

MIDLAND PUBLIC SHOOOLS

600 E. Carpenter Street
Midland, MI 48640



TRANSPORTATION BUILDING - AHU/RTU REPLACEMENT

DATE: 01/22/2024 ISSUANCE: BIDS/PERMITS

- MECHANICAL:
- M0.0TB MECHANICAL GENERAL INFORMATION
 - M1.1TB MECHANICAL PLANS – TRANSPORTATION BUILDING
 - M1.2TB MECHANICAL ROOF PLANS – TRANSPORTATION BUILDING

- ELECTRICAL:
- E0.0TB ELECTRICAL GENERAL INFORMATION
 - E1.1TB ELECTRICAL PLANS – TRANSPORTATION BUILDING
 - E1.2TB ELECTRICAL ROOF PLANS – TRANSPORTATION BUILDING

MEP ENGINEERS:



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SES Project # 23 0939 01

LOCATION:
MIDLAND PUBLIC SCHOOLS TRANSPORTATION BUILDING
410 E. Hines Road
Midland, MI 48640



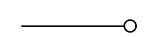
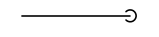
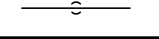

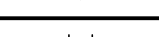


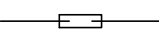

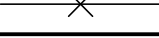
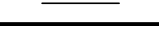
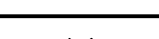

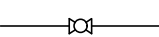
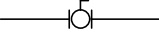
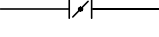
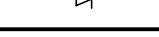
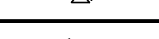
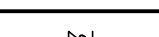

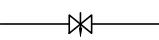




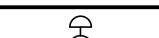
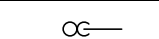

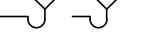
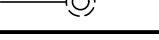

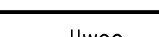

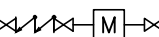
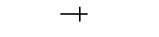
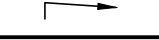
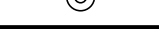
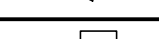
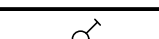
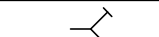
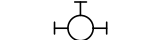


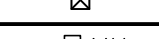
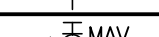





MAP IMAGE

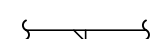
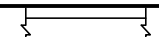
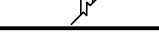
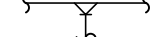

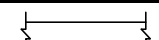
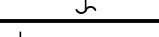

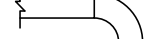
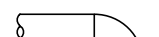
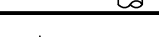

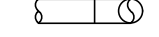
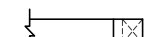
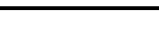

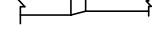
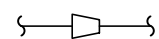
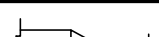

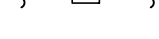
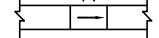
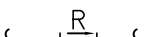


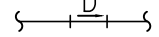
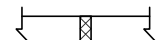

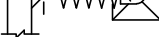

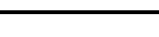

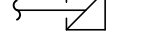
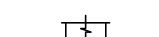
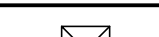
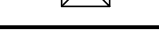

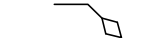
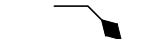
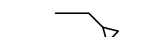
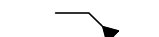
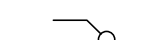
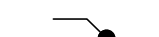
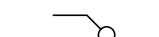
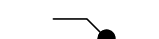
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Date: Jan 23, 2024, 10:45am Layout: M0.0TB Plotted by: jwg

MECHANICAL ABBREVIATIONS	
ABBREV.	DESCRIPTION
AAV	AUTOMATIC AIR VENT / AIR ADMITTANCE VALVE
AD	ACCESS DOOR
AE	AIR EXTRACTOR
AFF	ABOVE FINISHED FLOOR
APD	AIR PRESSURE DROP
ASR	AUTOMATIC SPRINKLER RISER
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
BWV	BACKWATER VALVE
CAP	CAPACITY
CAV	CONSTANT AIR VOLUME
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CIRC	CIRCULATING
CLG	COOLING
CO	CLEAN OUT
CONT	CONTINUATION OR CONTINUED
CONV	CONVECTOR
CUH	CABINET UNIT HEATER
CV	CONTROL VALVE
DB	DRY BULB TEMPERATURE
DEG	DEGREES
DDC	DIRECT DIGITAL CONTROL
DN	DOWN
DTC	DRAIN TILE CONNECTION
DWH	DOMESTIC WATER HEATER
(E)	EXISTING
EA/EXH	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EDB	ENTERING DRY BULB TEMPERATURE
EF	EXHAUST FAN
EJ	EXPANSION JOINT
EL	ELEVATION
ELECT	ELECTRICAL
EMS	ENERGY MANAGEMENT SYSTEM
ESP	EXTERNAL STATIC PRESSURE
EWB	ENTERING WET BULB TEMPERATURE
EWV	ELECTRIC WATER COOLER
°F	DEGREES FAHRENHEIT
FA	FACE AREA (COIL) / FREE AREA (LOUVER)
FC	FLEXIBLE CONNECTION
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FHR	FIRE HOSE RACK
FHV	FIRE HOSE VALVE
FLA	FULL LOAD AMPS
FLR	FLOOR
FPM	FEET PER MINUTE
FFD	FUNNEL FLOOR DRAIN
FFE	FINISHED FLOOR ELEVATION
FS	FLOOR SINK
FT	FEET
FURN	FURNISHED
FV	FACE VELOCITY
FVC	FIRE VALVE CABINET
GAL	GALLON
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
HB	HOSE BIBB
HO	HUB OUTLET
HP	HORSEPOWER

MECHANICAL ABBREVIATIONS	
ABBREV.	DESCRIPTION
HR	HOUR
HTG	HEATING
HYD	HYDRANT
HZ	HERTZ
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCHES
INST	INSTALLED
INV	INVERT
ISP	INTERNAL STATIC PRESSURE
IW	INDIRECT WASTE
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LBS/HR	POUNDS PER HOUR
LDB	LEAVING DRY BULB TEMPERATURE
LRA	LOCKED ROTOR AMPS
LWB	LEAVING WET BULB TEMPERATURE
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MBH	1000 BRITISH THERMAL UNITS PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MECH	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MOD	MOTOR OPERATED DAMPER (AUTOMATIC)
MOP	MAXIMUM OVER-CURRENT PROTECTION
N.C.	NOISE CRITERIA
NIC	NOT IN CONTRACT
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NOM	NOMINAL
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER / CENTER TO CENTER
OD	OUTSIDE DIAMETER
OED	OPEN ENDED DUCT
ORS	OVERFLOW ROOF SUMP
PD	PRESSURE DROP (FEET OF WATER)
PRV	PRESSURE REDUCING VALVE
PSIA	POUNDS PER SQUARE INCH – ABSOLUTE
PSIG	POUNDS PER SQUARE INCH – GAUGE
PT	PRESSURE / TEMPERATURE PORT
RA	RETURN AIR
RH	RELATIVE HUMIDITY
REQD	REQUIRED
RELA	RELIEF AIR
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE
RS	ROOF SUMP
SA	SUPPLY AIR
SH	SHOWER
SP	STATIC PRESSURE
SqFt / SF	SQUARE FOOT/SQUARE FEET
SS	SERVICE SINK
TC	TEMPERATURE CONTROL
TD	TRANSFER AIR DUCT
T & P	TEMPERATURE AND PRESSURE
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UL	UNDERWRITERS' LABORATORY
UNO	UNLESS NOTED OTHERWISE

MECHANICAL ABBREVIATIONS	
ABBREV.	DESCRIPTION
UR	URINAL
VD	VOLUME DAMPER (MANUALLY ADJUSTABLE)
VTR	VENT THRU ROOF
W	WASTE
W&V	WASTE AND VENT
WB	WET BULB TEMPERATURE
WC	WATER CLOSET
WG	WATER GAUGE
WH	WALL HYDRANT


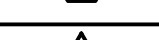
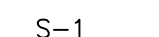
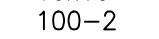


