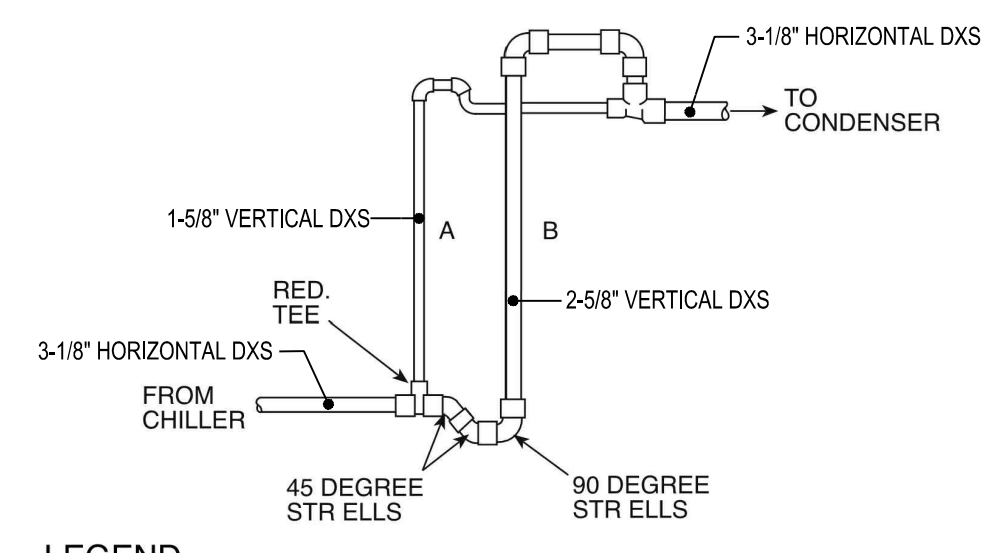
2 TYPICAL PUMP WIRING DETAIL
SCALE: NTS
ALL WIRING TO BE #14 AWG.
TYPICAL FOR PCHWP - 1 & 2



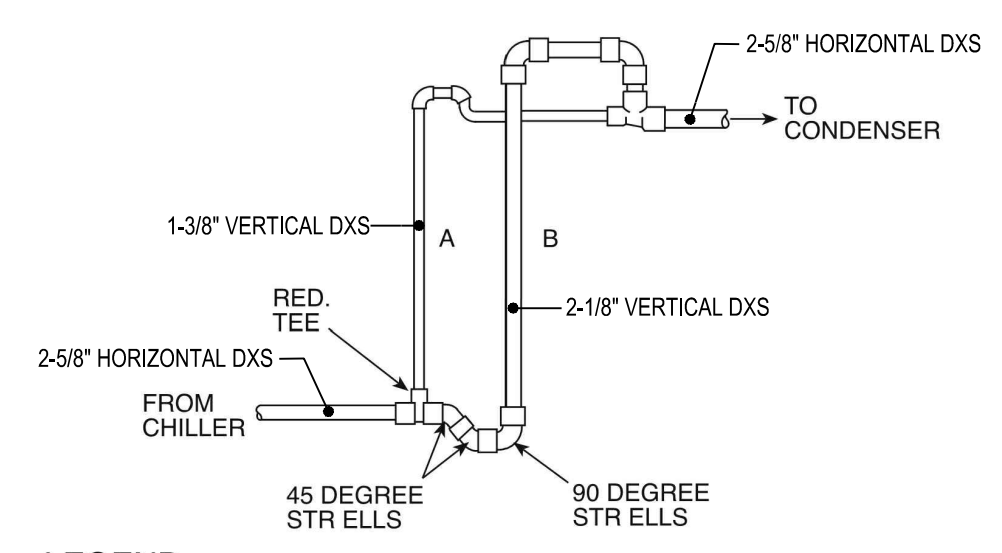
7 PIPING/CONDUIT THROUGH ROOF DECK DETAIL
SCALE: NTS



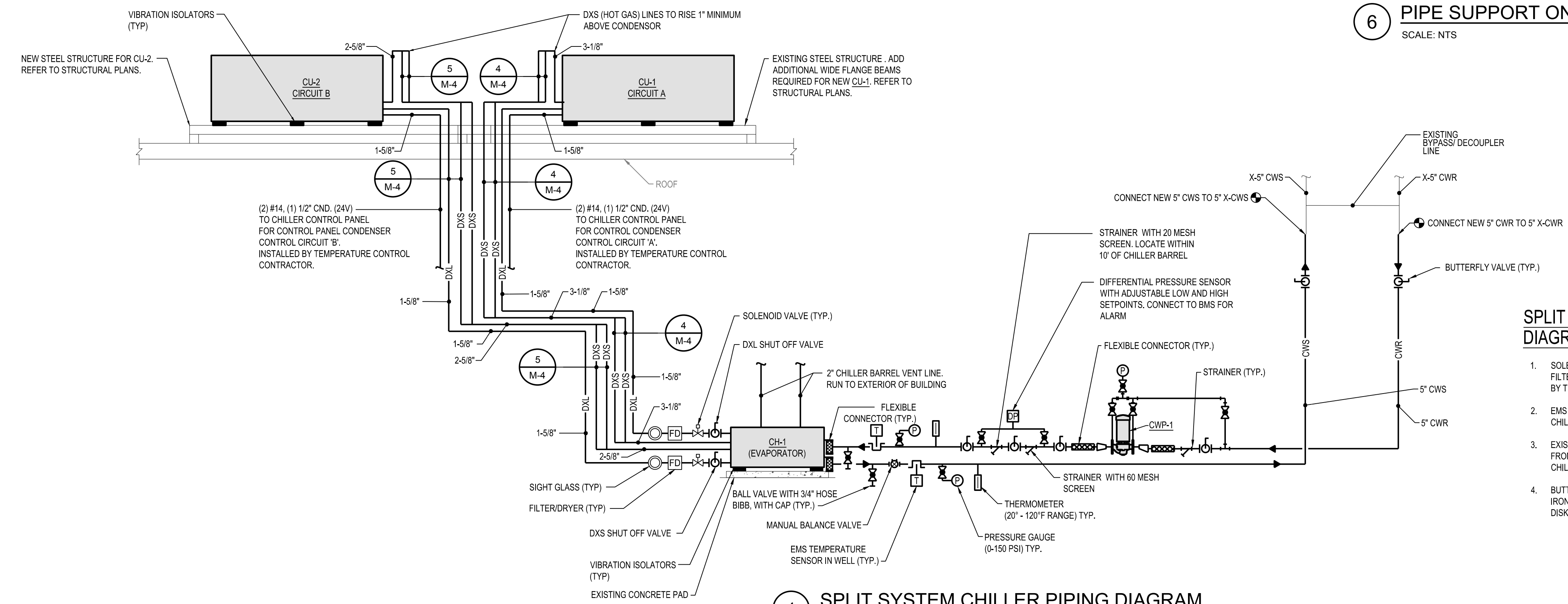
6 PIPE SUPPORT ON ROOF DETAIL
SCALE: NTS



4 CIRCUIT 'A' DOUBLE DISCHARGE RISER DETAIL
SCALE: NTS



5 CIRCUIT 'B' DOUBLE DISCHARGE RISER DETAIL
SCALE: NTS



1 SPLIT SYSTEM CHILLER PIPING DIAGRAM
SCALE: NTS

SPLIT SYSTEM CHILLER PIPING DIAGRAM NOTES:

- SOLENOID VALVE, REFRIGERANT LINE SHUT OFF VALVES, FILTER/DRYER, AND SIGHT GLASS IS FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.
- EMS TEMPERATURE SENSORS TO BE CONNECTED TO THE CHILLER CONTROL PANEL.
- EXISTING BMS SENSORS AND CONTROLS ARE TO BE REMOVED FROM EXISTING CHILLER AND PIPING AND RELOCATED TO NEW CHILLER AND PIPING.
- BUTTERFLY VALVES SHALL BE NIBCO WITH LUG STYLE, CAST IRON BODY, 200 PSIG RATING, EPDM LINER, ALUMINUM BRONZE DISK, GEAR OPERATED HANDLE, OR APPROVED EQUAL.

