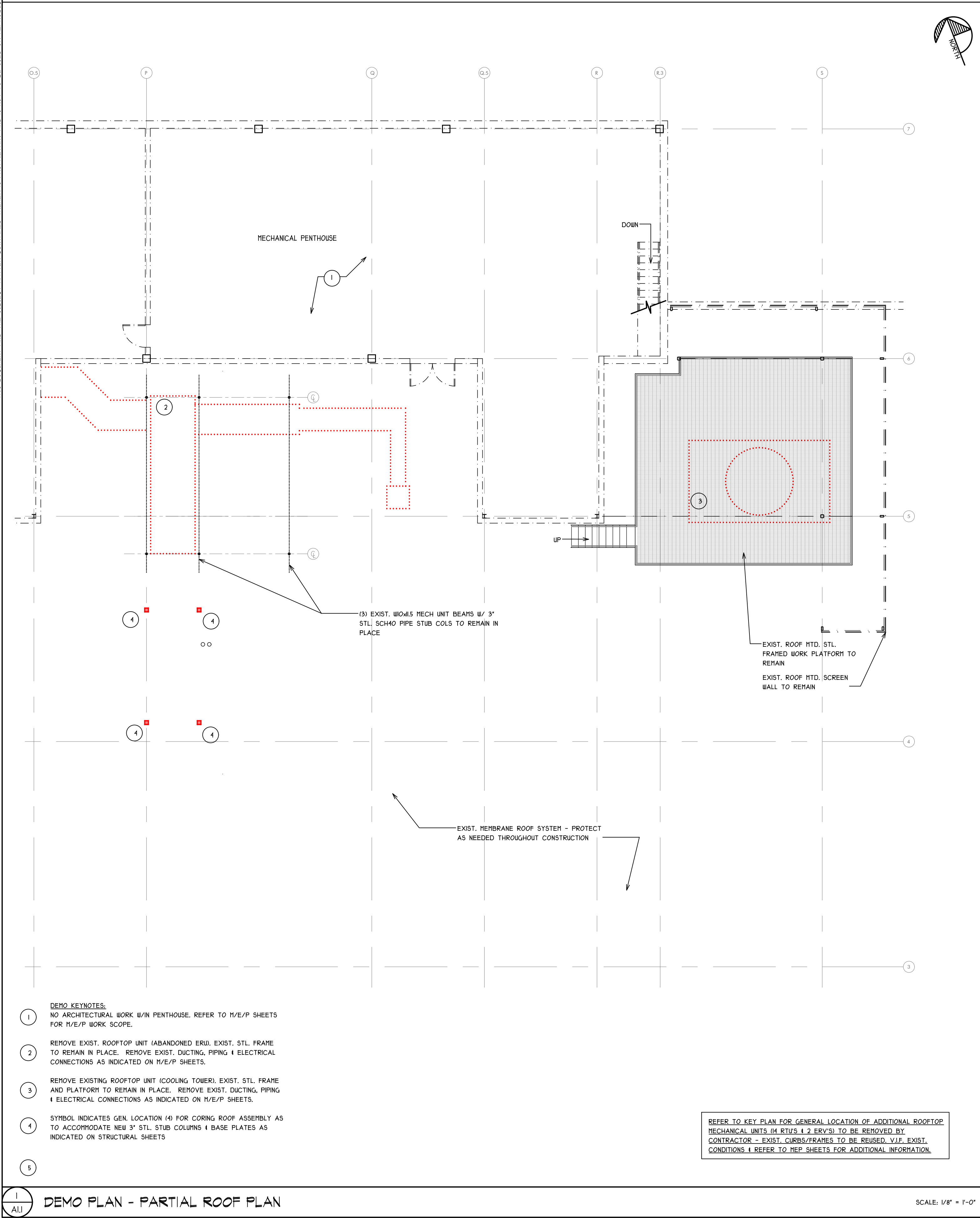


LINE LEGEND	
** APPLIES TO ALL DRAWING SHEETS **	
	NEW CONSTRUCTION
	EXISTING TO REMAIN
	HIDDEN WORK
	EXISTING TO BE REMOVED (RED TO BE PRINTED IN COLOR)

BRIGHTON AREA SCHOOLS (BAS)

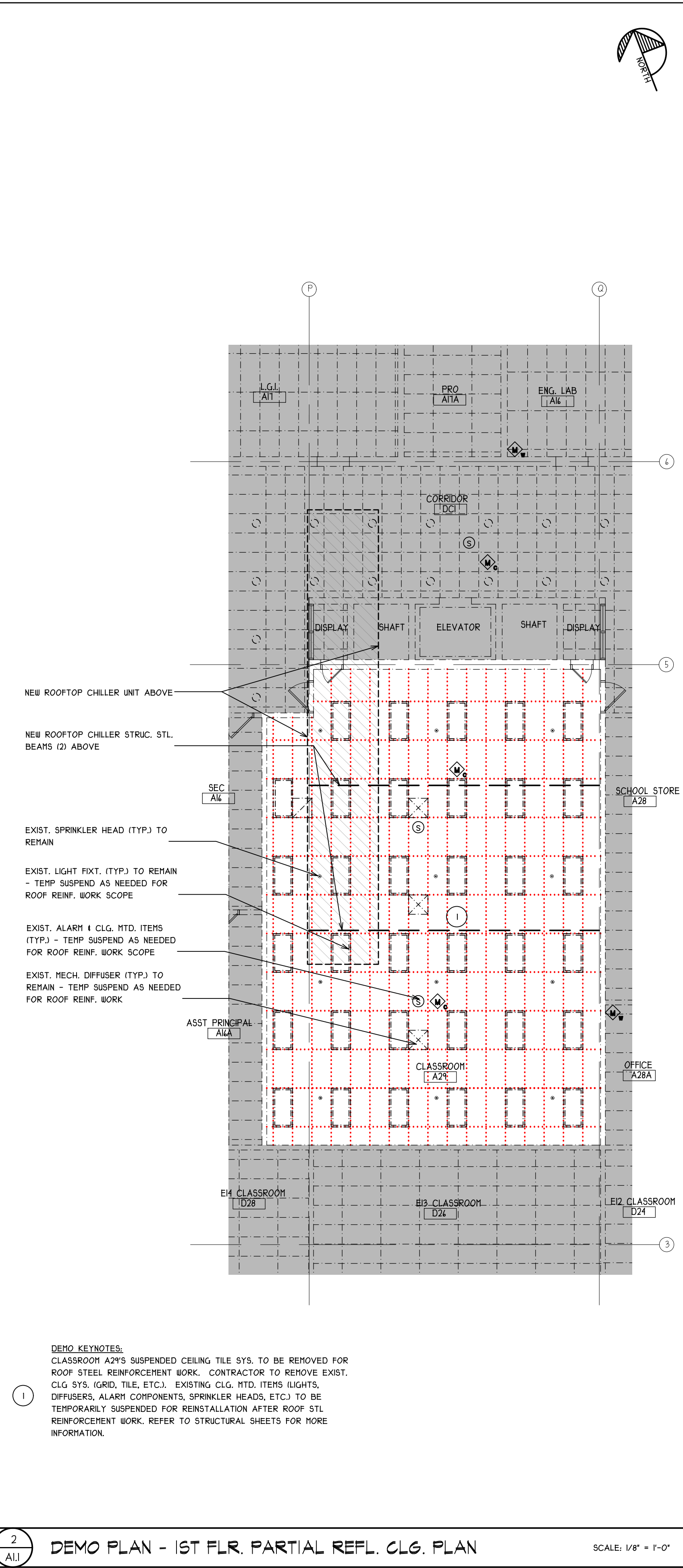
- BRIGHTON HIGH SCHOOL -

MECHANICAL UNITS REPLACEMENT



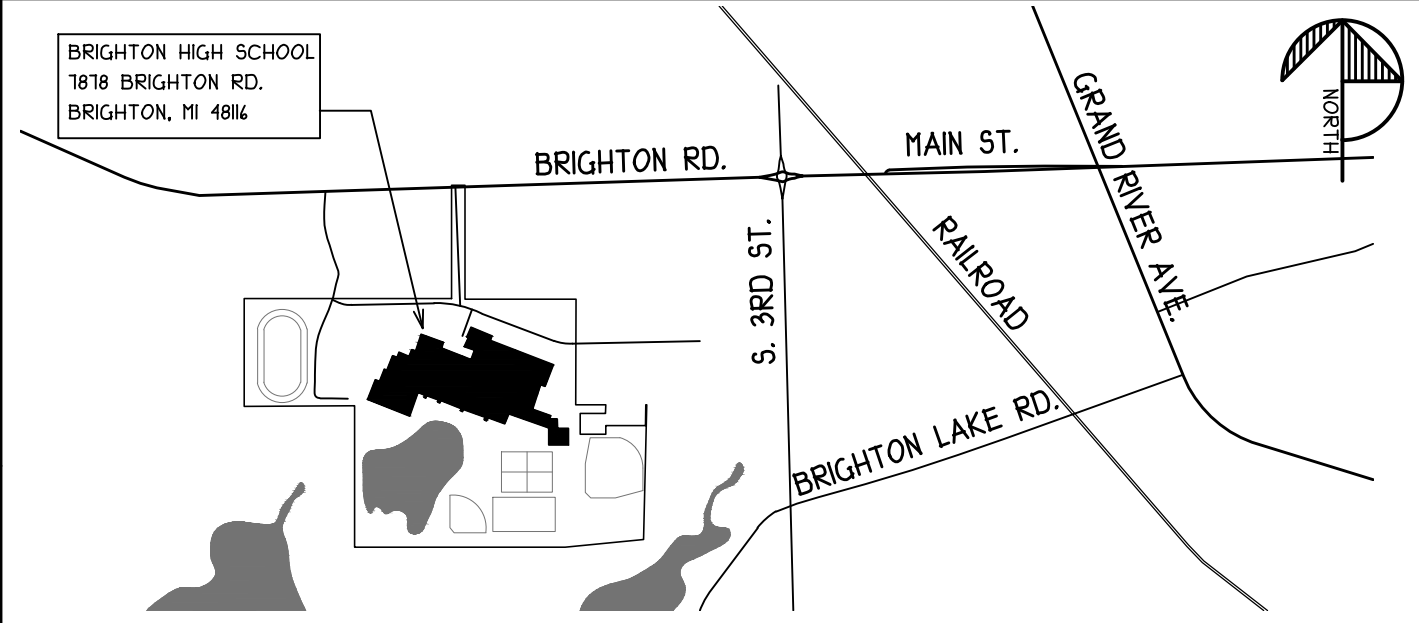
1 DEMO PLAN - PARTIAL ROOF PLAN

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



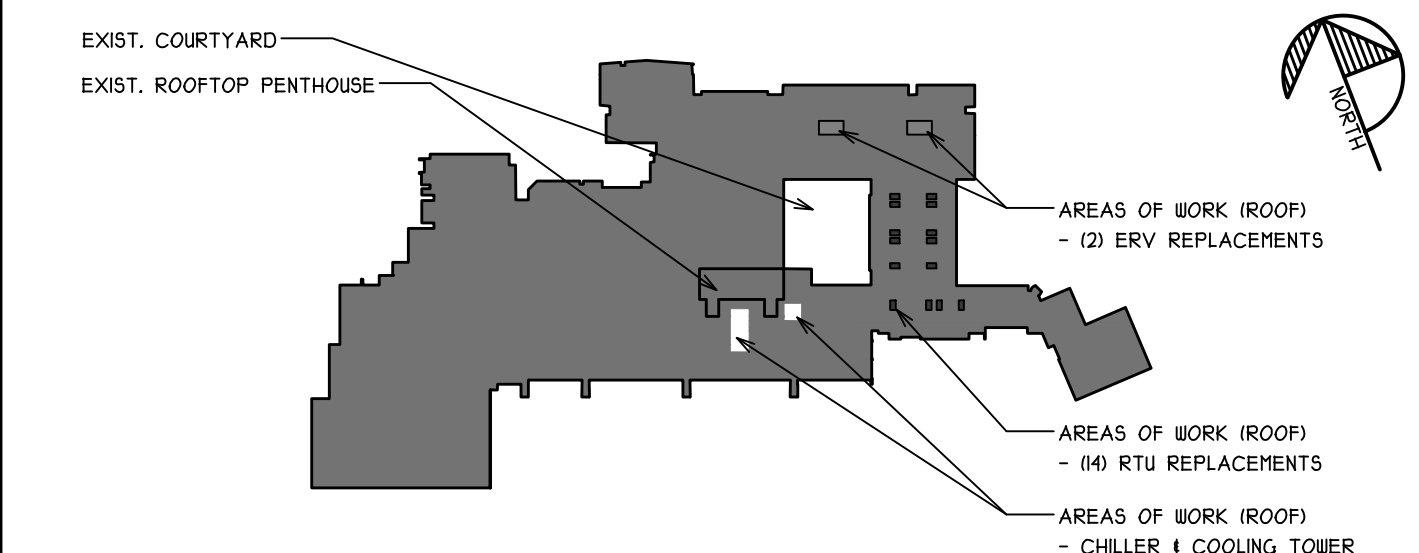
2 DEMO PLAN - 1ST FLR. PARTIAL REFL. CLG. PLAN

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



LOCATION MAP

SCALE: N.T.S.



KEY PLAN

SCALE: N.T.S.

NO.	TITLE	ISSUED: BIDS & PERMITS	ISSUED:	ISSUED:	ISSUED:
CA	COVER, CODE, & DEMO	X			
SI01	STRUCTURAL PLANS	X			
SI02	STRUCTURAL DETAILS	X			
AI	PLANS	X			
M1.0	GENERAL MECHANICAL INFORMATION	X			
MD1.1	PARTIAL ROOF-MECHANICAL DEMOLITION PLAN	X			
MD1.2	PARTIAL ROOF-MECHANICAL DEMOLITION PLAN	X			
M1.1	PARTIAL ROOF-MECHANICAL NEW WORK PLAN	X			
M1.2	PARTIAL ROOF-MECHANICAL NEW WORK PLAN	X			
M1.3	PARTIAL ROOF-MECHANICAL PLAN	X			
M2.0	MECHANICAL DETAILS	X			
M3.0	MECHANICAL SCHEDULES	X			
M4.0	MECHANICAL CONTROLS	X			
M4.1	MECHANICAL CONTROLS	X			
E0.0	GENERAL ELECTRICAL INFO	X			
ED1.1	PARTIAL ROOF-ELECTRICAL DEMOLITION PLAN	X			
ED1.2	PARTIAL ROOF-ELECTRICAL DEMOLITION PLAN	X			
E1.1	PARTIAL ROOF-ELECTRICAL NEW WORK PLAN	X			
E1.2	PARTIAL ROOF-ELECTRICAL NEW WORK PLAN	X			
E1.3	PARTIAL ROOF-ELECTRICAL PLAN	X			
E1.4	ROOF-ELECTRICAL PLAN	X			
E1.5	ENLARGED GEAR-ELECTRICAL PLANS	X			
E2.0	ONE LINE DIAGRAM	X			
E3.0	SPECIFICATIONS	X			
E3.1	SPECIFICATIONS	X			
E3.2	SPECIFICATIONS	X			

SHEET INDEX

PROJECT DESCRIPTION:

THIS PROJECT CONSISTS OF THE REMOVAL AND REPLACEMENT OF EXISTING ROOFTOP MOUNTED MECHANICAL UNITS AT BRIGHTON HIGH SCHOOL.

- 14 RTU'S
- 2 ERV'S
- 1 CHILLER AND ASSOCIATED COOLING TOWER UNIT.

THE NEW CHILLER UNIT'S FOOTPRINT & WEIGHT REQUIRES STRUCTURAL STEEL REINFORCEMENT TO THE EXISTING ROOF FRAMING FROM INSIDE/BELOW. MINOR STRUCTURAL STEEL MODIFICATIONS ARE ALSO REQUIRED AT THE CHILLER TOWER UNIT'S ROOF PLATFORM TO ACCOMMODATE THE NEW UNIT'S FOOTPRINT & WEIGHT.

WITH THIS PROJECT THERE IS NO CHANGE TO BUILDING USE, OCCUPANCY, EGRESS, OCCUPANT LOAD, FIRE RATED CONDITIONS, ETC. THE NEW CHILLER REQUIRES NEW STRUCTURAL SUPPORT AND UPGRADED ELECTRICAL INFRASTRUCTURE. THEREFORE, THIS PROJECT IS CONSIDERED AN "ALTERATION-LEVEL 2" WITHIN THE MICHIGAN REHABILITATION CODE.

APPLICABLE CODES:

2021 MICHIGAN BUILDING CODE
2021 MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS - LEVEL 2
2012 NFPA 101
2021 INTERNATIONAL FIRE CODE
2021 MICHIGAN PLUMBING CODE
2021 MICHIGAN MECHANICAL CODE
2023 NATIONAL ELECTRICAL CODE (STATE OF MI ELECTRICAL CODE W/ MI AMENDMENTS)

** BLDG. IS PROTECTED THROUGHOUT W/ AN APPROVED AUTOMATIC SPRINKLER SYSTEM PER SECTION 903 & NFPA 101
** BLDG. IS PROTECTED THROUGHOUT W/ AN APPROVED FIRE ALARM & DETECTION SYSTEM INCLUDING EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM PER SECTION 907 & NFPA 101
** EXISTING FACILITY IS DIVIDED IN SEPARATE BLDGS./ZONES W/ RATED FIRE BARRIERS & FIRE WALLS THROUGHOUT.

EXISTING BUILDING INFORMATION:

CONST. TYPE TYPE IIB
USE GROUP EDUCATIONAL "E"
STORIES/HT. 2 STORIES/VARIES
AREA ALL EXIST. BLDGS. LESS THAN 68,000 S.F. OR ARE LESS THAN ALLOWABLE AREAS W/ RBC'S FRONTAGE INCREASE

CODE & PROJECT INFORMATION

1. GENERAL STRUCTURAL NOTES
1. GOVERNING BUILDING CODE - 2021 MICHIGAN BUILDING CODE
2. THE STRUCTURAL NOTES ARE INTENDED TO AUGMENT THE DRAWINGS AND SPECIFICATIONS. SHOULD CONFLICTS EXIST BETWEEN THE DRAWINGS, SPECIFICATIONS AND THE STRUCTURAL NOTES, THE STRICTEST PROVISION SHALL GOVERN.
3. THE STRUCTURAL DRAWINGS FORM AN INTEGRAL PART OF THE CONTRACT DOCUMENTS, WHICH INCLUDE ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, SITE DRAWINGS AND SPECIFICATIONS. COORDINATE THE STRUCTURAL DRAWINGS WITH THE REQUIREMENTS SHOWN IN THE OTHER COMPONENTS OF THE CONTRACT DOCUMENTS.
4. TYPICAL DETAILS AND OTHER DETAILS APPLY TO CONDITIONS THAT ARE SIMILAR TO THE CONDITIONS DESCRIBED IN THE DETAILS, EVEN IF THEY ARE NOT SPECIFICALLY REFERENCED ON THE PLANS.
5. THE CONTRACTOR IS RESPONSIBLE FOR MEANS, METHODS, SEQUENCES AND PROCEDURES OF CONSTRUCTION.
6. THE STRUCTURE IS DESIGNED TO BE SELF SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. DETERMINE ERECTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE BUILDING AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF TEMPORARY BRACING, GUYS OR TIE DOWNS IF NECESSARY. RETAIN OWNERSHIP OF SUCH MATERIAL AFTER COMPLETION OF THE PROJECT.
7. CONSTRUCTION SHALL COMPLY FULLY WITH THE APPLICABLE PROVISIONS OF OSHA AND THE LOCAL GOVERNING CODES, LATEST EDITION, AND ALL REQUIREMENTS SPECIFIED IN THE CODES SHALL BE ADHERED TO AS IF THEY WERE CALLED FOR OR SHOWN ON THE DRAWINGS. THIS SHALL NOT BE CONSTRUED TO MEAN THAT REQUIREMENTS SET FORTH ON THE DRAWING MAY BE MODIFIED BECAUSE THEY ARE MORE STRINGENT THAN THE CODE REQUIREMENTS OR BECAUSE THEY ARE NOT SPECIFICALLY REQUIRED BY CODE.

DESIGN LOADS

1. THE STRUCTURE IS DESIGNED FOR THE FOLLOWING LIVE LOADS IN ADDITION TO THE LATERAL LOADS AND SUPERIMPOSED DEAD LOADS AND SELF-WEIGHT OF THE STRUCTURE. WHERE APPLICABLE, THE LIVE LOADS ARE REDUCED IN ACCORDANCE WITH THE PROVISIONS OF THE BUILDING CODE. THE SNOW LOADS ON LOWER ROOFS ADJACENT TO HIGH ROOFS OR SLOPED ROOFS ARE INCREASED FOR THE EFFECT OF DRIFTING.

2. BUILDING IS I

- EXPANSION.

LIVE LOAD

- | | |
|---|----------|
| ROOF SNOW LOAD: | |
| GROUND SNOW LOAD: | 25 PSF |
| FLAT ROOF SNOW LOAD (MINIMUM ROOF LOAD): | 17.5 PSF |
| SNOW EXPOSURE FACTOR: | 1.0 |
| SNOW LOAD IMPORTANCE FACTOR: | 1.0 |
| THERMAL FACTOR: | 1.0 |
| ADDITIONAL LOADING DUE TO DRIFTING AT CHANGES IN ROOF ELEVATIONS
AND ICE AT OVERHANGS PER APPLICABLE CODE. | |

DEAD LOAD

- | | |
|---------------------|-------------|
| EXISTING ROOF: | 30 PSF |
| CHILLER: | 25,900 LBS. |
| OPEN COOLING TOWER: | 19,090 LBS. |

WIND LOAD

- | | |
|---|---------|
| BASIC DESIGN WIND SPEED, V: | 115 MPH |
| ALLOWABLE STRESS DESIGN WIND SPEED, V_{asd} : | 90 MPH |
| EXPOSURE CATEGORY: | C |
| INTERNAL PRESSURE COEFFICIENT: | 0.18 |

SEISMIC LOAD

- | | |
|----------------------------|-------------|
| DESIGN CATEGORY: | B |
| SITE CLASSIFICATION: | D - DEFAULT |
| SEISMIC IMPORTANCE FACTOR: | 1.00 |
| Ss = | 0.094 |
| S1 = | 0.046 |
| SDs = | 0.100 |
| SD1 = | 0.073 |

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL SHALL CONFORM TO THE 14TH EDITION OF THE LOAD AND RESISTANCE FACTOR DESIGN (L.R.F.D.) "MANUAL OF STEEL CONSTRUCTION" OF THE AISC.
2. STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING ASTM SPECIFICATIONS AND MINIMUM YIELD STRENGTHS:

MEMBER	ASTM	MIN. YIELD STRENGTH
W SHAPES	A992	50 KSI
HSS TUBES	A500 (GRADE B)	46 KSI
ROUND HSS TUBES	A500 (GRADE B)	42 KSI
PIPE	A53 (GRADE B)	35 KSI
MISC. PLATES/SHAPES	A992	50KSI
CONNECTION BOLTS	A325	92 KSI
ANCHOR BOLTS	F1554	36 KSI
THREADED RODS	A36	36 KSI

3. WELDING SHALL BE DONE WITH APPROPRIATE E70 SERIES ELECTRODES COMPATIBLE WITH THE NEW AND EXISTING STEEL. WELDS AND WELDING PROCEDURES SHALL CONFORM TO THE "STRUCTURAL WELDING CODE - STEEL" OF THE AMERICAN WELDING SOCIETY ANSI/AWS D1.1.

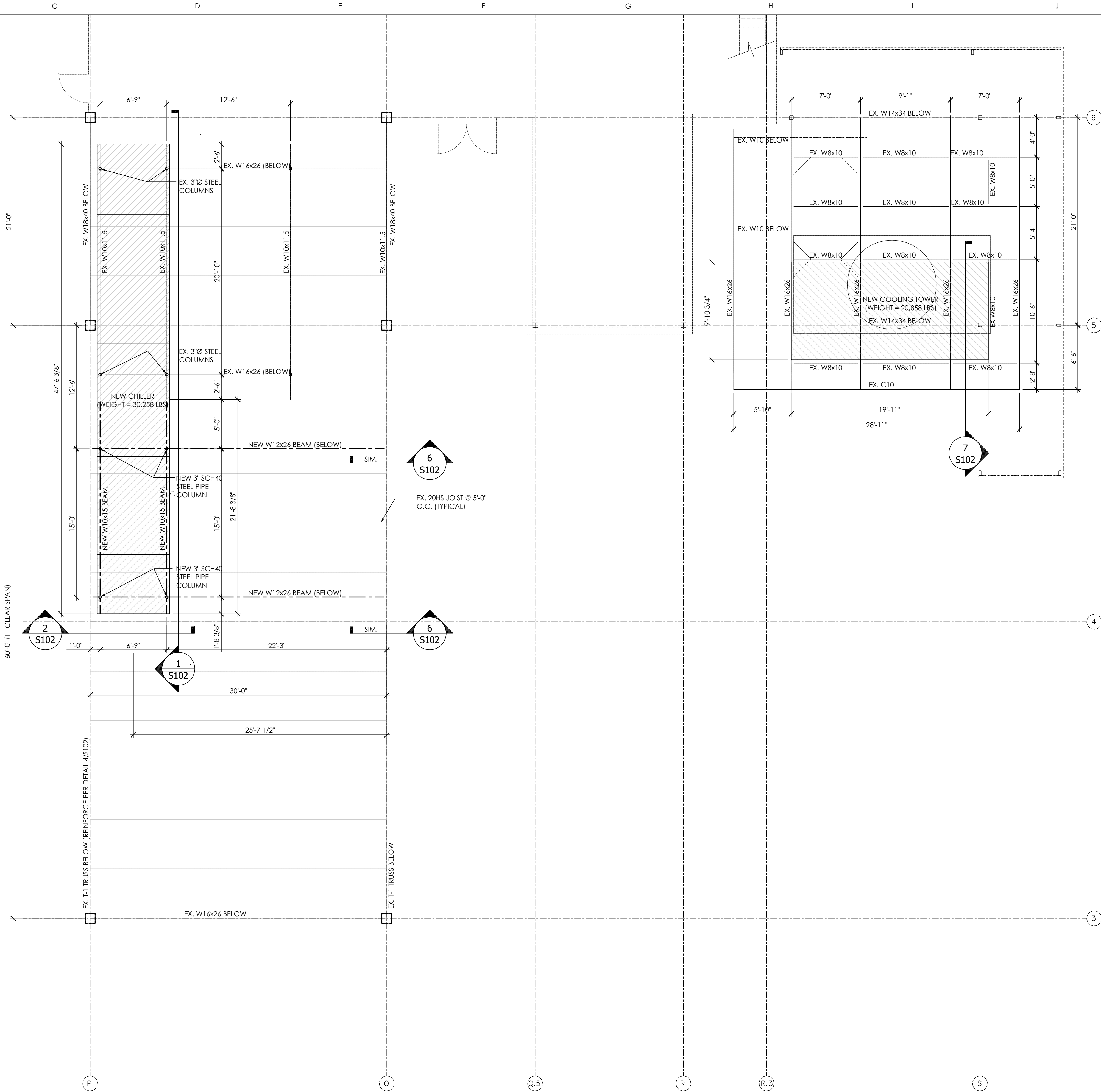
4. WHERE FIELD REVISIONS ARE REQUIRED DUE TO UNFORESEEN CIRCUMSTANCES, SUBMIT ALL CHANGES FOR REVIEW TO THE PROFESSIONAL ENGINEER.

5. THE LENGTH, DIMENSION AND CONNECTION DETAIL FROM NEW STRUCTURAL MEMBERS TO THE EXISTING STRUCTURE SHALL BE FIELD VERIFIED BEFORE FABRICATION. FIELD MODIFICATIONS TO THE FABRICATED MEMBER OR CONNECTION ARE NOT ALLOWED WITHOUT PRIOR APPROVAL BY THE ARCHITECT/ENGINEER OF THE CONTRACTOR'S SKETCHES OR SHOP DRAWINGS REFLECTING THESE MODIFICATIONS.

6. WELDING SHALL BE DONE BY WELDERS QUALIFIED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT "STRUCTURAL WELDING CODE - STEEL", AMERICAN WELDING SOCIETY, AWS D1.1.

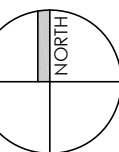
EXISTING STEEL JOISTS:

1. EXISTING STEEL JOISTS ARE ASSUMED TO BE A36 STEEL.
2. THE MANUFACTURER OF THE JOISTS IS ASSUMED TO BE A MEMBER OF THE STEEL JOIST INSTITUTE.
3. FABRICATED TRUSSES ARE ASSUMED TO BE BUILT PER ORIGINAL CONSTRUCTION DOCUMENTS.
4. REFER TO DETAILS FOR REINFORCEMENT OF EXISTING TRUSSES.



1 PARTIAL ROOF FRAMING PLAN

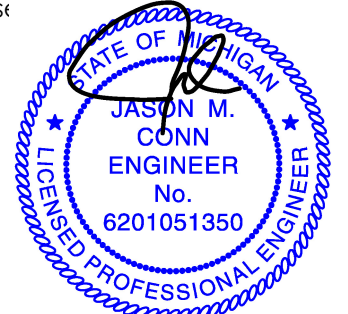
Scale: $3/16" = 1'-0"$



conn engineering
consultants, inc.

commercial+industrial+institutional+residen-
tial structural engineering
107 n. bridge st.
po box 791
linden, mi 48451

p. 810.458.4350
f. 810.458.4592
w. connengineering.com



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job information:

**SCHOOLS - ROOFTOP FRAME
3 BRIGHTON RD
BRIGHTON, MI 48116**

ISSUED FOR	DATE
APPROVAL	06.25.26
Bids & Permits	6/26/26

DATE : 06.16.26
DRAWN : JMC
CHECKED :
SCALE : AS NOTED
JOB NO : 26-264
SHEET TITLE : SHEET TITLE 1 SHEET TITLE 1

SHEE

S101



- NEW WT6x13 VERTICAL
- EX. (2) L2 1/2 x 2 x 3/16
TO BE REINFORCED (SEE
DETAIL 5/S102)
-

4 REINFORCED TRUSS - T1
Scale: 3/8" = 1'-0"



-
- NEW WT6x13 VERTICAL
- EX. [2] L2 1/2 x 2 x 3/16
TO BE REINFORCED (SEE
DETAIL 5/S102)
- The drawing shows a cross-section of a roof truss. A new vertical member, labeled 'NEW WT6x13 VERTICAL', is shown connecting the top and bottom chords. An existing member, labeled 'EX. [2] L2 1/2 x 2 x 3/16 TO BE REINFORCED (SEE DETAIL 5/S102)', is also shown. The truss members are shown in black, and the reinforcement is shown in white. The drawing includes a section line and a cut symbol.

