LIVONIA PUBLIC SCHOOLS - CTC CAREER CENTER SHOP ROOMS AC REPLACEMENTS

LIVONIA PUBLIC SCHOOLS

LOCATION MAP



PROJECT ADDRESS

LIVONIA CAREER TECHNICAL CENTER
8985 NEWBURGH ROAD
LIVONIA, MI 48150

OWNER NAME AND ADDRESS

LIVONIA PUBLIC SCHOOLS
15125 FARMINGTON RD.
LIVONIA, MI 48154

MEP ENGINEERS

UNIFIED BUILDING
SYSTEMS ENGINEERING
69 S. GRATIOT AVE.
MT. CLEMENS, MI 48043
UBS PROJECT 001.24.01 - CTC

STATE OF MICHIGAN
MICHAEL PAUL HARRIS, II
ENGINEER
No. 6201067299
LICENSED PROFESSIONAL ENGINEER

PROJECT SHEET INDEX

STRUCTURAL DRAWING INDEX

SHT NO	DESCRIPTION
S100	ROOF FRAMING PLAN
S200	GENERAL NOTES

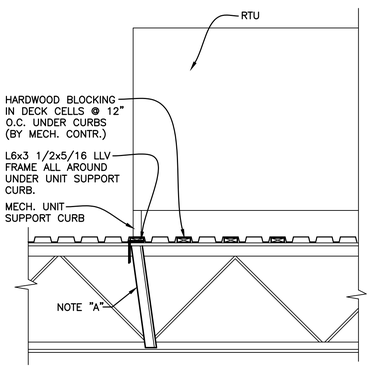
MECHANICAL DRAWING INDEX

SHT NO	DESCRIPTION
M0.00	MECHANICAL GENERAL INFORMATION
MD1.00	MECHANICAL SHOP ROOM DEMOLITION PLANS
M1.00	MECHANICAL SHOP ROOM NEW WORK PLANS
M8.00	MECHANICAL DETAILS, SCHEDULES, AND TEMPERATURE CONTROLS

ELECTRICAL DRAWING INDEX

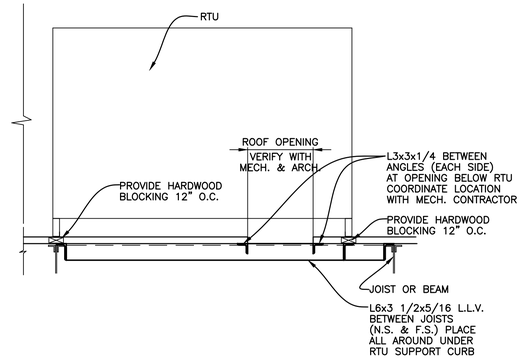
SHT NO	DESCRIPTION
E0.00	ELECTRICAL GENERAL INFORMATION
EP1.00	ELECTRICAL POWER DEMOLITION AND NEW WORK PLANS
E5.00	ELECTRICAL DETAILS, SCHEDULES, AND DIAGRAMS