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SPLIT SYSTEM AIR COOLED CHILLER																					
TAG	SERVES	MODEL	CAPACITY (MBH)	CAPACITY (Kw)	CAPACITY (TONS)	EER	WATER						OUTSIDE AIR TEMP. °F	ELECTRICAL					COMMENTS		
							EWT °F	LWT °F	NOMINAL FLOW (GPM)	MAX. FLOW (GPM)	MIN. FLOW (GPM)	EVAP. PRES. DROP (FEET WC)		VOLTAGE	PHASE	MCA	MOP	DISC. BY		STARTER BY	SCCR RATING (KA)
CH-1	BUILDING COOLING	30HXA136	1550.4	146.2	129.2	10.6	54	44	309.6	387	164	13.2	95	480	3	270.7	400	MANUFACTURER	MANUFACTURER	35	1,2,3,4,5,6,7,8,9,10,11,12,13

NOTES:
1. BASED ON CARRIER
2. TRANSPORT FLUID SHALL CONSIST OF 100% WATER.
3. PROVIDE WITH TWO (2) INDEPENDENT REFRIGERATION CIRCUITS.
4. VIBRATION ISOLATION PADS FURNISHED WITH UNIT, FIELD INSTALLED BY CONTRACTOR.
5. REFRIGERANT: R513A
6. DISCONNECT SWITCH FURNISHED WITH UNIT
7. MINIMUM LOAD CONTROL IS DOWN TO 10% CAPACITY
8. CHILLER SHIPPED WITH NITROGEN HOLDING CHARGE AND WILL NEED TO BE FIELD CHARGED WITH R513a REFRIGERANT.
9. SUCTION SERVICE VALVES FACTORY INSTALLED.
10. UNIT FURNISHED WITH WYE-DELTA STATERS.
11. FACTORY INSTALLED BACNET CARD.
12. ENERGY MANAGEMENT MODULE FACTORY INSTALLED.
13. FACTORY INSTALLED SOUND REDUCTION ENCLOSURE.

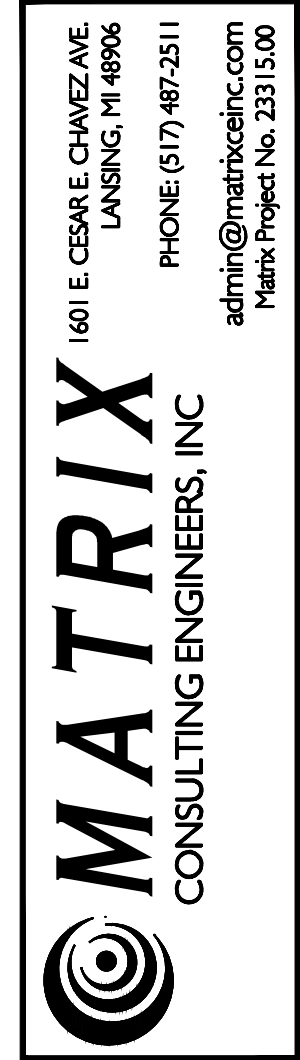
ELECTRICAL NOTES
EC - ELECTRICAL CONTRACTOR - NOT REQUIRED
MC - MECHANICAL CONTRACTOR

CONDENSING UNIT SCHEDULE																
TAG	SERVES	REFRIGERATION CIRCUIT	MODEL	CAPACITY MBH	NUMBER OF CIRCUITS	FAN QUANTITY	FAN MOTOR TYPE	TOTAL UNIT CFM	AMBIENT DESIGN TEMP	ELECTRICAL						COMMENTS
										VOLTAGE	PHASE	MCA	MOCP	DISC. BY	STARTER BY	
CU-1	CH-1	A	09DPM115	1792.8	1	8	STANDARD SINGLE SPEED MOTOR, FANS STAGED BY CONTROL PANEL	72,800	95	480	3	21	25	EC	INCLUDED IN UNIT CONTROL PANEL	1,2,3,4,5,6,7
CU-2	CH-1	B	09DPM075	1291.2	1	6	STANDARD SINGLE SPEED MOTOR, FANS STAGED BY CONTROL PANEL	52,000	95	480	3	15.2	20	EC	INCLUDED IN UNIT CONTROL PANEL	1,2,3,4,5,6,7

NOTES:
1. BASED ON CARRIER
2. VIBRATION ISOLATION PADS FURNISHED WITH UNIT, FIELD INSTALLED BY CONTRACTOR.
3. MOUNT ON STRUCTURAL FRAME ON ROOF
4. EC = ELECTRICAL CONTRACTOR
5. CONTRACTOR TO FIELD INSTALL CONDENSOR HEADER SHIPPED WITH UNIT.
7. CONTRACTOR TO FIELD INSTALL PRESSURE SWITCH FOR HEAD PRESSURE CONTROL AND WIRE TO CONDENSOR CONTROL PANEL.

RECIRCULATING PUMP SCHEDULE													
TAG	MODEL	SYSTEM	FLUID	GPM	PUMP HEAD	TEMP	SP. GR.	% EFF	TYPE	AIR SEPARATOR			COMMENTS
										NOMINAL HP	PHASE/VOLT	RPM	
CWP-1	e-80 5x5x13.5	CH-1	WATER	310	40	44	1	73.9	CLOSE COUPLED	7 1/2	480/3	1200	1,2,3

NOTES:
1. BASED ON BELL & GOSSETT
2. VFD FURNISHED BY ELECTRICAL CONTRACTOR
3. VFD SHALL BE YASKAWA Z1000 OR HV600 AND MEET ALL MSU STANDARDS.