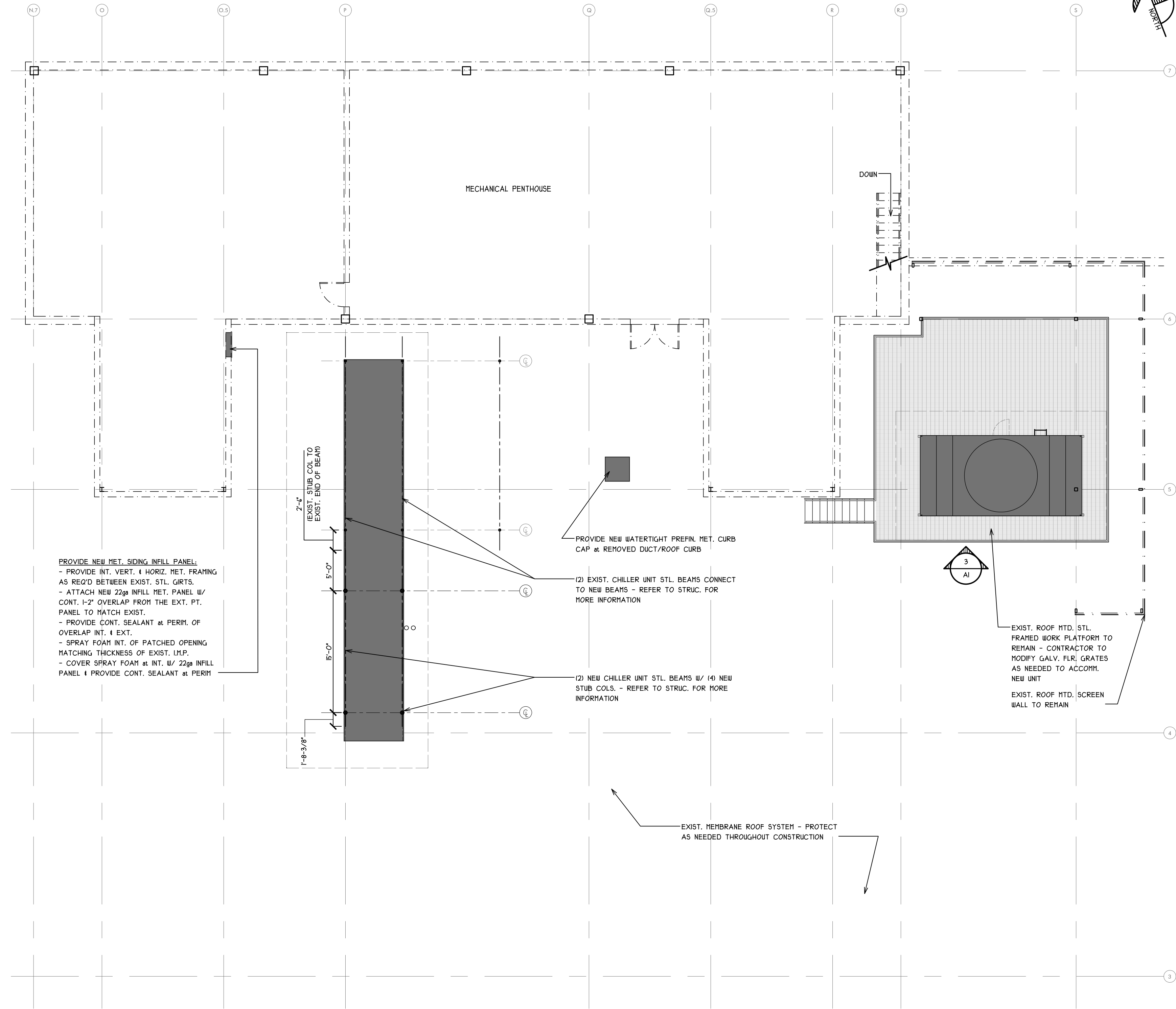
5 REINFORCED WEB Scale: 3/8" = 1'-0"



FILE LOCATION: H:\26022 - BAS Misc Services 2024\PROJECTS\BHS - HVAC rev\dwgs\26022-CA.dwg
DATE PLOTTED: 1/30/2024
PLOTTER: HP DesignJet T1200
LINDHOUT ASSOCIATES architects pc
THIS DOCUMENT AND THE SUBJECT MATTER CONTAINED THEREIN IS PROPRIETARY AND IS NOT TO BE USED OR REPRODUCED WITHOUT PRIOR WRITTEN APPROVAL

1
AI

ROOF PLAN

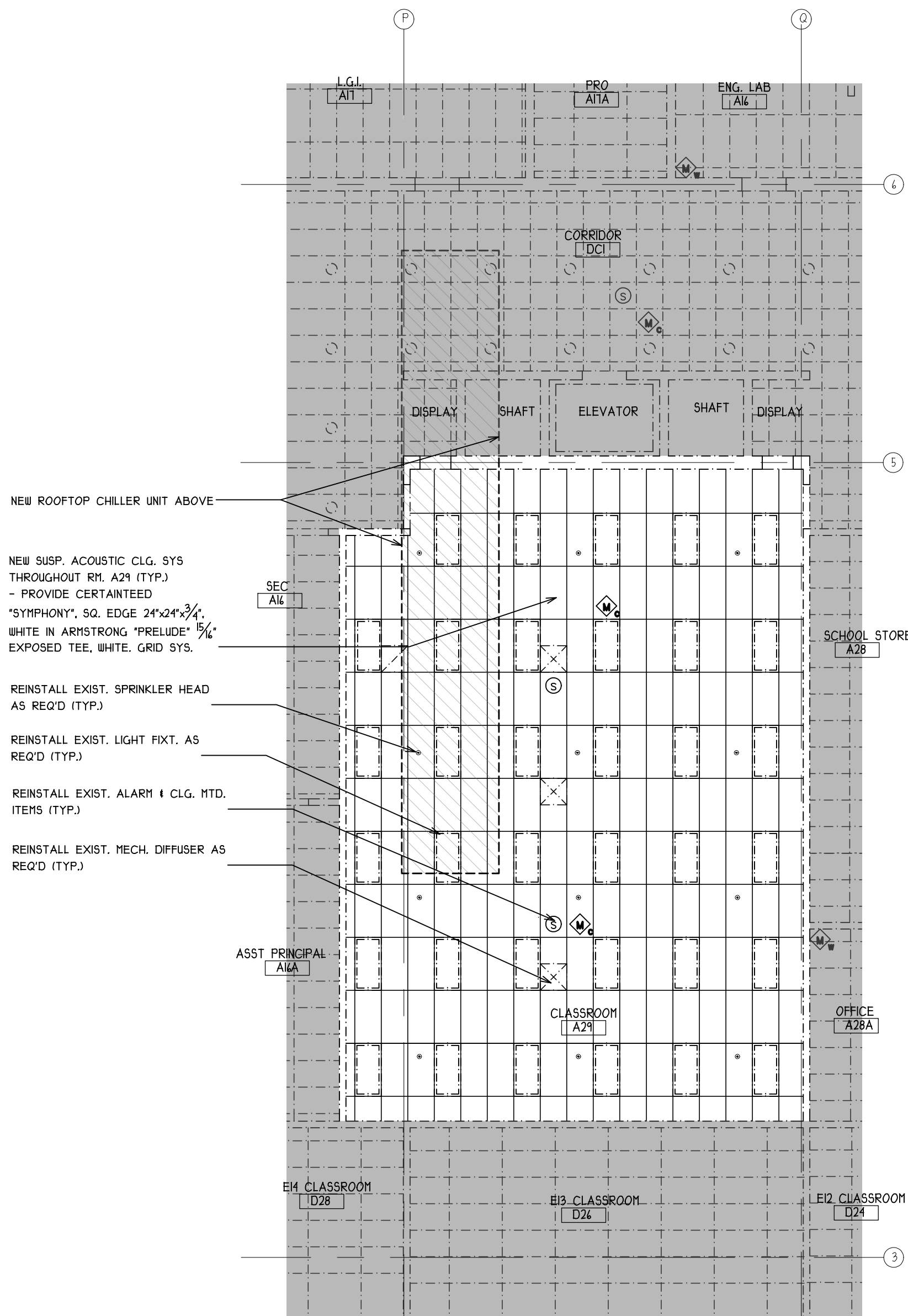


GENERAL NOTES:
- CONTRACTOR TO INSTALL NEW REPLACEMENT ROOFTOP MECHANICAL UNITS (14 RTU'S & 2 ERV'S) AS INDICATED ON SHEET CA'S KEY PLAN. EXIST. FRAMES & CURBS TO BE REUSED. REFER TO MEP SHEETS FOR ADD'L INFORMATION.

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

2
AI

1ST FLR. PARTIAL REFL. CLG. PLAN



NEW ROOFTOP CHILLER UNIT ABOVE

NEW SUSP. ACOUSTIC CLG. SYS THROUGHOUT RM. A29 (TYP.) - PROVIDE CERTAINTED "SYMPHONY", SQ. EDGE 24"x24"x3/4" WHITE IN ARMSTRONG "PRELUDE" 5/8" EXPOSED TEE, WHITE. GRID SYS.

REINSTALL EXIST. SPRINKLER HEAD AS REQ'D (TYP.)

REINSTALL EXIST. LIGHT FIXT. AS REQ'D (TYP.)

REINSTALL EXIST. ALARM & CLG. MTD. ITEMS (TYP.)

REINSTALL EXIST. MECH. DIFFUSER AS REQ'D (TYP.)

NEW COOLING TOWER UNIT - CONTRACTOR TO INSTALL MANUF.-PROVIDED RAILING & LADDER SYSTEM DURING INSTALLATION

EXIST. ROOF MTD. SCREEN WALL TO REMAIN

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

A1

26022

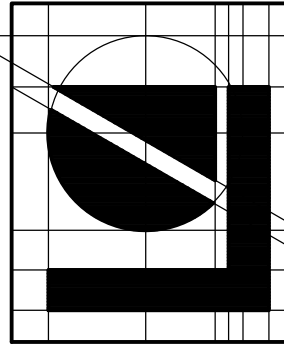
MECHANICAL UNITS REPLACEMENT FOR:
BRIGHTON AREA SCHOOLS
(BRIGHTON HIGH SCHOOL)
BRIGHTON, MICHIGAN
PLANS

dr: djm
ck: djm
app'd: djm
date: 1/30/2024
date: 1/30/2024

BIDS & PERMITS
OWNER REVIEW
issued for

STATE OF MICHIGAN
D. JASON MCINTYRE
ARCHITECT
No. 1301056404
LICENSED ARCHITECT

Lindhout Associates
architects aia pc
10456 Clinton Drive Brighton, Michigan 48116-9510
www.lindhout.com fax (810)227-5855 (810)227-5858



SPECIFICATIONS

GENERAL NOTES:

1. PROVIDE MATERIALS AND EQUIPMENT AND EXECUTE THE WORK, INCLUDING ALL TESTING AND INSPECTIONS, IN COMPLIANCE WITH THE APPLICABLE PROVISIONS OF FEDERAL, STATE AND LOCAL GOVERNMENT LAWS, ORDINANCES, REFERENCED CODES AND STANDARDS CURRENT AS OF THE ISSUE DATE OF THESE DRAWINGS. ALL MORE STRINGENT REQUIREMENTS OF THE CONTRACT DOCUMENTS SHALL MODIFY, SUPPLEMENT AND SUPERSEDE APPLICABLE PORTIONS OF GOVERNING LAWS, ORDINANCES, CODES AND STANDARDS.
2. CONTRACTOR SHALL PRESENT CERTIFICATE TO THE OWNER THAT ALL APPLICABLE BUILDING PERMITS HAVE BEEN SECURED PRIOR TO STARTING ANY WORK, AND PROVIDE THE OWNER WITH ALL REQUIRED CERTIFICATES OF FINAL APPROVAL FROM THE GOVERNING JURISDICTIONS AT COMPLETION OF THE WORK. PROVIDE ALL SHOP DRAWINGS AS REQUIRED IN FOLLOWING SECTIONS.
3. MAKE ALL CONNECTIONS TO EXISTING SYSTEMS DURING DESIGNATED PERIODS UPON APPROVAL OF THE OWNER AND AT NO INCREASE IN CONTRACT SUM.
4. EXISTING FACILITIES:
 - A. DO NOT INTERRUPT EXISTING UTILITIES UTILIZED BY THE OWNER EXCEPT AS SPECIFIED OR WHEN APPROVED IN WRITING, AND THEN ONLY AFTER TEMPORARY UTILITY SERVICES HAVE BEEN APPROVED AND PROVIDED. INTERRUPTIONS MUST BE SCHEDULED TO SUIT THE OWNER'S REQUIREMENTS.
 - B. VERIFY ALL EXISTING WORK, WHERE EXISTING CONNECTIONS ARE PARTIAL, PROVIDE ALL NECESSARY MATERIALS, LABOR AND EQUIPMENT REQUIRED TO MODIFY EXISTING WORK. IN ADDITION, MAINTAIN INTEGRITY OF THE EXISTING SYSTEMS. RECTIFY ANY CONTAMINATION, DEGRADATION OF CLEANLINESS OR DAMAGE TO THE EXISTING SYSTEMS TO THE SATISFACTION OF THE OWNER. PROVIDE ALL WORK SO REQUIRED AT NO INCREASE IN THE CONTRACTOR'S ORIGINAL PROPOSAL.
5. COORDINATE EXACT LOCATION OF CONSTRUCTION TO PRECLUDE ANY INTERFERENCES BETWEEN PIPING, WIRING, LIGHTING FIXTURES, DUCTWORK, BUILDING EQUIPMENT, PROCESS EQUIPMENT AND OTHER CONSTRUCTION.
6. PROVIDE LABOR, INCLUDING FIELD ERECTION AND SUPERVISION, MATERIALS, EQUIPMENT AND ANCILLARIES, AND COORDINATE, PROCURE, FABRICATE, DELIVER, ERECT OR INSTALL, INTERFACE WITH EXISTING WORK, START, DEBUG AND TEST ALL SYSTEMS AS NECESSARY TO PROVIDE THE OWNER WITH A COMPLETE, OPERATING FACILITY IN CONFORMANCE WITH THE CONSTRUCTION BID DOCUMENTS.
7. ALL CUTTING AND PATCHING THAT MAY BE NECESSARY FOR THE INSTALLATION OF THE MECHANICAL CONTRACTOR'S WORK SHALL BE PERFORMED AND REPAIRED BY THE TRADE WHOM NORMALLY PERFORMS THAT WORK AND PAID FOR BY THE MECHANICAL CONTRACTOR. NO CUTTING OF THE BUILDING STRUCTURAL SYSTEM SHALL BE PERFORMED.
8. THE MECHANICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING HIS BID TO FAMILIARIZE HIMSELF WITH THE ACTUAL PROJECT CONDITIONS AND TO CHECK FOR ANY INTERFERENCES BETWEEN HIS WORK AND THAT OF THE OTHER TRADES, AND/OR ANY APPARENT VIOLATIONS OF LOCAL OR STATE CODES, LAWS, ORDINANCES AND REGULATIONS. SHOULD ANY VIOLATIONS OR INTERFERENCES APPEAR AND DEPARTURE FROM THE DESIGN INTENT OF THE CONTRACT DOCUMENTS IS REQUIRED, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT PRIOR TO ENTERING INTO A CONTRACT WITH THE OWNER. FAILURE TO PROVIDE THE ARCHITECT WITH THE AFOREMENTIONED NOTIFICATION SHALL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE INTENT OF THE CONTRACT DOCUMENTS WITH NO ADDITIONAL EXPENSES BEING INCURRED BY THE OWNER.
9. THE DRAWINGS ARE DIAGRAMMATIC AND SHOW GENERAL LOCATIONS AND ARRANGEMENTS OF ALL THE EQUIPMENT AND PIPING. THE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS BUILDING CONSTRUCTION AND ALL OTHER WORK WILL PERMIT. DO NOT SCALE DRAWINGS FOR EXACT MEASUREMENTS.
10. DEMOLITION OF MECHANICAL EQUIPMENT SHALL INCLUDE ALL EXISTING PIPING, VALVES, CONTROLS, SUPPORTS, AND EQUIPMENT WHERE SUCH ITEMS ARE NOT REQUIRED FOR THE PROPER OPERATION OF THE REVISED SYSTEM. REMOVE, RECONNECT, CAP, PLUG AND REPLACE EXISTING PIPING AND DUCTWORK.

GENERAL NOTES: PIPING

1. THE PIPING SYSTEMS SHALL BE INSTALLED IN STRICT ACCORDANCE WITH ALL STATE AND LOCAL CODES. THE PIPING CONTRACTOR SHALL OBTAIN ALL PERMITS, PAY ALL FEES, AND ARRANGE FOR ALL INSPECTIONS FOR HIS WORK. AT THE COMPLETION OF THE PROJECT, THE PIPING CONTRACTOR SHALL FURNISH THE OWNER WITH CERTIFICATES OF FINAL INSPECTIONS AND APPROVALS.
2. PIPING SHALL BE AS FOLLOWS:
 - A. CHILLED WATER PIPING:
 - 1) CHILLED WATER PIPING SHALL BE SCHEDULE 40, BLACK STEEL WITH THREADED, GROOVED OR WELDED FITTINGS.
 - B. VALVES:
 - 1) BALL VALVES SHALL BE TWO PIECE FULL PORT BRONZE BALL VALVES WITH STAINLESS STEEL TRIM, TFE SEATS WITH 316 STAINLESS STEEL BALL AND STEM. THREADED BODY PACK NUT DESIGN WITH ADJUSTABLE STEM PACKING WITH THREADED OR SOLDERED ENDS. RATED FOR 150 PSIG SWP AND 600 PSIG CWP.
 - 2) CHECK VALVES SHALL BE SWING CHECK WITH BRONZE DISC, CLASS 150, ASTM B62 Y PATTERN DESIGN WITH THREADED OR SOLDERED ENDS. RATED FOR 300 PSIG CWP.
 - C. PIPING INSULATION:
 - 1) ALL CHILLED WATER PIPING SHALL BE INSULATED WITH MINIMUM 2" THICK FIBERGLASS INSULATION, WITH A FIRE RETARDANT JACKET, HAVING AN AVERAGE R VALUE OF 3.45. CHILLED WATER PIPING INSULATION SHALL BE PROVIDED WITH A VAPOR BARRIER. PROVIDE PREFORMED SECTIONS WITH PVC COVERS AT ALL FITTINGS.
 - 2) PIPE INSULATION SHALL HAVE A FLAME SPREAD AND SMOKE DENSITY RATING NOT EXCEEDING 25/50, AS TESTED PER ASTM STANDARD E-84.
3. PIPING SHALL BE SUPPORTED FROM HANGERS AT AN ADEQUATE DISTANCE WITH SUPPORTING HANGER RODS FASTENED TO THE BUILDING FRAMING WHENEVER POSSIBLE. SUPPORT SPACING SHALL NOT EXCEED THE HANGER SPACING REQUIREMENTS PER SECTION 308 OF THE LOCAL PLUMBING CODE.
4. ISOLATE PIPING AND EQUIPMENT FROM THE BUILDING STRUCTURE WITH INSULATING HANGERS AND FITTINGS AS REQUIRED TO PREVENT GALVANIC CORROSION OF THE BUILDING PIPING SYSTEMS.
5. FURNISH AND INSTALL ISOLATION VALVES AT ALL SERVICE POINTS OR EQUIPMENT CONNECTIONS.
6. LABEL ALL PIPING SYSTEMS WITH MANUFACTURED SELF ADHESIVE OR PRE-TENSIONED PIPE MARKERS. MARKERS SHALL INDICATE SERVICE AND DIRECTION OF FLOW. MARK PIPE NEAR VALVES, BRANCH CONNECTIONS, PENETRATIONS, ACCESS DOORS AND NEAR MAJOR PIECES OF EQUIPMENT.
7. THE PIPING CONTRACTOR SHALL VERIFY EXACT LOCATIONS AND PROVIDE ROUGH-INS FOR ALL EQUIPMENT FURNISHED BY OTHER CONTRACTORS. AFTER ALL EQUIPMENT HAS BEEN INSTALLED BY OTHER CONTRACTORS, THE PIPING CONTRACTOR SHALL MAKE ALL FINAL CONNECTIONS AND SHALL INCLUDE IN HIS BASE BID ALL VALVES, UNIONS, COUPLINGS, ETC., THAT ARE REQUIRED TO MAKE FINAL CONNECTIONS.
8. THE CONTRACTOR SHALL COORDINATE ELECTRICAL CHARACTERISTICS OF ALL EQUIPMENT FURNISHED BY THIS CONTRACTOR WITH THE ELECTRICAL CONTRACTOR.
9. THE PIPING CONTRACTOR SHALL GUARANTEE ALL WORK INSTALLED UNDER THIS CONTRACT TO BE FREE FROM DEFECTIVE WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE YEAR AFTER THE ACCEPTANCE OF THE BUILDING BY THE OWNER, AND SHOULD DEFECTS OCCUR WITHIN THIS PERIOD, REPAIR AND/OR REPLACE DEFECTIVE ITEMS AND ANY DAMAGE RESULTING FROM FAILURE OF THESE ITEMS, AT NO EXPENSE TO THE OWNER.
10. THE CONTRACTOR SHALL COORDINATE LOCATIONS OF HIS EQUIPMENT AND WORK WITH OTHER BUILDING TRADES TO AVOID ANY INTERFERENCES BETWEEN HIS WORK AND THE WORK OF OTHER TRADES.
11. CONTRACTOR SHALL MAINTAIN ADEQUATE CLEARANCES (PER N.E.C.) ABOVE AND AROUND ANY EXISTING ELECTRICAL PANELS, EQUIPMENT AND TRANSFORMERS WHEN ROUTING OVERHEAD PIPING.
12. CONTRACTOR SHALL PROVIDE PROTECTION FOR PIPING INSTALLED IN CONCEALED SPACES TO PREVENT DAMAGE FROM FASTENERS.

MECHANICAL GENERAL NOTES:

1. COORDINATE NEW PIPING WITH BUILDING STRUCTURAL CONDITIONS, EQUIPMENT MANUFACTURER RECOMMENDATIONS AND ALL OTHER TRADES TO AVOID INTERFERENCES.
2. PROVIDE ACCESS AROUND ALL NEW EQUIPMENT PER MANUFACTURERS RECOMMENDATIONS.
3. ALL MECHANICAL RELATED CORING THROUGH WALLS AND FLOORS SHALL BE BY MECHANICAL CONTRACTOR. SEAL ALL PENETRATIONS THROUGH RATED WALLS AND FLOORS WITH U.L. RATED CAULK SEALANT IN ACCORDANCE WITH THE SPECIFICATION REQUIREMENTS.

DEMOLITION GENERAL NOTES:

1. COORDINATE SHUT-DOWN OF ANY SYSTEM WITH THE BUILDING SERVICES PERSONNEL PRIOR TO SYSTEM SHUT-DOWN.
2. REMOVE (INCLUDING DISCONNECTION OF) MECHANICAL SERVICE AS INDICATED AND/OR DESCRIBED ALONG WITH PIPING, HANGERS, SUPPORTS, CONTROLS AND ALL RELATED ACCESSORIES.
3. FIELD VERIFY EXACT SIZE AND LOCATION OF ALL EXISTING SERVICES PRIOR TO DEMOLITION.
4. WHERE DAMAGE OCCURS DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR AS REQUIRED SO AS TO BE COMPATIBLE WITH EXISTING.
5. WHERE DUCT AND/OR PIPE INSULATION HAS BEEN DAMAGED, THE CONTRACTOR SHALL REPAIR AS REQUIRED SO AS TO BE COMPATIBLE WITH EXISTING.
6. ALL ITEMS DEMOLISHED SHALL BE REMOVED FROM THE SITE AND DISPOSED OF PROPERLY, UNLESS NOTED OTHERWISE.
7. LIMITS OF DEMOLITION ARE INDICATED ON THE DRAWINGS. SHOULD EXISTING FIELD CONDITIONS REQUIRE MODIFICATIONS OF THESE LIMITS FOR THE PROPER INSTALLATION OF NEW WORK, THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUCH MODIFICATIONS.
8. CAP AND SEAL AIRTIGHT ALL UNUSED OPENINGS ON THE RETURN AND SUPPLY DUCTWORK.

ABBREVIATIONS

ACC-#	AIR COOLED CHILLER
CHWP-#	CHILLED WATER PUMP
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CTWP-#	COOLING TOWER WATER PUMP
C.O.	CLEAN OUT
CT-#	COOLING TOWER
DIAØ	DIAMETER
(E)	EXISTING
G.P.M.	GALLONS PER MINUTE
HHWS	HEATING HOT WATER SUPPLY
HHWR	HEATING HOT WATER RETURN
(TYP.)	TYPICAL
VFD	VARIABLE FREQUENCY DRIVE
WCCH-#	WATER COOLED CHILLER
WH-#	WATER HEATER

SYMBOLS

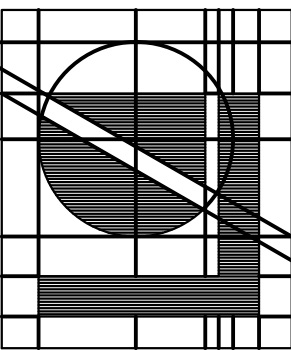
SYMBOL	DESCRIPTION
	BUTTERFLY VALVE
	CHECK VALVE
	PLUG VALVE
	UNION
	PIPE TURNED UP
	PIPE TURNED DOWN
	PIPE OUT TOP
	PIPE OUT BOTTOM
	CHILLED WATER SUPPLY PIPING
	CHILLED WATER RETURN PIPING
	REMOVE / DEMOLISH
	CONNECT NEW TO EXISTING
	EXISTING SERVICE TO BE CAPPED
(E)	EXISTING



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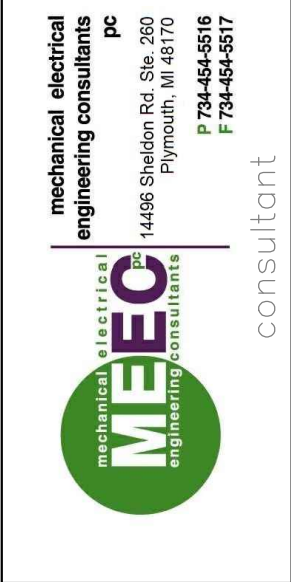
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architects aia pc

10465 clinton drive, brighton, michigan 48116-3510
www.lindhout.com fax (810) 227-5665 (810) 227-5668



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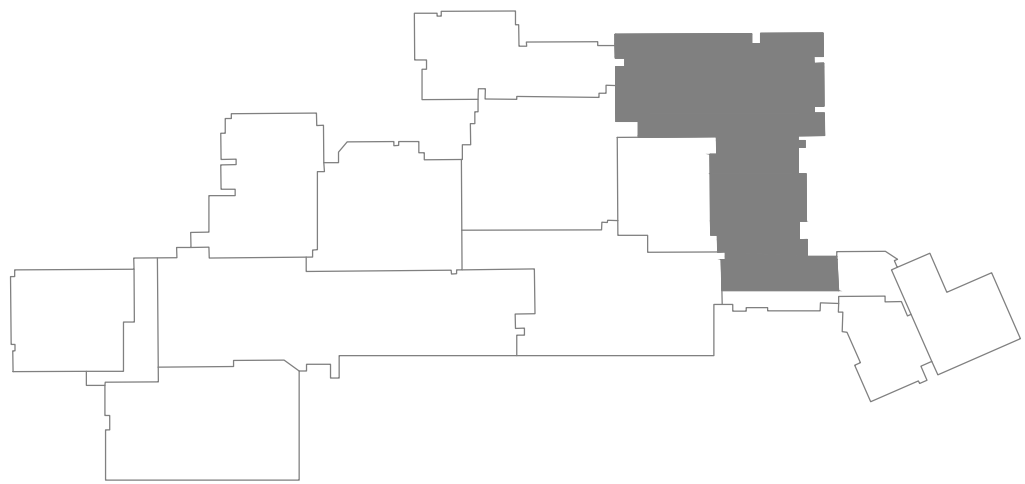
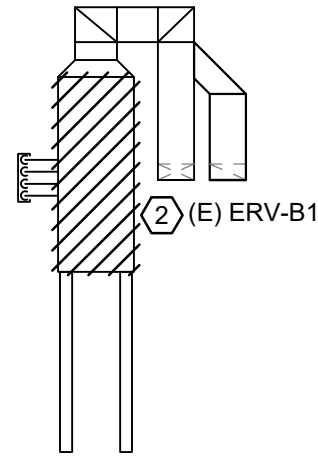
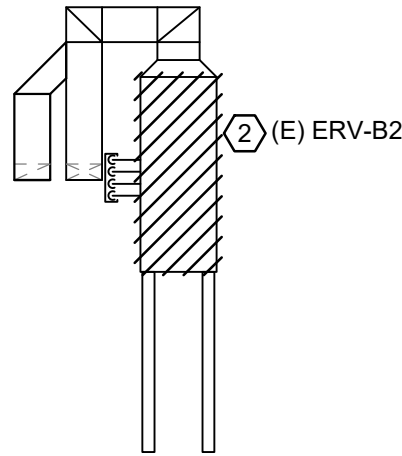
MEP RENOVATIONS for: BRIGHTON AREA SCHOOLS BRIGHTON HIGH SCHOOL BRIGHTON, MICHIGAN	GENERAL MECHANICAL INFORMATION
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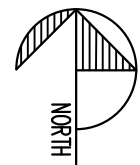
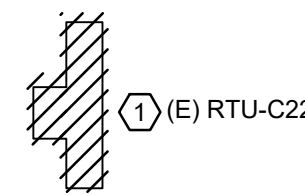
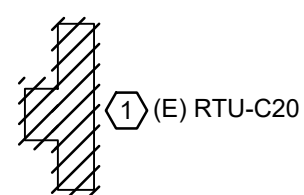
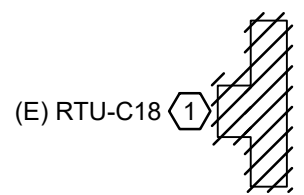
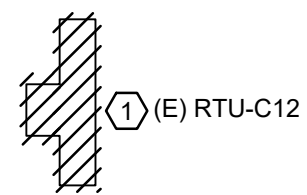
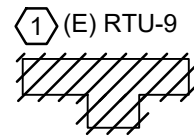
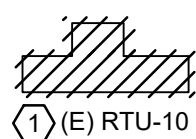
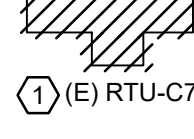
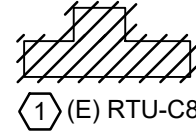
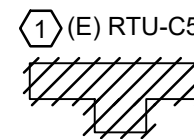
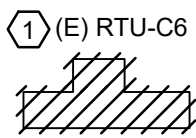
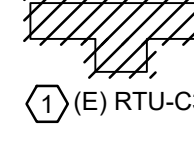
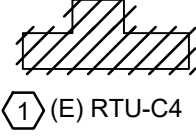
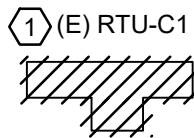
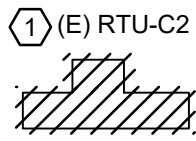
MD1.1 PARTIAL ROOF - MECHANICAL DEMOLITION PLAN



KEY PLAN
N.T.S.

DEMOLITION KEY NOTES: (#)

1. REMOVE AND PROPERLY DISPOSE OF THE EXISTING ROOF TOP UNIT IN ITS ENTIRETY. DISCONNECT ALL ELECTRICAL AND CONTROL WIRING AND THE HEATING HOT AND CHILLED WATER PIPING. EXISTING SUPPLY AND RETURN DUCTWORK CONNECTIONS WITHIN EXISTING CURB TO REMAIN. EXISTING SUPPORT RAILS ARE TO REMAIN IN PLACE AND BE PROTECTED DURING REMOVAL OPERATIONS. EQUIPMENT SHALL BE REMOVED FROM THE SITE AND REMAIN THE PROPERTY OF THE OWNER OR DISPOSED OF PROPERLY IF THE OWNER DOES NOT WANT THEM.
2. REMOVE AND PROPERLY DISPOSE OF THE EXISTING ENERGY RECOVERY UNIT IN ITS ENTIRETY. DISCONNECT ALL ELECTRICAL AND CONTROL WIRING AND THE HEATING HOT AND CHILLED WATER PIPING. EXISTING SUPPORT RAILS ARE TO REMAIN IN PLACE AND BE REUSED FOR NEW UNIT SUPPORT. EXISTING DUCTWORK IS ALSO TO REMAIN AND SHALL BE LEFT INTACT, CLEAN, AND READY FOR RECONNECTION TO NEW EQUIPMENT. REPAIR ANY MINOR DAMAGE TO ADJACENT MATERIALS CAUSED BY REMOVAL WORK. EQUIPMENT SHALL BE REMOVED FROM THE SITE AND REMAIN THE PROPERTY OF THE OWNER OR DISPOSED OF PROPERLY IF THE OWNER DOES NOT WANT THEM.



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BRIGHTON AREA SCHOOLS
BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
PARTIAL ROOF - MECHANICAL DEMOLITION PLAN

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app'd: J.K.
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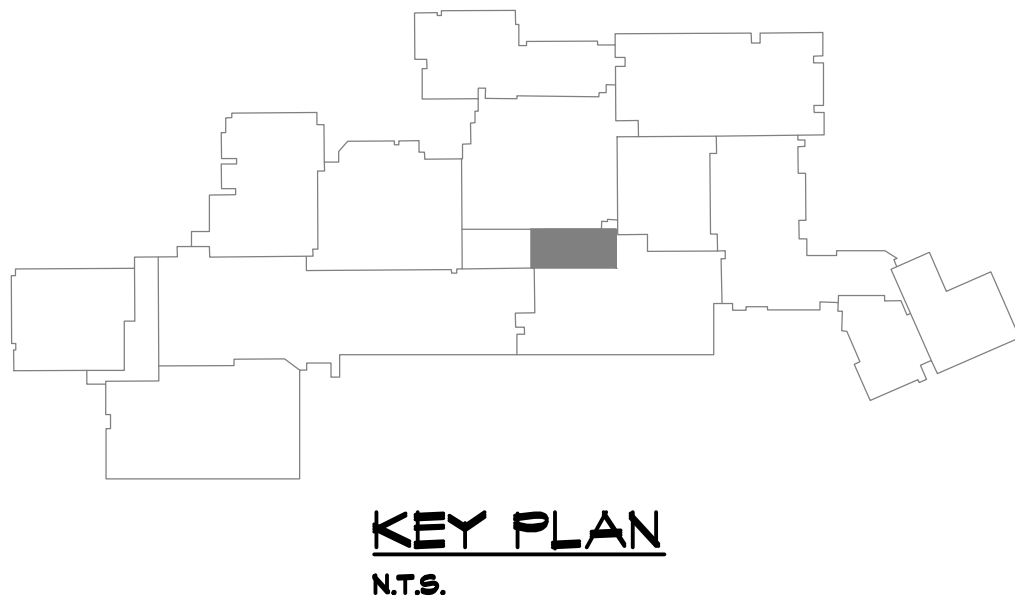
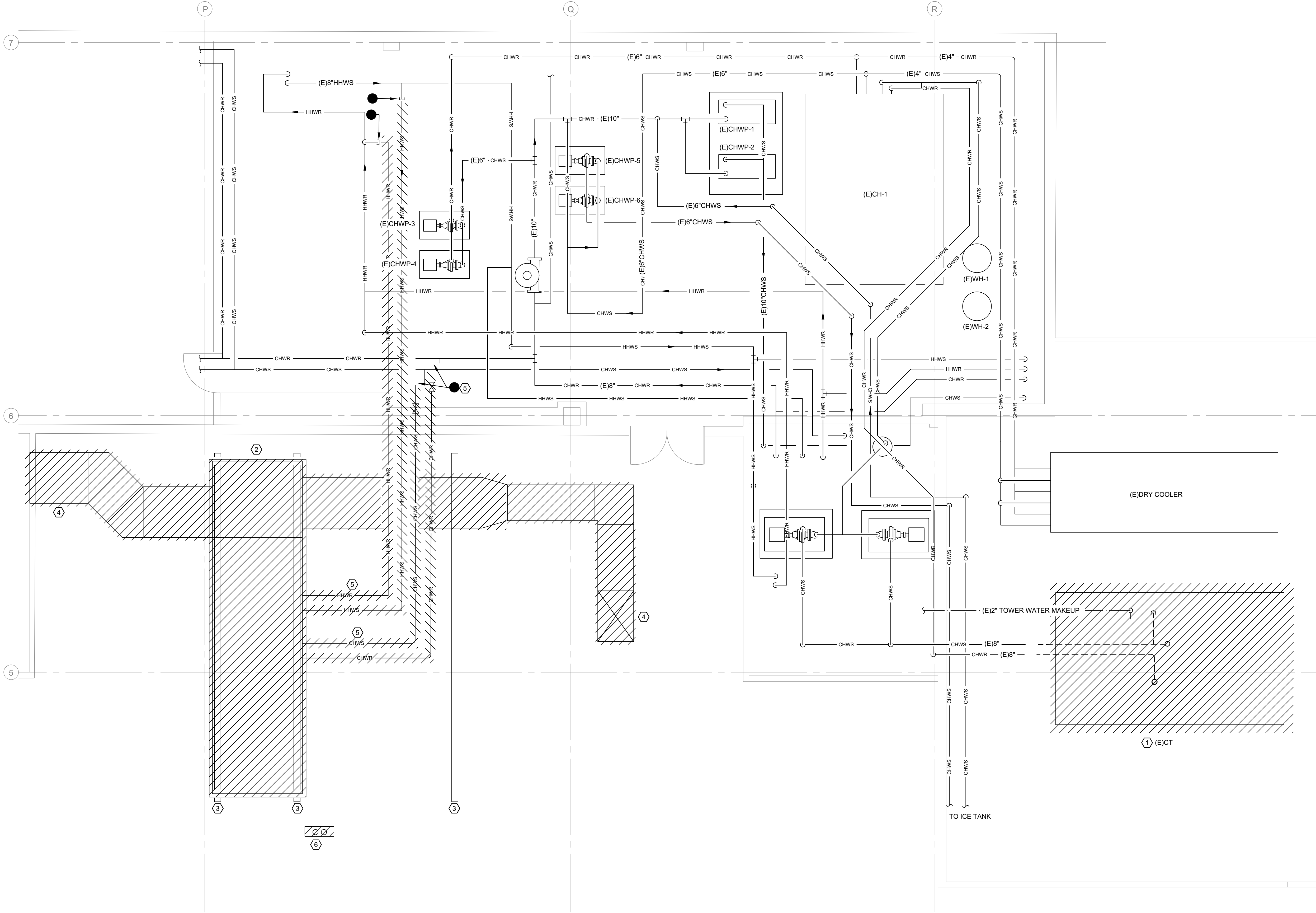
mechanical electrical
engineering consultants
pc
14486 Sheldon Rd. Ste. 200
Livonia, Michigan 48150
P 734-464-5816
F 734-464-5817
consultant
MEEC
mechanical electrical
engineering consultants
pc

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architects aia pc
10465 Clinton Drive, Brighton, Michigan 48116-3510
www.lindhout.com fax (810) 227-5665 (810) 227-5668

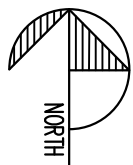
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MD1.4 PARTIAL ROOF - MECHANICAL DEMOLITION PLAN



- KEY NOTES:** #
1. REMOVE EXISTING COOLING TOWER, INCLUDING ALL ASSOCIATED PIPING, SUPPORTS, AND ELECTRICAL CONNECTIONS. CONTRACTOR SHALL PROPERLY DISCONNECT, DRAIN, AND DISPOSE OF EXISTING EQUIPMENT IN ACCORDANCE WITH APPLICABLE CODES. PROVIDE AND INSTALL NEW COOLING TOWER COMPLETE WITH ALL REQUIRED PIPING, VALVES, CONTROLS, AND ELECTRICAL CONNECTIONS. COORDINATE ALL WORK WITH EXISTING CONDITIONS. ENSURE PROPER SUPPORT, ALIGNMENT, AND COMMISSIONING OF THE NEW UNIT PER MANUFACTURER'S RECOMMENDATIONS.
 2. CONTRACTOR SHALL DISCONNECT AND REMOVE THE EXISTING ENERGY RECOVERY UNIT (ERU) IN ITS ENTIRETY, INCLUDING ALL ASSOCIATED DUCTWORK, CONTROLS, PIPING, SUPPORTS, AND APPURTENANCES. ALL ELECTRICAL, CONTROL WIRING, AND PIPING CONNECTIONS SHALL BE PROPERLY DISCONNECTED AND MADE SAFE PRIOR TO REMOVAL.
 3. EXISTING STRUCTURAL STEEL BEAM AND STRUCTURAL SUPPORTS SHALL REMAIN AND BE PROTECTED DURING DEMOLITION. DO NOT CUT, MODIFY, OR DAMAGE ANY STRUCTURAL ELEMENTS.
 4. DISCONNECT AND REMOVE ASSOCIATED DUCTWORK BACK TO THE NEAREST MAIN OR AS INDICATED ON THE DRAWINGS, AND CAP AND PROVIDE A WATERTIGHT SEAL AT ALL ROOF AND WALL OPENINGS.
 5. DISCONNECT AND REMOVE EXISTING PIPING BACK TO THE NEAREST ACTIVE MAIN AS INDICATED. PROVIDE CAPS AT ALL OPEN ENDS AND ENSURE A WATERTIGHT SEAL.
 6. RELOCATE EXISTING PIPING AS REQUIRED TO ACCOMMODATE THE NEW CHILLER. FIELD VERIFY FINAL LOCATION PRIOR TO INSTALLATION (APPROXIMATELY MINIMUM 10'-0" EAST).