BID SET: 11/15/2024

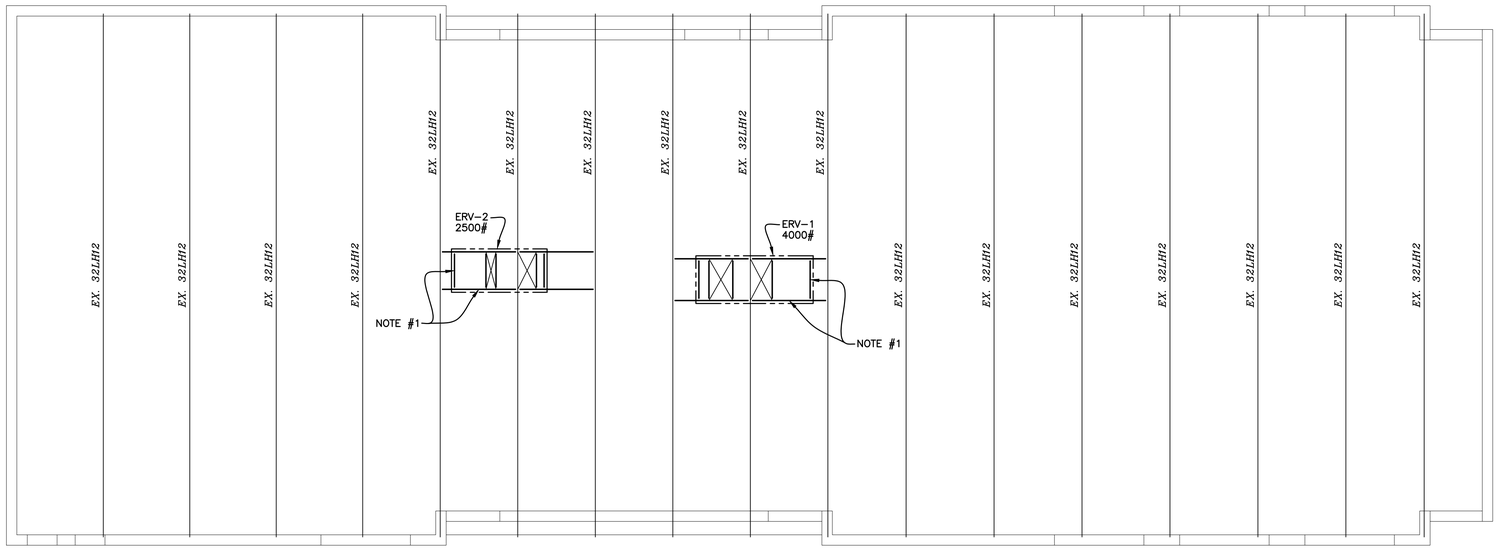


NOTE "A"
REINF. TOP CHORD OF JOIST W/ (2)L2x2x3/16" WELDED TO TOP CHORD OF JOIST AT LOAD AND TO BOTTOM CHORD AT PANEL POINT WHEN LOAD IS FARTHER THAN 6" FROM TOP CHORD PANEL POINT

2 S100 TYPICAL JOIST REINFORCING DETAIL AT NEW MECHANICAL UNIT
SCALE : NONE FOR ADDED LOADS



1 S100 TYPICAL DETAIL AT MECHANICAL UNIT SUPPORT
SCALE : 3/4" = 1'-0"



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

NOTE #1: PROVIDE L6x3 1/2x5/16 LLV ALL AROUND BELOW NEW RTU SUPPORT CURB. COORDINATE LOCATION OF RTU WITH MECH. CONTRACTOR. SEE 1 & 2/S100

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MT. CLEMENS, MI 48043
UBS PROJ. ID: 001.24.01

CLIENT:
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PROJECT:
CAREER TECHNICAL CENTER SHOP ROOMS - AC REPLACEMENT

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11/15/2024

ISSUANCE:
BIDS

DRAWN: RC
APPROVED: TS

ROOF FRAMING PLAN

S100

G E N E R A L N O T E S

GENERAL CONDITIONS

1. IF ANY GENERAL NOTE CONFLICTS WITH ANY DETAIL OR NOTE ON THE PLANS OR IN THE SPECIFICATIONS, THE STRICTEST PROVISION SHALL GOVERN.

2. THE STRUCTURAL DRAWINGS ARE FOR THE PLACEMENT AND SIZE OF STRUCTURAL COMPONENTS ONLY. O.S.H.A., LOCAL GOVERNMENT CODES AND SAFETY CODE REQUIREMENTS SHALL BE ADHERED TO BY THE CONTRACTOR.

3. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER IT IS FULLY COMPLETED. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES PROVIDING TEMPORARY BRACING, SHORING, GUYS OR TIE- DOWNS. THESE TEMPORARY SUPPORTS WILL REMAIN IN PLACE UNTIL ALL STRUCTURAL COMPONENTS ARE IN PLACE AND COMPLETED.

4. USE OF ENGINEERING DRAWINGS AS ERECTION DRAWINGS BY THE CONTRACTOR IS STRICTLY PROHIBITED. DIMENSIONS SHOWN ON THE STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR BUILDING LAYOUT AND LOCATION. SEE ARCHITECTURAL DRAWINGS AND SITE PLAN FOR THESE PURPOSES.

5. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AT THE RATE OF NO MORE THAN 80 DRAWINGS PER WEEK. THE CONTRACTOR SHALL SUBMIT A SCHEDULE OF SHOP DRAWINGS PRIOR TO SUBMITTAL. THE CONTRACTOR SHALL CHECK SHOP DRAWINGS PRIOR TO SUBMITTAL AND IS SOLELY RESPONSIBLE FOR ERRORS & OMISSION IN THE PREPARATION OF SHOP DRAWINGS TO CONFORM TO THE DESIGN DRAWINGS. SUBMIT ELECTRONIC SHOP DRAWINGS FOR ENGINEER REVIEW.

6. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY ALL RELEVANT DIMENSIONS AND ELEVATIONS FOR EQUIPMENT INSTALLATIONS AGAINST PURCHASED MANUFACTURER'S CERTIFIED EQUIPMENT DRAWINGS. DIMENSIONS THAT DEPEND UPON SPECIFIC EQUIPMENT SUCH AS ELEVATOR OPENINGS, MECHANICAL EQUIPMENT SUPPORTS, ETC. SHALL BE COORDINATED BY THE CONTRACTOR PRIOR TO SUBMITTAL TO THE ARCHITECT/ENGINEER. SUCH DIMENSIONS SHALL BE PROVIDED ON THE SHOP DRAWINGS BY THE CONTRACTOR PRIOR TO SUBMITTAL TO THE ARCHITECT/ENGINEER.

EXISTING CONDITIONS

1. VERIFY ALL EXISTING ASSUMED DIMENSIONS AND CONDITIONS (I.E. EXISTING MATERIALS; FRAMING MEMBER SIZES AND LOCATIONS; METHODS OF CONSTRUCTION; ETC.) AT THE SITE PRIOR TO CONSTRUCTION AND FABRICATION. IF DISCREPANCIES ARE FOUND, NOTIFY ARCHITECT BEFORE PROCEEDING WITH WORK.

STRUCTURAL STEEL

1. STEEL DESIGN, FABRICATION AND ERECTION TO BE IN ACCORDANCE WITH THE LATEST A.I.S.C. MANUAL AND SPECIFICATION FOR STRUCTURAL STEEL FOR BUILDINGS. ALL WIDE FLANGE BEAMS AND COLUMNS SHALL CONFORM TO THE LATEST ASTM. SERIAL DESIGNATION A992, GR50; ALL MISCELLANEOUS STEEL PLATES, BARS, ANGLES, ETC., SHALL CONFORM TO ASTM A36; STEEL TUBING TO BE ASTM A500, GRADE B; STEEL PIPE ASTM. A-53, GRADE B. ANCHOR BOLTS TO BE ASTM F1554 GRADE 36 KSI MINIMUM UNLESS OTHERWISE NOTED

2. UNLESS OTHERWISE NOTED OR SHOWN, ALL BEAM CONNECTIONS TO HSS 5 X 5 OR SMALLER COLUMN,5"Ø OR SMALLER COLUMN, OR ANY TUBE COLUMN REGARDLESS OF SIZE WITH A WALL THICKNESS LESS THAN 3/8" SHALL BE MADE WITH THRU PLATES WELDED TO BOTH WALLS OF COLUMN.

3. ALL WELDED CONNECTIONS SHALL BE IN ACCORDANCE WITH THE LATEST AWS CODE, E70XX ELECTRODES, WITH WELDING PERFORMED BY QUALIFIED WELDERS.

4. BOLTED CONNECTIONS SHALL BE MADE WITH A-325 OR A-490 BOLTS. ALL BOLTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE LATEST SPECIFICATIONS FOR "STRUCTURAL JOINTS USING A.S.T.M. A-325 OR A-490 BOLTS." TYPICAL BOLTED CONNECTIONS ARE "BEARING TYPE" UNLESS NOTED OTHERWISE.

5. DESIGN CONNECTIONS FOR MINIMUM ONE-HALF THE TOTAL ALLOWABLE UNIFORM LOAD PER A.I.S.C. BEAM LOAD TABLES, UNLESS OTHERWISE NOTED. (MIN. 2 BOLTS EACH CONNECTION).

9. THE DESIGN, CONFIGURATION & ERECTION SAFETY OF ALL STRUCTURAL STEEL CONNECTIONS SHALL BE THE RESPONSIBILITY OF THE STRUCTURAL STEEL FABRICATOR. REVIEW AND ACCEPTANCE OF THE SHOP DRAWINGS BY THE ENGINEER SHALL CONSTITUTE APPROVAL OF THE LOAD CARRYING ADEQUACY ONLY.