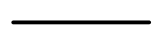

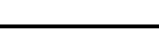
MECHANICAL PIPING SYMBOLS	
ABBREV.	DESCRIPTION
	PIPE ELBOW UP
	PIPE ELBOW DOWN
	PIPE TEE DOWN
	DIRECTION OF FLOW
	UNION
	STRAINER
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	EXPANSION JOINT
	FLEXIBLE CONNECTION
	PIPE ANCHOR
	PIPE GUIDE
	PIPE CAP OR PLUG
	ISOLATION VALVE
	CIRCULATING PUMP
	GLOBE VALVE
	BALL VALVE
	BUTTERFLY VALVE
	BACKWATER VALVE
	ANGLE VALVE
	CHECK VALVE (SWING)
	CHECK VALVE (SPRING)
	PLUG VALVE
	NEEDLE VALVE
	OUTSIDE SCREW AND YOKE VALVE (OS&Y)
	PRESSURE REGULATING VALVE
	SOLENOID VALVE
	CONTROL VALVE (2-WAY / 3-WAY)
	CENTRIFUGAL FAN
	AUTOMATIC GAS SHUT-OFF VALVE
	TRAP (PLAN VIEW)
	FLOOR DRAIN / FUNNEL FLOOR DRAIN (PLAN VIEW)
	FLOOR DRAIN / FUNNEL FLOOR DRAIN (ELEVATION)
	ROOF SUMP
	CLEAN OUT (IN FLOOR)
	CLEAN OUT (IN LINE)
	CLEAN OUT (WALL)
	BACKFLOW PREVENTER
	WATER METER ASSEMBLY
	HOSE BIBB, WALL HYDRANT
	DIRECTION OF PIPE PITCH
	SPRINKLER HEAD (UPRIGHT)
	SPRINKLER HEAD (SIDEWALL)
	FLOW SWITCH
	SIAMESE CONNECTION (YARD)
	SIAMESE CONNECTION (WALL MOUNTED)
	FIRE HYDRANT
	FLOW MEASURING DEVICE
	BALANCING VALVE
	COMBINATION FLOW MEASURING AND BALANCING DEVICE
	AUTOMATIC AIR VALVE
	MANUAL AIR VALVE

MECHANICAL SYMBOLS	
ABBREV.	DESCRIPTION
	RECTANGULAR TAKE-OFF (SINGLE LINE)
	RECTANGULAR TAKE-OFF (DOUBLE LINE)
	ROUND TAKE-OFF (SINGLE LINE)
	ROUND TAKE-OFF (DOUBLE LINE)
	SPIN-IN FITTING (WITH VOLUME DAMPER)
	ELBOW (WITH TURNING VANES)
	RADIUS RECTANGULAR ELBOW
	RADIUS ROUND ELBOW
	RECTANGULAR ELBOW UP
	ROUND ELBOW UP
	RECTANGULAR ELBOW DOWN
	ROUND ELBOW DOWN
	CONCENTRIC TRANSITION (DOUBLE LINE)
	CONCENTRIC TRANSITION (SINGLE LINE)
	ECCENTRIC TRANSITION (DOUBLE LINE)
	ECCENTRIC TRANSITION (SINGLE LINE)
	INCLINED RISE IN DIRECTION OF AIR FLOW (DOUBLE LINE)
	INCLINED RISE IN DIRECTION OF AIR FLOW (SINGLE LINE)
	INCLINED DROP IN DIRECTION OF AIR FLOW (DOUBLE LINE)
	INCLINED DROP IN DIRECTION OF AIR FLOW (SINGLE LINE)
	FLEXIBLE CONNECTION
	FLEXIBLE DUCT CONNECTION TO SUPPLY DIFFUSER
	SUPPLY DIFFUSER
	LINEAR SLOT DIFFUSER
	RETURN OR EXHAUST GRILLE
	TRANSFER GRILLE
	CROSS SECTION OF SUPPLY AIR DUCT
	CROSS SECTION OF EXHAUST OR RETURN AIR DUCT
	EXISTING FIRE DAMPER (HORIZONTAL)
	NEW FIRE DAMPER (HORIZONTAL)
	EXISTING FIRE DAMPER (VERTICAL)
	NEW FIRE DAMPER (VERTICAL)
	EXISTING SMOKE DAMPER
	NEW SMOKE DAMPER
	EXISTING COMBINATION FIRE/SMOKE DAMPER (VERTICAL)
	NEW COMBINATION FIRE/SMOKE DAMPER (VERTICAL)
	EXISTING COMBINATION FIRE/SMOKE DAMPER (HORIZONTAL)
	NEW COMBINATION FIRE/SMOKE DAMPER (HORIZONTAL)
	VOLUME DAMPER (MANUALLY ADJUSTABLE)
	MOTORIZED DAMPER
	SMOKE DETECTOR
	CO2 SENSOR
	THERMOSTAT OR TEMPERATURE SENSOR
	HUMIDISTAT OR HUMIDITY SENSOR
	RETURN OR EXHAUST / SUPPLY AIR FLOW

PIPING LEGEND	
ABBREV.	DESCRIPTION
—CA—	COMPRESSED AIR PIPING
—CD—	CONDENSATE DRAIN PIPING
—DT—	DRAIN TILE
—F—	FIRE PROTECTION PIPING
—FOR—	FUEL OIL RETURN PIPING
—FOS—	FUEL OIL SUPPLY PIPING
—G—	NATURAL GAS PIPING
—BCW—	BOOSTED-DOMESTIC COLD WATER PIPING
—BHW—	BOOSTED-DOMESTIC HOT WATER PIPING
—CW—	DOMESTIC COLD WATER PIPING
—NPCW—	NON POTABLE COLD WATER PIPING
—TW—	TEMPERED WATER PIPING
—HW—	DOMESTIC HOT WATER PIPING
—HW(XXX)—	DOMESTIC HOT WATER PIPING CIRCULATED AT XXX TEMPERATURE
—HWR—	DOMESTIC HOT WATER RETURN PIPING
—SAN—	SANITARY WASTE PIPING
—PSAN—	PUMPED SANITARY PIPING
—V—	VENT PIPING
—ST—	STORM SEWER PIPING
—PST—	PUMPED STORM PIPING
—RC—	RAIN CONDUCTOR PIPING
—ORC—	OVERFLOW RAIN CONDUCTOR PIPING
—CHWR—	CHILLED WATER RETURN PIPING
—CHWS—	CHILLED WATER SUPPLY PIPING
—CWR—	CONDENSER WATER RETURN PIPING
—CWS—	CONDENSER WATER SUPPLY PIPING
—HHWR—	HEATING HOT WATER RETURN PIPING
—HHWS—	HEATING HOT WATER SUPPLY PIPING
—HPLR—	HEAT PUMP LOOP RETURN PIPING
—HPLS—	HEAT PUMP LOOP SUPPLY PIPING
—RL—	REFRIGERANT LIQUID PIPING
—RS—	REFRIGERANT SUCTION PIPING
—HGB—	HOT GAS BY-PASS PIPING
—GXHR—	GEO HEAT EXCHANGE RETURN
—GXHS—	GEO HEAT EXCHANGE SUPPLY
—STM—	STEAM PIPING
—HPS—	HIGH PRESSURE STEAM PIPING
—LPS—	LOW PRESSURE STEAM PIPING
—CR—	STEAM CONDENSATE RETURN PIPING
—PCR—	PUMPED STEAM CONDENSATE RETURN PIPING
—LPC—	LOW PRESSURE CONDENSATE PIPING
—HPC—	HIGH PRESSURE CONDENSATE PIPING
—MA—	MEDICAL AIR PIPING
—N—	NITROGEN GAS PIPING
—O2—	OXYGEN GAS PIPING
—VAC—	VACUUM PIPING

APPLICABLE CODES AND REGULATIONS	
YEAR	CODE
2015	MICHIGAN BUILDING CODE
2015	MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS
2015	MICHIGAN MECHANICAL CODE
2015	MICHIGAN UNIFORM ENERGY CODE
2015	INTERNATIONAL FUEL GAS CODE
2009	ICC/ANSI ACCESSIBLE AND USABLE BUILDING & FACILITIES
–	AMERICANS WITH DISABILITIES ACT ACCESSIBILITIES GUIDELINE (ADA-AG)

DRAWING INDEX	
SHT. NO	DESCRIPTION
M0.0TB	MECHANICAL GENERAL INFORMATION
M1.1TB	MECHANICAL PLANS – TRANSPORTATION BUILDING
M1.2TB	MECHANICAL ROOF PLANS – TRANSPORTATION BUILDING

DRAWING NOTATION	
SYMBOL	DESCRIPTION
	NEW WORK KEY NOTE NO. 1
	DEMOLITION KEY NOTE NO. 1
EF-1	EQUIPMENT TAG
	AIR TERMINAL TAG: IE: DIFFUSER TYPE = S-1 NECK SIZE = 10x10 CFM = 100 (TYPICAL FOR 2)
	EXISTING DEVICES OR EQUIPMENT
	NEW OR MODIFIED DEVICES OR EQUIPMENT
	EXISTING SYSTEM COMPONENT TO BE REMOVED
	POINT OF NEW CONNECTION
	SECTION NO. 4 SHEET M5.2 ON WHICH SECTION DRAWN
	SECTION NO. 6 SCALE: 1/4" = 1' – 0" SHEET M5.2 ON WHICH SECTION IS CUT (ENLARGED PARTIAL PLAN SIMILAR)



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SES Project #23 0939 01

CLIENT:

MIDLAND PUBLIC SCHOOLS
600 East Carpenter Street
Midland, MI 48640

PROJECT:

**MIDLAND PUBLIC SCHOOLS
TRANSPORTATION
BUILDING - AHU/RTU
REPLACEMENT**
410 East Hines Road
Midland, MI 48640

Seal:

ISSUED FOR:

BIDS/PERMITS 01/22/24

ISSUED

DATE

DESIGNER:

JWG

ENGINEER:

NCS

SHEET TITLE:

**MECHANICAL GENERAL
INFORMATION**

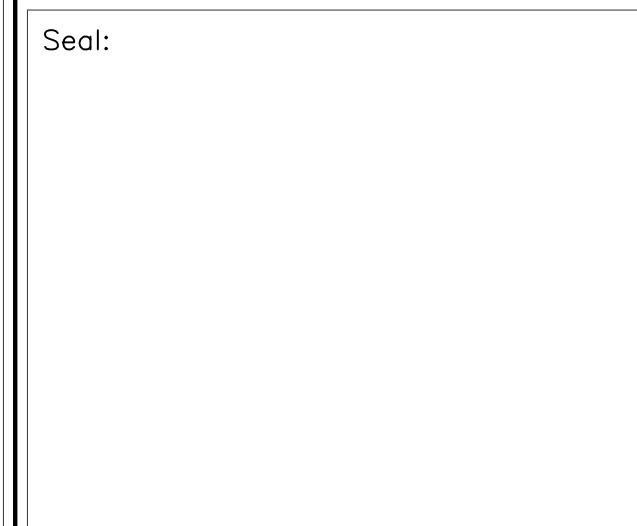
SHEET NUMBER:

M0.0TB



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600 East Carpenter Street
Midland, MI 48640

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ISSUED FOR:	
BIDS/PERMITS	01/22/24

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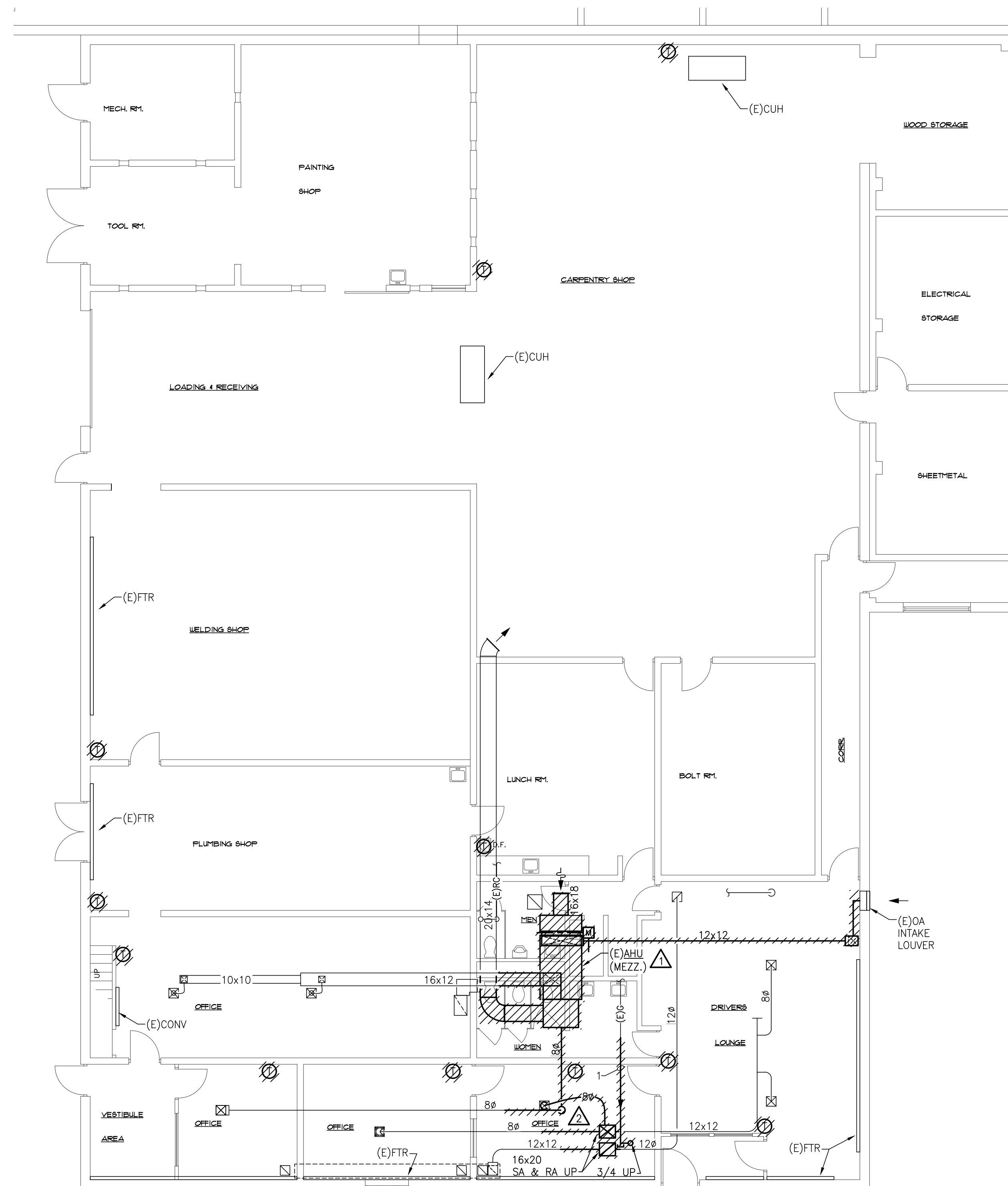
ISSUED	DATE
DESIGNER:	JWG
ENGINEER:	NCS

SHEET TITLE:

MECHANICAL PLANS -
TRANSPORTATION
BUILDING

SHEET NUMBER:

M1.1TB



PARTIAL MECHANICAL DEMO PLAN
SCALE: 1/8" = 1'-0"