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HVAC SCHEDULES AND DETAILS

ELECTRICAL SYMBOLS LEGEND

OUTLETS	
⊕	SINGLE RECEPTACLE (120 VOLT)
⊕	DUPLEX RECEPTACLE
⊕	EMERGENCY RECEPTACLE
⊕	DOUBLE DUPLEX RECEPTACLE
⊕	JUNCTION BOX
⊕	WALL JUNCTION BOX
⊕	PULL (JUNCTION) BOX
⊕	UNDERFLOOR JUNCTION BOX
SERVICE and EQUIPMENT	
VFD	VARIABLE FREQUENCY DRIVE
T	TRANSFORMER
□	DISCONNECT SWITCH
⊕	MAGNETIC STARTER
⊕	COMB. STARTER
⊕	PANELBOARD, SURFACE MOUNTED
⊕	PANELBOARD, FLUSH MOUNTED
CIRCUITRY and RACEWAYS	
---	CONDUIT INSTALLED (by E.C.)
---	CONDUIT INSTALLED (by others)
→	CONDUIT STUB UP
←	CONDUIT STUB DOWN
→ 1.3	HOME RUN (with circuit numbers)
---	END OF CONDUIT RUN
---	END OF CONDUIT RUN, CAP AND STAKE
---	"CONDUIT RUN CONTINUES" INDICATION
---	FLEXIBLE PIGTAILS/CONNECTIONS
WM	WIREMOLD AS SPECIFIED
PM	PLUGMOLD AS SPECIFIED
BD	BUS DUCT
UFD	UNDERFLOOR DUCT
MECHANICAL	
⊕	SINGLE PHASE MOTOR
⊕	THREE PHASE MOTOR
⊕	RESISTANCE HEATER, KW SHOWN
⊕	PIPE TRACE HEATER
⊕	ELECTRIC UNIT HEATER
⊕	ELECTRIC WATER HEATER
DESIGNATIONS	
⊕	DEMOLITION NOTE
⊕	PLAN NOTE
⊕	ADDENDUM NOTE

A	AMPS	GC	GENERAL CONTRACTOR	P	POLE
AC	ABOVE COUNTER	GFJ	GROUND FAULT INTERRUPTER	P-	PUMP
ACU-	AIR CONDITIONING UNIT	GND	GROUND	PB	PULL BOX
AFF	ABOVE FINISHED FLOOR	H-	HUMIDIFIER	PNL	PANEL
AHJ	AUTHORITY HAVING JURISDICTION	HID	HIGH INTENSITY DISCHARGE	PRV-	POWER ROOF VENTILATOR
AHU-	AIR HANDLING UNIT	HOA	HAND-OFF-AUTO SELECTOR SWITCH	PVC	POLY VINYL CHLORIDE
AIC	AMPS INTERRUPTING CAPACITY	HP	HORSEPOWER	PWR	POWER
AS	ABOVE SHELF	HR	HOUR	RECEPT	RECEPTACLE
ATS	AUTOMATIC TRANSFER SWITCH	HVAC	HEATING/VENTILATING/AIR CONDITIONING	RGC	RIGID GALVANIZED STEEL CONDUIT
B-	BOILER	IG	ISOLATED GROUND	RTU-	ROOF TOP UNIT
BC	BELOW COUNTER	IMC	INTERMEDIATE METAL CONDUIT	SF-	SUPPLY FAN
BLDG	BUILDING	JB	JUNCTION BOX	SPEC	SPECIFICATIONS
CHLR-	CHILLER	LC	LIGHT CONTROL	SW	SWITCH
CND (C)	CONDUIT	LT	LIGHT	SWBD	SWITCHBOARD
CKT	CIRCUIT	LTG	LIGHTING	TCC	TEMPERATURE CONTROL CONTRACTOR
CKT BKR	CIRCUIT BREAKER	LTG	LIQUID TIGHT FLEXIBLE METAL CONDUIT	TR	TAMPER PROOF RECEPTACLE
CT-	COOLING TOWER	LT FLEX		TS	TAMPER PROOF SWITCH
CU-	CONDENSING UNIT	MAX	MAXIMUM	TYP	TYPICAL
CUH-	CABINET UNIT HEATER	MC	MECHANICAL CONTRACTOR	UF	UNDER FLOOR
DFU-	DUCT FURNACE	MCC	MOTOR CONTROL CENTER	UH-	UNIT HEATER
DISC	DISCONNECT	MIN	MINIMUM	UL	UNDERWRITERS' LABORATORIES, INC.
DWG	DRAWING	MLO	MAIN LUG ONLY	UNO	UNLESS NOTED OTHERWISE
DWH-	DOMESTIC WATER HEATER	MT	MOUNT	V	VOLTS
EBB-	ELECTRIC BASEBOARD	MTD	MOUNTED	VL	VERIFY LOCATION WITH OWNER
EC	ELECTRICAL CONTRACTOR	MTG	MOUNTING	W	WATTS
EF-	EXHAUST FAN	MUAU-	MAKE-UP AIR UNIT	W/	WITH
EM	EMERGENCY	NC	NORMALLY CLOSED	W/O	WITHOUT
EMT	ELECTRICAL METALLIC TUBING	NIC	NOT IN CONTRACT	WP	WEATHER PROOF
EWC	ELECTRIC WATER COOLER	NL	NIGHT LIGHT	XFMR	TRANSFORMER
EXIST (E)	EXISTING	NO	NORMALLY OPEN		
FLA	FULL LOAD AMPS	NTS	NOT TO SCALE		
FLEX	FLEXIBLE CONDUIT				
FLR	FLOOR				
FLUOR	FLUORESCENT				
FSES	FOOD SERVICE EQUIP. SUPPLIER				
F/S	FIRE/SMOKE				
FU-	FURNACE				

ABBREVIATIONS LEGEND

P	POLE
P-	PUMP
PB	PULL BOX
PNL	PANEL
PRV-	POWER ROOF VENTILATOR
PVC	POLY VINYL CHLORIDE
PWR	POWER
RECEPT	RECEPTACLE
RGC	RIGID GALVANIZED STEEL CONDUIT
RTU-	ROOF TOP UNIT
SF-	SUPPLY FAN
SPEC	SPECIFICATIONS
SW	SWITCH
SWBD	SWITCHBOARD
TCC	TEMPERATURE CONTROL CONTRACTOR
TR	TAMPER PROOF RECEPTACLE
TS	TAMPER PROOF SWITCH
TYP	TYPICAL
UF	UNDER FLOOR
UH-	UNIT HEATER
UL	UNDERWRITERS' LABORATORIES, INC.
UNO	UNLESS NOTED OTHERWISE
V	VOLTS
VL	VERIFY LOCATION WITH OWNER
W	WATTS
W/	WITH
W/O	WITHOUT
WP	WEATHER PROOF
XFMR	TRANSFORMER