10. TYPE OF CONSTRUCTION PER ASCE A2.2 IS TYPE 2 "SIMPLE FRAMING" UNLESS NOTED OTHERWISE.

17. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL ANGLES, PLATES, BARS, CLIPS, ETC., ATTACHED TO STRUCTURAL STEEL.

18. UNLESS OTHERWISE NOTED, ALL ROOF OPENINGS SHALL BE FRAMED WITH L 5 X 3-1/2 X 5/16 L.L.V. VERIFY EXACT SIZE AND LOCATION OF ALL ROOF OPENINGS WITH ARCHITECTURAL AND MECHANICAL DRAWINGS AND WITH CONTRACTOR INVOLVED.

21. THE CONTRACTOR SHALL FURNISH ALL ACCESSORIES INCLUDING CLOSURES, "Z" CLOSURES, COLUMN CLOSURES, SCREED ANGLES AND GIRDER FILLERS AS REQUIRED.

23. NO LOADS SHALL BE PERMITTED TO BE HUNG FROM ANY ROOF DECK. ALL HANGERS FOR CEILINGS, DUCTWORK, ELECTRICAL CONDUIT, PIPING, ETC., SHALL BE HUNG DIRECTLY FROM STRUCTURAL STEEL WORK OR SUPPLEMENTARY MEMBERS.

JOIST OR BEAM REINFORCEMENT

1. GENERAL: FABRICATE MATERIAL IN LENGTHS MANAGEABLE AT THE SITE SPLICES OF MATERIAL SHALL BE MADE WITH FULL PENETRATION WELDS OR OTHER AS REVIEWED IN ADVANCE BY THE ENGINEER OF RECORD.

2. COORDINATE MATERIAL LENGTHS WITH ACCESS LOGISTICS. HEADROOM OR OTHER ACCESS LIMITATIONS MAY REQUIRE SUBSTITUTIONS OF PLATES OR SHAPES WITH OTHER PLATES OR SHAPES OF NOMINALLY EQUAL WEIGHT. SUBSTITUTIONS MUST BE REVIEWED BY THE ENGINEER OF RECORD PRIOR TO FABRICATION.

2.1 FIELD VERIFY WEB AND CHORD CONFIGURATIONS OF EXISTING JOISTS TO BE REINFORCED. CONFIGURATIONS INDICATED ON THE DRAWINGS ARE DIAGRAMMATIC ONLY WHICH INDICATE ONLY THE EXTENT OF WEB AND CHORD REINFORCEMENT. OTHER CONFIGURATIONS MAY EXIST, I.E. PANEL DIMENSIONS MAY BE DIFFERENT AND THERE MAY BE MORE VERTICALS AND DIAGONALS THAN SHOWN ON THE DRAWINGS, BUT NONETHELESS ALL WEB MEMBERS WITHIN THE ZONE INDICATED ARE TO BE REINFORCED.

3. THE SHAPE OF THE EXISTING CHORDS OR WEB MEMBERS MAY REQUIRE SUBSTITUTIONS OF PLATES OR SHAPES WITH OTHER PLATES OR SHAPES OF NOMINALLY EQUAL WEIGHT. SUBSTITUTIONS MUST BE REVIEWED BY THE ENGINEER OF RECORD PRIOR TO FABRICATION.

4. INSTALLING JOIST AND BEAM REINFORCEMENT:

4.1 INSTALL REINFORCEMENT MATERIAL TO COMPLY WITH STRENGTHENING REQUIREMENTS INDICATED ON THE DESIGN DRAWINGS.

4.1.1 PRIOR TO WELDING NEW MATERIAL TO EXISTING SURFACES, THOROUGHLY CLEAN ALL SURFACES TO REMOVE RUST, PAINT, DIRT, MILL SCALE OR OTHER FOREIGN MATTER IN THE WELD AREA

4.1.2 ALL FIELD WELDS SHALL BE CLEANED OF SLAG AND SCALE AND INSPECTED BY THE SITE QUALITY ASSURANCE INSPECTOR.

4.1.3 PRIME PAINT WELDS AFTER WELDING PASSES INSPECTION WITH MINIMUM TWO COATS OF ZINC RICH RUST INHIBITIVE PAINT.

5. PRIOR TO REINFORCING OF JOIST ALL SNOW AND ICE LOADS SHALL BE REMOVED FROM THE ROOF IF JOIST ARE BEING REINFORCED FOR NEW EQUIPMENT. JOIST ARE TO BE REINFORCED PRIOR TO ADDING NEW EQUIPMENT.