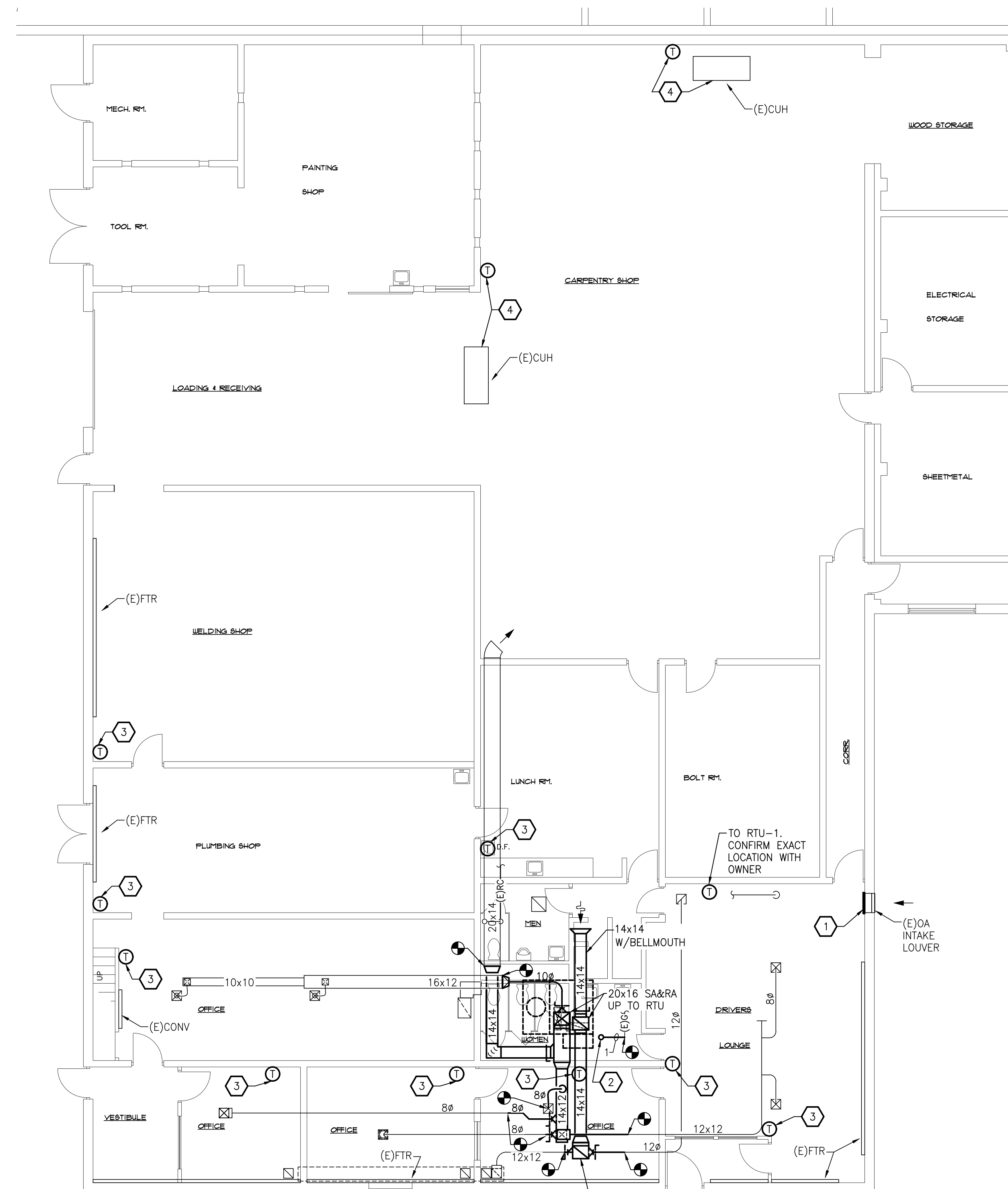
MECHANICAL DEMOLITION NOTES


1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF WORK TO BE PERFORMED. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK.
2. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH EXISTING SITE CONDITIONS, SYSTEMS, AND UTILITIES. NOTIFY ARCHITECT OF ANY INTERFERENCES OR DISCREPANCIES.
3. VERIFY DEPTH, SIZE, LOCATIONS AND CONDITION OF EXISTING UTILITIES IN THE FIELD, INCLUDING POINTS OF CONNECTION PRIOR TO STARTING ANY WORK.
4. ANY INTERRUPTIONS OF EXISTING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESENT BUILDING'S OPERATION.
5. ALL ITEMS ON DEMOLITION PLAN SHALL BE CONSIDERED EXISTING UNLESS OTHERWISE NOTED. ALL WORK INDICATED ON PLANS HAS BEEN LOCATED PER EXISTING DRAWINGS AND/OR FIELD OBSERVATION AND REQUIRES FIELD VERIFICATION.
6. ALL ITEMS INDICATED WITH CROSS-HATCHING SHALL BE REMOVED COMPLETE, WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, INSULATION, CONTROLS, ETC. CAP ALL OPEN ENDED PIPES AND DUCTS.
7. ALL EXISTING WORK TO REMAIN SHALL BE PROTECTED FROM DAMAGE, WHERE DUCT OR PIPE INSULATION HAS BEEN DAMAGED DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR INSULATION AS REQUIRED TO MATCH EXISTING.
8. THE OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL EQUIPMENT BEING REMOVED. ALL ITEMS REMOVED SHALL BE LEGALLY DISPOSED OF. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXISTING RELOCATED AND OWNER PROVIDED EQUIPMENT.



DEMOLITION KEYED NOTES


1. REMOVE EXISTING INDOOR AHU, DUCTWORK AS INDICATED, CONDENSING UNIT ON ROOF, AND HEATING HOT WATER PIPING BACK TO MAIN.
2. REMOVE RTU AND DUCTWORK AS INDICATED. REMOVE GAS PIPING AND PREPARE FOR CONNECTION TO NEW RTU.



 **PARTIAL MECHANICAL PLAN**
SCALE: 1/8" = 1'-0"

HVAC GENERAL NOTES

1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE HVAC SYSTEMS COMPLETE PER SPECIFICATION, SMACNA STANDARDS, AND PER APPLICABLE CODES INCLUDING ALL NECESSARY OFFSETS, FITTINGS, SPECIAL RADIUS OR MITERED ELBOWS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR STRUCTURAL CONDITIONS OR OTHER CONDITIONS.
 2. CONTRACTOR SHALL COORDINATE THEIR WORK WITH THE WORK OF ALL OTHER TRADES. ALL DUCTWORK IS TO BE ROUTED AS HIGH AS POSSIBLE. PROVIDE ACCESS AROUND ALL NEW EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. VERIFY ALL CLEARANCES PRIOR TO THE FABRICATION OF ANY WORK.
 3. DUCTWORK/PIPING SHALL BE ROUTED AS HIGH AS POSSIBLE AND SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT/PANELS. PROVIDE REQUIRED CLEARANCE IN FRONT OF ELECTRICAL EQUIPMENT. DUCTWORK/PIPING SHALL NOT INTERFERE WITH ELECTRICAL EQUIPMENT CLEARANCE.
 4. DUCTWORK/PIPING SHALL NOT BE INSTALLED IN A LOCATION THAT RESTRICTS THE ACCESS TO MECHANICAL DEVICES REQUIRING ACCESS.
 5. THE CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL, ETC. FOR THE PROPER INSTALLATION OF ALL MECHANICAL SYSTEMS.
 6. COORDINATE FLOOR, WALL, ROOF PENETRATIONS, LOUVER SIZES, PAD LOCATIONS ETC. WITH ARCHITECTURAL TRADES. SEAL ALL PIPING AND DUCT PENETRATIONS.
 7. BRANCH DUCTWORK TO GRILLES, REGISTERS AND DIFFUSERS SHALL BE THE SAME SIZE AS THE GRILLE, REGISTER OR DIFFUSER NECK SIZE WHERE NO DUCT SIZE IS INDICATED ON PLAN.
 8. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL BE 5'-0".
 9. PROVIDE CODE REQUIRED CLEARANCE/ACCESS DOORS FOR DAMPERS, VALVES, AND CLEANOUTS LOCATED IN WALLS OR ABOVE HARD CEILINGS. COORDINATE LOCATIONS WITH ARCHITECT. REFER TO ARCHITECTURAL PLANS FOR CEILING TYPES.
 10. CONNECTION TO EQUIPMENT SHALL BE VERIFIED WITH MANUFACTURER'S CERTIFIED DRAWINGS. TRANSITIONS TO ALL EQUIPMENT SHALL BE VERIFIED AND PROVIDED FOR EQUIPMENT FURNISHED.



KEYED NOTES

 1. PROVIDE METAL INSULATED PANEL TO BLANK OFF EXISTING OA INTAKE LOUVER
 2. 1" GAS UP TO RTU. PROVIDE DIRT LEG, UNION AND SHUT-OFF VALVE AT UNIT CONNECTION. COORDINATE EXACT LOCATION WITH UNIT PROVIDED. PROVIDE ROOF FLASHING CONE AND COUNTER FLASHING AT ROOF PENETRATION.
 3. REMOVE AND REPLACE FTR OR CONVECTOR CONTROLS WITH DDC CONTROLS. INCLUDE NEW CONTROL VALVE, TEMPERATURE SENSOR AND ZONE CONTROLLER FIELD VERIFY WHICH SENSOR SENSORS EACH PIECE OF EQUIPMENT.
 4. REMOVE AND REPLACE CUH CONTROLS AND TEMPERATURE SENSOR WITH DDC CONTROLS. INCLUDE NEW CONTROLLER, CONTROL VALVE, DAMPER ACTUATORS TEMPERATURE SENSORS, ETC. AS REQUIRED FOR COMPLETE DDC CONTROL OF THE UNIT.

KEYED NOTES

1. PROVIDE METAL INSULATED PANEL TO BLANK OFF EXISTING OA INTAKE LOUVER
2. 1" GAS UP TO RTU. PROVIDE DIRT LEG, UNION AND SHUT-OFF VALVE AT UNIT CONNECTION. COORDINATE EXACT LOCATION WITH UNIT PROVIDED. PROVIDE ROOF FLASHING CONE AND COUNTER FLASHING AT ROOF PENETRATION.
3. REMOVE AND REPLACE FTR OR CONNECTOR CONTROLS WITH DDC CONTROLS. INCLUDE NEW CONTROLLER VALVE, TEMPERATURE SENSOR AND ZONE CONTROLLER FIELD VERIFY WHICH SENSOR SERVES EACH PIECE OF EQUIPMENT.
4. REMOVE AND REPLACE CUH CONTROLS AND TEMPERATURE SENSOR WITH DDC CONTROLS. INCLUDE NEW CONTROLLER, CONTROL VALVE, DAMPER ACTUATORS TEMPERATURE SENSORS, ETC. AS REQUIRED FOR COMPLETE DDC CONTROL OF THE UNIT.