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MEP RENOVATIONS for:
BRIGHTON AREA SCHOOLS
BRIGHTON HIGH SCHOOL
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PARTIAL ROOF - MECHANICAL DEMOLITION PLAN

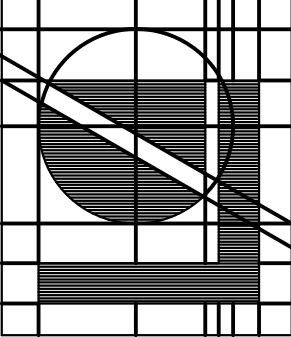
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app'd: J.K.

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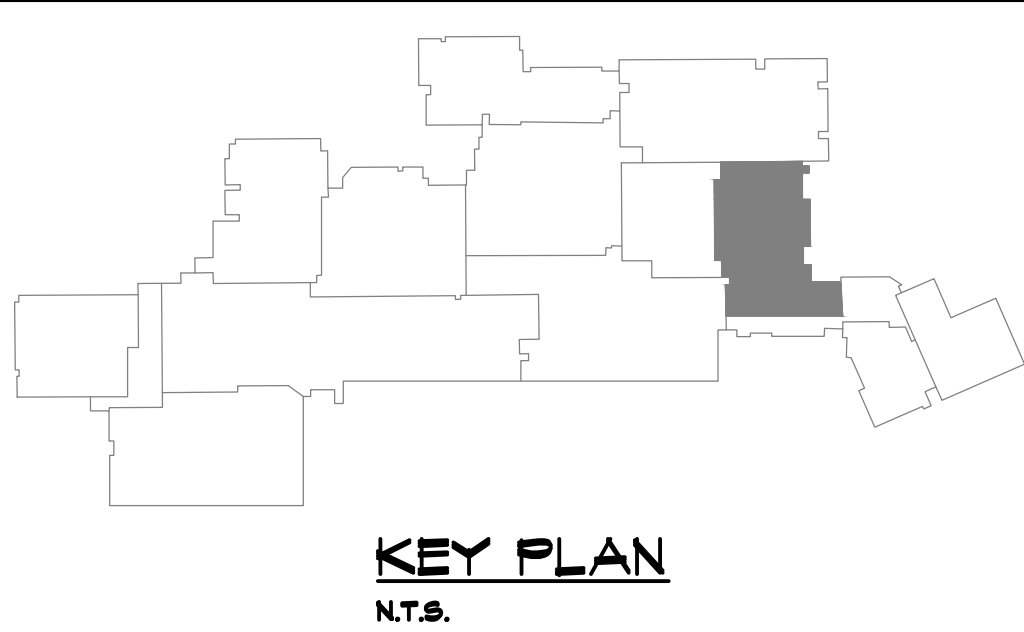
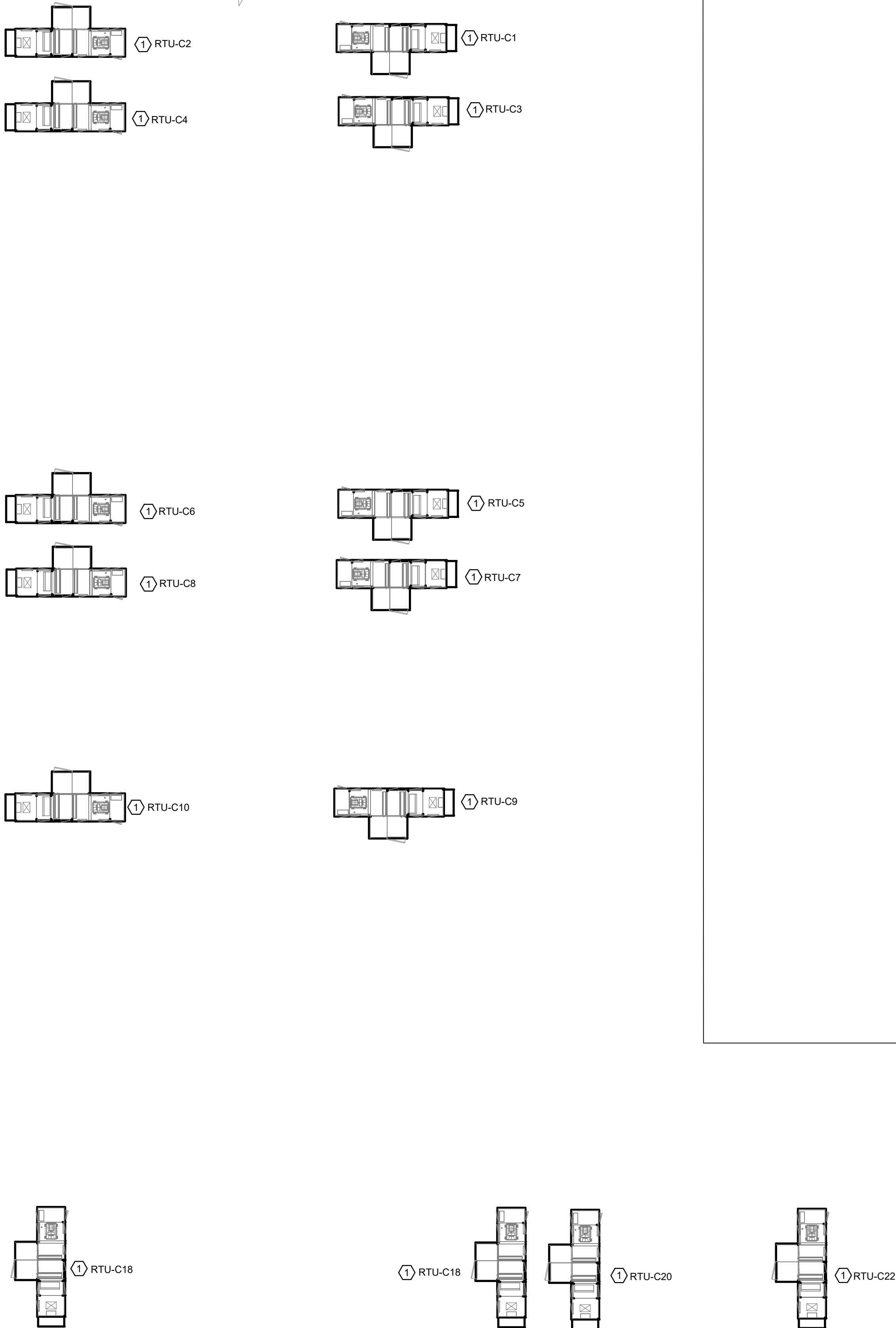
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1 M1.1 PARTIAL ROOF - MECHANICAL NEW WORK PLAN



KEY NOTES: #

- CONTRACTOR SHALL FURNISH AND INSTALL A NEW AIR HANDLING UNIT (AHU) ON AN ADAPTOR CURB THAT ALIGNS WITH THE EXISTING ROOF CURB FROM THE UNIT THAT WAS REMOVED IN THIS AREA. FIELD MEASURE EXACT EXISTING CURB DIMENSIONS PRIOR TO FABRICATION OF THE ADAPTOR CURB TO ENSURE PROPER FIT.

RECONNECT / EXTEND SUPPLY AND RETURN DUCTWORK WITHIN ADAPTOR CURB AS REQUIRED. MODIFY, EXTEND, OR PROVIDE TRANSITIONS AS REQUIRED TO MAINTAIN A COMPLETE, AIRTIGHT SYSTEM.

PROVIDE AND INSTALL NEW CHILLED WATER AND HEATING WATER PIPING AS REQUIRED TO CONNECT TO THE NEW AHU COIL CONNECTION POINTS. PROVIDE ISOLATION VALVES, BALANCING VALVES, STRAINERS, UNIONS, AND ALL REQUIRED ACCESSORIES FOR A COMPLETE INSTALLATION.

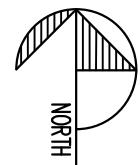
PROVIDE CONTROL VALVES AT EACH COIL (CHILLED WATER AND HEATING WATER), COMPLETE WITH ACTUATORS COMPATIBLE WITH THE EXISTING BUILDING MANAGEMENT SYSTEM (BMS). CONTROL VALVES SHALL BE SIZED AND SELECTED FOR PROPER MODULATION AND SYSTEM PERFORMANCE.

ALL CONTROLS, SENSORS, ACTUATORS, AND CONTROL WIRING SHALL BE PROVIDED AND INTEGRATED WITH THE EXISTING BMS. COORDINATE WITH CONTROLS CONTRACTOR TO ENSURE FULL FUNCTIONALITY, INCLUDING TEMPERATURE CONTROL, VALVE MODULATION, AND SYSTEM MONITORING.

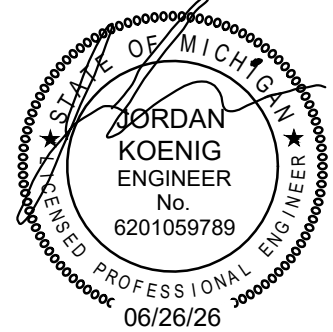
ALL PIPING SHALL BE PROPERLY SUPPORTED, INSULATED, FLUSHED, AND TESTED. PROVIDE AIR VENTS AND DRAIN VALVES AS REQUIRED FOR PROPER SYSTEM OPERATION.

SEAL ANY NEW ROOF PENETRATIONS WATERTIGHT AND COORDINATE WITH ROOFING CONTRACTOR AS REQUIRED.

CONTRACTOR SHALL VERIFY ALL EXISTING FIELD CONDITIONS AND COORDINATE WORK WITH ALL TRADES.

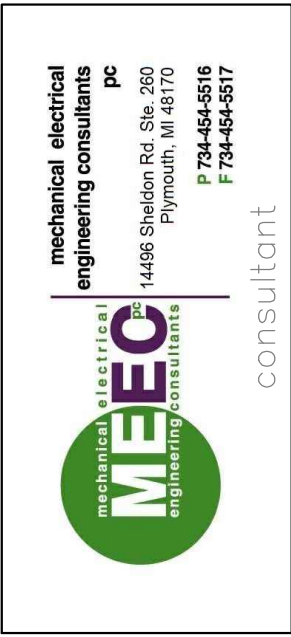


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MEP RENOVATIONS for:
BRIGHTON AREA SCHOOLS
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BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
PARTIAL ROOF - MECHANICAL NEW WORK PLAN

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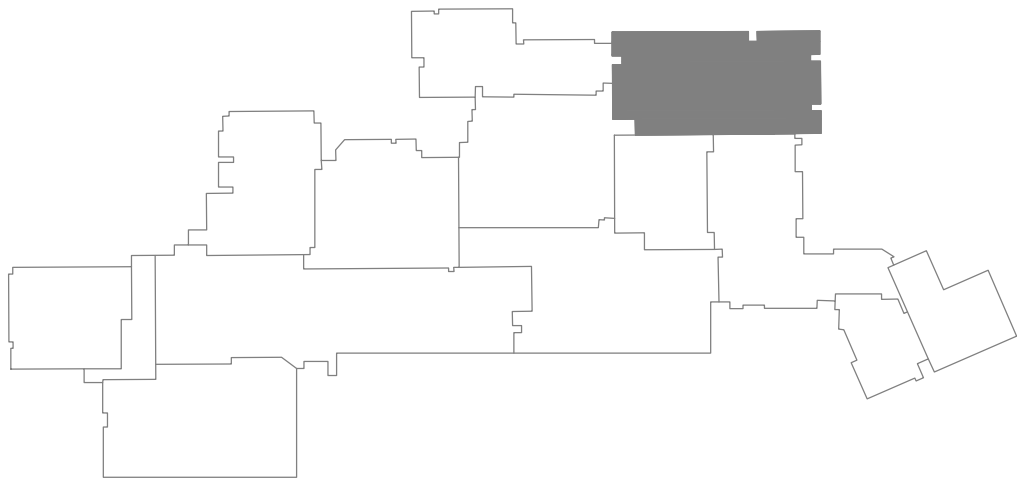
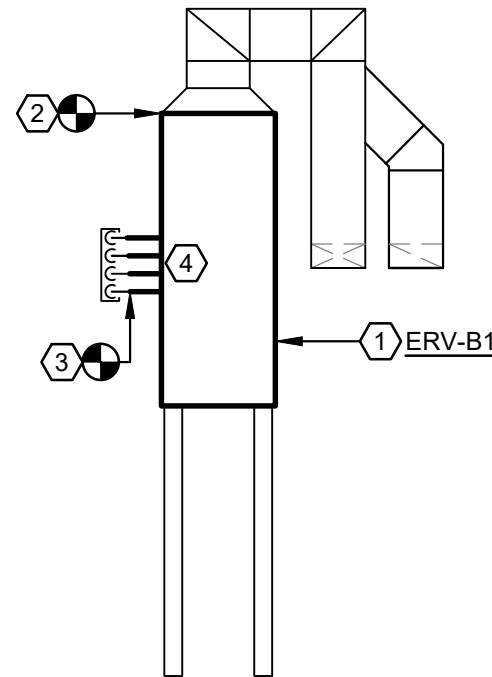
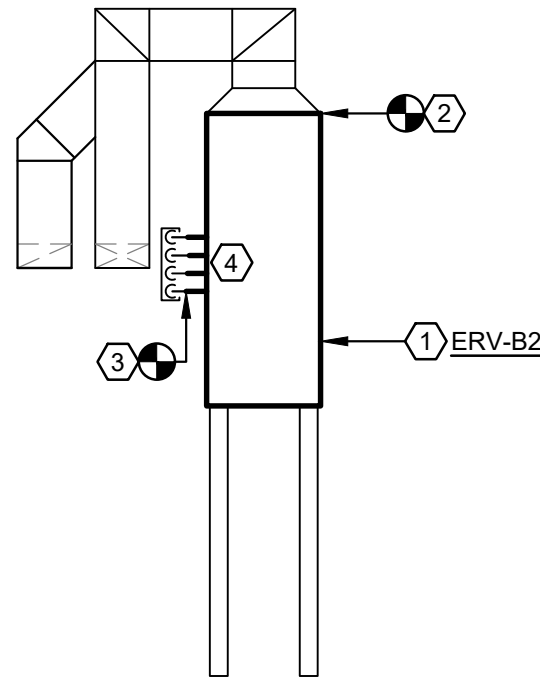
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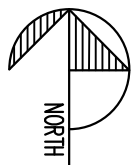


KEY PLAN
N.T.S.

KEY NOTES: (#)

1. CONTRACTOR SHALL FURNISH AND INSTALL A NEW ENERGY RECOVERY VENTILATOR UNIT (ERV). UNIT TO BE MOUNTED ON THE EXISTING STEEL SUPPORT BEAMS AS INDICATED. SECURE NEW UNIT TO EXISTING STEEL AS REQUIRED.

ALL CONTROLS, SENSORS, ACTUATORS, AND CONTROL WIRING SHALL BE PROVIDED AND INTEGRATED WITH THE EXISTING BMS. COORDINATE WITH CONTROLS CONTRACTOR TO ENSURE FULL FUNCTIONALITY, INCLUDING TEMPERATURE CONTROL VALVE MODULATION, AND SYSTEM MONITORING. INSTALLING CONTRACTOR SHALL VERIFY ALL EXISTING FIELD CONDITIONS AND COORDINATE WORK WITH ALL OTHER TRADES.
2. RECONFIGURE EXISTING DUCTWORK AS REQUIRED TO CONNECT TO THE NEW UNIT. MODIFY TRANSITIONS, ADAPTERS, OR OFFSETS AS REQUIRED TO ALIGN WITH THE NEW ERV DUCT CONNECTION FLANGES. INSPECT EXISTING DUCT INSULATION AND REPLACE ANY DAMAGED SECTIONS. ENSURE ALL REUSED DUCT JOINTS ARE RESEALED TO MEET CURRENT LEAKAGE REQUIREMENTS. INSULATE ALL NEW DUCTWORK TO MATCH EXISTING AND SEAL WATER TIGHT.
3. EXTEND / REWORK CHILLED WATER AND HEATING WATER PIPING AS REQUIRED TO CONNECT TO THE NEW ERV COILS CONNECTION LOCATIONS. PROVIDE ISOLATION BALL VALVES, BALANCING VALVES, STRAINERS, UNIONS, AND ALL REQUIRED ACCESSORIES FOR A COMPLETE INSTALLATION. ALL PIPING SHALL BE PROPERLY SUPPORTED, INSULATED, FLUSHED, AND TESTED. PROVIDE AIR VENTS AND DRAIN VALVES AS REQUIRED FOR PROPER SYSTEM OPERATION.
4. PROVIDE A CONTROL VALVES AT EACH COIL (CHILLED WATER AND HEATING WATER), COMPLETE WITH ACTUATORS COMPATIBLE WITH THE BUILDING MANAGEMENT SYSTEM (BMS). CONTROL VALVES SHALL BE SIZED AND SELECTED FOR PROPER MODULATION AND SYSTEM PERFORMANCE.



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MEP RENOVATIONS for:
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BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
PARTIAL ROOF - MECHANICAL NEW WORK PLAN

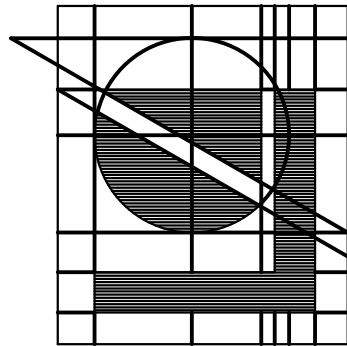
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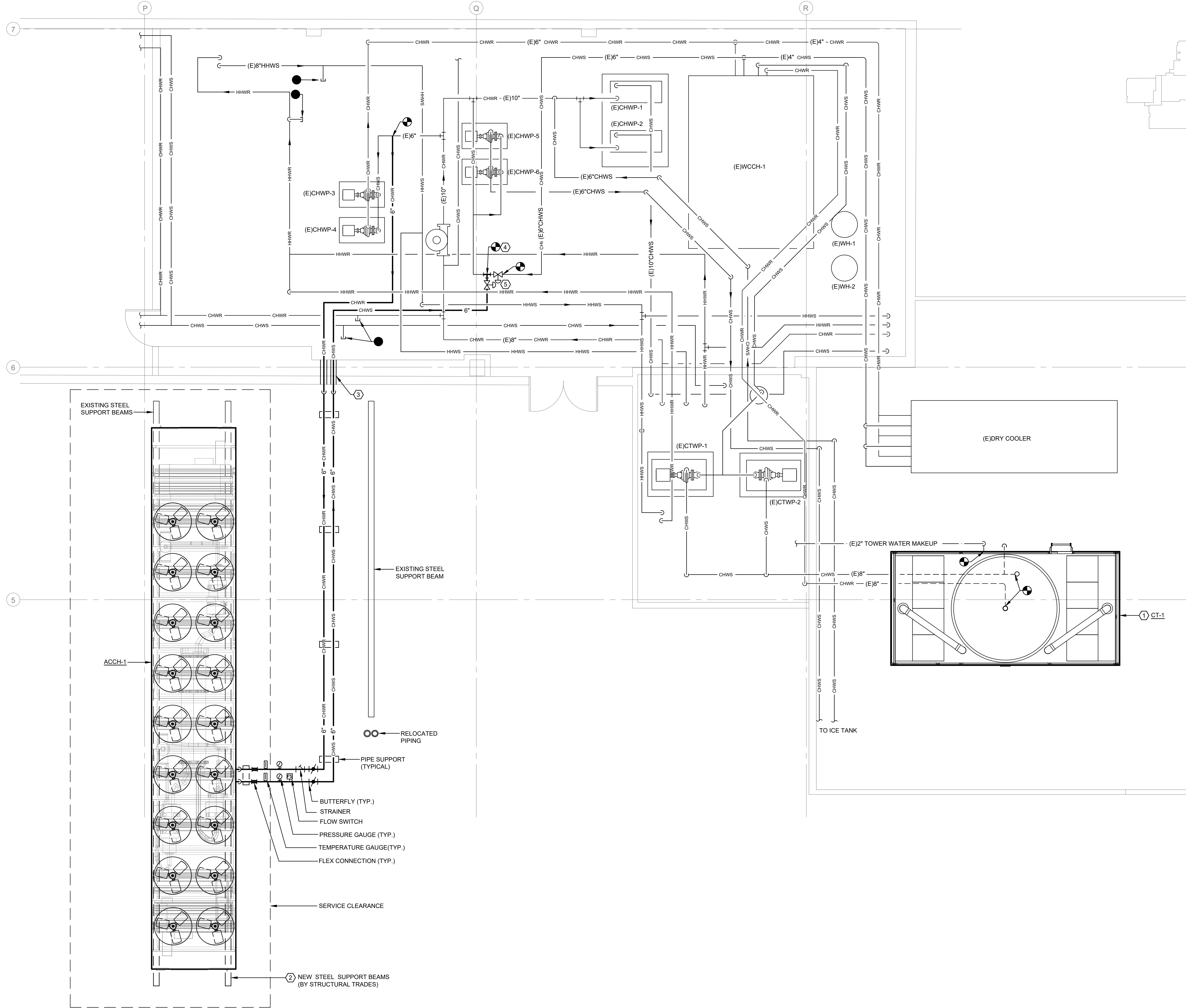
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Livonia, Michigan 48150
P 734-464-5816
F 734-464-5817
consultant

Lindhqut Associates
architects aia pc
10465 Clinton Drive, Brighton, Michigan 48116-3510
www.lindhqut.com fax (810) 227-5665 (810) 227-5668



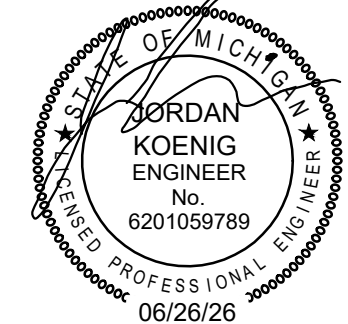
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PARTIAL ROOF - MECHANICAL PLAN



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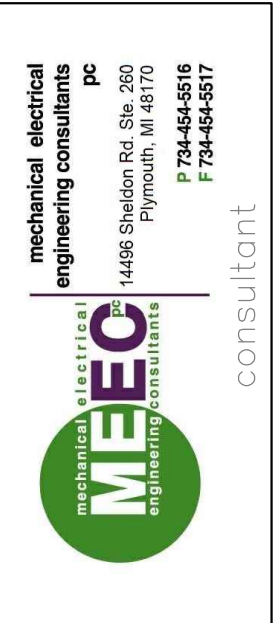
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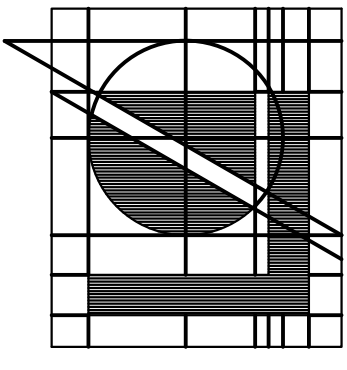
MEP RENOVATIONS for
BRIGHTON AREA SCHOOLS
- **BRIGHTON HIGH SCHOOL**
BRIGHTON, MICHIGAN
PARTIAL ROOF - MECHANICAL PLAN

dr: Z.S.
ck'd: W.V.
app'd: J.K.
date: 6-26-2026

BIDS & PERMITS
Issued for



Lindhout Associates
architects aia pc
10465 aldrich drive, Brighton, Michigan 48116-0510
www.lindhout.com fax: (810) 227-5855 (810) 227-5668



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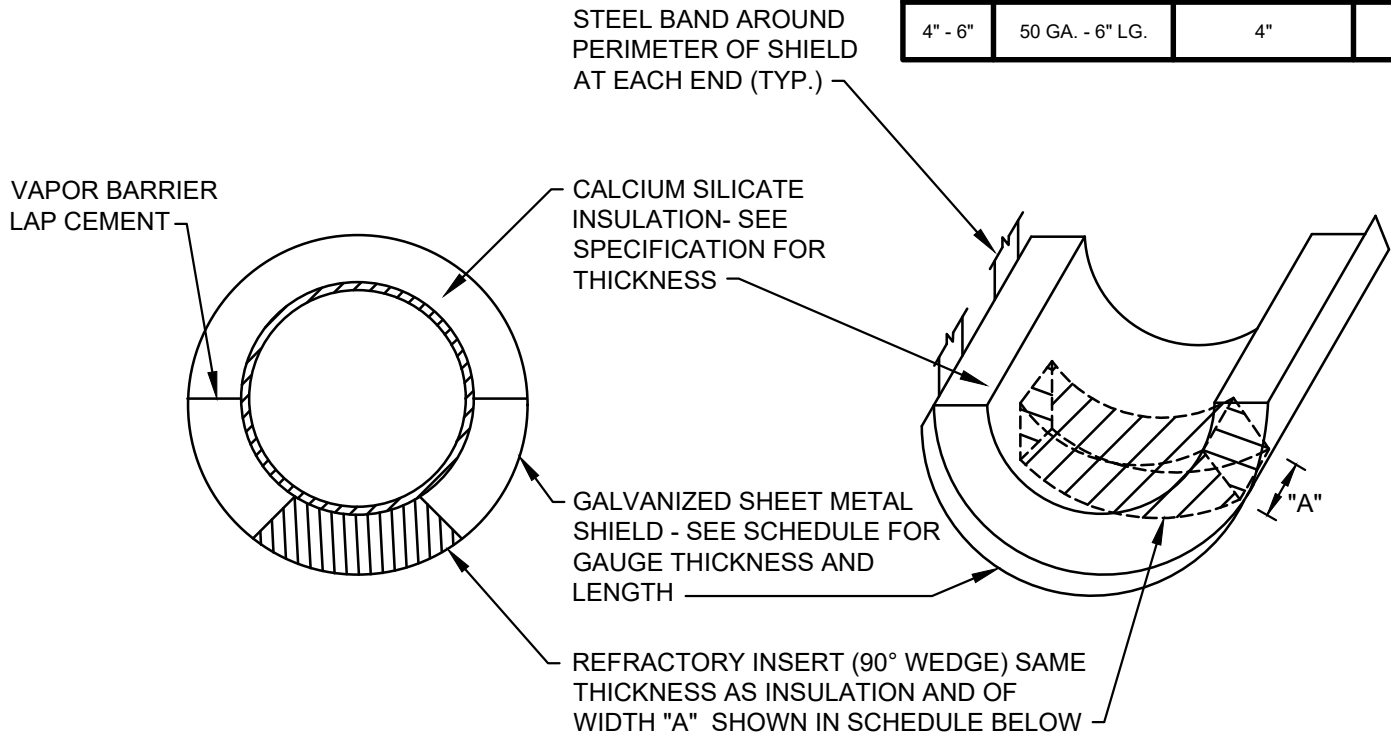
SCALE: 1/4" = 1'-0"

MECHANICAL DETAILS

PIPE HANGER SCHEDULE					
STEEL PIPE (STANDARD WEIGHT)			COPPER TUBING		
PIPE SIZE	ROD SIZE	MAX. SPACING	PIPE SIZE	ROD SIZE	MAX. SPACING
1" MAX.	3/8"	8'-0"	1" MAX.	3/8"	5'-0"
1" - 2"	3/8"	10'-0"	1 1/4" - 1 1/2"	3/8"	7'-0"
2 1/2" - 3"	1/2"	12'-0"	2"	1/2"	10'-0"
4" - 5"	5/8"	16'-0"	2 1/2" - 3"	1/2"	10'-0"
6" - 10"	3/4"	16'-0"	4"	5/8"	10'-0"

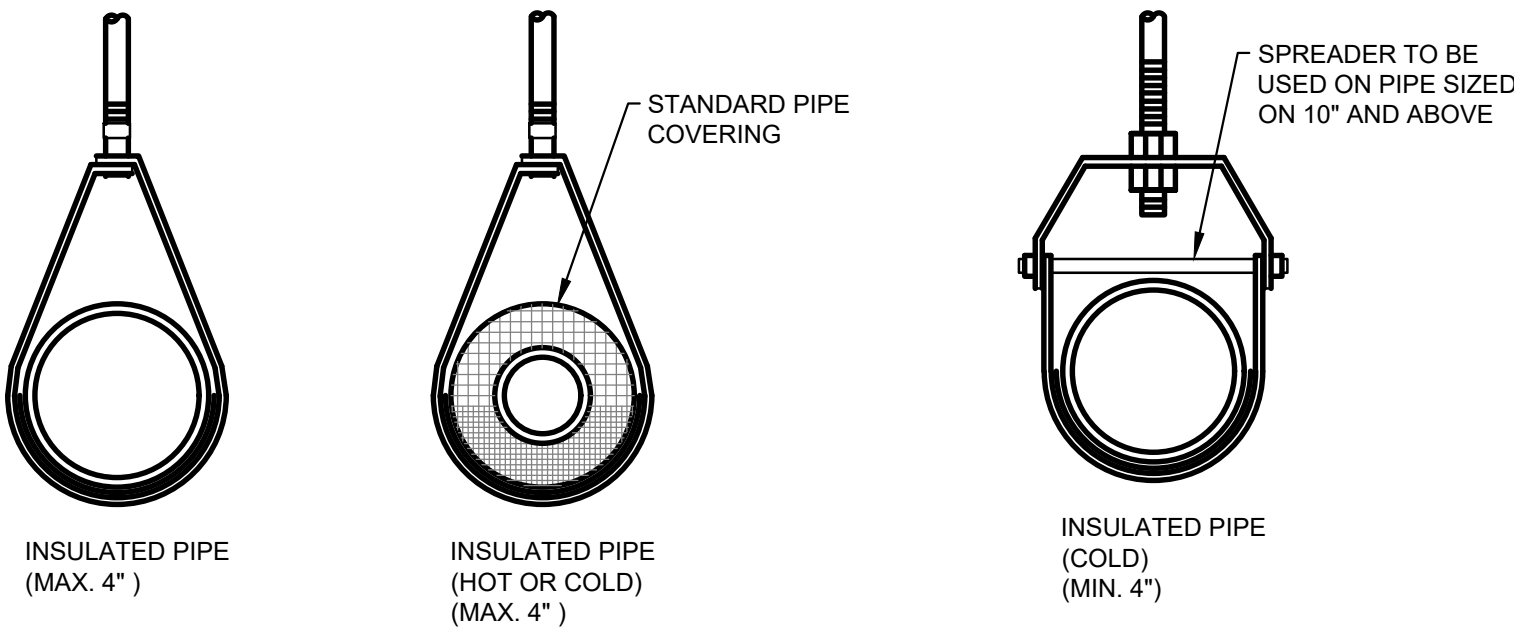
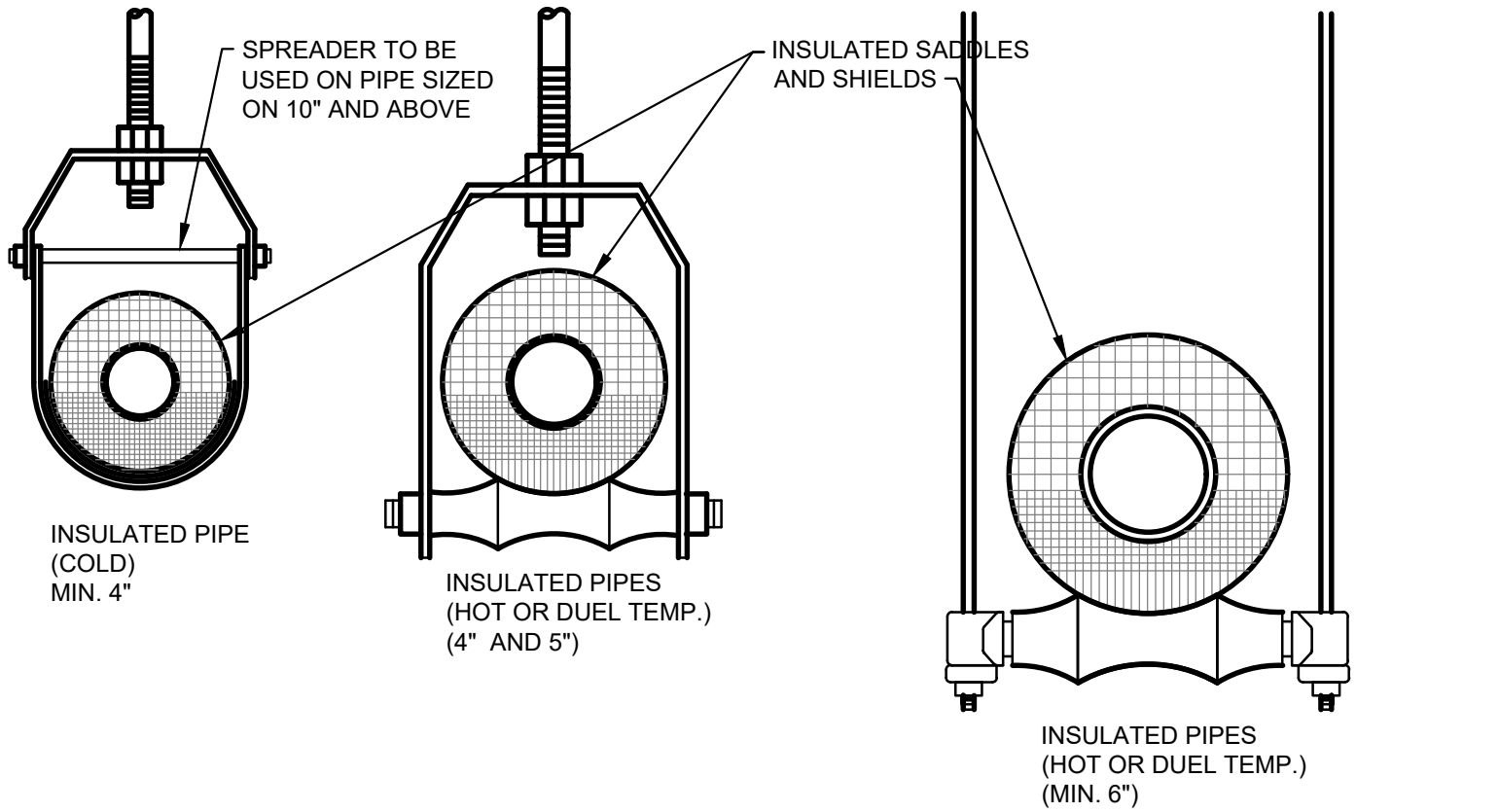
INSULATION SADDLE AND SHIELD SCHEDULES

PIPE SIZE	SHIELD GAUGE AND LENGTH	INSERT WIDTH "A"	
		COLD LINES	HOT OR DUEL TEMP. LINES
4" - 6"	50 GA. - 6" LG.	4"	4"



PIPE SUPPORT DETAIL

N.T.S.