SHORING

1. SHORE STRUCTURE AS REQUIRED TO MAINTAIN STRUCTURAL INTEGRITY.

2. ALL SHORING, UNDERPINNING, ETC., SHALL BE PERFORMED BY EXPERIENCED CONTRACTORS.

3. SHORE, UNDERPIN, ETC., ALL QUESTIONABLE AREAS PRIOR TO REMOVAL OF ANY STRUCTURAL SUPPORT TO INSURE STRUCTURAL INTEGRITY.

4. MAINTAIN SHORING UNTIL NEW PERMANENT STRUCTURE IS IN PLACE AND SECURE TO MAINTAIN STRUCTURAL INTEGRITY.

5. REMOVE SHORING AFTER NEW WORK IS IN PLACE AND CONNECTED.

SPECIAL INSPECTION

1. WORK CONSTRUCTED SHALL BE INSPECTED BY AN INDEPENDENT TESTING AGENCY TO ENSURE COMPLIANCE WITH THE REQUIREMENTS SHOWN ON THE DRAWINGS. INSPECTIONS REQUIRED BY CHAPTER 17 OF THE MICHIGAN BUILDING CODE; LOCAL BUILDING DEPARTMENTS AND THE CONTRACT DOCUMENTS SHALL BE PERFORMED BY AN INDEPENDENT TESTING AGENCY. SITE VISITS BY THE DESIGN ENGINEER DO NOT CONSTITUTE OR REPLACE INSPECTION

2. THE FOLLOWING ITEMS SHALL BE INSPECTED IN ACCORDANCE WITH MBC 2015 SEC. 1704 & 1705 BY A CERTIFIED SPECIAL INSPECTOR UNLESS NOTED OTHERWISE IN REMARKS COLUMN. ALL INSPECTION SHALL BE CONTINUOUS UNLESS OTHERWISE NOTED. ALL PRODUCTS WITH ICC APPROVALS SHALL BE INSTALLED PER THE APPROVAL AND PER MANUFACTURER'S RECOMMENDATIONS. FOR MATERIAL TESTING REQUIREMENTS, SEE SPECIFICATIONS AND/OR GENERAL NOTES. TESTING AGENCY SHALL SEND COPIES OF ALL STRUCTURAL TESTING AND INSPECTION REPORTS DIRECTLY TO THE ARCHITECT.

INSPECTION OF FABRICATOR'S (SEC. 1704.2.5) *

FABRICATION AND IMPLEMENTATION PROCEDURES 1704.2.5.1

*SPECIAL INSPECTION IS NOT REQUIRED FOR FABRICATOR SHOP IF CERTIFICATE OF APPROVAL SUBMITTED BY FABRICATOR'S INSPECTION AGENCY PER EXCEPTION 1704.2.5.1

TABLE 1705.2.2
REQUIRED VERIFICATION AND
INSPECTION OF STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	NOT APPLICABLE	REFERENCED STANDARD
1. MATERIAL VERIFICATION OF COLD-FORMED STEEL DECK:				
a. IDENTIFICATION MARKINGS TO CONFORM TO ASTM STANDARDS SPECIFIED IN THE APPROVED CONSTRUCTION DOCUMENTS.	-	X	-	APPLICABLE ASTM MATERIAL STANDARDS
b. MANUFACTURER'S CERTIFIED TEST REPORTS.	-	X	-	-
2. INSPECTION OF WELDING:				
a. COLD-FORMED STEEL DECK:				
1) FLOOR AND ROOF DECK WELDS.	-	X	-	AWS D1.3
b. REINFORCING STEEL:				
1) VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A 706.	-	X	-	AWS D1.4 ACI 318: SECTION 3.5.2
2) REINFORCING STEEL RESISTING FLEXURAL AND AXIAL FORCES IN INTERMEDIATE AND SPECIAL MOMENT FRAMES, AND BOUNDARY ELEMENTS OF SPECIAL STRUCTURAL WALLS OF CONCRETE AND SHEAR REINFORCEMENT.	X	-	-	
3) SHEAR REINFORCEMENT.	X	-	-	
4) OTHER REINFORCING STEEL.	-	X	-	

SPECIAL INSPECTION(CONT.)