PROJECT:
MIDLAND PUBLIC SCHOOLS
TRANSPORTATION
BUILDING - AHU/RTU
REPLACEMENT
410 East Hines Road
Midland, MI 48640



M1.2TB

NOTES:

1. DRY BULB ECONOMIZER.
2. PROVIDE WITH 24" ROOF CURB

COPPER FEEDER SCHEDULE									
FEEDER (AMPS)	COND. SIZE	2 WIRE WITH GROUND	FEEDER (AMPS)	COND. SIZE	3 WIRE WITH GROUND	FEEDER (AMPS)	COND. SIZE	4 WIRE WITH GROUND	
15S	12	2#12, 1#12 GND IN 3/4"C	15	12	3#12, 1#12 GND IN 3/4"C	15N	12	4#12, 1#12 GND IN 3/4"C	
20S	12	2#12, 1#12 GND IN 3/4"C	20	12	3#12, 1#12 GND IN 3/4"C	20N	12	4#12, 1#12 GND IN 3/4"C	
25S	10	2#10, 1#10 GND IN 3/4"C	25	10	3#10, 1#10 GND IN 3/4"C	25N	10	4#10, 1#10 GND IN 3/4"C	
30S	10	2#10, 1#10 GND IN 3/4"C	30	10	3#10, 1#10 GND IN 3/4"C	30N	10	4#10, 1#10 GND IN 3/4"C	
35S	8	2#8, 1#10 GND IN 3/4"C	35	8	3#8, 1#10 GND IN 3/4"C	35N	8	4#8, 1#10 GND IN 3/4"C	
40S	8	2#8, 1#10 GND IN 3/4"C	40	8	3#8, 1#10 GND IN 3/4"C	40N	8	4#8, 1#10 GND IN 3/4"C	
45S	6	2#6, 1#10 GND IN 3/4"C	45	6	3#6, 1#10 GND IN 3/4"C	45N	6	4#6, 1#10 GND IN 1"C	
50S	6	2#6, 1#10 GND IN 3/4"C	50	6	3#6, 1#10 GND IN 3/4"C	50N	6	4#6, 1#10 GND IN 1"C	
60S	4	2#4, 1#10 GND IN 1"C	60	4	3#4, 1#10 GND IN 1"C	60N	4	4#4, 1#10 GND IN 1 1/4"C	
70S	4	2#4, 1#8 GND IN 1"C	70	4	3#4, 1#8 GND IN 1"C	70N	4	4#4, 1#8 GND IN 1 1/4"C	
80S	3	2#3, 1#8 GND IN 1"C	80	3	3#3, 1#8 GND IN 1"C	80N	3	4#3, 1#8 GND IN 1 1/4"C	
90S	2	2#2, 1#8 GND IN 1"C	90	2	3#2, 1#8 GND IN 1 1/4"C	90N	2	4#2, 1#8 GND IN 1 1/2"C	
100S	1	2#1, 1#8 GND IN 1 1/4"C	100	1	3#1, 1#8 GND IN 1 1/4"C	100N	1	4#1, 1#8 GND IN 1 1/2"C	
			110	2	3#2, 1#6 IN 1 1/4"C	110N	2	4#2, 1#6 GND IN 1 1/4"C	
			125	1	3#1, 1#6 GND IN 1 1/4"C	125N	1	4#1, 1#6 GND IN 1 1/2"C	
			150	1/0	3#1/0, 1#6 GND IN 1 1/2"C	150N	1/0	4#1/0, 1#6 GND IN 2"C	
			175	2/0	3#2/0, 1#6 GND IN 1 1/2"C	175N	2/0	4#2/0, 1#6 GND IN 2"C	
			200	3/0	3#3/0, 1#6 GND IN 2"C	200N	3/0	4#3/0, 1#6 GND IN 2"C	
			225	4/0	3#4/0, 1#4 GND IN 2"C	225N	4/0	4#4/0, 1#4 GND IN 2 1/2"C	
			250	250	3-250 KCMIL, 1#4 GND IN 2"C	250N	250	4-250 KCMIL, 1#4 GND IN 2 1/2"C	
			300	350	3-350 KCMIL, 1#4 GND IN 2"C	300N	350	4-350 KCMIL, 1#4 GND IN 3"C	
			350	500	3-500 KCMIL, 1#3 GND IN 3"C	350N	500	4-500 KCMIL, 1#3 GND IN 3 1/2"C	
			400	600	3-600 KCMIL, 1#3 GND IN 3 1/2"C	400N	600	4-600 KCMIL, 1#3 GND IN 4"C	
			450	2-4/0	(2) 3#4/0, 1#2 GND IN 2"C	450N	2-4/0	(2) 4#4/0, 1#2 GND IN 2 1/2"C	
			500	2-250	(2) 3-250 KCMIL, 1#2 GND IN 2 1/2"C	500N	2-250	(2) 4-250 KCMIL, 1#1 GND IN 3"C	
			600	2-350	(2) 3-350 KCMIL, 1#1 GND IN 2 1/2"C	600N	2-350	(2) 4-350 KCMIL, 1#1 GND IN 3"C	
			700	2-500	(2) 3-500 KCMIL, 1#1/0 GND IN 3"C	700N	2-500	(2) 4-500 KCMIL, 1#1/0 GND IN 3 1/2"C	
			800	2-600	(2) 3-600 KCMIL, 1#1/0 GND IN 3 1/2"C	800N	2-600	(2) 4-600 KCMIL, 1#1/0 GND IN 4"C	
			1000	3-500	(3) 3-500 KCMIL, 1#2/0 GND IN 3"C	1000N	3-500	(3) 4-500 KCMIL, 1#2/0 GND IN 3 1/2"C	
			1200	3-600	(3) 3-600 KCMIL, 1#3/0 GND IN 4"C	1200N	3-600	(3) 4-600 KCMIL, 1#3/0 GND IN 4"C	
			1600	4-600	(4) 3-600 KCMIL, 1#4/0 GND IN 4"C	1600N	4-600	(4) 4-600 KCMIL, 1#4/0 GND IN 4"C	
			2000	5-600	(5) 3-600 KCMIL, 1-250 KCMIL GND IN 4"C	2000N	5-600	(5) 4-600 KCMIL, 1-250 KCMIL GND IN 4"C	
			2500	7-500	(7) 3-500 KCMIL, 1-350 KCMIL GND IN 3 1/2"C	2500N	7-500	(7) 4-500 KCMIL, 1-350 KCMIL GND IN 3 1/2"C	
			3000	8-500	(8) 3-500 KCMIL, 1-40				

POWER SYMBOL LIST	
SYMBOL	DESCRIPTION
●	CONDUIT DOWN
○	CONDUIT UP
	DISCONNECT SWITCH – NON FUSED
	DISCONNECT SWITCH – FUSED
	DISCONNECT SWITCH – COMB. MOTOR STARTER
	ELECTRICAL PANEL
	GROUNDING ROD
	GROUND
	GROUNDING BAR
	JUNCTION BOX
	METER
	MOTOR – SINGLE PHASE
	MOTOR – THREE PHASE
	MOTOR RATED SWITCH
	POWER RECEPTACLE – SIMPLEX TYPE
	POWER RECEPTACLE – DUPLEX TYPE

NOTES:

- | ELECTRICAL ABBREVIATIONS | |
|--------------------------|--|
| ABBREVIATION | DESCRIPTION |
| AFF | ABOVE FINISHED FLOOR |
| A | AMPERE |
| AF | AMPERE FUSE/AMPERE FRAME |
| AWG | AMERICAN WIRE GAUGE |
| AT | AMPERE TRIP |
| ATS | AUTOMATIC TRANSFER SWITCH |
| AIC | AVAILABLE INTERRUPTING CURRENT (AMPS) |
| C | CONDUIT OR CEILING MOUNTED |
| CB | CIRCUIT BREAKER |
| CL | CONTROL LOAD |
| CU | COPPER |
| CT | CURRENT TRANSFORMER |
| DIA | DIAMETER |
| DISC | DISCONNECT |
| EMT | ELECTRICAL METALLIC TUBING |
| EWC | ELECTRIC WATER COOLER |
| EPO | EMERGENCY POWER OFF |
| (E) | EXISTING ELECTRICAL EQUIPMENT OR WORK |
| FA | FIRE ALARM |
| FACP | FIRE ALARM CONTROL PANEL |
| FLA | FULL LOAD AMPS |
| F | FUSE |
| G/GRD | GROUND |
| GFCI/GFI | GROUND FAULT CIRCUIT INTERRUPTER |
| HOA | HAND-OFF-AUTO |
| HP | HORSEPOWER |
| IG | ISOLATED GROUND |
| KV | KILOVOLT |
| KVA | KILOVOLT AMPERE |
| KW | KILOWATT |
| KWH | KILOWATT HOUR |
| LP | LIGHTING PANEL |
| MCB | MAIN CIRCUIT BREAKER |
| MDP | MAIN DISTRIBUTION PANEL |
| MLO | MAIN LUG ONLY |
| MAX | MAXIMUM |
| MIN | MINIMUM |
| NEC | NATIONAL ELECTRICAL CODE |
| NEMA | NATIONAL ELECTRICAL MANUFACTURERS ASSOC. |
| N/NEU | NEUTRAL |
| NF | NON-FUSIBLE |
| NC | NORMALLY CLOSED |
| NO | NORMALLY OPEN |
| NIC | NOT IN CONTRACT |
| PH. OR Ø | PHASE |
| P | POLE |
| PF | POWER FACTOR |
| PVC | POLYVINYL CHLORIDE (PLASTIC) |
| (R) | RELOCATED EXISTING ELECTRICAL EQUIPMENT |
| (RR) | REMOVE AND REINSTALL |
| RMC | RIGID METALLIC CONDUIT |
| RP | RECEPTACLE PANEL |
| TBB | TELEPHONE BACKBOARD |
| TYP. | TYPICAL |
| UC | UNDER COUNTER |
| UL | UNDERWRITERS LABORATORIES |
| UPS | UNINTERRUPTIBLE POWER SUPPLY |
| USB | UNIVERSAL SERIAL BUS |
| V | VOLT |
| VA | VOLT AMPERE |
| W | WATT |
| WG | WIRE GUARD |
| WP | WEATHERPROOF |
| XFMR | TRANSFORMER |