HANGER PIPE DETAILS

N.T.S.

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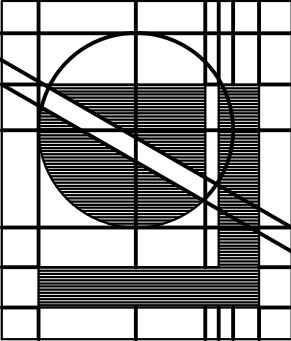
MEP RENOVATIONS for:
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MECHANICAL DETAILS

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dr:
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Lindhout Associates
architects aia pc
10465 clinton drive, brighton, michigan 48116-3510
www.lindhout.com fax (810) 227-5655 (810) 227-5668



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SCALE: NONE

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ENERGY RECOVERY VENTILATOR SCHEDULE																																				
MARK	MANUFACTURER	MODEL NUMBER	SUPPLY FAN					EXHAUST FAN					SUMMER HEAT WHEEL PERFORMANCE			WINTER HEAT WHEEL PERFORMANCE			PRE-HEAT COOLING COIL						HOT WATER HEATING COIL					FILTERS		WEIGHT (LBS)	ELECTRICAL			ACCESSORIES
			SA / OA (CFM)	ESP. (IN WG)	BHP	HP	VFD	EA (CFM)	ESP. (IN WG)	BHP	HP	VFD	OA °F (DB / WB)	RAT °F (DB / WB)	LAT °F (DB / WB)	E.A.T. DB / WB (°F)	R.A.T. DB / WB (°F)	L.A.T. DB / WB (°F)	E.A.T. DB (°F)	L.A.T. DB (°F)	E.W.T. (°F)	L.W.T. (°F)	TOTAL (MBH)	WATER FLOW (GPM)	E.A.T. DB (°F)	L.A.T. DB (°F)	E.W.T. (°F)	L.W.T. (°F)	TOTAL (MBH)	PRE. SA & EA	FINAL SA		VOLT / PHASE	MCA	MOP	
ERV-1	ANNEXAIR	ERU-E-05-HW-EW-HW-NC-4-S-B	6,100	1.5	6.54	8.0	YES	6,100	0.75	3.86	4.5	YES	86.2 / 76.7	72 / 63	75.0 / 64.5	0 / -1	70 / 63	40.3 / 40.1	-10	10	42	34	135	37	52.7	90	160	135	251	2" MERV 10	4" MERV 13	2,300	460 / 3	17	25	1, 2
ERV-2	ANNEXAIR	ERU-E-05-HW-EW-HW-NC-4-S-B	6,100	1.5	6.54	8.0	YES	6,100	0.75	3.86	4.5	YES	86.2 / 76.7	72 / 63	75.0 / 64.5	0 / -1	70 / 63	40.3 / 40.1	-10	10	42	34	135	37	52.7	90	160	135	251	2" MERV 10	4" MERV 13	2,300	460 / 3	17	25	1, 2

(APPROVED EQUAL: TRANE, AAOH, DAIKIN APPLIED, VALENT, VENMAR)

- NOTES:
1. UNIT TO BE MOUNTED ON EXISTING STEEL SUPPORT BEAMS.
2. ENTHALPY WHEEL HAS A 1/4 HP MOTOR AND SHALL MODULATE FOR FROST CONTROL.

ROOF TOP UNIT SCHEDULE																																											
MARK	MANUFACTURER	MODEL NUMBER	MINIMUM OUTSIDE AIR (CFM)	SUPPLY FAN SECTION						COOLING COIL - (BASED ON 30% ETHYLENE GLYCOL)										HEATING COIL								FILTERS				ELECTRICAL								WEIGHT (LBS)	NOTES		
				# OF FANS	TOTAL FAN AIRFLOW (CFM)	E.S.P. (IN W.G.)	TOTAL BHP (EA)	RPM (EA)	HP (EA)	FACE VEL (FPM)	COIL ROWS	ENT AIR DB (°F)	ENT AIR WB (°F)	LVG AIR DB (°F)	LVG AIR WB (°F)	AIR PD (IN WG)	SENSIBLE CAPACITY (MBH)	TOTAL CAPACITY (MBH)	FLOW RATE (GPM)	ENT WATER TEMP (°F)	LVG WATER TEMP (°F)	FACE VEL (FPM)	# OF ROWS	ENT AIR DB (°F)	LVG AIR DB (°F)	AIR PD (IN WG)	TOTAL CAPACITY (MBH)	FLOW RATE (GPM)	ENT WATER TEMP (°F)	LVG WATER TEMP (°F)	MAX FACE VEL (FPM)	FILTER EFFICIENCY		CIRCUIT #1 (SUPPLY FAN+CONTROLS+LIGHTS+SWITCH)				CIRCUIT #2 RECEPTACLE					
																																PRE	FINAL	VOLTS / PHASE	F.L.A.	M.C.A.	M.O.P.	VOLTS / PHASE	F.L.A.			M.C.A.	M.O.P.
RTU-C1 THRU RTU-C10	TRANE	CSAA004	1,800	1	1,800	3.5"	2.46	4499	3	399	6	85	76	54	53.9	0.6	62.19	136.73	25.5	42	54.2	399	2	0	78	0.113	152.26	13.4	180	157.3	324	(2) 2" PLEATED / MERV 8	(2) 12" BAG CARTRIDGE 65% MERV 13	480 / 3	6.1 A	7.3	15	115 / 1	8.0 A	10.0	15	2,300	1 - 9
RTU-C12, RTU-C18 RTU-C20, RTU-C22	TRANE	CSAA004	1,800	1	1,800	3.5"	2.46	4499	3	399	6	85	76	54	53.9	0.6	62.19	136.73	25.5	42	54.2	399	2	0	78	0.113	152.26	13.4	180	157.3	324	(2) 2" PLEATED / MERV 8	(2) 12" BAG CARTRIDGE 65% MERV 13	480 / 3	6.1 A	7.3	15	115 / 1	8.0 A	10.0	15	2,300	1 - 9

(APPROVED EQUAL: CARRIER, VENTROL, VENMAR, DAIKIN, SEASONS 4, CLIMATE CRAFT)

- NOTES:
1. SUPPLY AIR MOTOR SHALL BE DIRECT DRIVE, CONTROLLED BY A VARIABLE FREQUENCY DRIVE.
2. PROVIDE 5% LINE REACTORS FOR VARIABLE SPEED DRIVE.
3. PROVIDE INDIVIDUAL HOT WATER AND CHILLED WATER COILS.
4. ALL DAMPERS WITHIN THE UNIT ARE TO BE PROVIDED BY UNIT MANUFACTURER.
5. PROVIDE HINGED ACCESS DOORS.
6. HEATING HOT WATER DATA BASED ON (100% WATER) AND CHILLED WATER DATA BASED ON (30% ETHYLENE GLYCOL)
7. DOUBLE WALL, THERMALLY BROKEN INSULATED CABINET WITH 2" FOAM INJECTED r-13 INSULATION.
8. PROVIDE CUSTOM ADAPTOR CURB TO MOUNT NEW UNIT ON EXISTING CURB.
9. PROVIDE MARINE LIGHT IN THE FAN, COILING COIL, HEATING COIL AND MIXING BOX SECTIONS.

AIR COOLED CHILLER SCHEDULE																																			
MARK	MANUFACTURER	MODEL NUMBER	TYPE	NOMINAL CAPACITY (TONS)	EVAPORATOR				ICE BUILD				ICE MELT				CONDENSER				COMPRESSOR			PUMPS				REFRIGERANT			ELECTRICAL			WEIGHT (LBS)	NOTES:
					FLOW GPM	FLUID TYPE	# OF PASSES	FOULING FACTOR	E.W.T. °F	L.W.T. °F	CAPACITY (TONS)	W.P.D. (FT. HEAD)	E.W.T. °F	L.W.T. °F	CAPACITY (TONS)	W.P.D. (FT. HEAD)	AMBIENT ICE BUILD °F	AMBIENT ICE MELT °F	NO. OF FANS	FAN FLA (EA)	TYPE	NUMBER OF COMP.	RLA (EACH)	TYPE	FLOW (GPM)	TOTAL HEAD PRESSURE (FT H2O)	MOTOR (HP)	TYPE	NUMBER OF CIRCUITS	CHARGE PER CIRCUIT (LBS)	VOLTS / PHASE	M.C.A.	M.O.P.		
ACCH-1	TRANE	ACR-C-440	AIR COOLED	440	800	30% ETHYLENE GLYCOL	2	0.0001	31.72	22.00	294.8	56.3	56.12	42.00	430.9	55.1	85	95	18	2.7	SCREW	3	251.8 195.7 242.1	TACO	800	125	40	R-513A	2	366 / 177	480 / 3	856.8	1,000	30,500	1 - 7

- NOTES:
1. PROVIDE WITH LIQUID, DISCHARGE AND SUCTION LINE SHUT-OFF VALVES
2. PROVIDE A SINGLE POINT DISCONNECT SWITCH WITH CIRCUIT PROTECTION
3. PROVIDE WITH PHASE & UNDERVOVER VOLTAGE PROTECTION
4. PROVIDE A FIVE YEAR COMPRESSOR PARTS WARRANTY
5. PROVIDE A RUBBER IN SHEAR ISOLATOR KIT
6. PUMP PACKAGE SHALL BE EQUIPPED WITH:
A. SINGLE TACO 40HP PUMP WITH VFD FOR BALANCING
B. TYPE INLET STRAINER
C. COMBINATION TRIPLE-DUTY OUTLET VALVE HAVING A DRIP-TIGHT DISCHARGE SHUTOFF VALVE, NON-SLAM CHECK VALVE, AND FLOW THROTTLING VALVE
D. COMBINATION SUCTION GUIDE WITH FLOW STABILIZING OUTLET VANES AND STAINLESS STEEL STRAINER WITH A DISPOSABLE FINE-MESH STRAINER FOR START-UP
E. FACTORY POWER AND CONTROL WIRING FROM THE CHILLER TO THE PUMP PACKAGE CONTROL PANEL
F. THERMAL DISPERSION TYPE FLOW SWITCH MOUNTED AND WIRED
G. INTERCONNECTING SCHEDULE 40 PIPING WITH VICTAULIC COUPLINGS
H. INSULATION OF ALL COLD SURFACES

COOLING TOWER SCHEDULE																				
MARK	MANUFACTURER	MODEL NUMBER	TYPE	CAPACITY (TONS)	AIR DATA		FAN DATA		ELECTRICAL			WATER DATA				DIMENSIONS			WEIGHT (LBS)	NOTES:
					CFM	E.W.B. (°F)	#	HP	VOLTS / PHASE	FLA	MOCP	FLOW (GPM)	E.W.T. (°F)	L.W.T. (°F)	STATIC LIFT (FT.HD.)	WIDTH (FT.)	HEIGHT (FT.)	LENGTH (FT.)		
CT-1	MARLEY	NC8405QAN1	CROSSFLOW	434	113,060	77.2	1	20	460 / 3	33	70	1,300	93.5	84.5	12.3	19'-11"	11'-11"	9'-10"	20,200	1-12

(APPROVED EQUAL: EVAPCO, BALTIMORE AIR COIL, TOWER TECH)

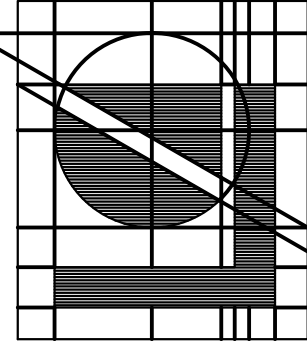
- NOTES:
1. PROVIDE WITH WELDED TYPE 304 STAINLESS STEEL WATER BASIN.
2. PROVIDE WITH LOW SOUND FAN ASSEMBLY.
3. PROVIDE WITH 8"Ø BOTTOM INLET AND 14"Ø BOTTOM OUTLET PIPING CONNECTIONS & 10"Ø BYPASS CONNECTION
4. VARIABLE SPEED FAN(S) WITH CONTROLLER(S).
5. PROVIDE AND INSTALL UNIT ON MANUFACTURER RECOMMENDED RESTRAINED SPRING ISOLATORS.
6. UNIT SHALL BE U.L. LISTED.
7. PROVIDE O.S.H.A. APPROVED SERVICE PLATFORM WITH HAND RAIL AND ACCESS LADDER.
8. PROVIDE VIBRATION CUT OUT SWITCH.
9. PROVIDE EXTENDED LUBRICATION LINES.
10. PROVIDE MECHANICAL, ELECTRIC MAKE-UP WATER CONTROL PACKAGE.
11. PROVIDE 5 YEAR FAN, SHAFT, AND INTERIOR WARRANTY.
12. PROVIDE TOTALLY ENCLOSED FAN MOTOR(S).



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MECHANICAL SCHEDULES



Lindhout Associates
architects aia pc
10465 columbia drive, brighton, michigan 48116-3510
www.lindhout.com fax (810) 227-5665 (810) 227-5668



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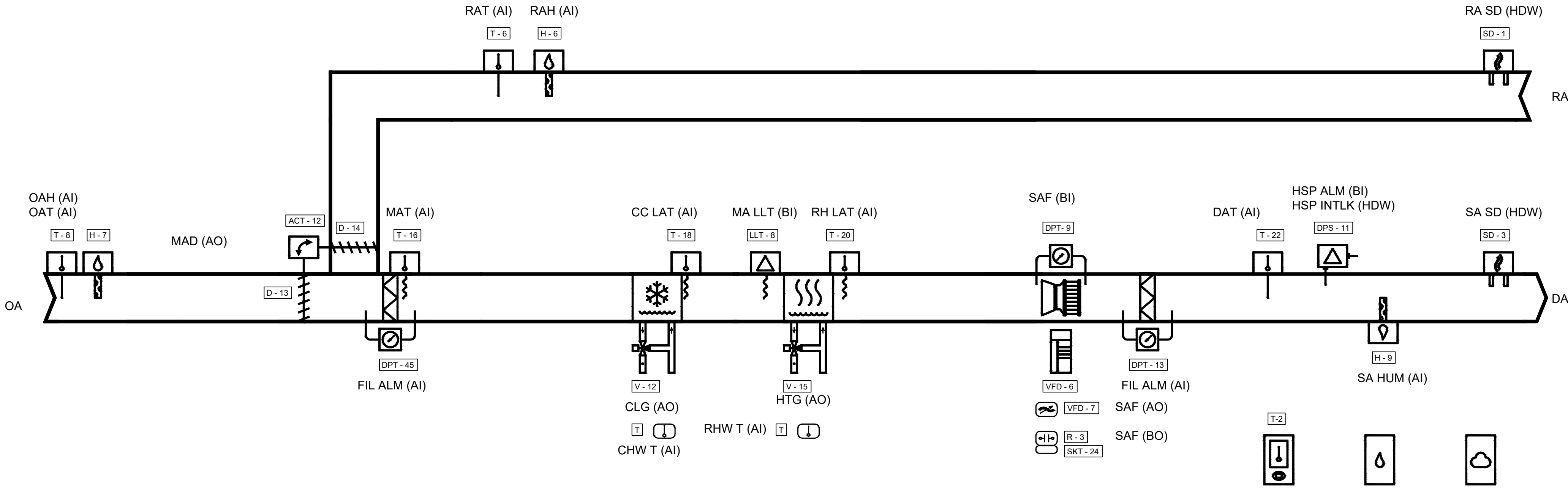
z.s. dr: 6-26-2026
ck' d: date
app'd: j.k.

MEP RENOVATIONS for:
BRIGHTON AREA SCHOOLS
BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
MECHANICAL SCHEDULES

M3.0
26022

FILE LOCATION: A:\LINDHQUT\26-0029 BUS CHILLER and RTU Upgrade\M4.0 - MECHANICAL CONTROLS.dwg
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MECHANICAL CONTROLS



RTUs Flow Diagram

SEQUENCE OF OPERATION: ROOF TOP UNITS (RTU-C1, RTU-C2, RTU-C3, RTU-C4, RTU-C5, RTU-C6, RTU-C7, RTU-C8, RTU-C9, RTU-C10, RTU-12, RTU-C18, RTU-C20, RTU-C22)

BUILDING AUTOMATION SYSTEM INTERFACE:

THE BUILDING AUTOMATION SYSTEM (BAS) SHALL SEND THE CONTROLLER OCCUPIED BYPASS, MORNING WARM-UP/PRE-COOL, OCCUPIED/UNOCCUPIED AND HEAT/COOL MODES. IF A BAS IS NOT PRESENT, OR COMMUNICATION IS LOST WITH THE BAS THE CONTROLLER SHALL OPERATE USING DEFAULT MODES AND SETPOINTS.

OCCUPIED:

DURING OCCUPIED PERIODS, THE SUPPLY FAN SHALL RUN CONTINUOUSLY AND THE MIXED AIR DAMPERS SHALL OPEN TO MAINTAIN MINIMUM VENTILATION REQUIREMENTS. IN THE COOLING MODE THE CHILLED WATER VALVE SHALL MODULATE TO CONTROL THE ACTIVE SPACE TEMPERATURE SETPOINT. IN THE HEATING MODE THE HOT WATER VALVE SHALL MODULATE TO CONTROL THE ACTIVE SPACE TEMPERATURE SETPOINT. IF THE SPACE TEMPERATURE SENSOR FAILS, THE COOLING AND HEATING SHALL FALLBACK TO CONTROL TO THE DISCHARGE AIR TEMPERATURE SETPOINT OF 70 DEG F (ADJ.) AND AN ALARM SHALL BE ANNUNCIATED AT THE BAS. THE SUPPLY FAN SHALL BE DISABLED, THE CHILLED WATER VALVE SHOULD CLOSE, THE HEATING VALVE SHOULD CLOSE, THE OUTDOOR AIR SHOULD CLOSE, AND AN ALARM SHOULD ANNUNCIATE AT THE BAS.

UNOCCUPIED:

DURING THE UNOCCUPIED PERIODS, THE SUPPLY FAN SHALL BE DISABLED, THE OUTSIDE AIR DAMPER SHALL CLOSE, THE MECHANICAL COOLING SHALL BE DISABLED, THE MECHANICAL HEATING SHALL BE DISABLED, TO CONSERVE ENERGY. WHEN THE SPACE TEMPERATURE IS ABOVE THE UNOCCUPIED COOLING SETPOINT OF 85 DEG F (ADJ.) THE SUPPLY FAN SHALL START, THE OUTDOOR DAMPER SHALL REMAIN CLOSED. THE OUTDOOR DAMPER SHALL MODULATE IF ECONOMIZING IS ENABLED AND REMAIN CLOSED IF NOT ECONOMIZING, AND THE MECHANICAL COOLING SHALL BE ENABLED. WHEN THE SPACE TEMPERATURE FALLS BELOW THE UNOCCUPIED COOLING SETPOINT OF 85.0 DEG. F (ADJ.) MINUS THE UNOCCUPIED DIFFERENTIAL OF 4.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL STOP, THE OUTDOOR DAMPER SHALL REMAIN CLOSED, AND THE MECHANICAL COOLING SHALL BE DISABLED. WHEN THE SPACE TEMPERATURE IS BELOW THE UNOCCUPIED HEATING SETPOINT OF 60.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL START, THE OUTDOOR DAMPER SHALL REMAIN CLOSED, AND THE MECHANICAL HEATING SHALL BE ENABLED. WHEN THE SPACE TEMPERATURE IS ABOVE THE UNOCCUPIED HEATING SETPOINT OF 60.0 DEG. F (ADJ.) PLUS THE UNOCCUPIED DIFFERENTIAL OF 4.0 DEG. F (ADJ.) THE SUPPLY FAN SHALL STOP, THE OUTDOOR DAMPER SHALL REMAIN CLOSED, AND THE MECHANICAL HEATING SHALL BE DISABLED.

OPTIMAL START:

THE BAS SHALL MONITOR THE SCHEDULED OCCUPIED TIME, OCCUPIED SPACE SETPOINTS AND SPACE TEMPERATURE TO CALCULATE WHEN THE OPTIMAL START OCCURS.

OPTIMAL STOP:

THE BAS SHALL MONITOR THE SCHEDULED UNOCCUPIED TIME, OCCUPIED SETPOINTS AND SPACE TEMPERATURE TO CALCULATE WHEN THE OPTIMAL STOP MODE IS ACTIVE. THE UNIT CONTROLLER SHALL SWITCH TO THE UNOCCUPIED MODE. OUTSIDE AIR DAMPER SHALL REMAIN ENABLED TO PROVIDE MINIMUM VENTILATION.

OCCUPIED BYPASS:

THE BAS SHALL MONITOR THE STATUS OF THE ON AND CANCEL BUTTONS OF THE SPACE TEMPERATURE SENSOR. WHEN AN OCCUPANT REQUEST IS MADE BY A SPACE SENSOR, THE UNIT SHALL TRANSITION FROM ITS CURRENT OCCUPANCY MODE TO OCCUPIED BYPASS MODE AND THE UNIT SHALL MAINTAIN THE SPACE TEMPERATURE TO THE OCCUPIED SETPOINTS (ADJ.).

HEAT/COOL MODE:

WHEN THE SPACE TEMPERATURE RISES ABOVE THE OCCUPIED COOLING SETPOINT THE MODE SHALL TRANSITION TO COOLING. WHEN THE SPACE TEMPERATURE FALLS BELOW THE OCCUPIED HEATING SETPOINT THE MODE SHALL TRANSITION TO HEATING. WHEN THE SPACE TEMPERATURE IS BELOW THE OCCUPIED COOLING SETPOINT AND ABOVE THE OCCUPIED HEATING SETPOINT THE MODE SHALL REMAIN IN ITS LAST STATE. IF THE SPACE TEMPERATURE SENSOR FAILS, THE MODE SHALL DEFAULT TO HEATING AND AN ALARM SHALL ANNUNCIATE AT THE BAS.

MORNING WARM-UP MODE:

DURING OPTIMAL START, IF THE SPACE TEMPERATURE IS BELOW THE OCCUPIED HEATING SETPOINT A MORNING WARM-UP MODE SHALL BE ACTIVATED. WHEN MORNING WARM-UP IS INITIATED THE UNIT SHALL ENABLE THE HEATING AND FAN(S). THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED. WHEN THE SPACE TEMPERATURE REACHES THE OCCUPIED HEATING SETPOINT (ADJ.), THE UNIT SHALL TRANSITION TO THE OCCUPIED MODE.

DAYTIME WARM-UP CONTROL:

DURING OCCUPIED PERIODS, WHEN THE SPACE TEMPERATURE IS BELOW THE DAYTIME WARM-UP INITIATE SETPOINT, A DAYTIME WARM-UP SEQUENCE SHALL BE ACTIVATED. THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN MINIMUM VENTILATION REQUIREMENTS, AND THE HEATING SHALL ENABLE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE HEATING SETPOINT. DAYTIME WARM-UP SHALL TERMINATE WHEN THE AVERAGE SPACE TEMPERATURE REACHES THE OCCUPIED HEATING SETPOINT.

PRE-COOL MODE:

DURING OPTIMAL START, IF THE SPACE TEMPERATURE IS ABOVE THE OCCUPIED COOLING SETPOINT, PRE-COOL MODE SHALL BE ACTIVATED. WHEN PRE-COOL IS INITIATED THE UNIT SHALL ENABLE THE FAN AND COOLING OR ECONOMIZER. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED, UNLESS ECONOMIZING. WHEN THE SPACE TEMPERATURE REACHES OCCUPIED COOLING SETPOINT (ADJ.), THE UNIT SHALL TRANSITION TO THE OCCUPIED MODE.

SUPPLY FAN:

THE SUPPLY FAN SHALL BE OFF IN THE UNOCCUPIED MODE. WHEN THE CONTROLLER IS IN THE OCCUPIED MODE, THE SUPPLY FAN SHALL OPERATE CONTINUOUSLY. THE UNIT CONTROLLER SHALL VARY THE SUPPLY FAN SPEED TO OPTIMIZE MINIMUM FAN SPEED IN ALL COOLING AND HEATING MODES. IF THE SUPPLY FAN FAILS TO PROVE STATUS FOR 30 SECONDS (ADJ.), THE FAN SHALL BE COMMANDED OFF, THE OUTSIDE AIR DAMPER SHALL CLOSE, COOLING SHALL BE DISABLED, ALL HEATING SHALL BE DISABLED, AND AN ALARM SHALL ANNUNCIATE AT THE BAS. A MANUAL RESET SHALL BE REQUIRED TO RESTART THE FAN. A HARDWIRED, HIGH STATIC PRESSURE CUT-OFF SWITCH SHALL BE ELECTRICALLY INTERLOCKED WITH THE VARIABLE SPEED DRIVE. IF THE HIGH STATIC PRESSURE CUT-OFF SWITCH IS TRIPPED THE FAN SHALL BE COMMANDED OFF, HEATING SHALL BE DISABLED, COOLING SHOULD BE DISABLED, THE OUTSIDE AIR DAMPER SHALL CLOSE, AND AN ALARM SHALL ANNUNCIATE AT THE BAS. A MANUAL RESET OF THE HIGH STATIC PRESSURE CUT-OFF SWITCH SHALL BE REQUIRED TO RESTART THE FAN.

LOW LIMIT TEMPERATURE CONTROL:

THE INITIAL DAMPER OPENING RATE SHALL BE LIMITED TO 2% PER MINUTE (ADJ.) UNTIL THE DAMPER HAS REACHED ITS MINIMUM VENTILATION POSITION. THE OUTSIDE AIR DAMPER SHALL MODULATE TO A POSITION LESS THAN THE MINIMUM DAMPER POSITION IF THE MIXED AIR TEMPERATURE DROPS BELOW 45.0 DEG. F (ADJ.). IF THE MIXED AIR TEMPERATURE SENSOR FAILS AN ALARM SHALL ANNUNCIATE AT THE BAS AND THE OUTSIDE AIR DAMPER SHALL CLOSE.

DISCHARGE AIR TEMPERATURE CONTROL:

AT THE ZONE'S DESIGN COOLING LOAD, THE SUPPLY FAN SHALL OPERATE AT MAXIMUM SPEED (DESIGN AIRFLOW) AND THE COOLING CAPACITY SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT SETPOINT (55.0 DEG. F. ADJ.). AS THE ZONE COOLING LOAD DECREASES, THE SUPPLY FAN VFD SHALL DECREASE FAN SPEED TO MAINTAIN THE SPACE TEMPERATURE AT COOLING SETPOINT PLUS 0.5 DEG. F. WHILE THE COOLING CAPACITY SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE RESET MINIMUM SETPOINT (55.0 DEG. F. ADJ.) WHEN THE ZONE COOLING LOAD HAS DECREASED TO THE POINT THAT THE SUPPLY FAN VFD HAS REACHED ITS MINIMUM SPEED, THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE GRADUALLY RESET UPWARD TOWARD THE OCCUPIED COOLING SETPOINT, ATTEMPTING TO KEEP THE SPACE TEMPERATURE 0.5 DEG. F. BELOW THE COOLING SETPOINT. THE SUPPLY FAN SHALL OPERATE AT MINIMUM SPEED WHILE THE COOLING CAPACITY SHALL MODULATE TO MAINTAIN THIS RESET DISCHARGE AIR TEMPERATURE SETPOINT. IF THE SUPPLY FAN BEGINS TO MODULATE UPWARD FROM THE MINIMUM SPEED TO MAINTAIN SPACE COOLING SETPOINT PLUS 0.5 DEG. F, THE DISCHARGE AIR SETPOINT RESET SHALL BE BYPASSED AND THE DISCHARGE AIR SETPOINT SHALL BE SET TO MINIMUM (55.0 DEG. F. ADJ.).

IN THE HEATING MODE, THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET UPWARD FROM THE OCCUPIED HEATING SETPOINT TOWARD MAXIMUM LIMIT (95.0 DEG. F. ADJ.); ATTEMPTING TO KEEP THE SPACE TEMPERATURE 0.5 DEG. F. ABOVE THE HEATING SETPOINT. IF THE SUPPLY FAN BEGINS TO MODULATE UPWARD FROM THE MINIMUM SPEED TO MAINTAIN THE OCCUPIED HEATING SETPOINT MINUS 0.5 DEG. F, THE DISCHARGE AIR SETPOINT RESET SHALL BE BYPASSED AND THE DISCHARGE AIR SETPOINT SHALL BE SET TO MAXIMUM (95.0 DEG. F. ADJ.). AS THE ZONE HEATING LOAD CONTINUES TO INCREASE THE SUPPLY FAN VFD SHALL INCREASE FAN SPEED TO MAINTAIN THE SPACE TEMPERATURE AT HEATING SETPOINT, WHILE THE HEATING CAPACITY SHALL BE STAGED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT THIS MAXIMUM LIMIT (95.0 DEG. F. ADJ.). AS THE ZONE HEATING LOAD CONTINUES TO INCREASE THE SUPPLY FAN VFD SHALL INCREASE FAN SPEED TO MAINTAIN THE SPACE TEMPERATURE AT THIS MAXIMUM LIMIT (95.0 DEG. F. ADJ.). THE BAS SHALL OVERRIDE THE RESET FUNCTION TO THE MINIMUM DISCHARGE AIR TEMPERATURE SETPOINT WHEN:

- OUTDOOR DEW POINT IS HIGHER THAN 60.0 DEG. F (ADJ.)
- SPACE OR RETURN HUMIDITY SENSOR DEWPOINT IS HIGHER THAN 60 DEG F (ADJ.)

IF THE DISCHARGE AIR TEMPERATURE RISES ABOVE THE MAXIMUM LIMIT, A HIGH TEMPERATURE ALARM SHALL ANNUNCIATE TO THE BAS. IF THE DISCHARGE AIR TEMPERATURE DROPS BELOW THE MINIMUM LIMIT, A LOW TEMPERATURE ALARM SHALL ANNUNCIATE TO THE BAS.

ECONOMIZER MODE:

THE OUTSIDE AIR (OA) ENTHALPY SHALL BE COMPARED WITH RETURN AIR (RA) ENTHALPY POINT. THE ECONOMIZER SHALL ENABLE WHEN OA ENTHALPY IS LESS THAN RA ENTHALPY - 2.0 BTU/LB. THE ECONOMIZER SHALL DISABLE WHEN OA ENTHALPY IS GREATER THAN RA ENTHALPY.