GENERAL ELECTRICAL NOTES

- ALL ELECTRICAL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), LATEST APPLICABLE EDITION AND MSU STANDARDS FOR CONSTRUCTION.
- ALL ITEMS REMOVED DURING DEMOLITION ARE TO BE TURNED OVER TO MSU RECYCLING.
- ALL WALL AND FLOOR PENETRATIONS ARE TO BE SEALED TO MAINTAIN ORIGINAL RATING.
- ALL CONDUITS TO BE FIELD ROUTED ALONG EXISTING PIPING AND STRUCTURAL STEEL.
- THE OWNER OR CONTRACTORS SHALL VISIT THE PROJECT AND DETERMINE THE EXACT EXTENT OF THE DEMOLITION WORK REQUIRED BEFORE BEGINNING THE PROJECT.
- REMOVE ALL EXISTING OR GLETTES EXPOSED CONDUIT, WIRE AND UNUSED EQUIPMENT WHERE WORK IS BEING DONE EXCEPT ITEMS NOTED OTHERWISE.
- WHERE BUILDING SURFACES ARE DAMAGED BY THE REMOVAL OF OLD WORK, SURFACES SHALL BE PATCHED TO MATCH ADJACENT.
- EXISTING WORK WHICH IS PRESENTLY CONCEALED AND WHICH WILL REMAIN CONCEALED AND DOES NOT INTERFERE WITH ANY NEW WORK OF ANY TRADE NEED NOT BE REMOVED; HOWEVER, ALL CONDUIT SHALL BE CAPPED BELOW FINISH SURFACE AND THEN PATCHED TO MATCH OR AS NOTED.
- EXISTING OPENINGS, WHICH ARE TO BE REUSED, SHALL BE MODIFIED OR ENLARGED TO SUIT THE NEW SYSTEMS AS REQUIRED. PROVIDE ALL REQUIRED CUTTING AND PATCHING.
- IF ASBESTOS IS PRESENT, IT WILL BE REMOVED OR RENDERED HARMLESS UNDER SEPARATE CONTRACT BY THE OWNER.
- THE OWNER OR CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING THE EXISTING WALLS TO MATCH THE ADJACENT SURFACES BEHIND ALL SURFACE MOUNTED EQUIPMENT.
- CONTRACTOR SHALL FIELD VERIFY ALL EQUIPMENT VOLTAGES AND LOADS PRIOR TO INSTALLING SERVICE TO EQUIPMENT.
- DRAWINGS ARE BASED ON EXISTING RECORD DOCUMENT AND CASUAL FIELD OBSERVATION. REPORT ANY DISCREPANCIES TO ENGINEER FOR CLARIFICATION.

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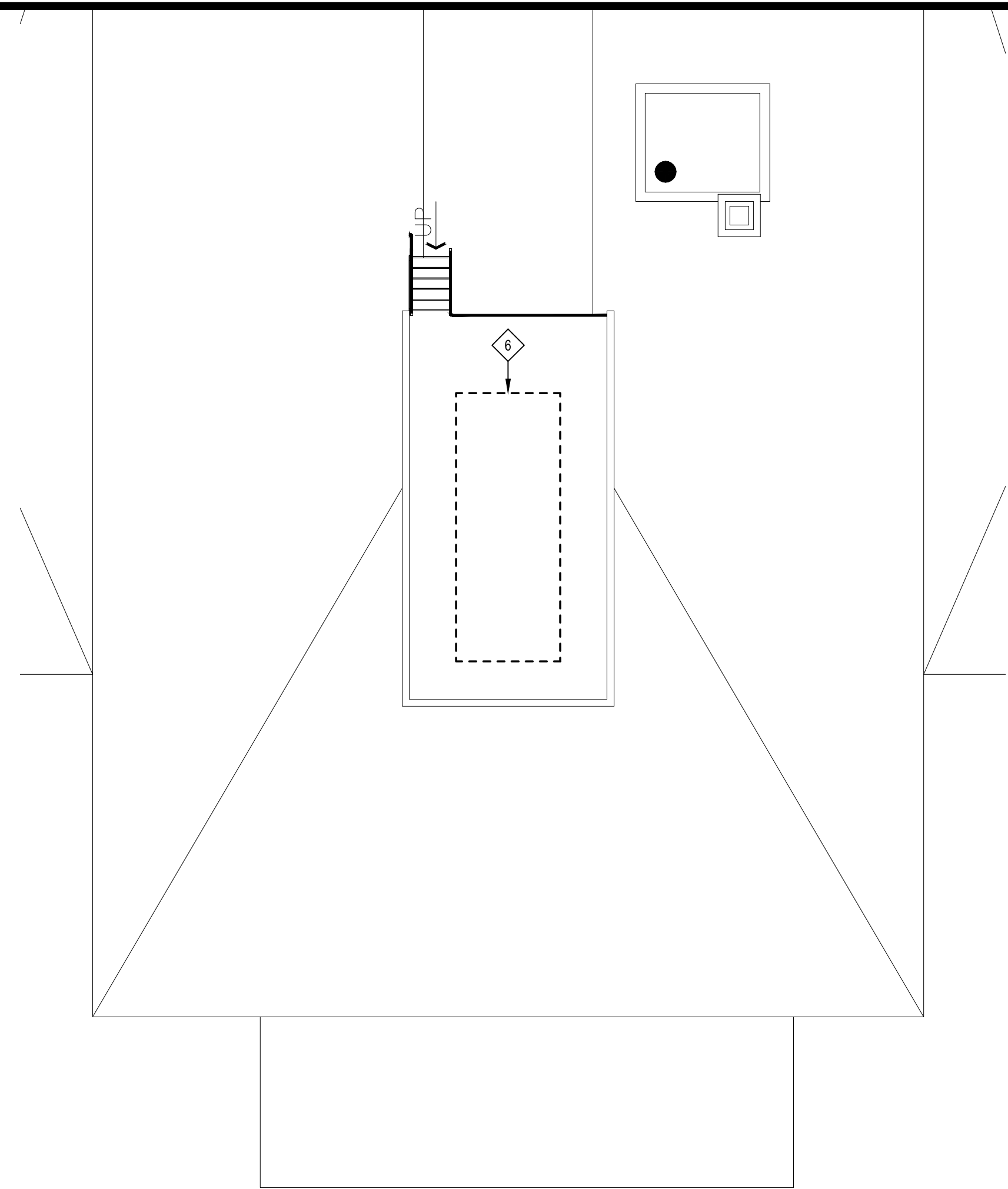
MICHIGAN STATE UNIVERSITY
Infrastructure Planning and Facilities

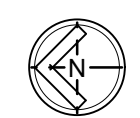
MANLY MILES
REPLACE SPLIT CHILLER SYSTEM