TABLE N5.4-1
INSPECTION TASKS PRIOR TO WELDING

INSPECTION TASKS PRIOR TO WELDING	QC	QA	NOT APPLICABLE
WELDING PROCEDURE SPECIFICATIONS (WPSs) AVAILABLE	P	P	-
MANUFACTURER CERTIFICATION FOR WELDING CONSUMABLES AVAILABLE	P	P	-
MATERIAL IDENTIFICATION (TYPE/GRADE)	O	O	-
WELDER IDENTIFICATION SYSTEM[1]	O	O	-
FIT-UP OF GROOVE WELDS (INCLUDING JOINT GEOMETRY) • JOINT PREPARATION • DIMENSIONS (ALIGNMENT, ROOT OPENING, ROOT FACE, BEVEL) • CLEANLINESS (CONDITION OF STEEL SURFACES) • TACKING (TACK WELD QUALITY AND LOCATION) • BACKING TYPE AND FIT (IF APPLICABLE)	O	O	-
CONFIGURATION AND FINISH OF ACCESS HOLES	O	O	-
FIT-UP OF FILLET WELDS • DIMENSIONS (ALIGNMENT, GAPS AT ROOF) • CLEANLINESS (CONDITION OF STEEL SURFACES) • TACKING (TACK WELD QUALITY AND LOCATION)	O	O	-
CHECK WELDING EQUIPMENT	O	-	-

[1]THE FABRICATOR OR ERECTOR, AS APPLICABLE, SHALL MAINTAIN A SYSTEM BY WHICH A WELDER WHO HAS WELDED A JOINT OR MEMBER CAN BE IDENTIFIED. STAMPS, IF USED, SHALL BE THE LOW-STRESS TYPE.

TABLE N5.4-2
INSPECTION TASKS DURING WELDING

INSPECTION TASKS DURING TO WELDING	QC	QA	NOT APPLICABLE
USE OF QUALIFIED WELDERS	O	O	-
CONTROL AND HANDLING OF WELDING CONSUMABLES • PACKAGING • EXPOSURE CONTROL	O	O	-
NO WELDING OVER CRACKED TACK WELDS	O	O	-
ENVIRONMENTAL CONDITIONS • WIND SPEED WITHIN LIMITS • PRECIPITATION AND TEMPERATURE	O	O	-
WPS FOLLOWED • SETTINGS ON WELDING EQUIPMENT • TRAVEL SPEED • SELECTED WELDING MATERIALS • SHIELDING GAS TYPE/FLOW RATE • PREHEAT APPLIED • INTERPASS TEMPERATURE MAINTAINED (MIN./MAX.) • PROPER POSITION (F, V, H, OH)	O	O	-
WELDING TECHNIQUES • INTERPASS AND FINAL CLEANING • EACH PASS WITHIN PROFILE LIMITATIONS • EACH PASS MEETS QUALITY REQUIREMENTS	O	O	-

TABLE N5.4-3
INSPECTION TASKS AFTER WELDING

INSPECTION TASKS AFTER WELDING	QC	QA	NOT APPLICABLE
WELDS CLEANED	O	O	-
SIZE, LENGTH AND LOCATION OF WELDS	P	P	-
WELDS MEET VISUAL ACCEPTANCE CRITERIA • CRACK PROHIBITION • WELD/BASE-METAL FUSION • CRATER CROSS SECTION • WELD PROFILES • WELD SIZE • UNDERCUT • POROSITY	P	P	-
ARC STRIKES	P	P	-
K-AREA[1]	P	P	-
BACKING REMOVED AND WELD TABS REMOVED (IF REQUIRED)	P	P	-
REPAIR ACTIVITIES	P	P	-
DOCUMENT ACCEPTANCE OR REJECTION OF WELDED JOINT OR MEMBER	P	P	-

[1]WHEN WELDING OF DOUBLER PLATES, CONTINUITY PLATES OF STIFFENERS HAS BEEN PERFORMED IN THE K-AREA, VISUALLY INSPECT THE WEB K-AREA FOR CRACKS WITHIN 3 IN. (75MM) OF THE WELD.