WHEN ECONOMIZING IS ENABLED AND THE UNIT IS OPERATING IN THE COOLING MODE, THE ECONOMIZER DAMPER SHALL BE MODULATED BETWEEN ITS MINIMUM POSITION AND 100% OPEN TO MAINTAIN THE SPACE TEMPERATURE SETPOINT. THE ECONOMIZER DAMPER SHALL MODULATE TOWARD MINIMUM POSITION IN THE EVENT THE MIXED AIR TEMPERATURE FALLS BELOW THE LOW TEMPERATURE LIMIT SETTING.

OCCUPIED HUMIDITY CONTROL:

IF THE SPACE RELATIVE HUMIDITY IS GREATER THAN 50% (ADJ.), THE CHILLED WATER VALVE SHALL MODULATE TO MAINTAIN SPACE RELATIVE HUMIDITY SETPOINT OF 50% (ADJ.) AND THE REHEAT VALVE SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. MODE SHALL TERMINATE WHEN THE SPACE RELATIVE HUMIDITY FALLS BELOW THE RELATIVE HUMIDITY SETPOINT OF 50% (ADJ.) MINUS 3% (ADJ.). IF THE SPACE RELATIVE HUMIDITY SENSOR FAILS THE DEHUMIDIFICATION SEQUENCE SHALL BE TERMINATED AND AN ALARM SHALL ANNUNCIATE AT THE BAS.

FREEZE PROTECTION:

A HARDWIRED, LOW LIMIT TEMPERATURE SWITCH SHALL BE ELECTRICALLY INTERLOCKED WITH THE VARIABLE SPEED DRIVE. IF THE LOW LIMIT TEMPERATURE SWITCH IS TRIPPED 38.0 DEG. F (ADJ.), THE FAN SHALL BE COMMANDED OFF AND THE OUTSIDE AIR DAMPER SHALL CLOSE. ALL VALVES SHALL BE COMMANDED OPEN TO 100% OPEN (ADJUST PER CLIMATE). AN ALARM SHALL ANNUNCIATE AT THE BAS AND MANUAL RESET OF THE LOW LIMIT TEMPERATURE SWITCH SHALL BE REQUIRED TO RESTART THE FAN.

DEMAND CONTROL VENTILATION:

USING A SPACE CO2 INPUT (LOCAL SENSOR OR NETWORK COMMUNICATED VALUE), THE CONTROLLER SHALL MONITOR AND COMPARE THE MEASURED SPACE CO2 TO THE SPACE CO2 CONCENTRATION SETPOINT (ADJ.). WHEN THE MEASURED SPACE CO2 CONCENTRATION REACHES THE SETPOINT (ADJ.), THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN INCREMENTALLY UNTIL THE SPACE CO2 LEVEL IS SATISFIED OR THE OUTSIDE AIR DAMPER REACHES THE FULL OPEN POSITION. IF THE MEASURED CO2 CONCENTRATION FALLS, THE OUTSIDE AIR DAMPER SHALL MODULATE TOWARD NORMAL ECONOMIZER OPERATION. IF THE MIXED AIR TEMPERATURE DROPS BELOW THE MIXED AIR LOW LIMIT SETPOINT THE CO2 SENSOR INPUT IS OVERRIDDEN AND THE OUTSIDE AIR DAMPER SHALL BE MODULATED CLOSED TO MAINTAIN THE MIXED AIR TEMPERATURE LOW LIMIT SETPOINT. WHEN THE MIXED AIR TEMPERATURE RISES ABOVE THE MIXED AIR LOW LIMIT SETPOINT, CO2 OPERATION IS RESTORED.

FILTER STATUS:

A DIFFERENTIAL PRESSURE TRANSMITTER SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER(S) WHEN THE FAN IS RUNNING. IF THE DIFFERENTIAL PRESSURE ACROSS THE FILTER IS HIGHER THAN THE FILTER ALARM SETPOINT, A DIRTY FILTER ALARM SHALL ANNUNCIATE AT THE BAS.

SMOKE DETECTOR SHUTDOWN:

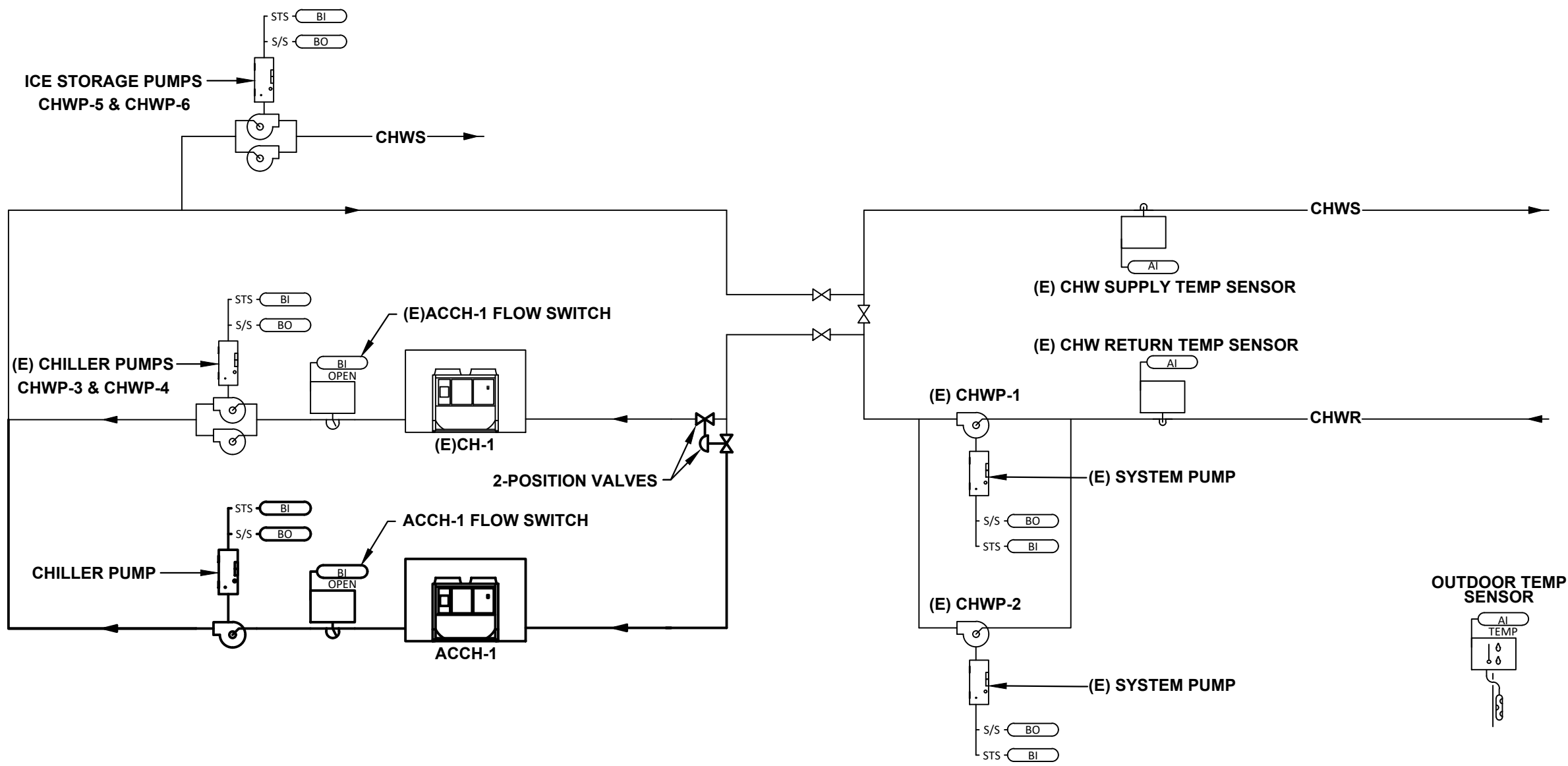
THE UNIT SHALL SHUT DOWN IN RESPONSE TO A SIGNAL FROM THE SMOKE DETECTOR INDICATING THE PRESENCE OF SMOKE. THE SMOKE DETECTOR SHALL BE INTERLOCKED TO THE UNIT THROUGH THE DRY CONTACTS OF THE SMOKE DETECTOR. A MANUAL RESET OF THE SMOKE DETECTOR SHALL BE REQUIRED TO RESTART THE UNIT.

Points List: AIR HANDLING UNIT (QTY: 14)

Point Name	POINTS										ALARMS				
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT (AO)	BINARY HARDWARE OUTPUT (BO)	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
COIL LEAVING AIR LOW TEMP CUTOUT ALARM LLT			X										X		
COOLING COIL LEAVING TEMPERATURE CC LAT	X	X								X	X			X	
COOLING OUTPUT COMMAND CLG	X			X											
DISCHARGE AIR TEMPERATURE DAT	X	X								X	X			X	
DISCHARGE AIR STATIC PRESSURE LOCAL DA SP	X	X								X			X	X	
ENERGY WHEEL SPEED COMMAND EW SPD	X			X											
FINAL FILTER ALARM FIL ALM		X								X					
FILTER ALARM FIL ALM		X								X					
HEATING OUTPUT COMMAND HTG	X		X												
HIGH STATIC ALARM HSP ALM	X	X											X	X	
HIGH STATIC ALARM INTERLOCK HSP INTLK						X									
MIXED AIR DAMPER COMMAND MAD	X		X												
MIXED AIR LOW TEMPERATURE CUTOUT ALARM MA LLT				X									X		
MIXED AIR TEMPERATURE LOCAL MAT	X	X								X			X		
OUTDOOR AIR RELATIVE HUMIDITY LOCAL OAH	X	X													
OUTDOOR AIR TEMPERATURE LOCAL OAT	X	X													
REHEAT LEAVING COIL TEMPERATURE LOCAL RH LAT	X	X								X	X		X		
REHEAT OUTPUT COMMAND RH	X		X												
RETURN AIR HUMIDITY LOCAL RAH	X	X								X					
RETURN AIR TEMPERATURE LOCAL RAH	X	X													
RETURN SMOKE DETECTOR INPUT RA SD						X									
SPACE CO2 CONCENTRATION LOCAL SP CO2	X	X								X					
SPACE HUMIDITY LOCAL SPH	X	X								X					
SPACE TEMPERATURE LOCAL SPT	X	X								X	X		X		
SPACE TEMPERATURE SETPOINT LOCAL SPT SP	X	X													
SUPPLY AIR HUMIDITY LOCAL SA HUM	X	X								X	X		X		
SUPPLY FAN SPEED COMMAND SAF	X			X											
SUPPLY FAN START STOP COMMAND SAF	X			X											
SUPPLY FAN STATUS SAF	X	X													
SUPPLY SMOKE DETECTOR INPUT SA SD						X									
BAS COMMUNICATION STATE BAS COM					X										X
DISCHARGE AIR COOLING SETPOINT DA CL SP					X										
DISCHARGE AIR HEATING SETPOINT DA HT SP					X										
MAINTENANCE REQUIRED MNT REQ						X						X			
MIXED AIR TEMPERATURE LOW LIMIT SETPOINT MA LLT STPT					X										
OCCUPIED COOLING SETPOINT OCC CLG STPT	X				X										
OCCUPIED HEATING SETPOINT OCC HTG STPT	X				X										
SUPPLY FAN FAILURE SE FAIL					X							X			
UNOCCUPIED COOLING SETPOINT UNOCC CLG STPT	X				X										
UNOCCUPIED HEATING SETPOINT UNOCC HTG STPT	X				X										
LEAVING CHILLED WATER TEMPERATURE CHW T	X	X													
LEAVING PREHEAT WATER TEMPERATURE PHW T	X	X													
LEAVING REHEAT WATER TEMPERATURE RHW T	X	X													

MEEC JOB # 26-0029

THIS DRAW



CHILLER CONTROL DIAGRAM

SYSTEM GENERAL DESCRIPTION

THE CHILLED WATER SYSTEM CONSISTS OF THE FOLLOWING PRIMARY COMPONENTS:

WATER-COOLED PLANT: ONE (1) EXISTING WATER-COOLED CHILLER (WCCH-1), ONE (1) COOLING TOWER (CT-1), TWO (2) CONDENSER WATER PUMPS (CTWP-1 & 2), AND TWO (2) PRIMARY CHILLED WATER PUMPS (CHWP-3 & 4).

AIR-COOLED PLANT: ONE (1) NEW AIR-COOLED CHILLER (ACCH-1) WITH AN INTEGRAL PRIMARY PUMP. DISTRIBUTION & STORAGE: TWO (2) EXISTING SECONDARY PUMPS (CHWP-1 & 2) FOR BUILDING DISTRIBUTION AND TWO (2) ICE STORAGE PUMPS SERVING THE ICE TANKS.

REVISED CHILLER SEQUENCE OF OPERATION

THE EXISTING CHILLED WATER SYSTEM SHALL MAINTAIN ITS CURRENT SEQUENCE OF OPERATION, MODIFIED TO INCLUDE ACCH-1 AS A REDUNDANT STANDBY UNIT. THE BUILDING AUTOMATION SYSTEM (BAS) SHALL MANAGE THE TWO CHILLERS IN A LEAD/STANDBY CONFIGURATION BASED ON A PRE-DETERMINED SCHEDULE OR UPON FAILURE/MAINTENANCE OF THE LEAD UNIT.

- INTERLOCK & SAFETY**
 - MUTUAL EXCLUSION: THE BAS SHALL HARDWARE- OR SOFTWARE-INTERLOCK WCCH-1 AND ACCH-1 TO PREVENT SIMULTANEOUS OPERATION.
 - ISOLATION VALVES: UPON A CHANGE IN LEAD STATUS, AUTOMATED CONTROL VALVES SHALL MODULATE TO ISOLATE THE STANDBY CHILLER AND OPEN THE FLOW PATH FOR THE LEAD CHILLER.
- AIR-COOLED MODE (ACCH-1 LEAD)**

WHEN ACCH-1 IS COMMANDED TO RUN:

 - THE WATER-COOLED PLANT (WCCH-1, CT-1, CTWPS, AND CHWPS 3 & 4) SHALL BE DISABLED.
 - ISOLATION VALVES SHALL CLOSE THE WCCH-1 FLOW PATH AND OPEN THE ACCH-1 FLOW PATH.
 - ACCH-1 SHALL OPERATE IN "ICE MAKE" OR "ICE MELT" MODE AS REQUIRED BY THE SYSTEM DEMAND.
- WATER-COOLED MODE (WCCH-1 LEAD)**

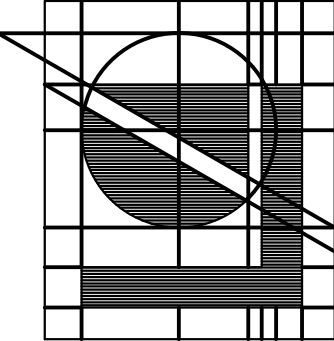
WHEN WCCH-1 IS COMMANDED TO RUN:

 - ACCH-1 AND ITS INTEGRAL PUMP SHALL BE DISABLED.
 - ISOLATION VALVES SHALL CLOSE THE ACCH-1 FLOW PATH AND OPEN THE WCCH-1 FLOW PATH.
 - THE WATER-COOLED PLANT COMPONENTS SHALL BE ENABLED TO RUN IN CONJUNCTION WITH WCCH-1 IN "ICE MAKE" OR "ICE MELT" MODES.



THIS DRAWING IS DIAGRAMMATIC AND SHOULD BE USED TO DETERMINE THE DESIGN INTENT. THE CONTRACTOR SHALL FIELD VERIFY ALL WORK AND SHALL NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES IN THE DOCUMENTS BEFORE PROCEEDING. FAILURE TO DO SO WILL RESULT IN THE CONTRACTOR TAKING FULL RESPONSIBILITY AND LIABILITY FOR SAID DISCREPANCIES. NOTICE: THIS DRAWING AND THE DESIGN ARE THE PROPERTY OF MECHANICAL ELECTRICAL ENGINEERING CONSULTANTS, PC AND NO ALTERATIONS AND/OR TRANSFERS OF WORK ARE PERMITTED UNLESS WRITTEN APPROVAL IS GRANTED BY MECHANICAL ELECTRICAL ENGINEERING CONSULTANTS, PC.

SCALE: NONE



ELECTRICAL SYMBOL LIST

POWER SYMBOLS		WIRING & CONDUIT SYMBOLS	
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	DUPLEX RECEPTACLE, 120V. 20A. GROUNDING TYPE		CONDUIT RUN IN WALL OR ABOVE CEILING
	WEATHERPROOF RECEPTACLE		CONDUIT RUN BELOW GRADE OR CONCRETE SLAB
	HALF-CONTROLLED DUPLEX RECEPTACLE, 120V. 20A. GROUNDING TYPE		ISOLATED GROUND CONDUCTOR & SAFETY GROUND CONDUCTOR
	DUPLEX RECEPTACLE, 120V. 20A. GROUNDING TYPE		BRANCH CIRCUIT HOMERUN
	DUPLEX RECEPTACLE, GFCI TYPE, 120V. 20A., GROUNDING TYPE		LOW VOLTAGE WIRING FOR LIGHTING CONTROL
	COMPUTER GRADE RECEPTACLE, 120V. 20A. WITH ISOLATED GROUND		BRANCH CIRCUIT HOMERUN WITH (3) LINE CONDUCTORS, (1) NEUTRAL CONDUCTOR, (1) SAFETY GROUND CONDUCTOR & (1) ISOLATED GROUND CONDUCTOR
	DOUBLE DUPLEX RECEPTACLE, 120V. 20A. GROUNDING TYPE	NOTE: ANY CIRCUIT WITHOUT FURTHER IDENTIFICATION IS 2-WIRE PLUS GROUND WIRE. A GREATER NUMBER OF WIRES IS INDICATED BY HASH MARKS.	
	DOUBLE DUPLEX RECEPTACLE 120V. 20A. GROUNDING TYPE		NIGHT LIGHT CIRCUIT ON EMERGENCY ELECTRIC SYSTEM
	SPECIAL RECEPTACLE, TYPE & MOUNTING HEIGHT AS NOTED		TELEPHONE RACEWAY
	JUNCTION BOX - CEILING MOUNTED		DATA SYSTEM RACEWAY
	JUNCTION BOX - FLOOR MOUNTED		PRIMARY UNDERGROUND DUCT
	JUNCTION BOX - WALL MOUNTED, HEIGHT AS NOTED		EXISTING TO BE REMOVED OR ABANDONED
	KWH METER		MATCHLINE
	FUSIBLE DISCONNECT SWITCH - UPPER NUMERAL DENOTES SWITCH SIZE, LOWER NUMERAL DENOTES FUSE SIZE	ONE-LINE DIAGRAM SYMBOLS	
	NON-FUSED DISCONNECT SWITCH - NUMERAL DENOTES SWITCH SIZE	SYMBOL	DESCRIPTION
	MAGNETIC MOTOR STARTER		CIRCUIT BREAKER - UPPER NUMERAL DENOTES AMPERAGE FRAME RATING AND LOWER NUMERAL INDICATES TRIP RATING
	COMBINATION MOTOR STARTER		FUSIBLE DISCONNECT SWITCH - UPPER NUMERAL DENOTES SWITCH SIZE, LOWER NUMERAL DENOTES FUSE SIZE
	MOTOR CONTROL SWITCH WITH PILOT LIGHT		GROUND
	MANUAL MOTOR STARTER, OR ON MOTORIZED EQUIP.		TRANSFORMER
	MOTOR CONNECTION		
	LOAD CENTER		
	PANELBOARD		
	DISTRIBUTION PANELBOARD		
	MAIN SWITCHBOARD		
	TRANSFORMER		
	CONTROL PANEL		

PROJECT SPECIFIC NOTES

- APPLICABLE CODES INCLUDE, BUT ARE NOT NECESSARILY LIMITED TO, THE FOLLOWING:
 - 2021 MICHIGAN BUILDING CODE
 - 2023 NEC WITH MICHIGAN PART 8 AMENDMENTS
 - 2019 MICHIGAN COMMERCIAL ENERGY CODE. (IECC 2021/ASHRAE 90.1-2019)
 - 2017 ICC ANSI STANDARD A117.1-2017
 - 2021 INTERNATIONAL FIRE CODE
- ALL WIRING AND BUSSING SHALL BE COPPER, UNLESS OTHERWISE NOTED.
- A SEPARATE EQUIPMENT GROUNDING CONDUCTORS, SIZED PER NEC, SHALL BE INSTALLED WITH ALL CIRCUIT CONDUCTORS.
- PROVIDE A THERMAL-ADHESIVE LABEL ON EACH DEVICE (LIGHT SWITCH, RECEPTACLE, ETC.) INDICATING THE SOURCE PANEL AND CIRCUIT NUMBER.

GENERAL NOTES

- THE CONTRACTOR SHALL ABIDE BY ALL FEDERAL, STATE, AND/OR LOCAL CODES. IF A DISCREPANCY BETWEEN CODES OCCURS, THE MOST STRINGENT SHALL PREVAIL.
- THE CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO THE COMMENCEMENT OF ANY WORK. SHOULD DISCREPANCIES BE DISCOVERED, THE CONTRACTOR SHALL VERIFY INTENT WITH THE ENGINEER/OWNER BEFORE PROCEEDING.
- COORDINATE LOCATIONS OF ALL CEILING MOUNTED DEVICES WITH OTHER TRADES PRIOR TO INSTALLATION.
- COORDINATE ALL ROUGH-IN REQUIREMENTS FOR OWNER FURNISHED EQUIPMENT WITH THE OWNER PRIOR TO BEGINNING WORK. THESE DRAWINGS ARE BASED ON THE BEST INFORMATION AVAILABLE DURING THE DESIGN PHASE OF THE PROJECT.
- COORDINATE WITH MILLWORK CONTRACTOR TO DETERMINE THE EXACT LOCATION OF OUTLETS BEING PLACED IN MILLWORK.
- DEVICES NOTED "GFI" SHALL INCLUDE GROUND FAULT INTERRUPTING DEVICES.
- DEVICES NOTED "WP" SHALL BE WEATHERPROOF, "WHILE-IN-USE" TYPE WHERE APPLICABLE.
- ELECTRICAL CONTRACTOR SHALL PROVIDE SAFETY DISCONNECT SWITCHES FOR ALL MECHANICAL AND PLUMBING EQUIPMENT.
- DEDICATED NEUTRAL CONDUCTORS SHALL BE CONSIDERED CURRENT-CARRYING CONDUCTORS. HOMERUNS CONTAINING MORE THAN THREE CURRENT-CARRYING CONDUCTORS SHALL BE DERATED IN ACCORDANCE WITH THE 2023 NEC.
- BRANCH CIRCUIT HOMERUN CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH THE 2023 NEC. THE MAXIMUM ALLOWABLE VOLTAGE DROP ON A FEEDER IS 2% AND THE MAXIMUM ALLOWABLE VOLTAGE DROP ON A BRANCH CIRCUIT IS 3%. PROVIDE BRANCH CIRCUIT CONDUCTORS SIZED TO ENSURE THE TOTAL VOLTAGE DROP FROM THE SOURCE TO THE POINT OF UTILIZATION IS LESS THAN OR EQUAL TO 5%.
- DEDICATED NEUTRALS SHALL BE PROVIDED FOR ALL BRANCH CIRCUITS, EXCEPT WHERE A MULTI-WIRE CIRCUIT IS REQUIRED TO SERVE THE LOAD (I.E. SYSTEMS FURNITURE). WHEN SHARING THE NEUTRAL CONDUCTOR IN A MULTI-WIRE CIRCUIT, THE NEUTRAL SIZE SHALL BE INCREASED 177%.
- ALL MOUNTING HEIGHTS PROVIDED ARE TO CENTER OF DEVICE, UNLESS OTHERWISE INDICATED.

GENERAL NOTES - DEMOLITION

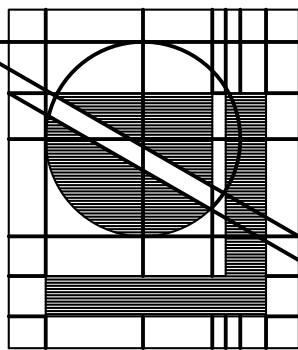
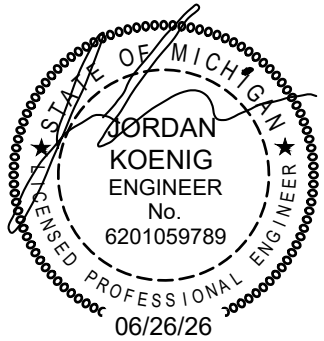
- CERTAIN AREAS IN THE EXISTING BUILDING SHALL BE MODIFIED TO SUIT THE NEW REQUIREMENTS. THESE DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO INDICATE THE SCOPE OF WORK REQUIRED TO COMPLETE A SAFE REMOVAL OF THE ELECTRICAL SYSTEMS AS INDICATED BY THE NOTES ON THIS DRAWING.
- WORK IN THE AREA SHALL INCLUDE THE DISCONNECTION, REMOVAL, RELOCATION, AND RECONNECTION COMPLETE IN ALL RESPECTS OF ALL ITEMS REQUIRED TO SUIT THE DESIGN INTENT. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VISIT THE PROJECT SITE TO CORRECTLY ASCERTAIN THE SCOPE OF SERVICES AND TO INCLUDE ALL PERTINENT COSTS IN HIS BID. NO EXTRAS WILL BE ALLOWED.
- ALL ELECTRICAL WORK INTERFERING WITH AND REQUIRING MODIFICATION FOR THE NEW REQUIREMENTS SHALL BE RELOCATED AS DIRECTED BY BUILDING MANAGEMENT PERSONNEL AND REINSTALLED AND REWIRED AS NECESSARY TO THE SATISFACTION OF THE BUILDING OWNER.
- PROVIDE ALL EQUIPMENT, MATERIALS, LABOR AND SUPERVISION NECESSARY TO PROVIDE A SAFE ELECTRICAL INSTALLATION. ALL ELECTRICAL DEVICES AND SYSTEMS THAT ARE INDICATED AS EXISTING TO REMAIN SHALL BE IN SAFE WORKING ORDER.
- OBTAIN NECESSARY PERMITS FROM THE LOCAL AUTHORITY HAVING JURISDICTION BEFORE PROCEEDING WITH ANY WORK IN THE FIELD.
- ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, OSHA AND OTHER ELECTRICAL SAFETY STANDARDS AND GUIDELINES. CONFORM TO ALL STATE AND LOCAL CODES AND STANDARDS.
- ALL EQUIPMENT AND WIRING NOT IN RENOVATION AREAS BUT AFFECTED BY WORK IN RENOVATION AREAS SHALL BE RECONNECTED AS REQUIRED FOR A COMPLETE WORKING SYSTEM.
- ABANDONED AND INACTIVE CONDUITS, WIRE, DEVICES, EQUIPMENT, ETC. SHALL BE REMOVED IN THEIR ENTIRETY. IN ADDITION TO THESE ITEMS, THIS CONTRACTOR SHALL REMOVE ALL ITEMS AS INDICATED ON THE PLANS, OR AS REQUIRED TO CLEAN UP THE ENTIRE AREA OF UNUSED, ABANDONED, OR INACTIVE MATERIALS. CONDUIT AND WIRING FEEDING DEVICES AND EQUIPMENT TO BE REMOVED SHALL ALSO BE REMOVED UP TO THE NEXT ACTIVE PULLBOX, JUNCTION BOX, OR PANELBOARD. HANGERS, MESSENGER CABLE, BRACKETS, ETC. SUPPORTING ITEMS TO BE REMOVED SHALL ALSO BE UNFASTENED AND REMOVED. OPEN HOLES IN DUCTS, BOXES, PANELBOARDS, AND KNOCKOUTS SHALL BE CLOSED WITH SUITABLE SNAP PLUGS OR FILLER PLATES.
- THE CONTRACTOR SHALL REMOVE AND DELIVER TO A PLACE DESIGNATED BY THE OWNER ALL EXISTING ELECTRICAL EQUIPMENT NO LONGER INTENDED FOR USE. THIS EQUIPMENT REMAINS THE PROPERTY OF THE OWNER.
- ANY EQUIPMENT, DEVICES, MATERIALS, ETC., THE OWNER ELECTS NOT TO RETAIN SHALL BE LEGALLY DISPOSED OF BY THE CONTRACTOR OFF THE OWNER'S PREMISES.
- AT COMPLETION OF ALL ELECTRICAL WORK, UPDATE CIRCUIT DIRECTORIES IN PANELS AFFECTED BY NEW WORK WITH NEW TYPEWRITTEN CIRCUIT DESCRIPTIONS. CIRCUIT DIRECTORIES SHALL BE MOUNTED ON INSIDE OF FRONT PANEL COVER IN A CLEAR PLASTIC ENCLOSURE.
- EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, AND IN ACCORDANCE WITH THEIR LISTING OR LABELING REQUIREMENTS. ANY PENETRATIONS THROUGH FIRE RATED ASSEMBLIES THAT ARE CREATED BY THE ELECTRICAL DEMOLITION, SHALL BE SEALED AND RESTORED IN ACCORDANCE WITH THE UL FIRE RESISTANCE DIRECTORY.
- WHERE CONDUIT AND/OR OUTLET BOXES INDICATED FOR DEMOLITION ARE EMBEDDED IN CONCRETE OR BELOW CONCRETE SLAB, ABANDON IN PLACE. CUT BACK AND SEAL EXPOSED CONDUIT. PROVIDE BLANK COVERS FOR ABANDONED BOXES. REMOVE ALL ASSOCIATED WIRING BACK TO SOURCE.

ELECTRICAL ABBREVIATIONS

A.C.	ALTERNATING CURRENT
AC	ABOVE COUNTERTOP
AFCI	ARC FAULT CIRCUIT INTERRUPTER
ARMS	ARC-FLASH REDUCTION MAINTENANCE SWITCH.
AFF	ABOVE FINISHED FLOOR TO CENTERLINE
AFG	ABOVE FINISHED GRADE TO CENTERLINE
AIC	AMPERE INTERRUPTING CAPACITY
BAS	BUILDING AUTOMATION SYSTEM
BC	BLANK COVER PLATE
C	CONDUIT
CKT/CIRC	CIRCUIT
DP	DISTRIBUTION PANEL
(E)	EXISTING
(ER)	EXISTING RELOCATED
EC	ELECTRICAL CONTRACTOR
EC	EMPTY CONDUIT
EF	EXHAUST FAN
EWC	ELECTRIC WATER COOLER
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FT.	FEET
G/GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GEC	GROUNDING ELECTRODE CONDUCTOR
GRD	GROUNDED
MDP	MAIN DISTRIBUTION PANEL
MSS	MAIN SERVICE SWITCHBOARD.
RIO	ROUGHED-IN ONLY
RTU	ROOFTOP UNIT
(R)	RELOCATED
S	SURFACE MOUNTED
SWBD	SWITCHBOARD
UON	UNLESS OTHERWISE NOTED
WH	WATER HEATER
WP	WEATHERPROOF

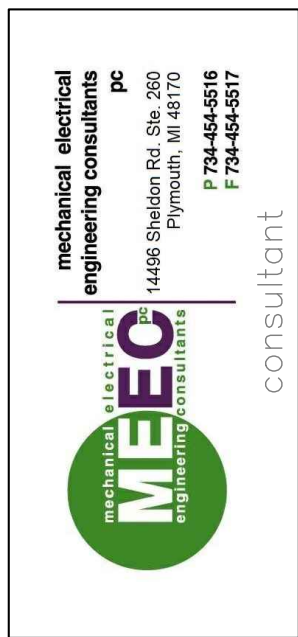
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ck'd: R.S.	date	Issued for
app'd: J.K.		

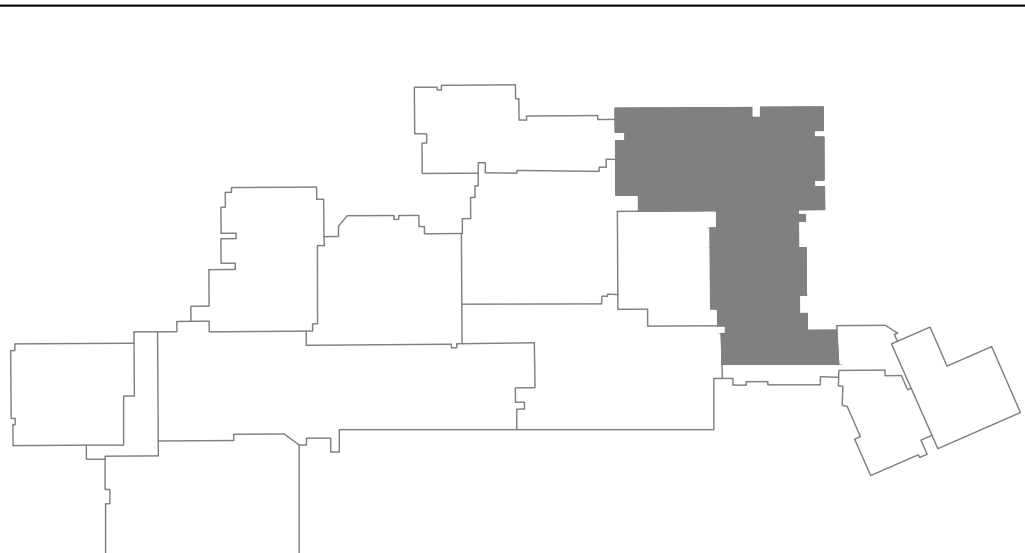
REP RENOVATIONS for:
BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN

GENERAL ELECTRICAL INFO.

20.0

26022

FILE LOCATION: A:\LINDHQUT\24-0029-BHS Chiller and RTU Upgrade\EDJ1 - PARTIAL ROOF - ELECTRICAL DEMOLITION PLAN.dwg
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KEY PLAN
N.T.S.

GENERAL NOTES:

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- IT IS NOT THE INTENT OF THESE DRAWINGS TO SHOW ALL THE ELECTRICAL DEVICES TO BE REMOVED, BUT TO INDICATE THE SCOPE OF DEMOLITION WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VISIT THE JOB SITE TO DETERMINE THE EXTENT OF THE DEMOLITION WORK PRIOR TO SUBMITTING THEIR BID.
- ALL ELECTRICAL ITEMS BEING REMOVED AND NOT REUSED SHALL BE TURNED OVER TO THE OWNER OR DISPOSED OF AS DIRECTED.
- ALL ELECTRICAL ITEMS BEING REUSED SHALL BE STORED IN A SAFE PLACE UNTIL REINSTALLATION.
- EXISTING CIRCUITS NOT BEING REUSED SHALL BE REMOVED COMPLETELY BACK TO SOURCE, DISCONNECTED AND RELABELED AS "SPARE".