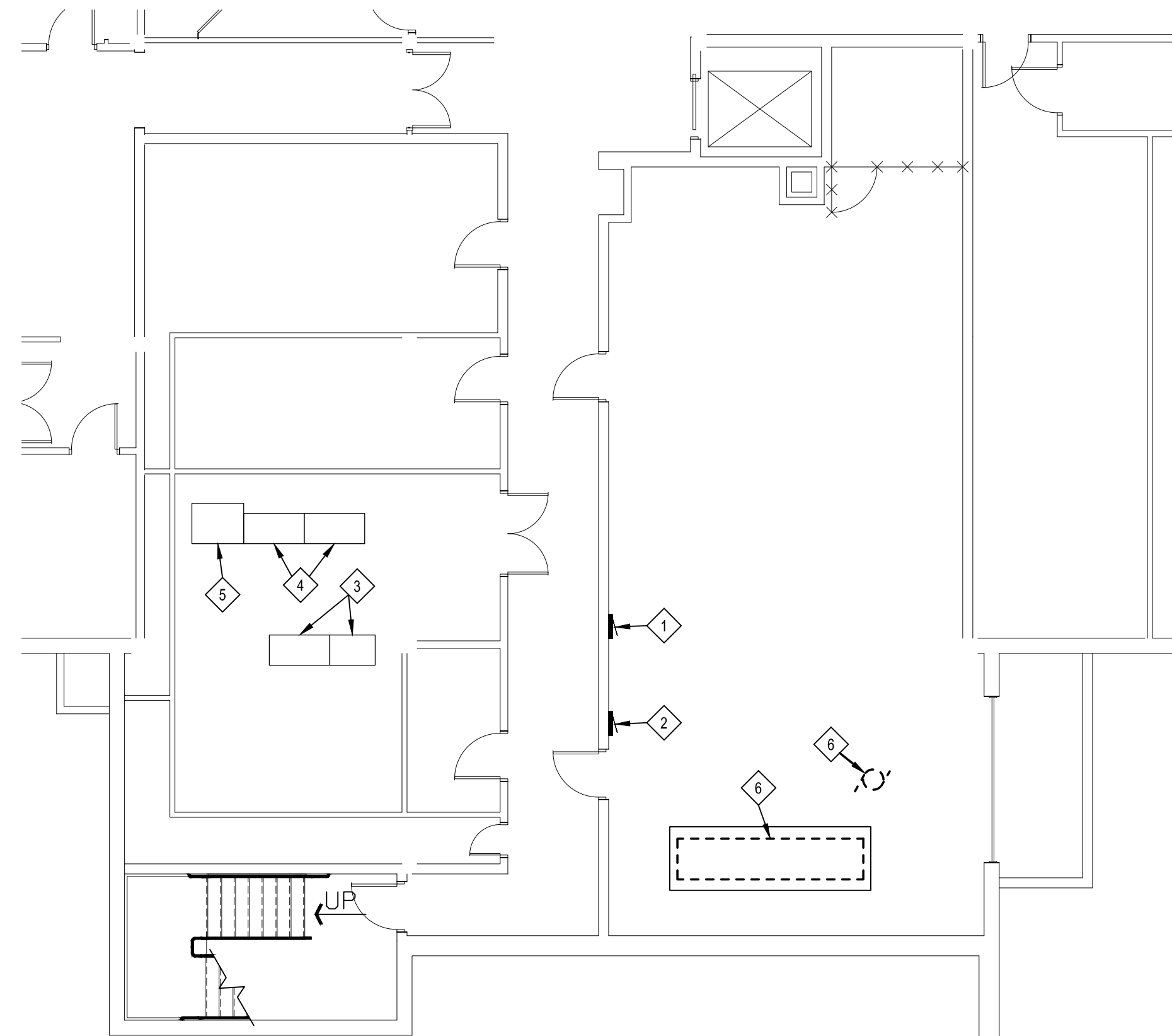
CAPITAL PROJ. NO.
CP22055

PR. MGR.	CRUZ
ARCH.	CHARLAND
MECH.	GOERGE
ELEC.	HOWARD
CIVIL	
L.A.	WILBER
INT. DES.	
CONST. REP.	CRUZ
APPR.	DURKIN
DATE	4/12/2024
SCALE	AS NOTED
ISSUED	
ISSUED FOR BIDS	4/22/2024

ELECTRICAL NOTES, SYMBOLS, ABBREV.
E-1
11 OF 15



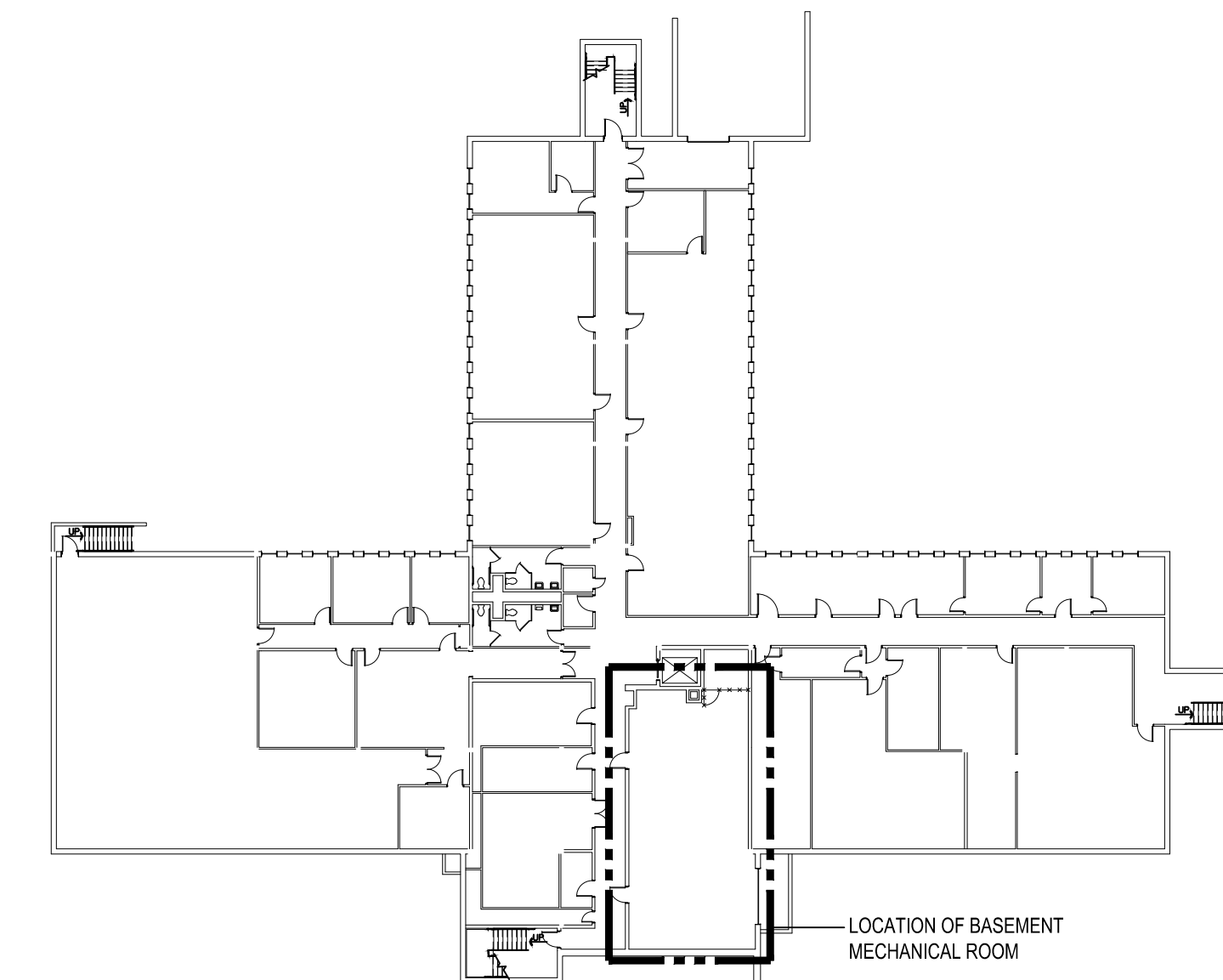
 **ELECTRICAL ROOF PLAN - OVERALL - DEMOLITION**
 0 5 10 20
 SCALE: 1/8" = 1'-0"




 **ELECTRICAL BASEMENT PLAN - OVERALL - DEMOLITION**
 0 5 10 20
 SCALE: 1/8" = 1'-0"

DEMOLITION NOTES

- 1 EXISTING PANEL 'P' TO REMAIN.
- 2 EXISTING PANEL 'BR' TO REMAIN.
- 3 EXISTING 277/480V PANEL 'MDP1' TO REMAIN.
- 4 EXISTING 120/208V PANEL 'MDP2' TO REMAIN.
- 5 EXISTING 300 KVA TRANSFORMER TO REMAIN.
- 6 DISCONNECT EQUIPMENT FOR REMOVAL BY OTHERS. REMOVE ASSOCIATED CONDUIT & WIRE.