DRAWING INDEX	
SHT NO	DESCRIPTION
E0.0TB	ELECTRICAL GENERAL INFORMATION
E1.1TB	ELECTRICAL PLANS - TRANSPORTATION BUILDING
E1.2TB	ELECTRICAL ROOF PLANS - TRANSPORTATION BUILDING

DRAWING NOTATION	
SYMBOL	DESCRIPTION
L1	LIGHTING FIXTURE TAG
	CONSTRUCTION KEY NOTE NUMBER 1
	DEMOLITION KEY NOTE NUMBER 1
	COPPER FEEDER SIZE TAG (REFER TO FEEDER SCHEDULE)
	ALUMINUM FEEDER SIZE TAG (REFER TO FEEDER SCHEDULE)
<u>EQUIPMENT</u>	EQUIPMENT TAG
	EXISTING DEVICES OR EQUIPMENT
	NEW OR MODIFIED DEVICES OR EQUIPMENT
	NEW OR MODIFIED UNDERGROUND WIRING
	EXISTING SYSTEM COMPONENT TO BE REMOVED
	POINT OF NEW CONNECTION



CLIENT:

600 East Carpenter Street
Midland, MI 48640

PROJECT:

410 East Hines Road
Midland, MI 48640

Seal

ISSUED FOR:

BIDS/PERMITS 01/22/24

[illegible]

ISSUED	DATE
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DESIGNER: GBS

ENGINEER: SET

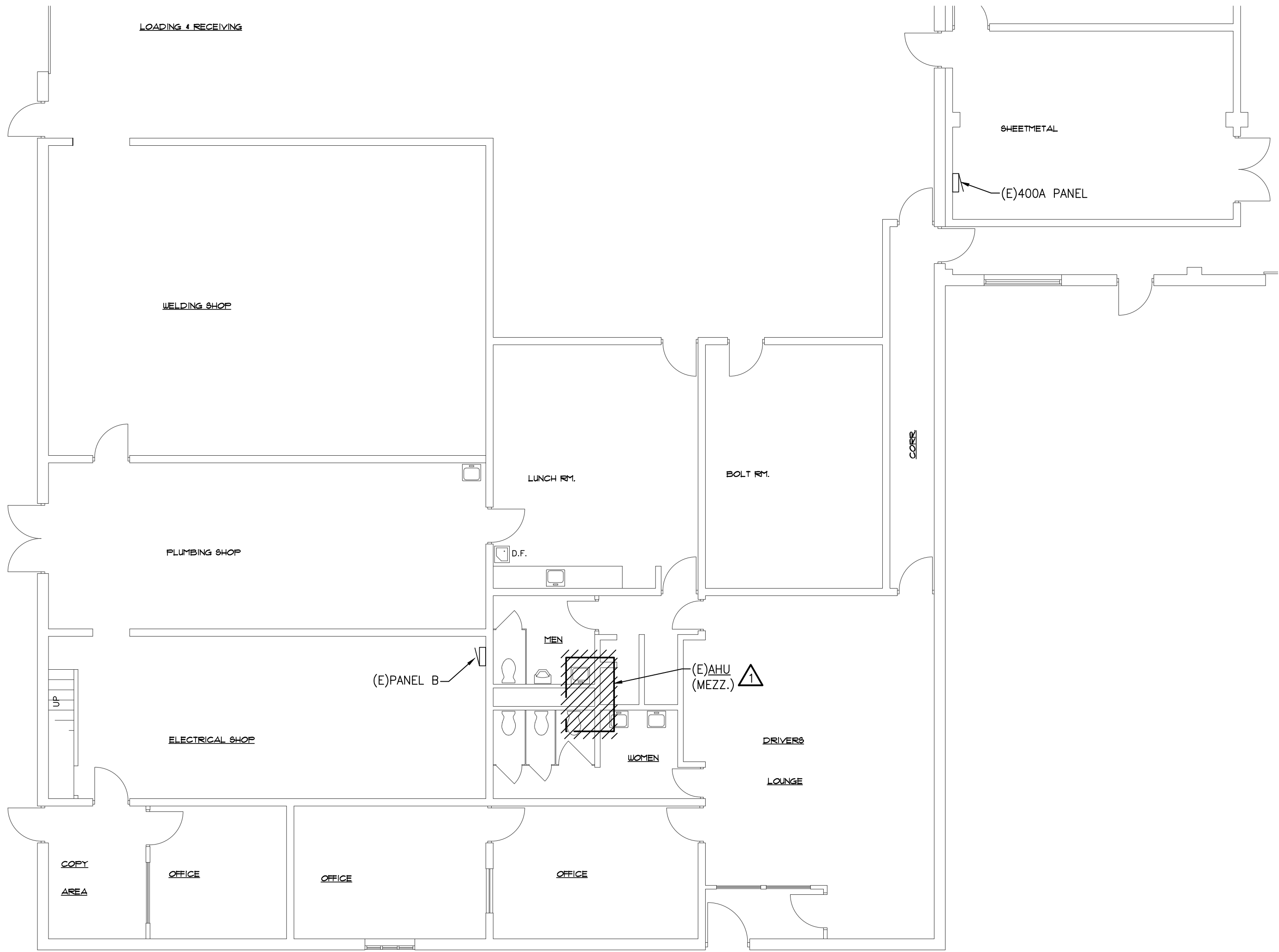
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ELECTRICAL GENERAL INFORMATION

SHEET NUMBER:

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Date: Jan 23, 2024, 10:42am
Layout: E1.1TB
Printed by: jwg