KEY NOTES: #

- EXISTING HVAC UNIT TO BE REPLACED WITH A NEW EQUIVALENT UNIT. ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE ALL ASSOCIATED EQUIPMENT, DEVICES, ETC. UNIT TO BE REMOVED BY OTHERS. EXISTING CONDUIT, WIRING, DISCONNECT SWITCH MAY BE REUSED WHERE DETERMINED TO BE IN GOOD CONDITION AND SUITABLE FOR NEW INSTALLATION. REPLACE ANY UNSUITABLE OR DAMAGED CONDUIT, CONDUIT, WIRING, OR DISCONNECT WITH NEW COMPONENTS OF EQUAL TYPE, SIZE, RATING, AND CODE COMPLIANCE. CONTRACTOR SHALL VERIFY COMPATIBILITY OF EXISTING ELECTRICAL INFRASTRUCTURE PRIOR TO INSTALLATION.

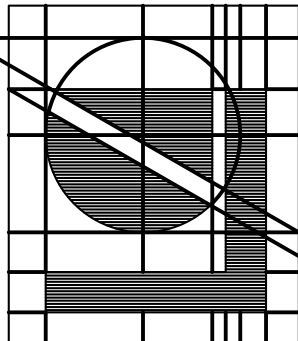


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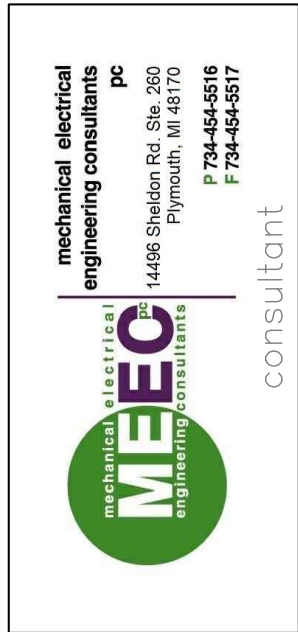
PARTIAL ROOF - ELECTRICAL DEMOLITION PLAN

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



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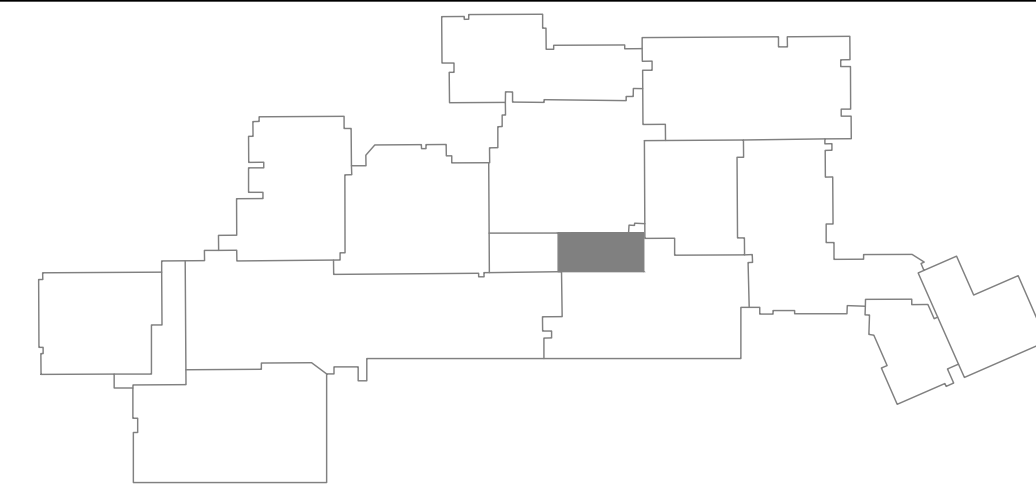
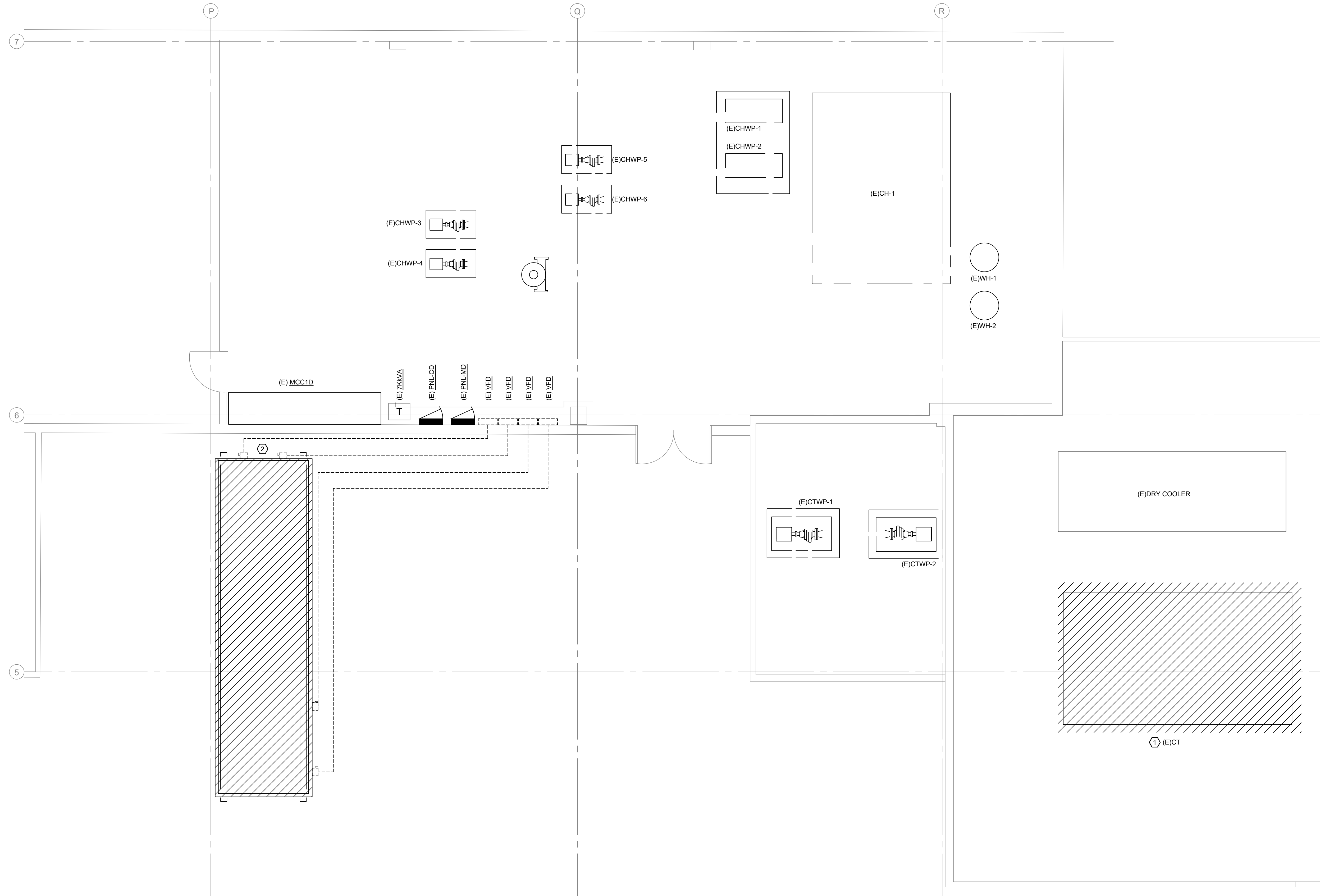
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REP RENOVATIONS for:
BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
PARTIAL ROOF - ELECTRICAL DEMOLITION PLAN

ED1.1
26022



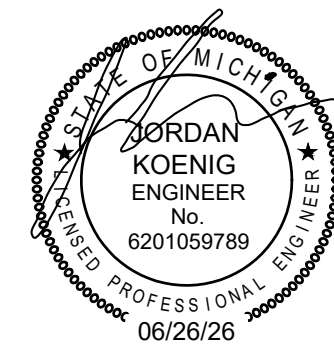
KEY PLAN
N.T.S.

GENERAL NOTES:

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2. IT IS NOT THE INTENT OF THESE DRAWINGS TO SHOW ALL THE ELECTRICAL DEVICES TO BE REMOVED, BUT TO INDICATE THE SCOPE OF DEMOLITION WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VISIT THE JOB SITE TO DETERMINE THE EXTENT OF THE DEMOLITION WORK PRIOR TO SUBMITTING THEIR BID.
3. ALL ELECTRICAL ITEMS BEING REMOVED AND NOT REUSED SHALL BE TURNED OVER TO THE OWNER OR DISPOSED OF AS DIRECTED.
4. ALL ELECTRICAL ITEMS BEING REUSED SHALL BE STORED IN A SAFE PLACE UNTIL REINSTALLATION.
5. EXISTING CIRCUITS NOT BEING REUSED SHALL BE REMOVED COMPLETELY BACK TO SOURCE, DISCONNECTED AND RELABELED AS "SPARE".

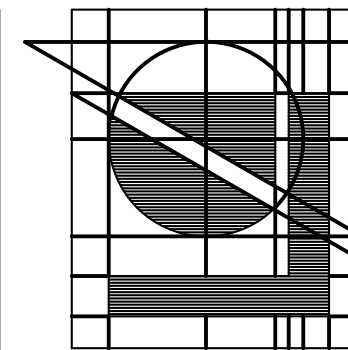
KEY NOTES:

1. EXISTING COOLING TOWER UNIT TO BE REPLACED WITH A NEW EQUIVALENT UNIT. ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE ALL ASSOCIATED EQUIPMENT, DEVICES, ETC. UNIT TO BE REMOVED BY OTHERS.
EXISTING CONDUIT RECOVERY, DISCONNECT SWITCH MAY BE REUSED WHERE DETERMINED TO BE IN GOOD CONDITION AND SUITABLE FOR NEW INSTALLATION. REPLACE ANY UNSUITABLE OR DAMAGED CONDUIT, CONDUIT, WIRING, OR DISCONNECT WITH NEW COMPONENTS OF EQUAL TYPE, SIZE, RATING, AND CODE COMPLIANT. THE ELECTRICAL CONTRACTOR SHALL MAINTAIN THE INTEGRITY OF EXISTING ELECTRICAL INFRASTRUCTURE PRIOR TO INSTALLATION.
2. EXISTING ENERGY RECOVERY UNIT (ERU) TO BE REMOVED COMPLETELY AND REPLACED WITH LARGER UNIT.
ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE ALL ASSOCIATED EQUIPMENT, DEVICES, ETC. AND REMOVE ALL ASSOCIATED WIRING AND CONDUITS BACK TO SOURCE. UNIT TO BE REMOVED BY OTHERS.



THIS DRAWING IS DIAGRAMMATIC AND SHOULD BE USED TO DETERMINE THE DESIGN INTENT. THE CONTRACTOR SHALL FIELD VERIFY ALL WORK AND SHALL NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES. THE DOCUMENTS BEFORE PROCEEDING, FAILURE TO DO SO WILL RESULT IN THE CONTRACTOR TAKING FULL RESPONSIBILITY AND LIABILITY FOR SAID DISCREPANCIES. NOTICE: THIS DRAWING AND THE DESIGN ARE THE PROPERTY OF MECHANICAL ELECTRICAL ENGINEERING CONSULTANTS, PC AND NO ALTERATIONS AND/OR TRANSFERS OF WORK ARE PERMITTED UNLESS WRITTEN APPROVAL IS GRANTED BY MECHANICAL ELECTRICAL ENGINEERING CONSULTANTS, PC.

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



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MEP RENOVATIONS for:
BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN

PARTIAL ROOF - ELECTRICAL DEMOLITION PLAN

ED1.2

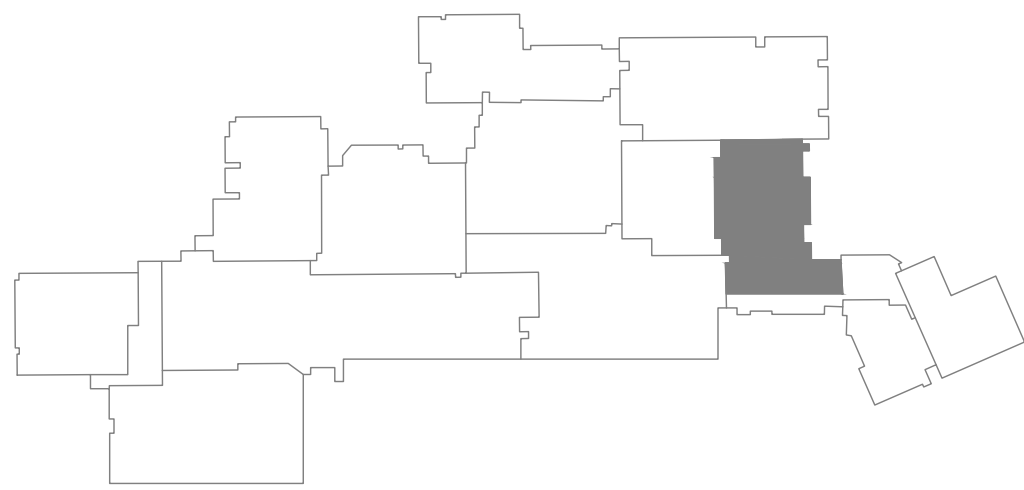
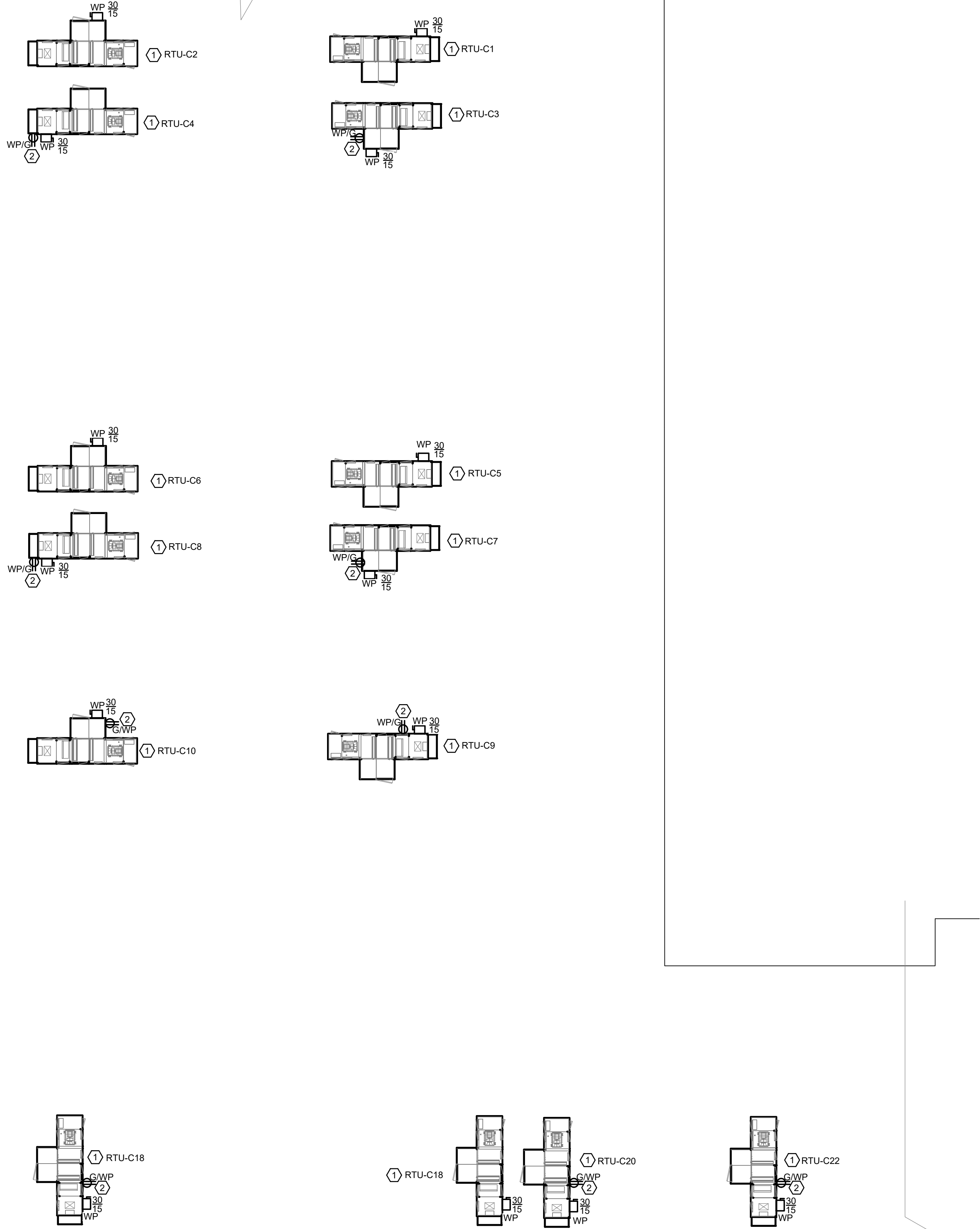
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PLOTTED BY: JAC

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CORPORATE

PARTIAL ROOF - ELECTRICAL NEW WORK PLAN



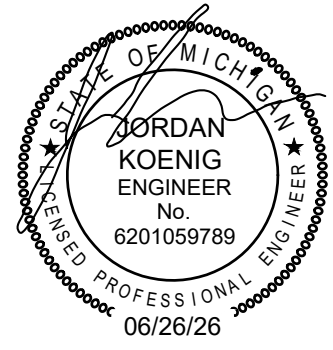
KEY PLAN
N.T.S.

GENERAL NOTES:

- REFER TO SHEET E0.0 FOR ELECTRICAL SYMBOL LIST, ABBREVIATIONS AND PROJECT NOTES.
- REFER TO POWER ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
- ELECTRICAL CONTRACTOR SHALL PROVIDE ALL DISCONNECT SWITCHES, STARTERS, CONDUIT AND WIRING, ETC. FOR ALL ROOFTOP EQUIPMENT UNLESS OTHERWISE NOTED.
- ALL BRANCH CIRCUIT WIRING SERVING EQUIPMENT AT THE ROOFTOP SHALL BE PROVIDED WITH SEAL IN ACCORDANCE WITH NEC 300.7(A). FILL RACEWAY WITH A PLIABLE COMPOUND AT A CONDUIT BODY OR JUNCTION BOX AT THE POINT WHERE THE CONDUIT PASSES FROM THE INTERIOR TO EXTERIOR OF THE BUILDING. SEAL OFF FITTINGS ARE NOT REQUIRED.
- WHERE RACEWAYS ARE INSTALLED OUTDOORS ABOVE GRADE, THE INTERIOR OF THE RACEWAY SHALL BE CONSIDERED A WET LOCATION PER NEC 300.8. PROVIDE CONDUCTORS THAT ARE LISTED FOR USE IN WET LOCATIONS AS PER NEC 310.8(C).
- CONDUCTORS INSTALLED IN CONDUIT EXPOSED TO SUNLIGHT ON OR ABOVE THE ROOFTOP SHALL HAVE THEIR AMPACITY DERATED IN ACCORDANCE WITH NEC 310.15(B)(2)(c).
- INSTALL AND SUPPORT FEEDERS AND BRANCH CIRCUITS SO THERE IS NOT LESS THAN 1-1/2" FROM THE LOWEST SURFACE OF THE ROOF DECKING TO THE TOP OF THE CABLE, RACEWAY OR BOX. A CABLE, RACEWAY OR BOX SHALL NOT BE INSTALLED IN CONCEALED LOCATIONS IN METAL-CORRUGATED SHEET DECKING-TYPE ROOF.

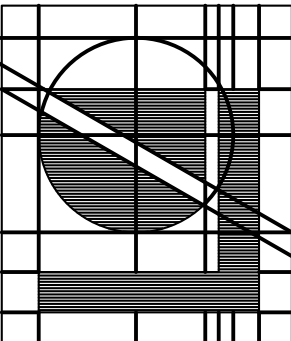
KEY NOTES: (#)

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- GFIWP RECEPTACLE PROVIDED WITH UNIT BY OTHERS.



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SCALE: 3/32" = 1'-0"



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architects aia pc
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CK'D: R.S.
APP'D: J.K.
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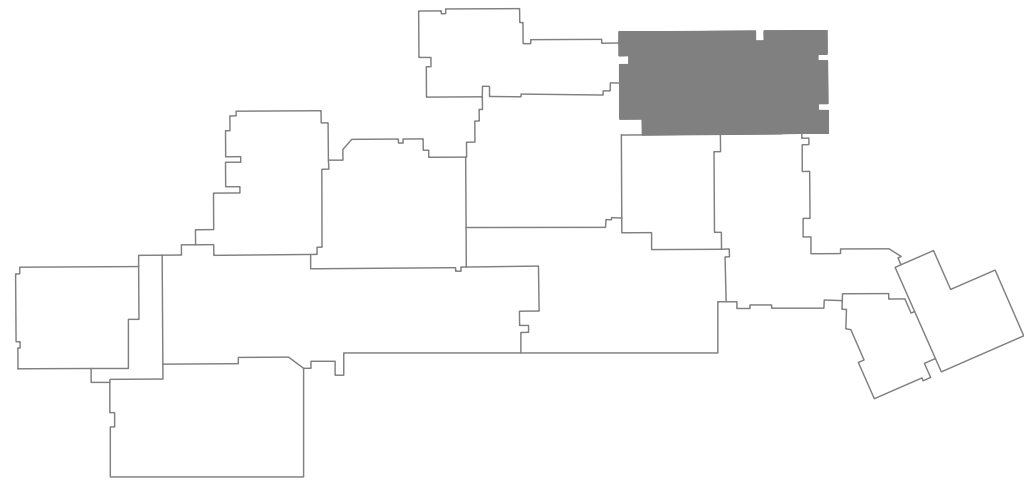
REP RENOVATIONS FOR:
BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
PARTIAL ROOF - ELECTRICAL NEW WORK PLAN

31.1
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E1.2 PARTIAL ROOF - ELECTRICAL NEW WORK PLAN

SCALE: 3/32" = 1'-0"



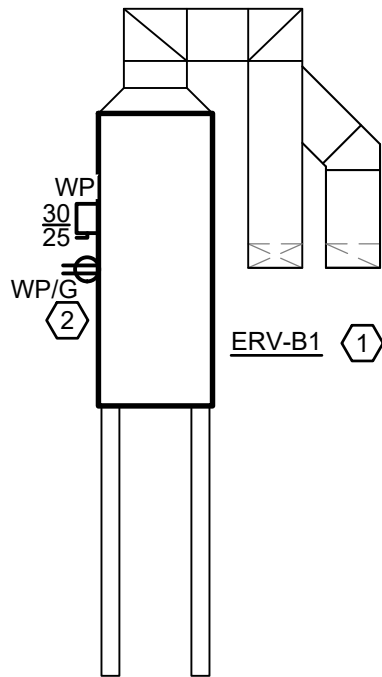
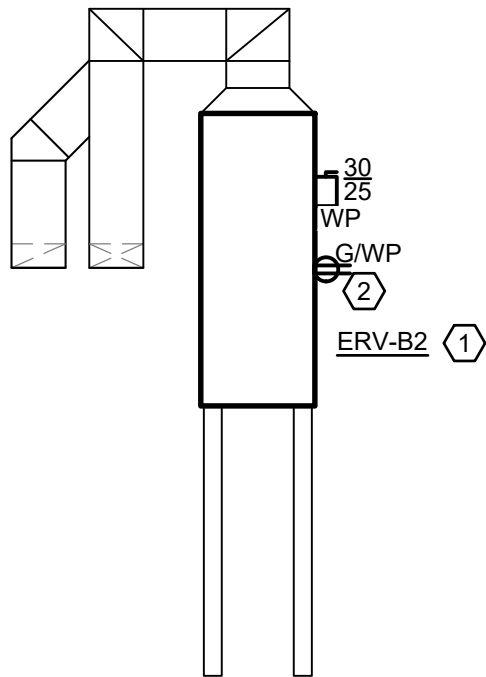
KEY PLAN
N.T.S.

GENERAL NOTES:

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KEY NOTES: (#)

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PREP RENOVATIONS FOR:
BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
PARTIAL ROOF - ELECTRICAL NEW WORK PLAN

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app'd: J.K.

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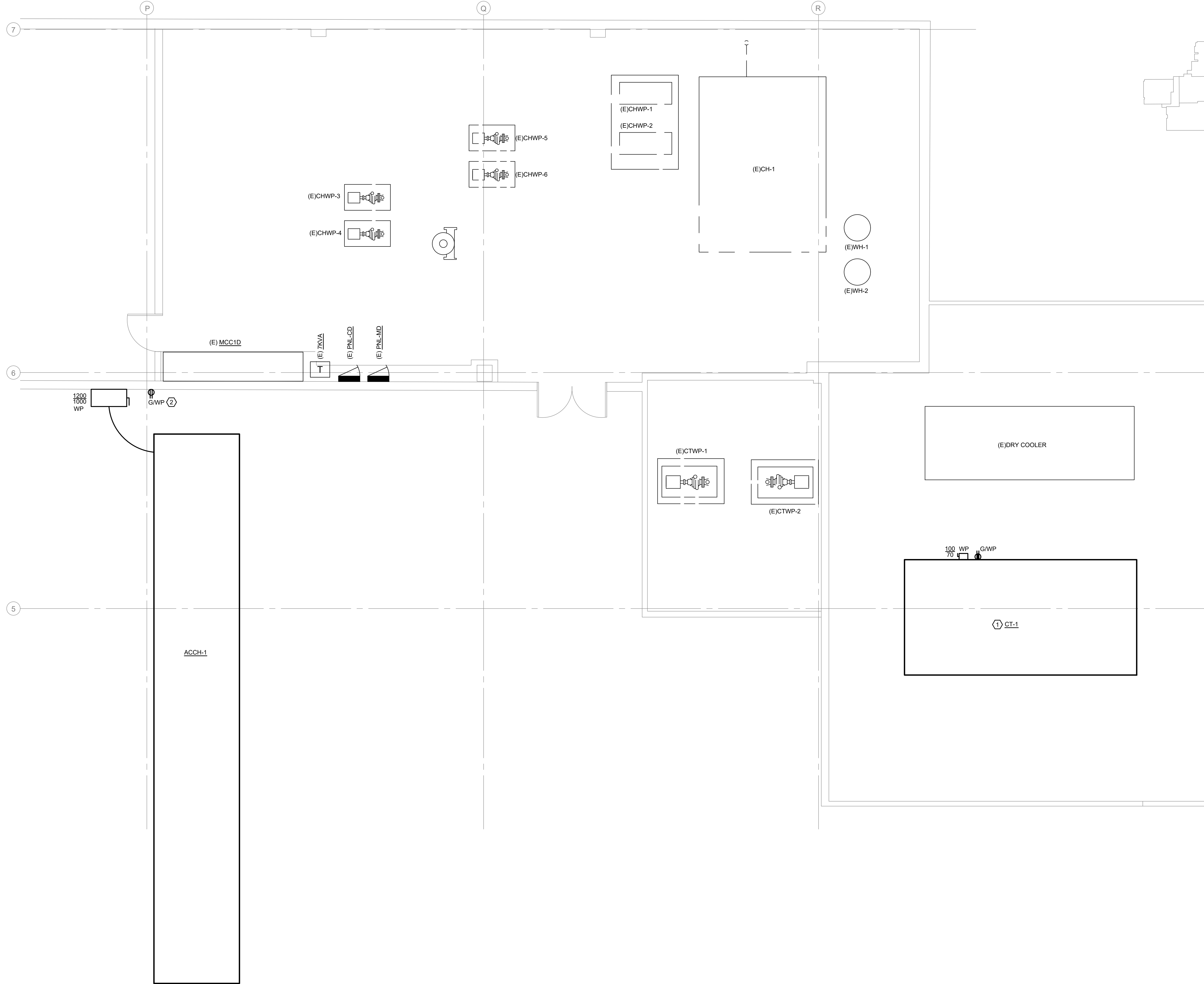


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E1.2
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PARTIAL ROOF - ELECTRICAL PLAN

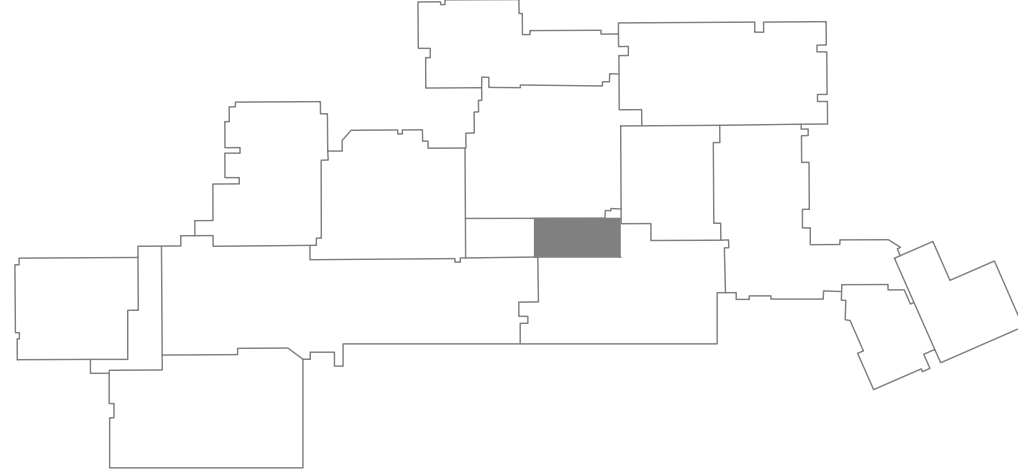


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KEY PLAN

N.T.S.



GENERAL NOTES:

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KEY NOTES: (#)

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- PROVIDE BRANCH CIRCUIT FROM NEAREST EXISTING 120/208V OR 120/240V PANELBOARD TO FEED NEW 20A, 120V DUPLEX RECEPTACLE AS INDICATED. PROVIDE DEDICATED 20A, 1-POLE CIRCUIT BREAKER, IF REQUIRED, CONDUIT, CONDUCTORS, FITTINGS, DEVICE BOX, AND ALL REQUIRED SUPPORTS AND ACCESSORIES FOR A COMPLETE INSTALLATION. VERIFY PANEL CAPACITY PRIOR TO INSTALLATION.

MEP RENOVATIONS for:
BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
PARTIAL ROOF - ELECTRICAL PLAN

E1.3

26022

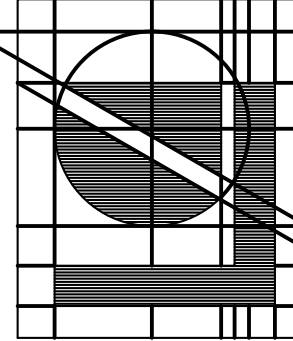
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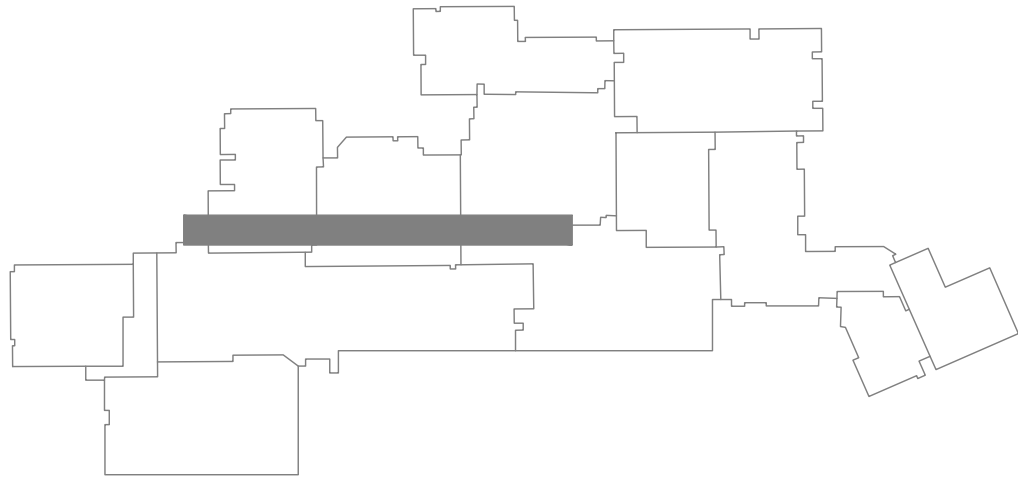
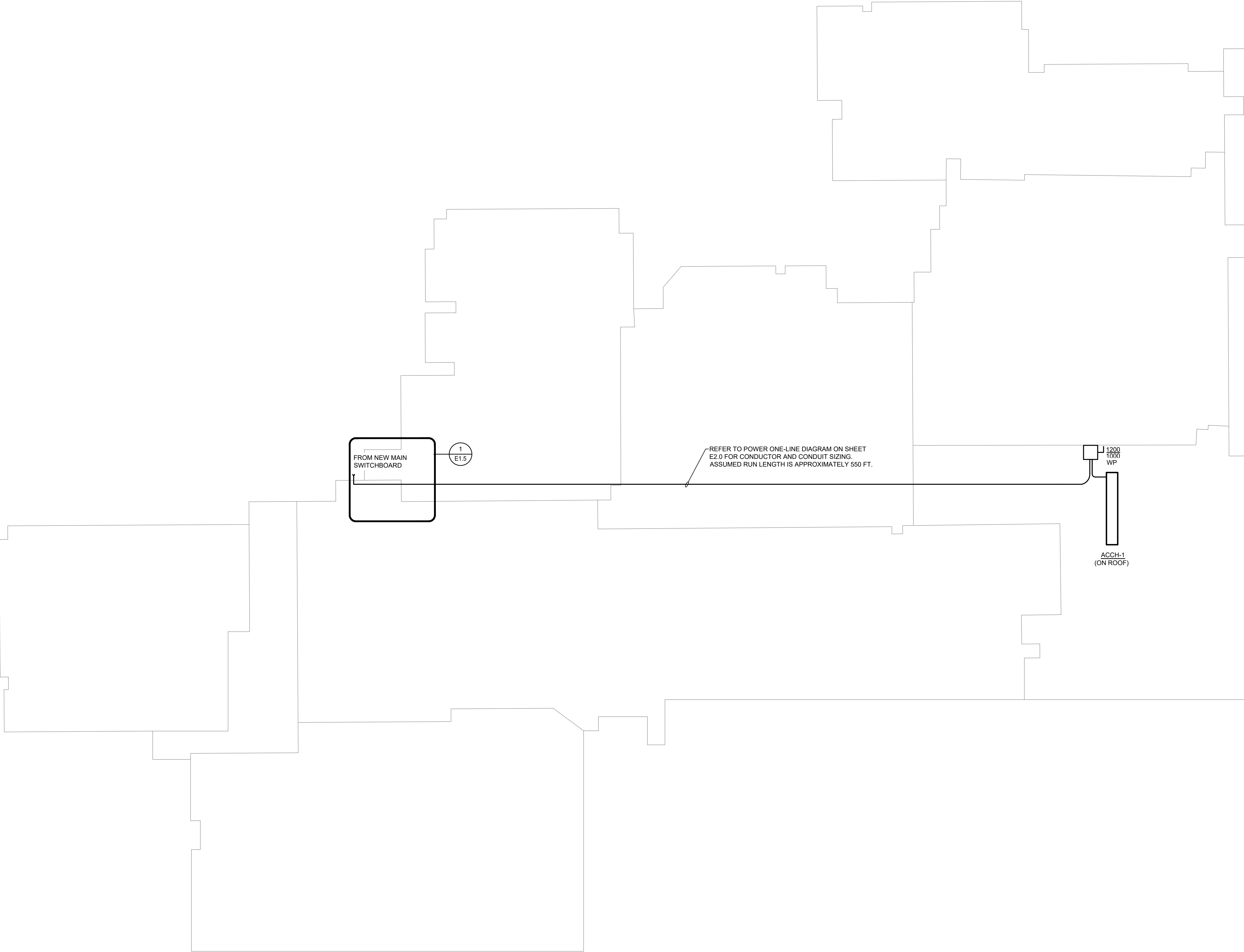


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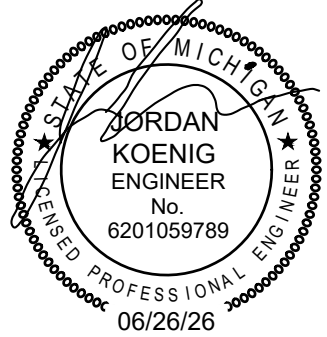
ROOF - ELECTRICAL PLAN



KEY PLAN
N.T.S.