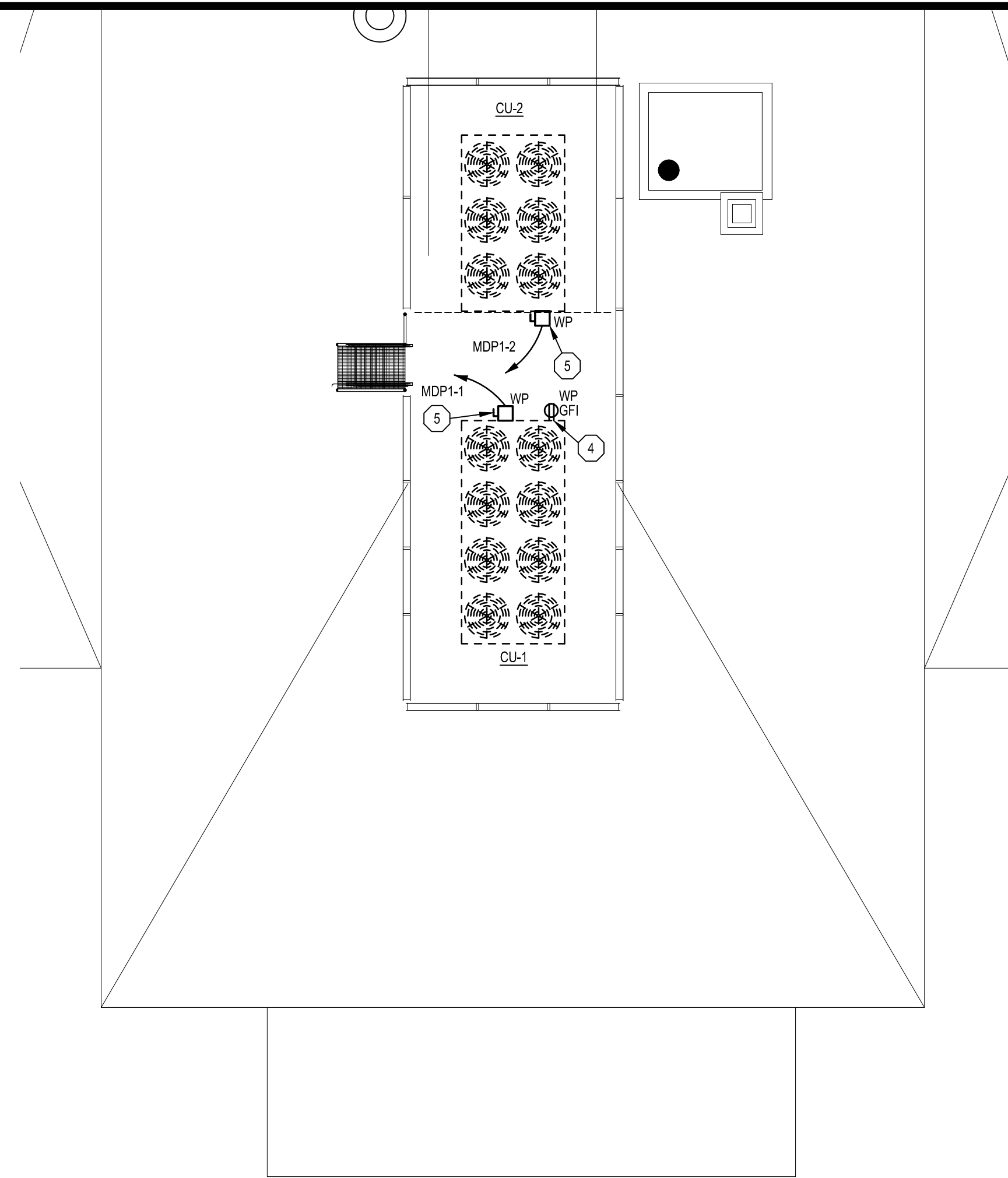


 **BASEMENT KEY PLAN**
 0 10 20 40
 SCALE: 1/32" = 1'-0"

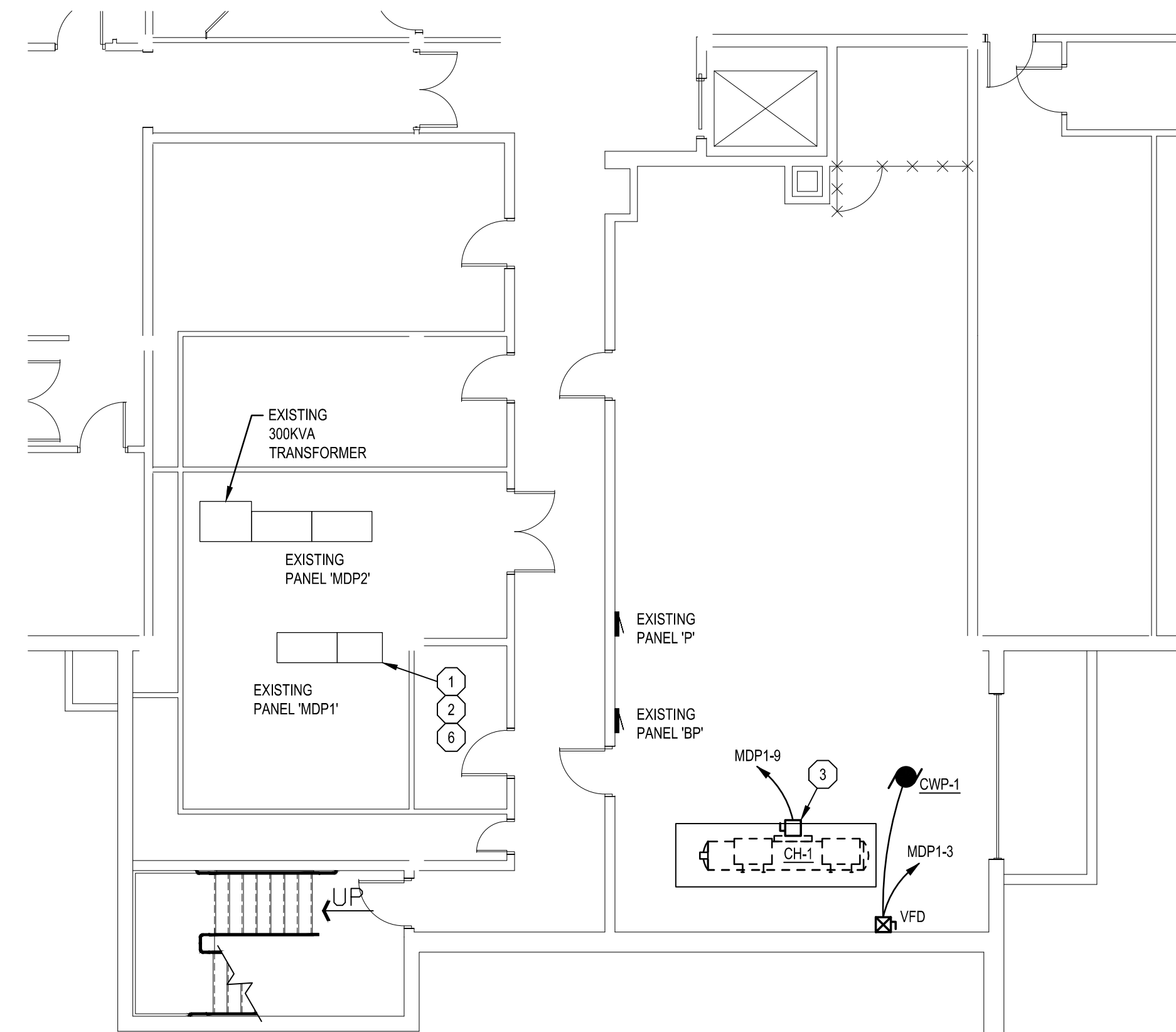
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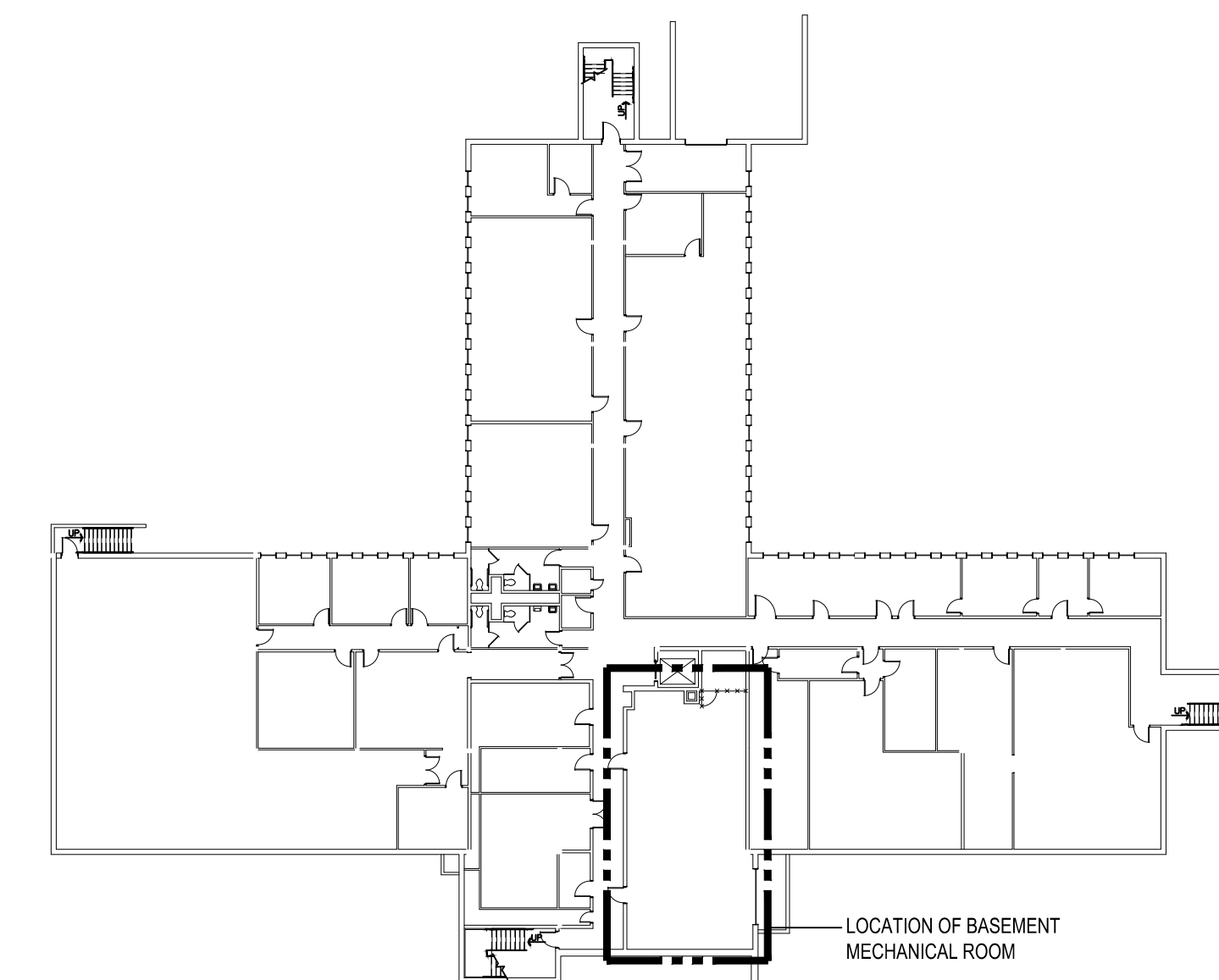
ELECTRICAL ROOF PLAN - OVERALL - DEMOLITION
 SCALE: 1/8" = 1'-0"



ELECTRICAL BASEMENT PLAN - OVERALL - DEMOLITION
 SCALE: 1/8" = 1'-0"

ELECTRICAL KEY NOTES

- 1 INSTALL NEW 3P400A CIRCUIT BREAKER IN EXISTING BLANK SPACE CIRCUIT #9 IN EXISTING PANEL 'MDP1'.
- 2 INSTALL NEW 3P25A CIRCUIT BREAKER IN EXISTING BLANK SPACE CIRCUIT #1 IN EXISTING PANEL 'MDP1'.
- 3 FUSED DISCONNECT SWITCH FURNISHED WITH EQUIPMENT.
- 4 MOUNT NEW RECEPTACLE TO CU-1, RECONNECT TO EXISTING RECEPTACLE CIRCUIT.
- 5 NON-FUSED DISCONNECT SWITCH FURNISHED WITH EQUIPMENT.
- 6 INSTALL NEW 3P20A CIRCUIT BREAKER IN EXISTING BLANK SPACE CIRCUIT #2 IN EXISTING PANEL 'MDP1'.