PARTIAL ELECTRICAL DEMO PLAN

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

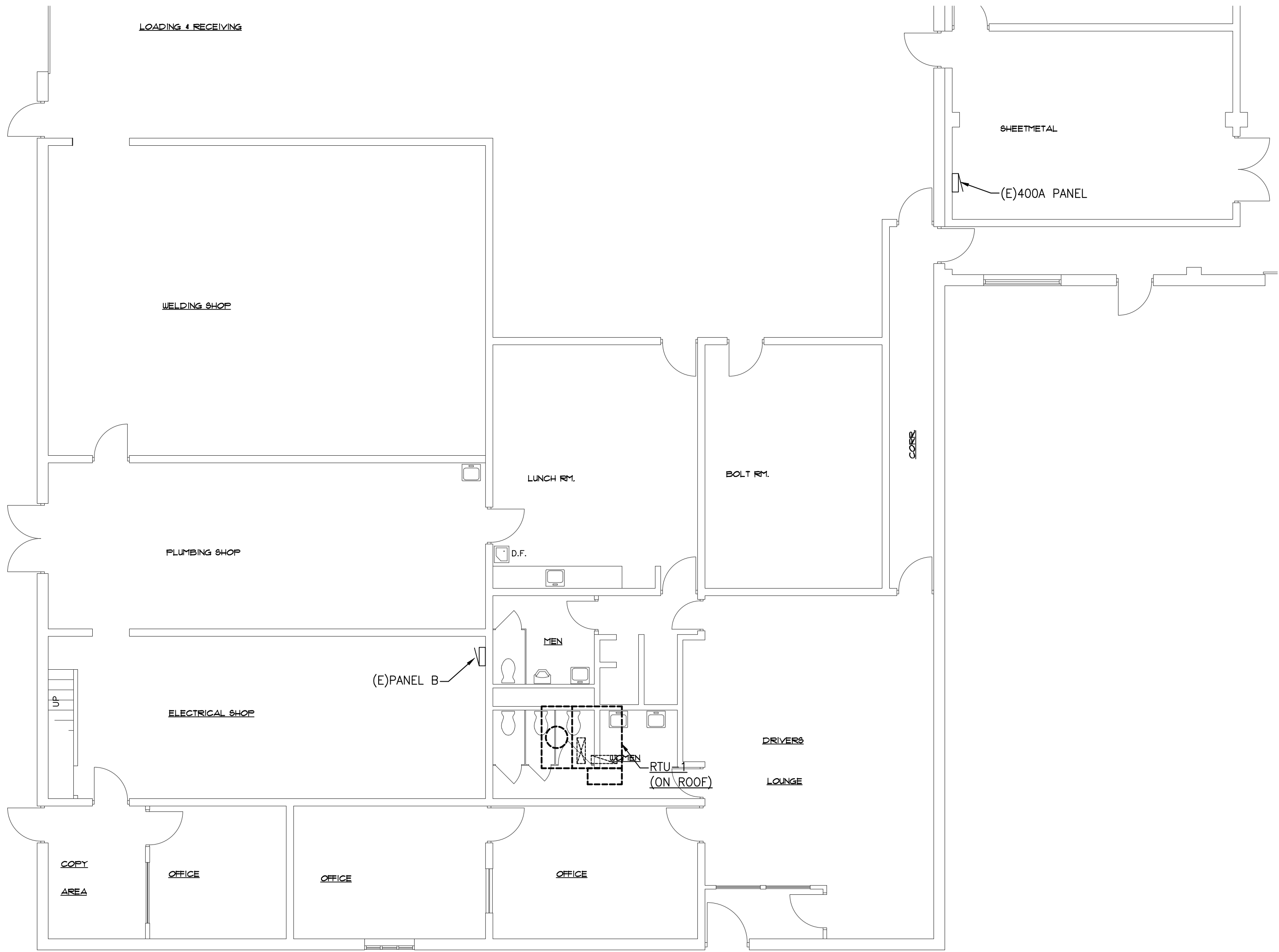
ELECTRICAL DEMOLITION NOTES

- VISIT THE SITE PRIOR TO SUBMISSION OF BID TO EXAMINE THE EXISTING CONDITIONS AND THE EXTENT OF DEMOLITION WORK.
- EXAMINE THE DRAWINGS OF OTHER TRADES, BE FAMILIAR WITH THE DEMOLITION REQUIRED BY OTHER TRADES.
- PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION OF DEVICES AND EQUIPMENT REQUIRED TO FACILITATE THE DEMOLITION WORK OF OTHER TRADES.
- COORDINATE WITH NEW WORK PLANS, ONE LINE, AND RISER DIAGRAMS FOR EXTENT OF DEMOLITION WORK.
- COORDINATE ANY SHUTDOWN OF EXISTING SERVICES AND EQUIPMENT REMAINING IN USE WITH OWNERS' REPRESENTATIVE. WHERE EXISTING BUILDING SERVICE IS REQUIRED TO BE SHUT DOWN, INCLUDE ALL ASSOCIATED OVERTIME COST TO PERFORM THIS WORK DURING EVENING AND WEEKENDS. INCLUDE ALL COSTS FOR PROVIDING TEMPORARY POWER.
- REMOVE ALL CONDUIT AND WIRE BACK TO NEAREST UPSTREAM DEVICE REMAINING IN SERVICE.
- WHERE DEMOLITION WORK AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM DEVICES TO REMAIN, EXTEND CONDUIT AND WIRE AS REQUIRED TO MAINTAIN ELECTRICAL SERVICE.
- PROVIDE BLANK COVER PLATES WHERE SWITCHES AND DEVICES ARE REMOVED AND WALL REMAINS INTACT. MARK ALL UNUSED CIRCUIT BREAKERS AS "SPARE"
- CONTRACTOR TO TAG ALL CIRCUITS AT BOTH ENDS AFFECTED BY THIS SCOPE OF WORK.
- CONTRACTOR SHALL PROVIDE UPDATED, TYPED-IN DIRECTORIES FOR ALL PANELS AFFECTED BY THIS SCOPE OF WORK.
- CONTRACTOR SHALL VERIFY ALL UNDERGROUND AND IN-SLAB UTILITIES LOCATIONS PRIOR TO SAW CUTTING OR PENETRATING ANY FLOOR SLABS. CONTRACTOR SHALL REPAIR ALL UTILITIES DAMAGED BY SAW CUTTING.



DEMOLITION KEYED NOTES

- MECHANICAL EQUIPMENT TO BE REMOVED. REMOVE CIRCUITING COMPLETE BACK TO SOURCE.



PARTIAL ELECTRICAL PLAN

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

POWER GENERAL NOTES

- ALL RECEPTACLES ON EXTERIOR, IN KITCHEN, IN CONCESSION, IN LABORATORY, AND WITHIN 6'-0" OF SINK OR OTHER WATER SUPPLY SHALL BE READILY ACCESSIBLE GFCI TYPE RECEPTACLE.
- ALL CONDUITS SERVING 120 VOLTS OR GREATER SHALL INCLUDE A GROUND WIRE.
- ALL CONDUITS SHALL BE ROUTED CONCEALED UNLESS NOTED OTHERWISE.
- ALL 120 VOLT CIRCUITS SHALL UTILIZE A SEPARATE NEUTRAL.

Panel Designation: (E)PANEL B										Main: MLO				P-P Voltage: 208			
Panel Location: ELECTRICAL SHOP										Bussing: 100A				P-N Voltage: 120			
Fed From: EXISTING										Ground Bus: STANDARD				Phase: 3			
Feeder Size: EXISTING										Mounting: SURFACE				Wire: 4			
										Neutral: 100%				Min SC Interrupting Rating: EXISTING			
Remarks	Light Load	Recept Load	Cont Load	nonC Load	OC Prot	CKT	Ø A	Ø B	Ø C	CKT	OC Prot	nonC Load	Cont Load	Recept Load	Light Load	Remarks	
EXISTING LOAD	500				20	1	X		2	20	500					EXISTING LOAD	
EXISTING LOAD				1000	20	3	X		4	20	500					EXISTING LOAD	
EXISTING LOAD				1000	20	5	X		6	20	1200					EXISTING LOAD	
EXISTING LOAD	500				20	7	X		8	20	1200					EXISTING LOAD	
EXISTING LOAD				1000	20	9	X		10	20	1200					EXISTING LOAD	
RTU-1				3086	20	11	X		12	20						SPARE	
				3086	20	13	X		14	20	500					EXISTING LOAD	
				3086	20	15	X		16	20	500					EXISTING LOAD	
				3086	20	17	X		18	20	180					GFI ROOFTOP RECEPTACLE	
EXISTING LOAD	500				20	19	X		20	--						SPACE	
SPARE					20	21	X		22	--						SPACE	
SPARE					20	23	X		24	20						SPACE	
SPARE					20	25	X		26	20						SPACE	
SPARE					20	27	X		28	20						SPACE	
SPARE					20	29	X		30	20						SPACE	
SPARE					20	31	X		32	20						SPACE	
SPARE					20	33	X		34	20						SPACE	
SPARE					20	35	X		36	20						SPACE	
SPARE					20	37	X		38	20						SPACE	
SPARE					20	39	X		40	20						SPACE	
SPARE					20	41	X		42	20						SPACE	
										Connected Load				Demand			
										ØA ØB ØC Total				ØA ØB ØC Total			
Load Description																	
Lighting or Continuous Load (Volt-Amps)										1500 0 0 1500				1.25 1875 0 0 1875			
180VA Receptacle Load (Volt-Amps)										0 0 0 0				1.00 (First 10kVA) 0 0 0 0			
										Amount over 10kVA 0				0.50 (> 10kVA) 0 0 0 0			
Continuous Load (Volt-Amps)										0 0 0 0				1.25 0 0 0 0			
Non-Continuous Load (Volt-Amps)										5286 7286 6466 19038				1.00 5286 7286 6466 19038			
Total Load (KVA)										6.79 7.29 6.47 20.54				7.16 7.29 6.47 20.91			
Total Ampacity (Amps)										56.5 60.7 53.8 57.0				57.6 60.7 53.8 58.0			
Minimum Feeder Sizing (Amps)										60.4 60.7 53.8 58.3				63.5 60.7 53.8 59.3			

Receptacle Demand Factor per Article 220.44 of the National Electrical Code.



Strategic Energy Solutions®

4000 W. Eleven Mile Road Berkley, MI 48072
Phone 248.399.1900 Fax 248.399.1901
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SES Project #23 0939 01

CLIENT:

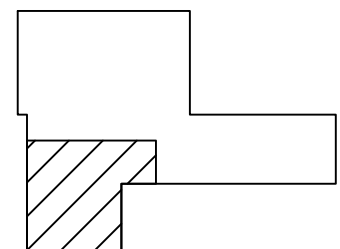
MIDLAND PUBLIC SCHOOLS

600 East Carpenter Street
Midland, MI 48640

PROJECT:

MIDLAND PUBLIC SCHOOLS
TRANSPORTATION
BUILDING - AHU/RTU
REPLACEMENT

410 East Hines Road
Midland, MI 48640



KEY PLAN
NOT TO SCALE

Seal:

ISSUED FOR:

BIDS/PERMITS 01/22/24

ISSUED

DATE

DESIGNER:

GBS

ENGINEER:

SET

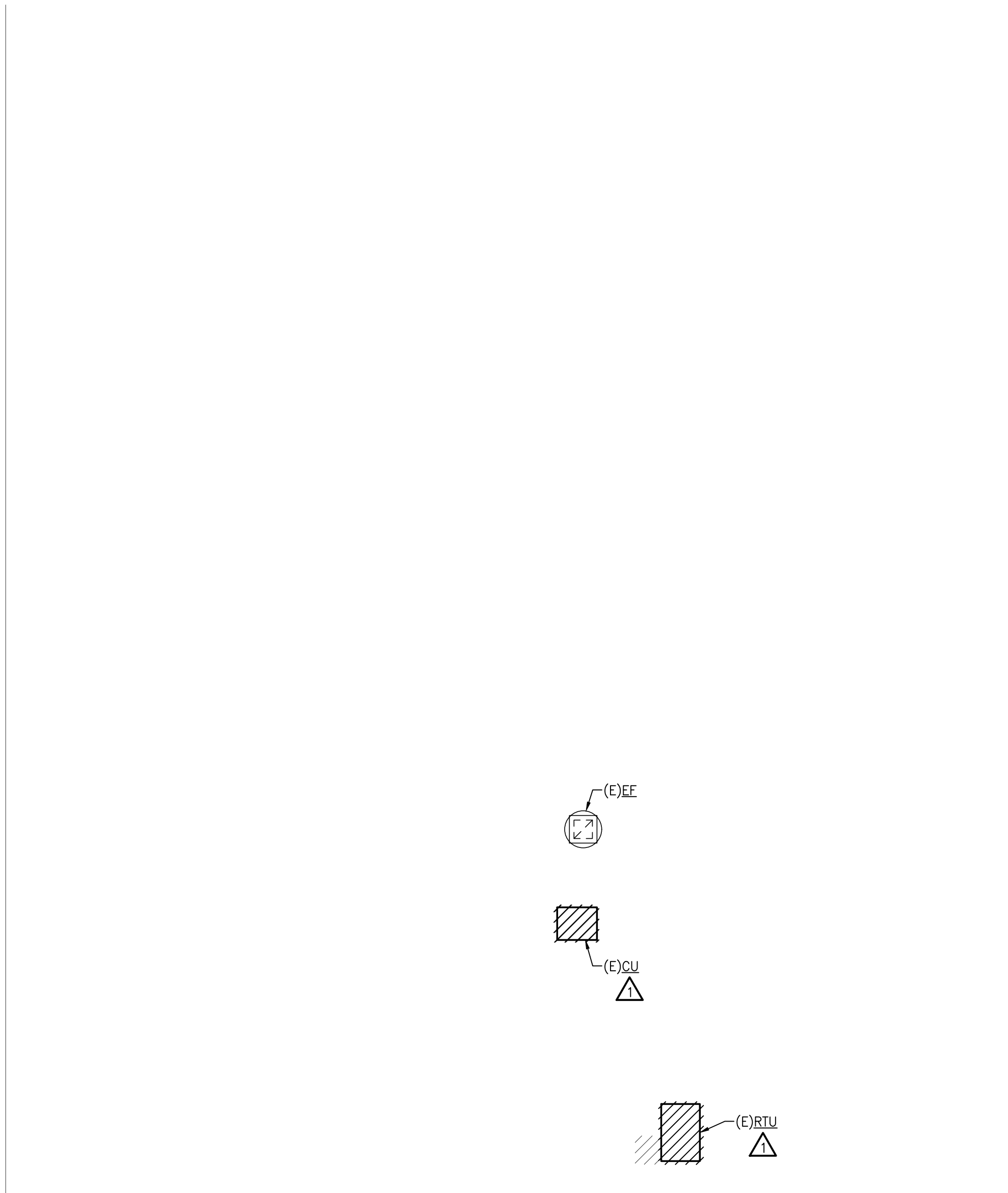
SHEET TITLE:

ELECTRICAL PLANS -
TRANSPORTATION
BUILDING

SHEET NUMBER:

E1.1TB

Drawing: S:\03_0939_01_Midland Public Schools_Misc_Mechanical Projects\03_0939_01_E1.2TB.dwg
Date: Jan 23, 2024, 10:47am
Layout: E1.2TB
Plotted by: jwg



 **PARTIAL ELECTRICAL ROOF DEMO PLAN**
SCALE: 1/8" = 1'-0"

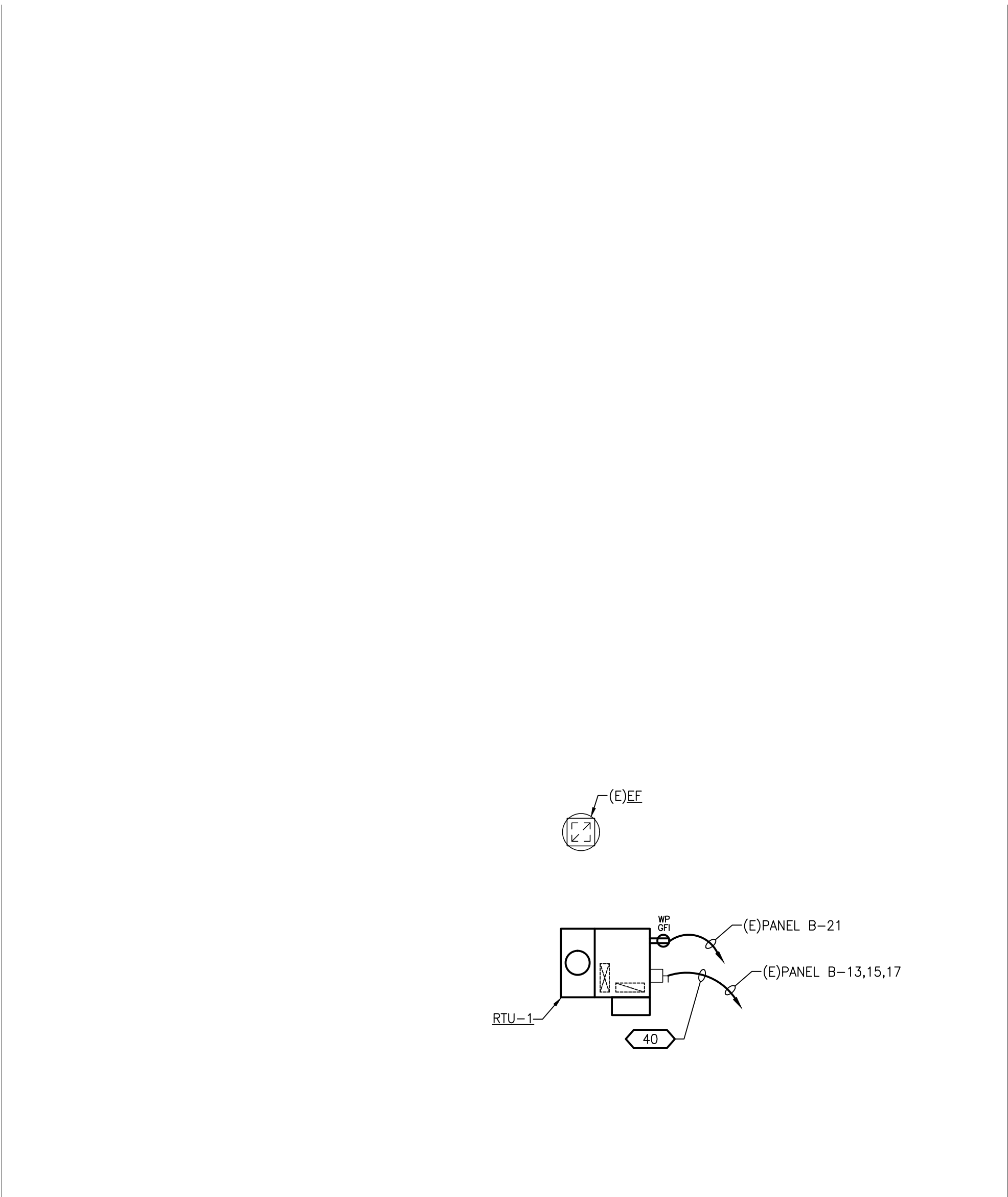
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DEMOLITION KEYED NOTES

- MECHANICAL EQUIPMENT TO BE REMOVED. REMOVE CIRCUITING COMPLETE BACK TO SOURCE.



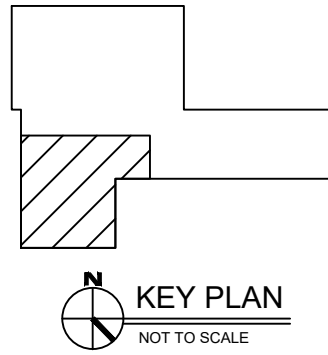
 **PARTIAL ELECTRICAL ROOF PLAN**
SCALE: 1/8" = 1'-0"

POWER GENERAL NOTES

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600 East Carpenter Street
Midland, MI 48640

PROJECT:
**MIDLAND PUBLIC SCHOOLS
TRANSPORTATION
BUILDING - AHU/RTU
REPLACEMENT**
410 East Hines Road
Midland, MI 48640



Seal:

ISSUED FOR:
BIDS/PERMITS 01/22/24

ISSUED _____ DATE _____

DESIGNER: _____ GBS
ENGINEER: _____ SET

SHEET TITLE:
**ELECTRICAL ROOF PLANS -
TRANSPORTATION
BUILDING**

SHEET NUMBER:

E1.2TB