GENERAL NOTES:

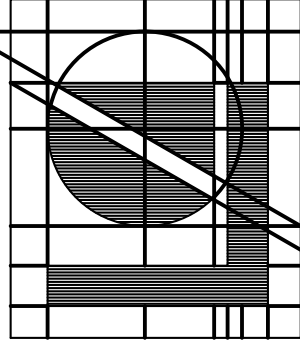
1. REFER TO SHEET E0.0 FOR ELECTRICAL SYMBOL LIST, ABBREVIATIONS AND PROJECT NOTES.
2. REFER TO POWER ONE-LINE DIAGRAM ON SHEET E2.0 FOR ADDITIONAL INFORMATION.
3. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL DISCONNECT SWITCHES, STARTERS, CONDUIT AND WIRING, ETC. FOR ALL ROOFTOP EQUIPMENT UNLESS OTHERWISE NOTED.
4. ALL BRANCH CIRCUIT WIRING SERVING EQUIPMENT AT THE ROOFTOP SHALL BE PROVIDED WITH SEAL IN ACCORDANCE WITH NEC 300.7(A). FILL RACEWAY WITH A PLIABLE COMPOUND AT A CONDUIT BODY OR JUNCTION BOX AT THE POINT WHERE THE CONDUIT PASSES FROM THE INTERIOR TO EXTERIOR OF THE BUILDING. SEAL OFF FITTINGS ARE NOT REQUIRED.
5. WHERE RACEWAYS ARE INSTALLED OUTDOORS ABOVE GRADE, THE INTERIOR OF THE RACEWAY SHALL BE CONSIDERED A WET LOCATION PER NEC 300.8. PROVIDE CONDUCTORS THAT ARE LISTED FOR USE IN WET LOCATIONS AS PER NEC 310.8(C).
6. CONDUCTORS INSTALLED IN CONDUIT EXPOSED TO SUNLIGHT ON OR ABOVE THE ROOFTOP SHALL HAVE THEIR AMPACITY DERATED IN ACCORDANCE WITH NEC 310.15(B)(2)(c).
7. INSTALL AND SUPPORT FEEDERS AND BRANCH CIRCUITS SO THERE IS NOT LESS THAN 1-1/2" FROM THE LOWEST SURFACE OF THE ROOF DECKING TO THE TOP OF THE CABLE, RACEWAY OR BOX. A CABLE, RACEWAY OR BOX SHALL NOT BE INSTALLED IN CONCEALED LOCATIONS IN METAL-CORRUGATED SHEET DECKING-TYPE ROOF.
8. ROUTE CONDUIT ELEVATED A MINIMUM OF 1 TO 1.5 INCH ABOVE ROOF SURFACE USING DURA-BLOK ROOFTOP SUPPORTS IN COMBINATION WITH EATON COOPER B-LINE CHANNEL STRUT SUPPORTS. PROVIDE COMPLETE SUPPORT SYSTEM AND INSTALLATION PER MANUFACTURER'S REQUIREMENTS.



MEEC JOB # 24-0029
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SCALE: 1/32" = 1'-0"



Lindhout Associates
architects aia pc

10465 columbia drive, Brighton, Michigan 48116-0510
www.lindhout.com fax: (810) 227-5555 (810) 227-5568



consultant

dr: D.P.
ck'd: R.S.
app'd: J.K.

6-26-2026
date

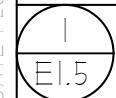
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BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN
ROOF - ELECTRICAL PLAN

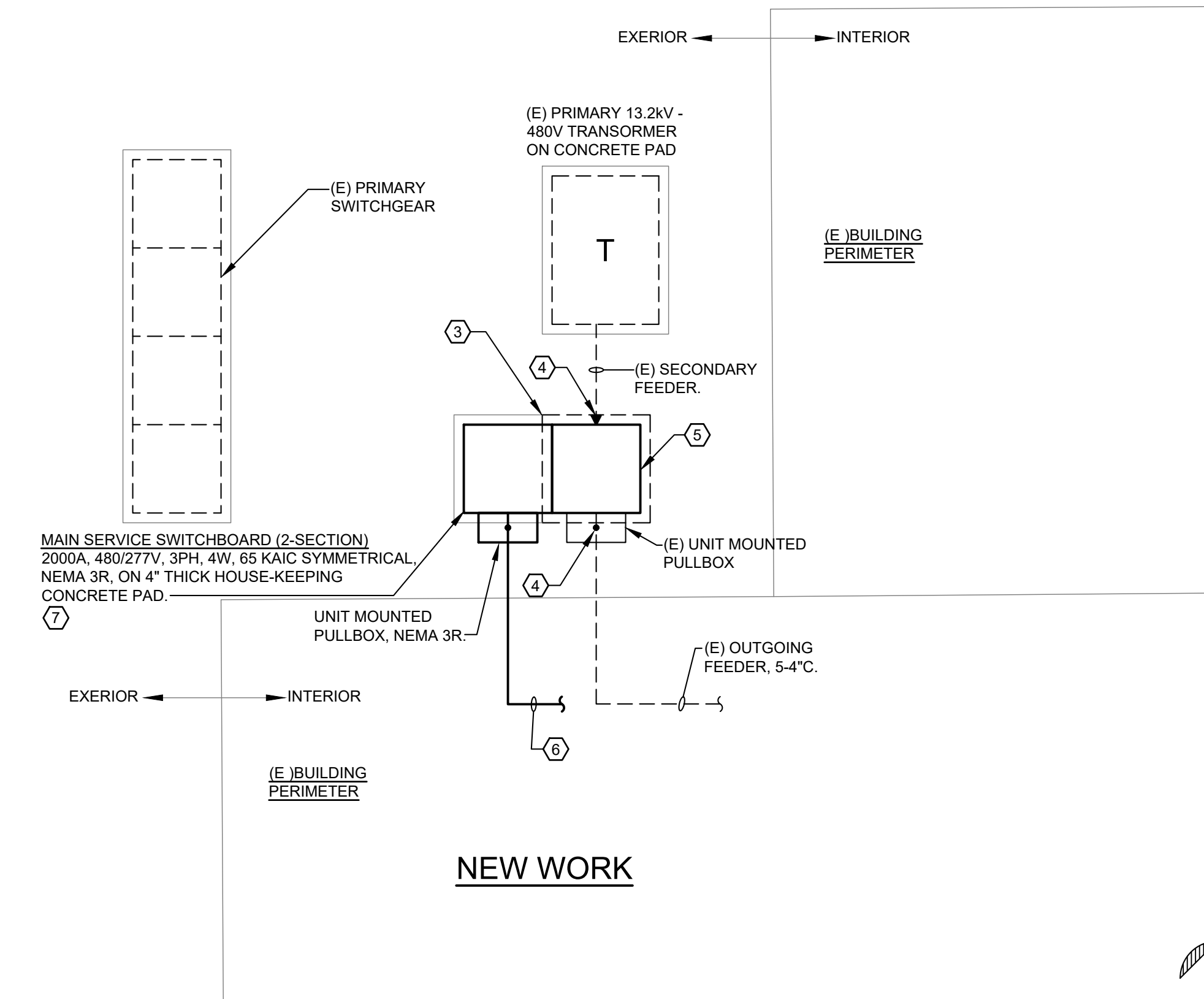
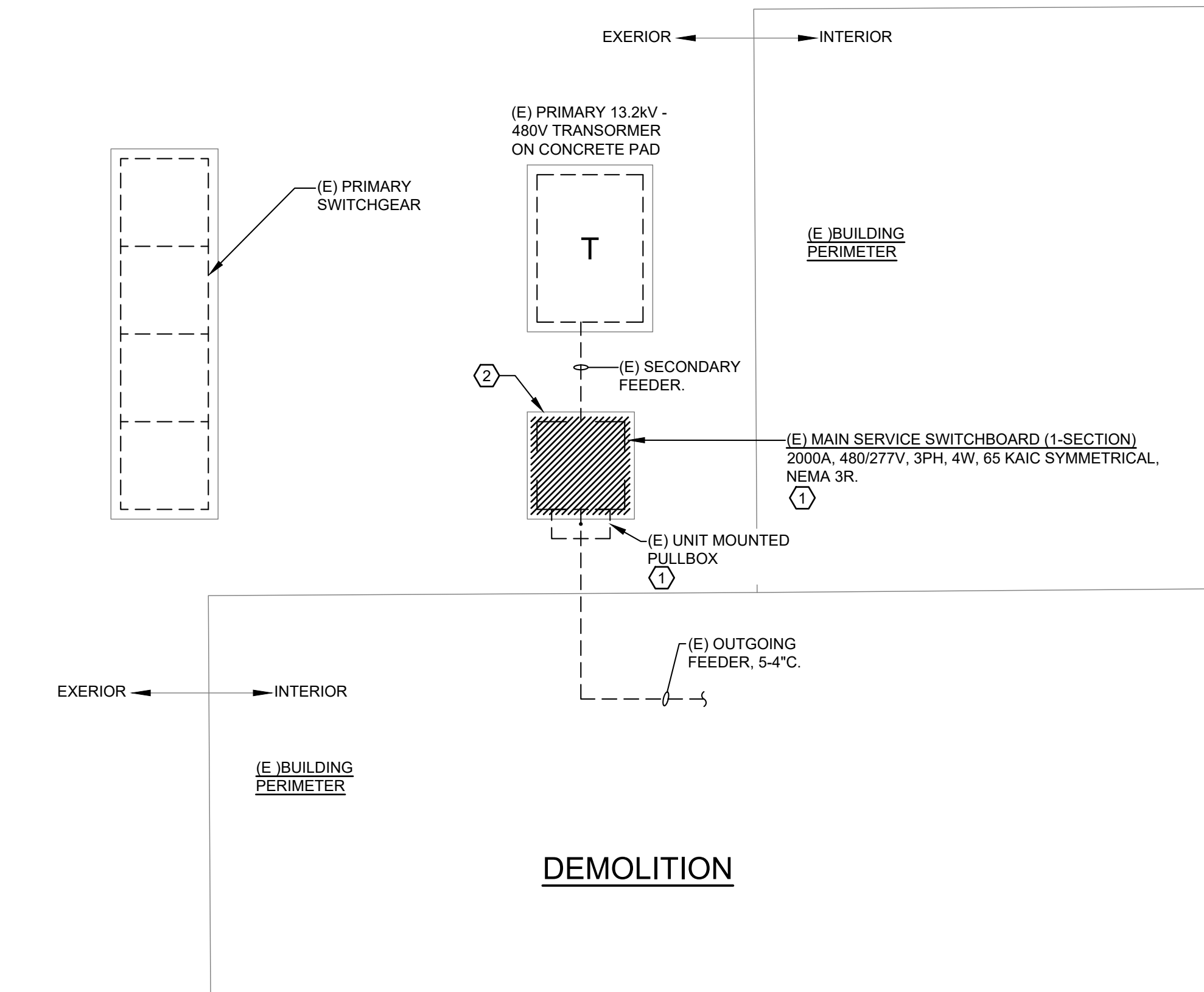
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DATE PLOTTED: 6/26/2024
PLOTTED BY: zach.mattaus
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ENLARGED GEAR - ELECTRICAL PLANS



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

DEMOLITION GENERAL NOTES:

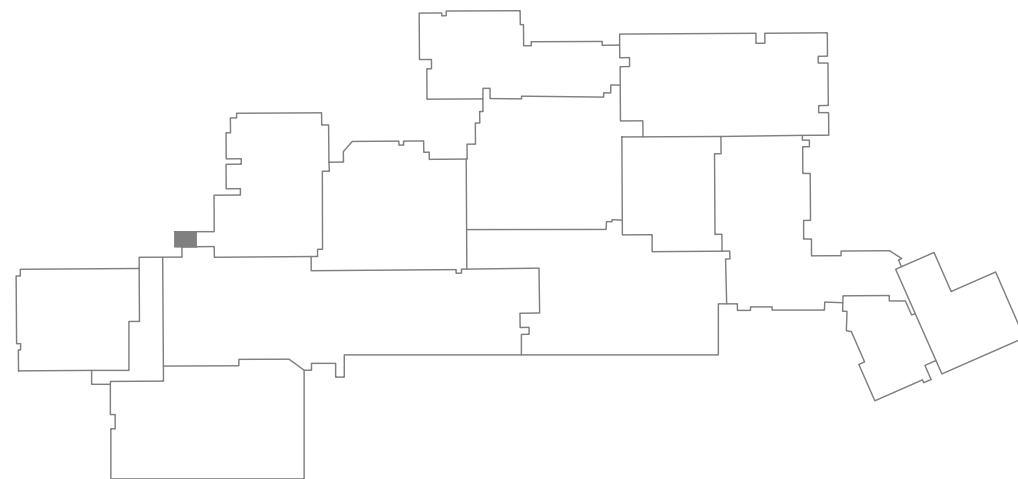
1. REFER TO SHEET E0.1 FOR ELECTRICAL SYMBOL LIST, ABBREVIATIONS AND PROJECT NOTES.
2. IT IS NOT THE INTENT OF THESE DRAWINGS TO SHOW ALL THE ELECTRICAL DEVICES TO BE REMOVED, BUT TO INDICATE THE SCOPE OF DEMOLITION WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VISIT THE JOB SITE TO DETERMINE THE EXTENT OF THE DEMOLITION WORK PRIOR TO SUBMITTING THEIR BID.
3. ALL ELECTRICAL ITEMS BEING REMOVED AND NOT REUSED SHALL BE DISPOSED OF AS DIRECTED.
4. ALL ELECTRICAL ITEMS BEING REUSED SHALL BE STORED IN A SAFE PLACE UNTIL REINSTALLATION.
5. ALL EQUIPMENT, DEVICES, ETC. SHOWN DASHED ARE EXISTING TO REMAIN.
6. ALL EQUIPMENT, DEVICES, ETC. SHOWN DASHED AND CROSS-HATCHED ARE EXISTING TO BE REMOVED OR RELOCATED AS INDICATED.
7. EXISTING JUNCTION BOXES AND/OR RACEWAYS MAY BE REUSED FOR NEW LIGHTING WHERE APPLICABLE.

GENERAL NOTES:

1. REFER TO SHEET E0.0 FOR ELECTRICAL SYMBOL LIST, ABBREVIATIONS AND PROJECT NOTES.
2. REFER TO POWER ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
3. WHERE RACEWAYS ARE INSTALLED OUTDOORS ABOVE GRADE, THE INTERIOR OF THE RACEWAY SHALL BE CONSIDERED A WET LOCATION PER NEC 300.8. PROVIDE CONDUCTORS THAT ARE LISTED FOR USE IN WET LOCATIONS AS PER NEC 310.8(C).
4. CONDUCTORS INSTALLED IN CONDUIT EXPOSED TO SUNLIGHT ON OR ABOVE THE ROOFTOP SHALL HAVE THEIR AMPACITY DERATED IN ACCORDANCE WITH NEC 310.15(B)(2)(c).
5. INSTALL AND SUPPORT FEEDERS AND BRANCH CIRCUITS SO THERE IS NOT LESS THAN 1-1/2" FROM THE LOWEST SURFACE OF THE ROOF DECKING TO THE TOP OF THE CABLE, RACEWAY OR BOX. A CABLE, RACEWAY OR BOX SHALL NOT BE INSTALLED IN CONCEALED LOCATIONS IN METAL-CORRUGATED SHEET DECKING-TYPE ROOF.

KEY NOTES: (#)

1. DISCONNECT EXISTING INCOMING AND OUTGOING FEEDER CONDUCTORS AND GROUNDING ELECTRODE SYSTEM FROM MAIN SERVICE SWITCHBOARD SCHEDULED FOR DEMOLITION. PROTECT, PRESERVE, AND MAINTAIN INTEGRITY OF ALL FEEDERS, GROUNDING CONDUCTORS AND UNIT MOUNTED PULL BOX FOR REUSE. COORDINATE OUTAGE AND RECONNECTION WITH OWNER.
2. PROTECT AND PRESERVE THE EXISTING CONCRETE PAD DURING DEMOLITION OF THE ASSOCIATED EQUIPMENT. REPAIR AND RESTORE THE PAD AS REQUIRED TO PROVIDE A SOUND, SERVICEABLE SURFACE SUITABLE FOR REUSE.
3. PROVIDE NEW 4" THICK REINFORCED CONCRETE HOUSEKEEPING PAD FOR NEW SWITCHBOARD INSTALLATION. NEW CONCRETE PAD SHALL BE STRUCTURALLY DOWELED AND TIED INTO EXISTING ADJACENT CONCRETE PAD TO CREATE A CONTINUOUS, STABLE FOUNDATION. CONTRACTOR SHALL VERIFY EXISTING PAD CONDITION AND ELEVATIONS PRIOR TO INSTALLATION AND REPAIR EXISTING CONCRETE AS REQUIRED FOR PROPER INTEGRATION. FINISH EXPOSED SURFACES SMOOTH AND APPLY PAINT/COATING AS REQUIRED TO PROVIDE A UNIFORM APPEARANCE.
4. RECONNECT EXISTING SERVICE FEEDER AND OUTGOING SERVICE FEEDER PROTECTED AND PRESERVED DURING DEMOLITION TO NEW SWITCHBOARD AS INDICATED. INSPECT EXISTING FEEDER CONDUCTORS AND TERMINATIONS PRIOR TO RECONNECTION. PROVIDE ALL NECESSARY LUGS, CONNECTORS, SPLICE KITS, HARDWARE, SUPPORTS, AND ACCESSORIES REQUIRED REQUIRED FOR A COMPLETE, CODE-COMPLIANT, AND FULLY FUNCTIONAL INSTALLATION. COODINATE ALL WORK TO MINIMIZE SERVICE INTERRUPTION.
5. RECONNECT EXISTING GROUNDING ELECTRODE SYSTEM TO NEW SWITCHBOARD/SERVICE EQUIPMENT. VERIFY CONTINUITY OF ALL GROUNDING AND BONDING CONNECTIONS AND PROVIDE ALL REQUIRED CONDUCTORS, CONNECTORS, CLAMPS, HARDWARE FOR A COMPLETE AND FULLY FUNCTIONAL GROUNDING SYSTEM PER NEC ARTICLE 250.
6. REFER TO "POWER ONE-LINE DIAGRAM - NEW WORK" ON SHEET E2.0 FOR CONDUCTOR AND CONDUIT SIZING. ASSUMED RUN LENGTH IS APPROXIMATELY 600FT.
7. REFER TO ONE LINE DIAGRAM ON SHEET E2.0 FOR ADDITIONAL INFORMATION.



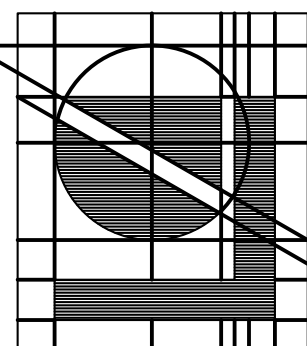
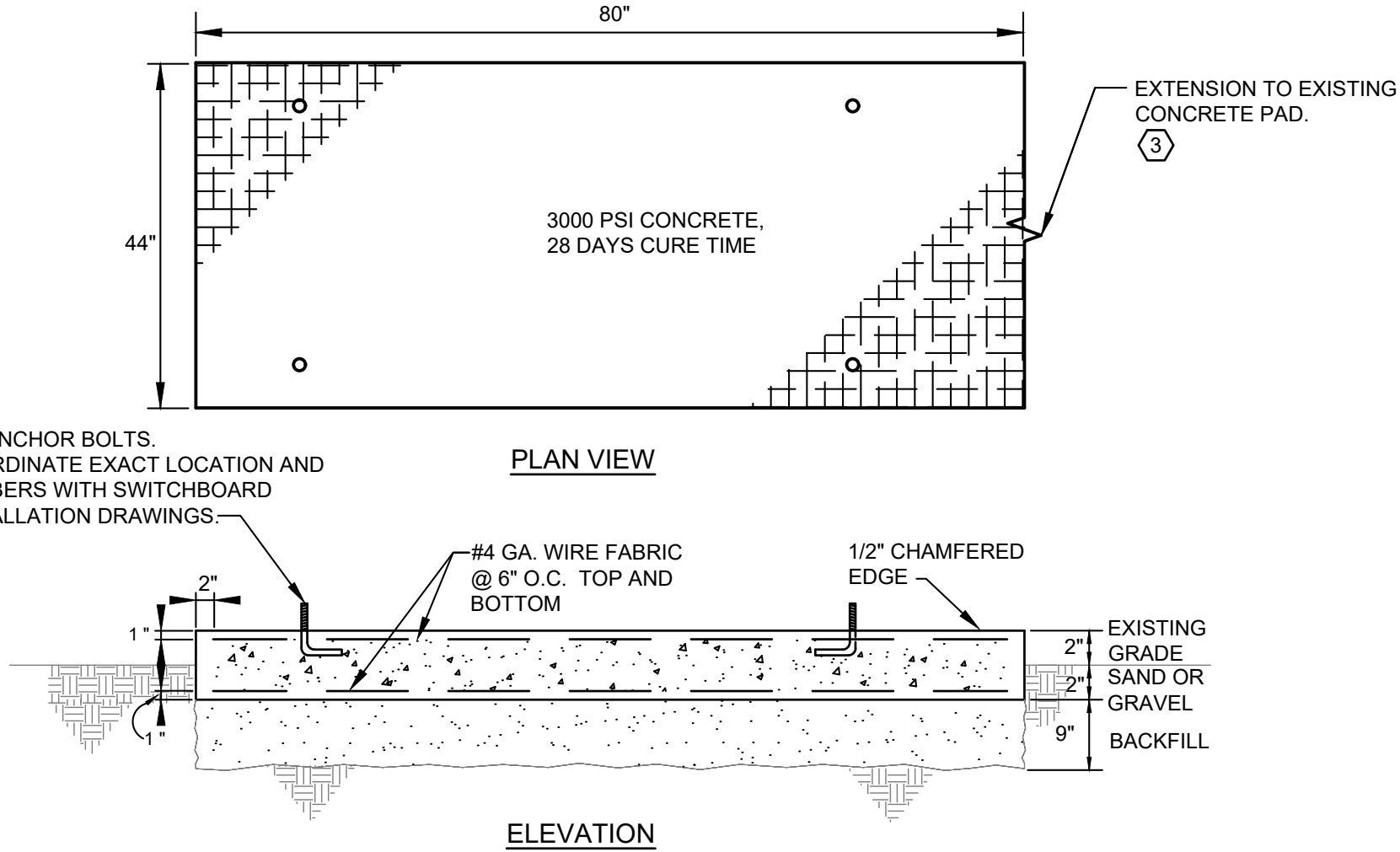
KEY PLAN
N.T.S.

CONCRETE PAD DETAIL - EXTENSION TO EXISTING CONCRETE PAD

N.T.S.

NOTE:

1. MAIN SERVICE SWITCHBOARD CONCRETE PAD TO BE PROVIDED BY ELECTRICAL CONTRACTOR.
2. CONFIRM CONCRETE PAD THICKNESS WITH STRUCTURAL ENGINEER.
3. CONFIRM ALL DIMENSIONS INCLUDING CONDUIT WINDOW OPEN WITH SWITCHGEAR MANUFACTURER PRIOR TO INSTALLATION OF FOUNDATION.
4. THE PAD MUST EXTEND MINIMUM 4" BEYOND THE EDGES OF SWITCHGEAR ON ALL SIDES BUT NOT EXCEEDING MORE THAN 6" AND MEETS NEC ARTICLE 110.26 WORKING SPACE REQUIREMENTS.
5. THE PAD MUST BE PLACED ON SOLID SUB SURFACE.



Lindhout Associates
architects aia pc
10465 aldrich drive, Brighton, Michigan 48116-0510
www.lindhout.com fax: (810) 227-5655 (810) 227-5668



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ck'd: R.S.
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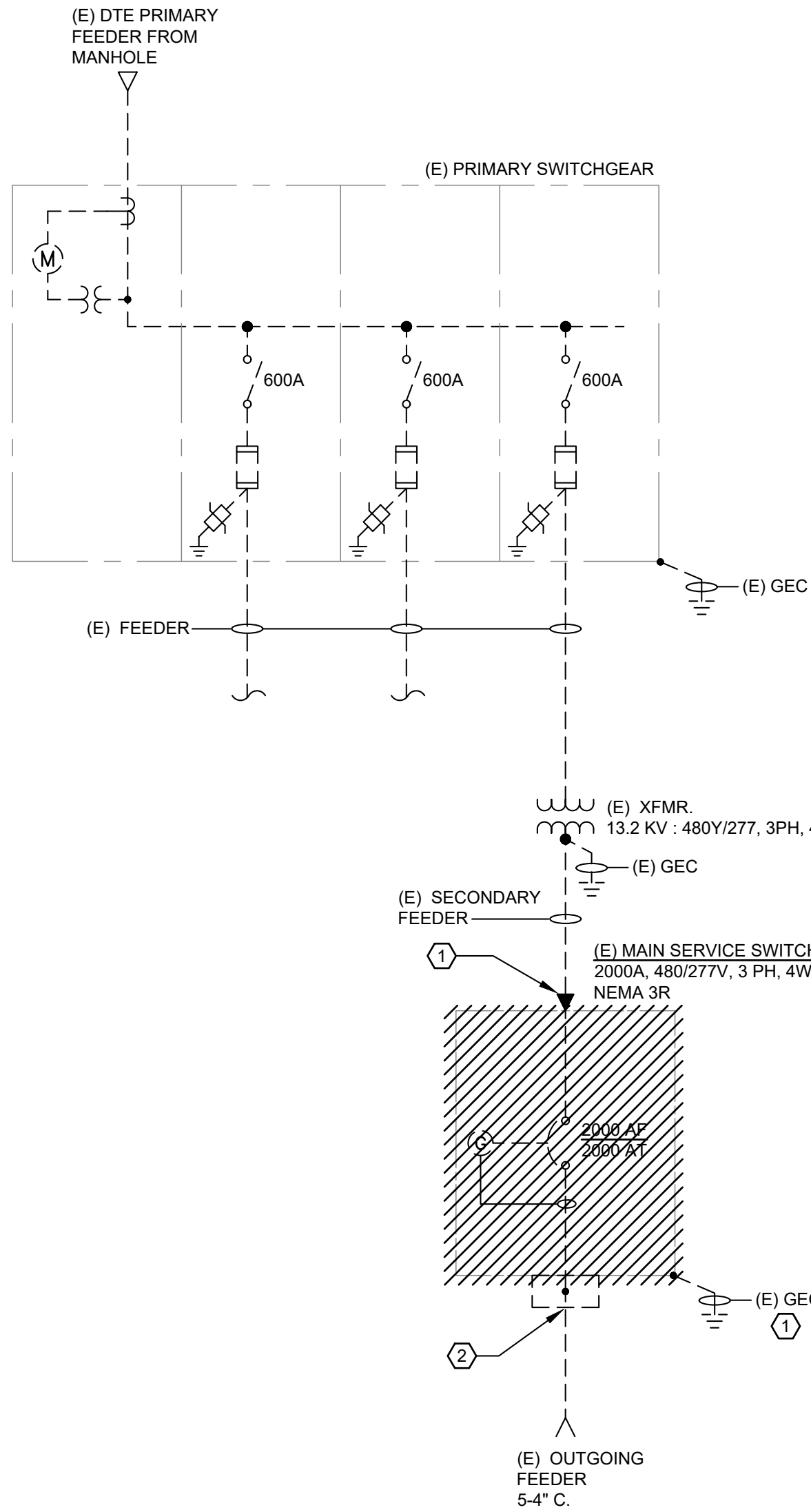
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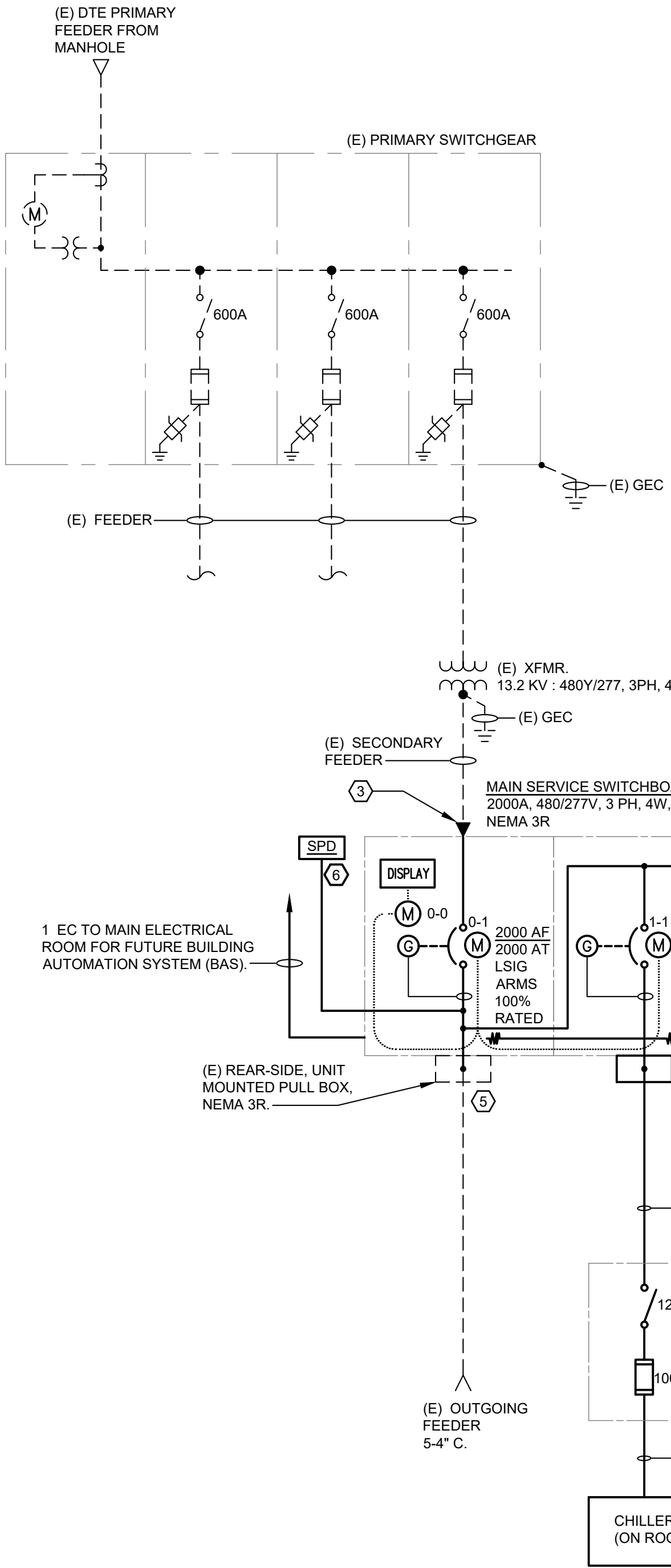
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DATE PLOTTED: 6/24/2024
PLOTTED BY: jdk mathew

ONE LINE DIAGRAM



(E) PARTIAL ONE-LINE DIAGRAM - DEMOLITION

N.T.S.



PARTIAL ONE-LINE DIAGRAM - NEW WORK

N.T.S.