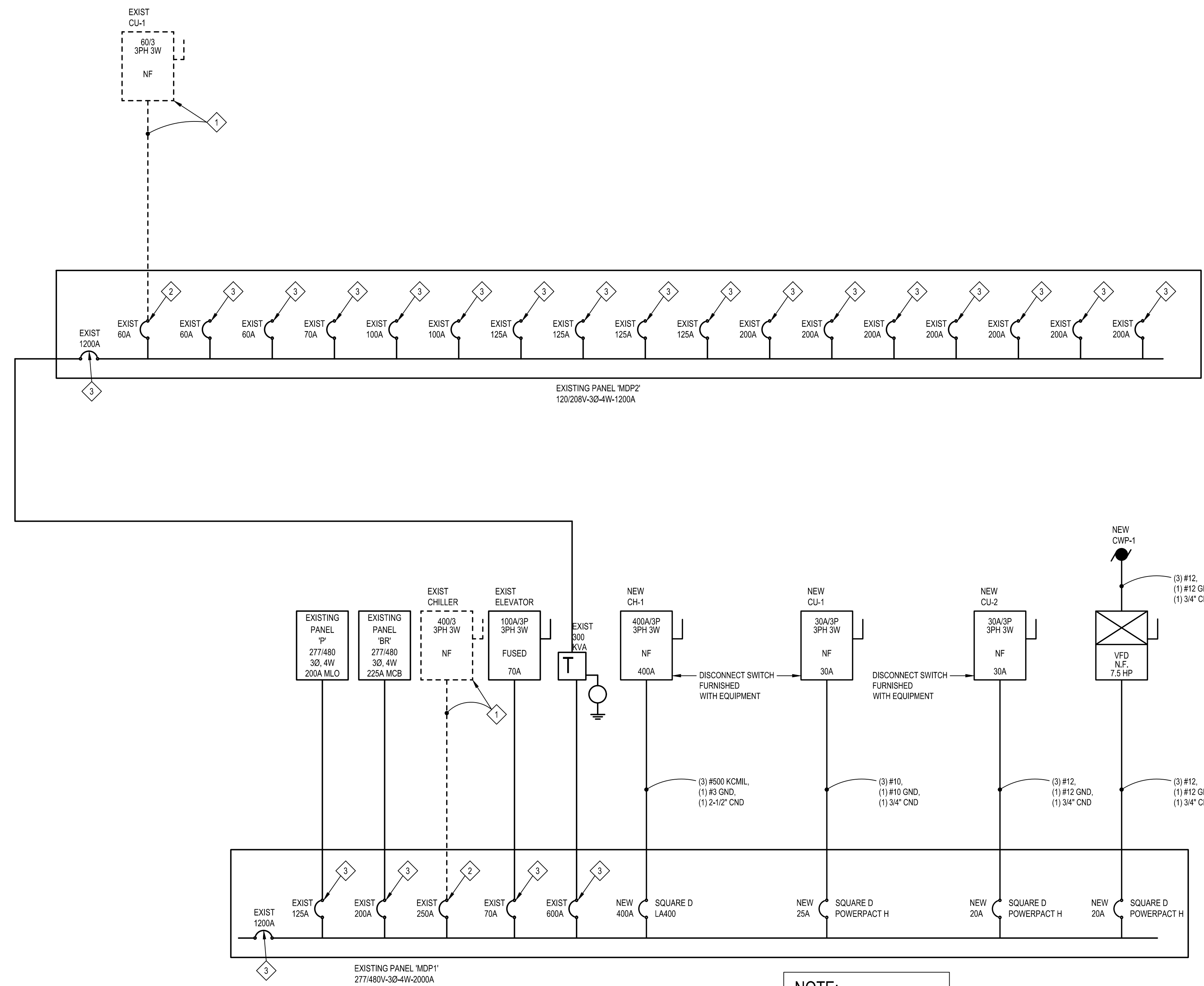


BASEMENT KEY PLAN
 SCALE: 1/32" = 1'-0"



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NOTE:
FIELD VERIFY BREAKER COMPATABILITY WITH EXISTING SWITCHBOARD.

1 ELECTRICAL RISER DIAGRAM
SCALE: N.T.S.

- DEMOLITION NOTES**
- 1 DISCONNECT EQUIPMENT FOR REMOVAL BY OTHERS. REMOVE ASSOCIATED CONDUIT & WIRE.
 - 2 EXISTING CIRCUIT BREAKER TO REMAIN AND BE LABELED AS 'SPARE'.
 - 3 EXISTING CIRCUIT BREAKER, FEEDER, AND LOAD TO REMAIN.

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 APPR. DURKIN
 DATE 4/12/2024
 SCALE AS NOTED
 ISSUED
 ISSUED FOR BIDS 4/22/2024

EXISTING PANEL "MDP1"											
		VOLTS: <u>480 / 277</u>		PHASE: <u>3</u>		WIRE: <u>4</u>		AMPS: <u>1200</u>		MAIN: <u>BREAKER</u>	
BRKR	A	P	DESCRIPTION	CIRCUIT		PHASE LOADS			COMMENTS		
				VA	NO	A	B	C			
25	3		CU-1	5817	1	5817			NEW CIRCUIT BREAKER		
25	3		CU-1	5817	1		5817		NEW CIRCUIT BREAKER		
25	3		CU-1	5817	1			5817	NEW CIRCUIT BREAKER		
20	3		CU-2	4210	2	4210			NEW CIRCUIT BREAKER		
20	3		CU-2	4210	2		4210		NEW CIRCUIT BREAKER		
20	3		CU-2	4210	2			4210	NEW CIRCUIT BREAKER		
20	3		CWP-1	3047	3	3047			NEW CIRCUIT BREAKER		
20	3		CWP-1	3047	3		3047		NEW CIRCUIT BREAKER		
20	3		CWP-1	3047	3			3047	NEW CIRCUIT BREAKER		
			EXISTING BLANK SPACE		4	0					
			EXISTING BLANK SPACE		4		0				
			EXISTING BLANK SPACE		4			0			
200	3		BOILER PANEL ROOM B02	38780	5	38780			EXISTING CIRCUIT BREAKER		
200	3		BOILER PANEL ROOM B02	38780	5		38780		EXISTING CIRCUIT BREAKER		
200	3		BOILER PANEL ROOM B02	38780	5			38780	EXISTING CIRCUIT BREAKER		
125	3		POWER PANEL 'P'	24238	6	24238			EXISTING CIRCUIT BREAKER		
125	3		POWER PANEL 'P'	24238	6		24238		EXISTING CIRCUIT BREAKER		
125	3		POWER PANEL 'P'	24238	6			24238	EXISTING CIRCUIT BREAKER		
800	3		300 KVA TRANSFORMER	75000	7	75000			EXISTING CIRCUIT BREAKER		
800	3		300 KVA TRANSFORMER	75000	7		75000		EXISTING CIRCUIT BREAKER		
800	3		300 KVA TRANSFORMER	75000	7			75000	EXISTING CIRCUIT BREAKER		
250	3		SPARE		8	0			EXISTING CIRCUIT BREAKER - RELABEL AS 'SPARE'		
250	3		SPARE		8		0		EXISTING CIRCUIT BREAKER - RELABEL AS 'SPARE'		
250	3		SPARE		8			0	EXISTING CIRCUIT BREAKER - RELABEL AS 'SPARE'		
400	3		CHILLER ROOM B02	74790	9	74790			NEW CIRCUIT BREAKER		
400	3		CHILLER ROOM B02	74790	9		74790		NEW CIRCUIT BREAKER		
400	3		CHILLER ROOM B02	74790	9			74790	NEW CIRCUIT BREAKER		
			EXISTING BLANK SPACE		10	0					
			EXISTING BLANK SPACE		10		0				
			EXISTING BLANK SPACE		10			0			
70	3		ELEVATOR	9418	11	9418			EXISTING CIRCUIT BREAKER		
70	3		ELEVATOR	9418	11		9418		EXISTING CIRCUIT BREAKER		
70	3		ELEVATOR	9418	11			9418	EXISTING CIRCUIT BREAKER		
CONNECTED				235300		235300		235300	TOTAL CONNECTED LOAD	705900 VOLT-AMPS	
TOTAL CONNECTED				705900						849.09 AMPS	

Project Name: MANLEY MILES CHILLER REPLACEMENT

Project Number: 2331500

PANEL "MDP" LOAD SUMMARY			
CONNECT LOADS	CONNECT VA	DEMAND VA	N.E.C. SECTION
MECHANICAL	263592	263592	215.2(A)(1)
LIGHTING	0	0	215.2(A)(1)
RECEPTACLE	0	0	TABLE 220.44
KITCHEN EQUIP	0	0	TABLE 220.56
EQUIPMENT	442308	442308	
TOTAL VA	705900	705900	
TOTAL AMPS	850	850	