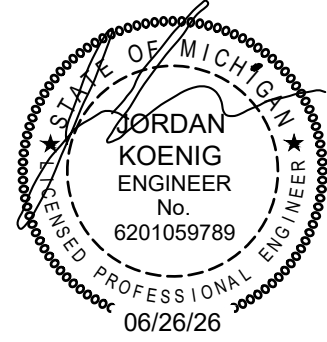
ENERGY MONITORING METERING LEGEND		
METER NO.	METER TYPE	LOAD DESCRIPTION
M0-0	DISPLAY UNIT W/ PXG1000 GATEWAY	OVERALL SERVICE
M0-1	MAIN CB W/ PXR25 TRIP UNIT	OVERALL SERVICE/EXISTING CHILLER
M1-1	FEEDER CB W/ PXR25 TRIP UNIT	NEW CHILLER

GENERAL NOTES:

- REFER TO SHEET E0.0 FOR ELECTRICAL SYMBOLS LIST, ABBREVIATIONS AND PROJECT NOTES.
- ALL SOLID LINE WORK DEPICTS NEW WORK. ALL DASHED LINE WORK IS EQUIPMENT, FEEDERS ETC. THAT ARE EXISTING TO REMAIN AND ALL CROSS-HATCHED EQUIPMENT AND FEEDERS ARE SCHEDULED TO DEMOLISHED.
- COMPLETE SHOP DRAWINGS FOR ALL NEW MAIN ELECTRICAL EQUIPMENT LIKE MAIN SERVICE SWITCHBOARD, PAD MOUNTED TRANSFORMER, PRIMARY & SECONDARY SERVICE FEEDERS SHALL BE PROVIDED BY THE CONTRACTOR AND APPROVED BY ENGINEERING, PRIOR TO PROCUREMENT.
- THE NEW WORK AT EXIST. EQUIPMENT SHALL BE PERFORMED, DE-ENERGIZED BY OEM OR A OEM AUTHORIZED SERVICE PROVIDER, TESTED PER OEM AND AHJ REQUIREMENTS AND COORDINATED TO MAINTAIN ORIGINAL EQUIPMENT RATINGS, CLEARANCES AND WARRANTY.
- ALL WIRING SHALL BE COPPER UNLESS NOTED OTHERWISE. THE MINIMUM CONDUIT SIZE IS 3/4". THE FLEXIBLE CONNECTIONS CAN BE 1/2".
- PROVIDE ENGRAVE NAME PLATED FOR ALL NEW ELECTRICAL EQUIPMENT LIKE SWITCHBOARDS, TRANSFORMERS, PANELBOARDS, SAFETY SWITCHES, MOTOR STARTERS ETC. INDICATING THE IDENTITY OF THE EQUIPMENT AND POWER SOURCE FOR EACH.
- PROVIDE TYPE-WRITTEN DIRECTORY FOR ALL NEW PANELBOARDS AND EXISTING BEING REWORKED.
- ALL TERMINATIONS SHALL COMPLY WITH THE REQUIREMENTS OF NEC ARTICLE 110.14(C)(1).
- PROVIDE LABEL INDICATING THE AVAILABLE FAULT CURRENT AND THE DATE. THE CALCULATIONS WERE PERFORMED PER NEC ARTICLE 110.24(A).
- PROVIDE ARC-FLASH HAZARD WARNING LABEL PER NEC ARTICLE 110.16(A) AND 110.16 (B).
- PROVIDE GROUND-FAULT PROTECTION OF EQUIPMENT FOR ALL NEW OVERCURRENT DEVICES RATED 1000 AMPS OR GREATER, AND MORE THAN 150 VOLTS TO GROUND .
- PROVIDE ARC-FLASH REDUCTION SYSTEM FOR ALL NEW OVERCURRENT DEVICES RATED 1200 AMPS OR GREATER PER NEC ARTICLE 240.87

KEY NOTES: (#)

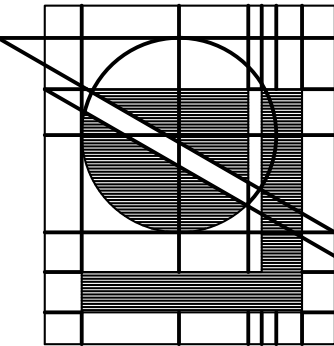
- DISCONNECT EXISTING INCOMING FEEDER CONDUCTORS AND GROUNDING ELECTRODE SYSTEM FROM MAIN SERVICE SWITCHBOARD SCHEDULED FOR DEMOLITION. PROTECT, PRESERVE, AND MAINTAIN INTEGRITY OF ALL FEEDERS AND GROUNDING CONDUCTORS FOR REUSE. COORDINATE OUTAGE AND RECONNECTION WITH OWNER.
- DISCONNECT EXISTING OUTGOING DISTRIBUTION FEEDER FROM EXISTING MAIN SERVICE SWITCHBOARD SCHEDULED FOR DEMOLITION. PROTECT, AND PRESERVE FEEDER CONDUCTORS AND UNIT MOUNTED PULL BOX FOR REUSE.
- RECONNECT EXISTING INCOMING FEEDER AND GROUNDING ELECTRODE SYSTEM TO NEW SERVICE SWITCHBOARD OF EQUAL RATING AND CONFIGURATION. VERIFY CONDUCTORS LENGTH, INSULATION CONDITIONS AND TERMINATIONS. EXTEND CONDUCTORS AS REQUIRED TO SUIT TO NEW EQUIPMENT. PROVIDE ALL NECESSARY LUGS, SPLICES AND HARDWARE FOR COMPLETE INSTALLATION.
- 120V CIRCUIT FOR A SPACE HEATER FROM NEAREST 208Y/120V PANELBOARD .
- REINSTALL THE EXISTING PULL BOX PRESERVED DURING DEMOLITION AT REAR OF NEW SWITCHBOARD AS INDICATED. EXTEND EXISTING CONDUCTORS FROM THE PULL BOX TO THE NEW SWITCHBOARD. PROVIDE ALL NECESSARY CONDUIT, FITTINGS, SUPPORTS, SPLICING MATERIALS, GROUNDING, HARDWARE, AND ACCESSORIES REQUIRED FOR A COMPLETE, CODE-COMPLIANT, SECURE, AND FULLY FUNCTIONAL INSTALLATION. VERIFY CONDUCTOR CONDITION AND LENGTHS PRIOR TO RECONNECTION AND REPLACE ANY DAMAGED COMPONENTS AS REQUIRED.
- PROVIDE TYPE 2 SURGE PROTECTOR DEVICE "SPD" WITH INTEGRAL DISCONNECT, SURGE COUNTER AND DRY CONTACTS FOR REMOTE MONITORING. SIZE PER MANUFACTURER'S RECOMMENDATIONS.
- EXTEND EXISTING GROUNDING ELECTRODE CONDUCTOR AND BOND TO NEW SERVICE SWITCHBOARD, WHERE EXISTING GROUNDING SYSTEM IS IN GOOD CONDITION AND SUITABLE FOR REUSE. WHERE EXISTING GROUNDING SYSTEM IS DAMAGED, UNDERSIZED, OR UNSUITABLE, PROVIDE NEW GROUNDING ELECTRODE SYSTEM INCLUDING MINIMUM OF (2) 10FT. GROUND RODS AND NEW #3/0 COPPER GROUNDING ELECTRODE CONDUCTOR (GEC) IN ACCORDANCE WITH NEC ARTICLE 250.



MEEC JOB # 24-0029

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SCALE: NONE



Lindhout Associates
architects aia pc

10465 clation drive, brighton, michigan 48116-9510
www.lindhout.com fax(810)227-5655 (810)227-5668



consultant

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issued for

dr: D.P.
ck'd: R.S.
app'd: J.K.

6-26-2026
date

REP RENOVATIONS for:
BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN

ONE LINE DIAGRAM

E2.0
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FILE LOCATION: A:\UNIDHOUT\24-0029\BHS Chiller and RTU Upgrade\E3.OX - ELECTRICAL SPECIFICATIONS.dwg
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PLOTTER: 4240
COMPILED: 2/21/2024
UNIDHOUT ASSOCIATES, INC. 10465 Clinton Drive, Brighton, Michigan 48116-9510
www.unidhoul.com fax (810) 227-5955 (810) 227-5958

3. ANSI Compliance: Comply with applicable requirements of ANSI Std A13.1, "Scheme for the Identification of Piping Systems". 4. NEMA Compliance: Comply with applicable requirements of NEMA Std No.'s. WC-1 and WC-2 pertaining to identification of power and control conductors. B. Lettering and Graphics: 1. General: Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/maintenance of electrical systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers. C. General Installation Requirements: 1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions, and requirements of NEC. 2. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting. 3. Regulations: Comply with governing regulations and requests of governing authorities for identification after completion of painting. D. Conduit Identification: 1. Underground Conduit and Cable Identification: a. General: During back-filling/top-soiling of each exterior underground electrical conduit, and signal or communication cable, install continuous underground-type plastic line marker, located directly over buried lines at 6" to 8" below finish grade. Where multiple lines are buried in a common trench and do not exceed an overall width of 12", install a single line marker. b. Install line marker for every buried service, regardless of whether direct-buried or protected in conduit. E. Equipment/System Identification: 1. General: Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems unless unit is specified with its own self-explanatory identification of signal system. Except as otherwise indicated, provide a single line of text, 2" high lettering on 1-1/2" high sign (2" where 2 lines are required), white lettering in black field. Provide texting matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work. a. Panelboards, electrical cabinets and enclosures. b. Access panel/doors to electrical facilities. c. Major electrical switchgear. 2. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operating and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate the substrate. WIRE AND CABLE (600 Volts) A. All wiring shall be run in conduit. B. Wire shall be as manufactured by Anaconda, Walker, General Cable, or Southwire, and shall be copper, minimum conductivity of 98 percent. C. Feeders and branch circuit wiring shall be 600 volt rated, 75 deg. C insulated type XHHW, THW or THWN. D. Conductors installed in runs within 6 inches of heating pipes shall be type AVA. No conductors shall be drawn into conduit until all work which may cause cable damage is completed. E. No wiring smaller than No. 12 AWG gauge shall be used unless otherwise noted, and all wire No. 10 AWG gauge and larger shall be stranded, unless otherwise specified. F. Home runs to panelboards 75 feet in length or over shall be not less than No. 10 AWG gauge, whether shown or not shown on the drawings. G. Conductors shall be color coded per the National Electrical Code. H. All conductors shall be copper. FIRE AND SMOKE BARRIERS A. All conduit penetrations in fire-rated walls and floors and designated smoke barriers shall be sealed with an approved fire barrier material. CABLE SUPPORTS AND BOXES A. The Electrical Contractor shall install cable supports and boxes for all vertical feeders in accordance with the schedule in the current edition of the National Electrical Code. The cable supports shall be of the split wedge type which clamps each individual conductor firmly and tightens due to weight of cable. OUTLET BOXES A. Outlets boxes shall be zinc-coated and shall be of the size and type to accommodate: 1. Structural conditions 2. Size and number of conductors and conduit entering 3. Devices or fixtures for which required. B. Outlet boxes shall be firmly anchored in place and shall be provided with approved fixture supports. Outlet boxes for switches, convenience outlets, etc., shall be set flush with finished walls. C. Outlet boxes shall be not less than 1-1/2 inches deep unless shallower boxes are required by structural conditions. Ceiling and bracket boxes shall be not less than 4 inch octagonal except that smaller boxes may be used where required by the particular fixture installed. Flush or recessed fixtures shall be provided with separate junction boxes when required by the fixture terminal requirements. Switch and receptacle boxes shall be approximately 4 inches. Telephone outlet boxes shall be 4 inches square. WIRING DEVICES A. Ground fault receptacles shall be specification grade, duplex type, rated 20 ampere, 125 volt, UL listed under 498 Receptacle Requirements and 943 Class A Requirements, shall conform to NEC requirements, and equal to Hubbell series #5260, P&S, or Arrow-Hart. B. Device colors shall be as selected by Architect. WEATHERPROOF BOXES AND COVERS: A. Wiring devices installed at exterior locations shall be weather-resistant and installed in a single gang, deep weatherproof box with while-in-use cover per NEC section 406.8(b)(1). Boxes and covers shall be constructed of polycarbonate and shall be fully gasketed. The translucent cover shall include a pad-lockable, break-resistant bullnose and latch. Pass & Seymour #WUIC10-DC of equal. DEVICE PLATES A. Device plates shall be stainless steel type 302. Hubbell "S" series, or as selected by the Architect or Owner. CONNECTION OF MECHANICAL EQUIPMENT A. The Electrical Contractor is cautioned to note carefully other sections of these specifications describing electrical equipment to be furnished under those sections in order that he may fully understand the wiring requirements. B. The Electrical Contractor shall be responsible for final coordination of all electrical feeders and over current protection devices (circuit breakers and/or fuses) with the manufacturers written data for each mechanical device prior to submittal of any electrical equipment for review. No additional compensation will be allowed for any changes to electrical feeders or over current protection devices required for any mechanical devices. C. All power wiring and feeders for mechanical equipment shall be furnished and installed by the Electrical Contractor. D. Safety or disconnect switches where indicated or required shall be furnished and installed by the Electrical Contractor. SAFETY DISCONNECT SWITCHES A. Switches shall be quick-make, quick-break type, horsepower rated. All switches shall be NEMA type HD (heavy duty). B. In-door enclosures shall be NEMA 1, indoor; outdoor enclosures shall be NEMA 3R, raintight. C. Equip fusible switches with Class R, rejection type fuse clips. D. Safety disconnect switches shall be manufactured by: Eaton, Schneider Electric, General Electric, or Siemens Energy & Automation. SWITCHBOARD GENERAL 1.1 SUMMARY A. Section Includes: 1. Service and distribution switchboards rated 600 V and less. 2. Transient voltage suppression devices. 3. Disconnecting and overcurrent protective devices. 4. Instrumentation. 5. Control power. 6. Accessory components and features. 7. Identification. 1.2 ACTION SUBMITTALS A. Product Data: For each type of product indicated. B. Shop Drawings: For switchboard and related equipment. 1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings. 2. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. 3. Include schematic and wiring diagrams for power, signal, and control wiring. 1.3 INFORMATIONAL SUBMITTALS A. Field quality-control reports. 1.4 CLOSEOUT SUBMITTALS A. Operation and maintenance data. 1.5 QUALITY ASSURANCE A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application. B. Comply with NEMA PB 2. C. Comply with NFPA 70. D. Comply with UL 891. 1.6 WARRANTY When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws. A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period. 1. Warranty Period: Two (2) years from date of Substantial Completion. PRODUCTS 2.1 MANUFACTURED UNITS A. Basis-of-Design Product: Subject to compliance with requirements, provide Eaton switchboard per One-Line Diagram shown on drawings, or comparable product by one of the following: 1. Square D, Schneider Electric. 2. Siemens Energy & Automation, Inc. B. Front-Connected, Front-Accessible Switchboards: 1. Main Devices: Fixed, individually mounted. 2. Branch Devices: Panel mounted. 3. Sections front and rear aligned. C. Nominal System Voltage: 480Y/277 V, 3-phase, 4-wire. D. Main Bus Continuous: 2000 Amps. E. Enclosure: Steel, NEMA 250, Type 3R, Non-Walking. 1. Enclosure Finish: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface. Rearward/down sloping roof. F. Customer Metering Compartment: Fabricated, barrier compartment and section complying with utility company's requirements. If separate vertical section is required for metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features. G. Incoming Pull Sections: Matched and aligned with basic switchboard. H. Barriers: Between adjacent switchboard sections. I. Insulation and Isolation for main bus of main section and main and vertical buses of feeder sections. J. Space Heaters: Factory-installed electric space heaters of sufficient wattage in each vertical section to maintain enclosure temperature above expected dew point. 1. Space Heater Control: Thermostats to maintain temperature of each section above expected dew points. 2. Space -Heater Power Source: External source. K. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments. L. Phase and Neutral Buses and Connections: Three phase, four wire unless otherwise indicated. Tin-plated, high-strength, electrical-grade copper with tin-plated copper circuit-breaker-liner connections. 1. Ground Bus: 1/4-by-2-inch (6-by-50-mm-) minimum size, hard-drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors. 2. Main Phase Buses and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. 3. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with pressure connectors for outgoing circuit neutral cables. 4. Bus-bar insulation. 5. Fungus proofing. 2.2 TRANSIENT VOLTAGE SUPPRESSION DEVICES A. Surge Protection Device Description: IEEE C62.41-compliant, integrally mounted, solid-state, parallel-connected, with sine-wave tracking suppression and filtering modules, UL 1449, fifth edition, short-circuit current rating matching or exceeding the switchboard short-circuit rating, and with the following features and accessories: 1. Peak Single-Impulse Surge Current Rating: 120 kA per mode/240 kA per phase. 2. Withstand Capabilities: 5000 IEEE C62.41, Category C3 (100 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage. B. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277-V, and 208Y/120-V three-phase, four-wire circuits shall be as follows: 1. Line to Neutral: 1200 V for 480Y/277, 700 V for 208Y/120V. 2. Line to Ground: 1200 V for 480Y/277, 1200 V for 208Y/120V. 3. Line to Line: 2000 V for 480Y/277, 1000 V for 208Y/120 V. 2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES A. FEEDERS - Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents. 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger. 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting. 3. 400 amp and above: Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings: a. Instantaneous trip. b. Long- and short-time pickup levels. c. Long- and short-time time adjustments. 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5. 5. Ground Fault Protection - 1000 amp and above: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator. 6. Communication Capability: Integral communication module with functions and features compatible with power monitoring and control system specified in Section "Electrical Power Monitoring and Control." 7. Molded-Case Circuit-Breaker (MCCB) Features and Accessories: a. Standard frame sizes, trip ratings, and number of poles. b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material. B. MAIN: Insulated-Case Circuit Breaker (ICCB): 100 percent rated, sealed, ipanulated-case power circuit breaker with interrupting capacity rating to meet available fault current. 1. Fixed circuit-breaker mounting. 2. Full-function, microprocessor-based trip units with interchangeable rating plug, trip indicators, and the following field-adjustable settings: a. Instantaneous trip. b. Long- and short-time time adjustments. 3. Remote trip indication and control. 4. Ground Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator. 5. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function. 6. Communication Capability: Integral communication module with functions and features compatible with power monitoring and control system specified in Section "Electrical Power Monitoring and Control." 7. Shunt Trip: 120 V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage. 8. Under Voltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay. 9. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts. 10.Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key must be removable only when circuit breaker is in off position. 2.4 INSTRUMENTATION A. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features: 1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated: a. Phase Currents, Each Phase: Plus or minus 1 percent. b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent. c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent. d. Megawatts: Plus or minus 2 percent. e. Megavolts: Plus or minus 2 percent. f. Power Factor: Plus or minus 2 percent. g. Frequency: Plus or minus 0.5 percent. h. Accumulated Energy, Megawatt Hours: Plus or minus 2 percent; accumulated values unaffected by power outages up to 72 hours. i. Megawatt Demand: Plus or minus 2 percent; demand interval programmable from five to 60 minutes. 2. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door. 3. Refer to Electrical Power Monitoring and Control for additional requirements. 2.5 CONTROL POWER A. Control Circuits: 120-V ac, supplied through secondary disconnecting devices from control-power transformer. 2.6 ACCESSORY COMPONENTS AND FEATURES A. Portable Test Set: For testing functions of solid-state trip devices without removing from switchboard. Include relay and meter test plugs suitable for testing switchboard meters and switchboard class relays. PART 3 - EXECUTION 3.1 INSTALLATION Referenced NECA and NEMA standards in first paragraph below include similar requirements. See "Testing and Inspecting" Article in the Evaluations. A. Receive, inspect, handle, store and install switchboards and accessories according to [NECA 400] (NEMA PB 2.1). B. Equipment Mounting: 1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded. 2. Install anchor bolts to elevations required for proper attachment to switchboards. C. Install filler plates in unused spaces of panel-mounted sections. D. Install overcurrent protective devices, transient voltage suppression devices, and instrumentation. Include a Coordination report for this project and submit with switchboard submittal. 1. Set field-adjustable switches and circuit-breaker trip ranges. 3.2 IDENTIFICATION A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems." B. Switchboard Nameplates: Label switchboard compartment with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems." C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in "Identification for Electrical Systems." 3.3 FIELD QUALITY CONTROL A. Acceptance Testing Preparation: 1. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. 2. Test continuity of each circuit. B. Tests and Inspections: 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest. 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment. 4. Switchboard will be considered defective if it does not pass tests and inspections. C. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action. D. Field Tests and inspections must be witnessed by BHS (Brighton High School). E. Manufacturer Services: Engage factory-authorized service representatives to supervise field tests and inspections. F. Switchboard manufacturer to perform a complete Short-Circuit Study of the One-Line-Diagram with all information shown. 3.4 WARRANTY A. Special Installer Extended Warranty: Two years from date of substantial completion; full coverage for labor and material. B. Special Manufacturer Extended Warranty: Five years from date of substantial completion; prorated coverage for labor, material and equipment. 3.5 DELIVERY, STORAGE AND HANDLING A. Remove loose packing and flammable material from inside the switchboard and connect factory installed space heaters to temporary electrical service to prevent condensation. B. Handle and prepare switchboard for installation in accordance with NECA 400/NEMA PB 2.1. 3.6 CLOSEOUT A. Provide record drawings indicating the as-built locations and wiring of all metering equipment. B. Submit all warranties, operation and maintenance manuals, software licenses, and test reports. ELECTRICAL POWER MONITORING PART 1 - GENERAL 1.1 SUMMARY A. This section specifies the requirements for a complete electrical power monitoring system (EPMS) to monitor electrical energy consumption in accordance with ASHRAE Standard 90.1-2019, Section 8.4.3, Electrical Energy Monitoring. B. The work includes, but is not limited to, furnishing, installing, testing, and commissioning all hardware and software necessary for a fully functional EPMS. 1.2 RELATED DOCUMENTS A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. B. Relevant sections of ASHRAE Standard 90.1-2019, Energy Standard for Buildings Except Low-Rise Residential Buildings. 1.3 SYSTEM DESCRIPTION A. Provide a complete and functional electrical power monitoring system (EPMS) capable of accurately measuring and reporting electrical energy consumption as required by ASHRAE 90.1-2019, Section 8.4.3. B. The system shall include, but is not limited to: 1. Main service metering: Eaton Power Xpert Meter 1000. 2. Multi-point metering: Eaton Power Xpert Multi-Point PMP. 3. Circuit monitoring: Eaton PXR25 digital trip units. 4. Current transformers (CTs) and potential transformers (PTs) as required. 5. Communication interfaces for data acquisition and integration with Building Automation System (BAS). 6. Software for data logging, analysis, and reporting. 7. Wiring, conduit, and accessories necessary for a complete and operational system. 1.4 RECORDING AND REPORTING PERFORMANCE A. The EPMS shall record and report the following parameters: 1. Real-time kW, kVA, kVAR, voltage, current, frequency, and power factor for each monitored point. 2. Accumulated kWh, kVAh, and kVARh for each monitored point. 3. Demand (kW and kVA) with selectable demand intervals. 4. Historical data logging with configurable intervals and retention periods. 5. Time-stamped events and alarms. 6. Reports shall be capable of being generated for daily, weekly, monthly, and annual energy consumption. 7. Reports shall be capable of displaying data in both tabular and graphical formats. 8. The system shall be capable of exporting data in common formats such as CSV or Excel. 9. The electrical energy use for all loads specified in Section 1.4 shall be recorded a minimum of every 15 minutes and reported at least hourly, daily, monthly, and annually. 10. The system shall be capable of maintaining all data collected for a minimum of 36 months. 1.5 SUBMITTALS A. Product Data: For each type of meter, CT, PT, communication device, and software, submit manufacturer's catalog cuts, specifications, installation instructions, and wiring diagrams. Include detailed information on accuracy, communication protocols (e.g., BACnet IP, Modbus TCP/IP), and software compatibility. B. Shop Drawings: Provide shop drawings indicating the location of all metering equipment, wiring diagrams showing connections to the electrical system and communication network, and details of mounting and installation. Include network architecture diagrams and details showing how load separation will be achieved. C. Test Reports: Submit manufacturer's certified test reports for each meter verifying accuracy and performance. D. Calibration Certificates: Provide calibration certificates for all metering equipment, traceable to a recognized national standard. E. Operation and Maintenance Data: Submit comprehensive operation and maintenance manuals, including troubleshooting guides, programming instructions, and communication protocol documentation. Include software manuals and licensing information. F. Recording and Reporting Performance Verification: Submit documentation demonstrating the system's ability to meet the performance requirements outlined in Section 1.5. 1.6 QUALITY ASSURANCE A. Metering equipment shall be listed and labeled by a nationally recognized testing laboratory (NRTL) acceptable to authorities having jurisdiction. B. Meters shall meet or exceed the accuracy requirements specified in ANSI C12.20 for revenue-grade meters (main service) and ANSI C12.1 for sub-metering and branch circuit monitoring. C. Install all metering equipment in accordance with manufacturer's instructions and applicable codes and standards. D. Engage a qualified electrical contractor experienced in the installation and commissioning of electrical power monitoring systems. 1.7 DELIVERY, STORAGE, AND HANDLING A. Deliver metering equipment in its original, unopened containers with manufacturer's labels clearly visible. B. Store equipment in a clean, dry environment protected from the elements and physical damage. C. Handle equipment carefully to prevent damage during transportation and installation. 1.8 WARRANTY A. Provide a one-year manufacturer's warranty against defects in materials and workmanship. PART 2 - PRODUCTS 2.1 MANUFACTURERS A. Basis of Design: Eaton (as specified in Section 1.3). B. Acceptable Manufacturers: Subject to compliance with specified requirements, including the following manufacturers: 1. Eaton 2. Approved Equal 2.2 ELECTRICAL METERS A. Main Service Metering: 1. Eaton Power Xpert Meter 1000. 2. Revenue-grade accuracy as defined in ANSI C12.20 (Class 0.2). 3. Capable of bi-directional metering. 4. Communication protocol: BACnet IP, Modbus TCP/IP. 5. Display: clear and large character LCD screen display with white backlight. B. Multi-Point Metering (for circuits rated less than 400 amps): 1. Eaton Power Xpert Multi-Point PMP. 2. Accuracy: ANSI C12.1. 3. Communication protocol: Modbus RTU, Modbus TCP/IP. C. Circuit Monitoring (for circuits rated 400 amps and larger): 1. Eaton PXR25 digital trip units. 2. Integrated metering functions. 3. Communication protocol: Modbus RTU. 2.3 CURRENT TRANSFORMERS (CTs) A. Accuracy Class: Suitable for the connected meter accuracy requirements (e.g., Class 0.2 for main service, Class 0.5 or 1.0 for others). B. Ratio: Selected to provide appropriate input current to the meters based on the anticipated load. C. Burden: Compatible with the input impedance of the connected meters. D. Type: Split-core CTs shall be used where installation without disconnecting existing conductors is required. Solid-core CTs shall be used where conductors can be disconnected. E. Safety: CTs shall be appropriately insulated for the system voltage. 2.4 POTENTIAL TRANSFORMERS (PTs) (If Required) A. Accuracy Class: Suitable for the connected meter accuracy requirements. B. Ratio: Selected to provide appropriate input voltage to the meters based on the system voltage. C. Burden: Compatible with the input impedance of the connected meters. D. Safety: PTs shall be appropriately fused and installed in accordance with applicable codes. 2.5 COMMUNICATION INTERFACE A. Provide communication interfaces on all meters as specified herein. B. Communication Protocol: BACnet IP, Modbus TCP/IP, Modbus RTU. 1. MODBUS protocol is acceptable for internal communication between trip units and meters. All internal wiring shall be factory-installed and tested prior to shipment. 2. BACnet IP protocol shall be provided for interfacing with the external building automation system (BAS). Confirm communication protocols with BAS system vendor and provide the required connection port (i.e. RJ45 for CAT6 cabling). C. Interface Hardware: Include all necessary interface modules, cables, and connectors for seamless communication with the building automation system (BAS) or dedicated data acquisition system. 2.6 SOFTWARE A. Provide software for data acquisition, logging, analysis, and reporting. B. Software shall be capable of: 1. Real-time monitoring of electrical parameters (kW, kVA, kVAR, V, A, Hz, PF). 2. Data logging with adjustable intervals and retention periods. 3. Generating reports on energy consumption, demand, and power quality. 4. Alarming on abnormal conditions. 5. Data export in standard formats (e.g., CSV, XML). 6. User-friendly interface. 7. Generating reports that clearly show the separated loads as defined in Section 1.4. 8. Generating daily, weekly, monthly, and annual energy consumption reports. 9. Displaying data in both tabular and graphical formats. 10. Exporting data in common formats such as CSV or Excel. 11. Recording electrical energy use for all loads specified in Section 1.4 a minimum of every 15 minutes.	10465 Clinton Drive, Brighton, Michigan 48116-9510 www.unidhoul.com fax (810) 227-5955 (810) 227-5958 Lindhout Associates architects aia pc mechanical electrical engineering consultants pc 14466 Sheldon Rd. Ste. 200 Livonia, Michigan 48150 734-464-5916 734-464-5917 MEEC mechanical electrical engineering consultants pc consultant BDS & PERMITS issued for date 6-26-2026 D.P. dr: ck'd: R.S. app'd: J.K. REP. RENOVATIONS for: BRIGHTON AREA SCHOOLS - BRIGHTON HIGH SCHOOL BRIGHTON, MICHIGAN SPECIFICATIONS 26022 THIS DRAWING IS DIAGRAMMATIC AND SHOULD BE USED TO DETERMINE THE DESIGN INTENT. THE CONTRACTOR SHALL FIELD VERIFY ALL WORK AND SHALL NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES IN THE DOCUMENTS BEFORE PROCEEDING. FAILURE TO DO SO WILL RESULT IN THE CONTRACTOR TAKING FULL RESPONSIBILITY AND LIABILITY FOR SAID DISCREPANCIES. 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10465 Clinton Drive, Brighton, Michigan 48116-9510
www.unidhoul.com fax (810) 227-5955 (810) 227-5958

Lindhout Associates
architects aia pc

mechanical electrical
engineering consultants
pc
14466 Sheldon Rd. Ste. 200
Livonia, Michigan 48150
734-464-5916
734-464-5917

MEEC
mechanical electrical
engineering consultants
pc

consultant

BDS & PERMITS
issued for
date
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D.P.
dr: ck'd: R.S.
app'd: J.K.

REP. RENOVATIONS for:
BRIGHTON AREA SCHOOLS
- BRIGHTON HIGH SCHOOL
BRIGHTON, MICHIGAN

SPECIFICATIONS

26022

FILE LOCATION: A:\LINDHOUT\24-0029-BHS Chiller and RTU Upgrade\E3.OX - ELECTRICAL SPECIFICATIONS.dwg
DATE PLOTTED: 6/26/2024
PLOTTED BY: jk40 math40
LINDHOUT ASSOCIATES architects pc
THIS DOCUMENT AND THE SUBJECT MATTER CONTAINED THEREIN IS PROPRIETARY AND IS NOT TO BE USED OR REPRODUCED WITHOUT PRIOR WRITTEN APPROVAL

12. Storing all collected data for a minimum of 36 months.
13. For buildings with tenants, providing the energy use data for each tenant space in a format accessible to the tenant.
14. In buildings with a building automatic system (BAS) installed, transmitting the energy use data to the BAS system and providing tools for graphical display of the data.

2.7 WIRING AND CONDUIT

- A. Install all wiring in accordance with Division 26 Section "Basic Electrical Materials and Methods."
- B. Provide appropriately sized conductors for all power and communication wiring.
- C. Install wiring in conduit as required by applicable codes and the Contract Documents.
- D. Label all wiring clearly at both ends.
- E. Provide CAT6 cable homerun to the building automation system (BAS), if provided, or otherwise to the building IT network switch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that the electrical system is ready to receive the metering equipment.
- B. Examine the Drawings and Contract Documents to ensure the correct location and type of metering equipment are installed, and that the load separation requirements are clearly indicated.
- C. Verify that the voltage and current ratings of the metering equipment are compatible with the electrical system.

3.2 INSTALLATION

- A. Install all metering equipment in accordance with manufacturer's instructions and approved shop drawings.
- B. Mount meters in accessible locations, protected from physical damage and environmental conditions.
- C. Install CTs and PTs on the appropriate conductors and ensure correct orientation. Ensure that the CTs are installed to accurately measure the separated loads as defined in Section 1.4.
- D. Connect all wiring securely and in accordance with wiring diagrams.
- E. Ground all metering equipment in accordance with applicable codes.
- F. Label all metering equipment clearly.

3.3 FIELD QUALITY CONTROL

- A. Perform point-to-point checks on all wiring to ensure correct connections.
- B. Verify proper operation of all meters and communication interfaces.
- C. Calibrate the entire metering system in the field to ensure accuracy. Provide calibration certificates.
- D. Test the communication interface with the BAS or data acquisition system to verify data transmission.
- E. Verify proper operation of the software and its ability to log, analyze, and report data, including the separated loads as defined in Section 1.4, and in accordance with the performance requirements in Section 1.5.

3.4 COMMISSIONING

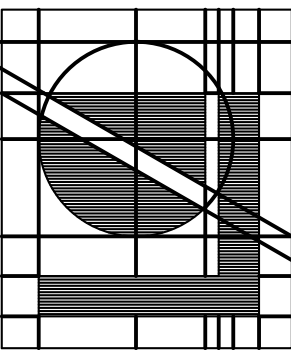
- A. Engage a qualified commissioning agent to oversee the commissioning process.
- B. Provide all necessary documentation and support for commissioning activities.
- C. Demonstrate the functionality of the EPMS, including data logging, reporting capabilities, and integration with the BAS. Show that the system accurately measures and reports on the separated loads as defined in Section 1.4, and meets the recording and reporting performance requirements in Section 1.5. for tenant spaces, demonstrate how the energy usage data is made available.
- D. Demonstrate the data transmission and graphical display.
- E. Provide training to the Owner's personnel on the operation and maintenance of the EPMS. For tenant spaces, provide training on how to access their energy usage data.

GUARANTEE

- A. The Electrical Contractor shall leave the electrical installation in proper working order and shall, without charge, replace any work or materials which develop defects, within one (1) year from date of final inspection and acceptance by the Owner.

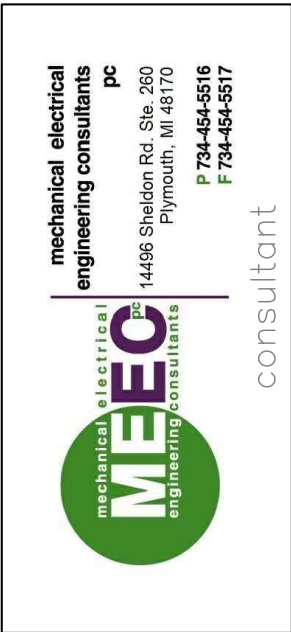
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Lindhout Associates
architects aia pc

10465 clinton drive, brighton, michigan 48116-9510
www.lindhout.com fax (810) 227-5665 (810) 227-5668



dr: D.P. ck'd: R.S. app'd: J.K.	6-26-2026 date	BIDS t PERMITS issued for
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REP RENOVATIONS for:
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SPECIFICATIONS