TABLE N5.6-1
INSPECTION TASKS PRIOR TO BOLTING

INSPECTION TASKS PRIOR TO BOLTING	QC	QA	NOT APPLICABLE
MANUFACTURER'S CERTIFICATIONS AVAILABLE FOR FASTENER MATERIALS	O	P	-
FASTENERS MARKED IN ACCORDANCE WITH ASTM REQUIREMENTS	O	O	-
PROPER FASTENERS SELECTED FOR THE JOINT DETAIL (GRADE, TYPE, BOLT LENGTH IF THREADS ARE TO BE EXCLUDED FROM SHEAR PLANE)	O	O	-
PROPER BOLTING PROCEDURE SELECTED FOR JOINT DETAIL	O	O	-
CONNECTING ELEMENTS, INCLUDING THE APPROPRIATE FAYING SURFACE CONDITION AND HOLE PREPARATION, IF SPECIFIED, MEET APPLICABLE REQUIREMENTS	O	O	-
PRE-INSTALLATION VERIFICATION TESTING BY INSTALLATION PERSONNEL OBSERVED AND DOCUMENTED FOR FASTENER ASSEMBLIES AND METHODS USED	P	O	-
PROPER STORAGE PROVIDED FOR BOLTS, NUTS, WASHERS AND OTHER FASTNER COMPONENTS	O	O	-

TABLE N5.6-2
INSPECTION TASKS DURING BOLTING

INSPECTION TASKS DURING BOLTING	QC	QA	NOT APPLICABLE
FASTENERS ASSEMBLIES, OF SUITABLE CONDITION, PLACED IN ALL HOLES AND WASHERS (IF REQUIRED) ARE POSITIONED AS REQUIRED	O	O	-
JOINT BROUGHT TO THE SNUG-TIGHT CONDITION PRIOR TO THE PRETENSIONING OPERATION	O	O	-
FASTENER COMPONENT NOT TURNED BY THE WRENCH PREVENTED FROM ROTATING	O	O	-
FASTENERS ARE PRETENSIONED IN ACCORDANCE WITH THE RCSC SPECIFICATION, PROGRESSING SYSTEMATICALLY FROM THE MOST RIGID POINT TOWARD THE FREE EDGES	O	O	-

TABLE N5.6-3
INSPECTION TASKS AFTER BOLTING

INSPECTION TASKS AFTER BOLTING	QC	QA	NOT APPLICABLE
FASTENER COMPONENT NOT TURNED BY THE WRENCH PREVENTED FROM ROTATING	O	O	-

O - OBSERVE THESE ITEMS ON A RANDOM BASIS. OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS.

P - PERFORM THESE TASKS FOR EACH WELDED JOINT OR MEMBER.

SPECIAL INSPECTION(CONT.)

DESIGN CRITERIA		
CODE: MBC 2015 THE STRUCTURE IS DESIGNED FOR THE FOLLOWING LIVE LOADS, IN ADDITION TO THE LATERAL LOADS, SUPER-IMPOSED DEAD LOADS, & SELF WEIGHT OF THE STRUCTURE. WHERE APPLICABLE LIVE LOADS ARE REDUCED IN ACCORDANCE WITH THE PROVISIONS OF THE BUILDING CODE. A. AMERICAN CONCRETE INSTITUTE BUILDING CODE (ACI-318). B. MANUAL OF STEEL CONSTRUCTION BY AMERICAN INSTITUTE OF STEEL CONSTRUCTION (LATEST EDITION). C. LATEST MASONRY STANDARDS JOINT COMMITTEE (MSJC) BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES (TMS 402/ACI 530/ASCE 5) AND SPECIFICATIONS FOR MASONRY STRUCTURES (TMS 602/ACI 530.1/ASCE 6) D. AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC) STANDARDS AND SPECIFICATIONS. E. NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION (NDS) AS PUBLISHED BY AMERICAN FOREST AND PAPER ASSOCIATION.		
		CODE REFERENCE
BUILDING OCCUPANCY CATEGORY	III	MBC-Table 1604.5 ASCE Table 1.5-1

SNOW LOADS/ROOF LIVE LOADS		
SNOW CRITERIA		CODE REFERENCE
GROUND SNOW LOAD	Pg = 20 PSF	MBC FIG. 1608.2 ASCE Fig. 7-1
FLAT ROOF SNOW LOAD	Pf = 22 PSF (MINIMUM)	ASCE Sec. 7.3
EXPOSURE FACTOR	Ce = 1.0	ASCE Table 7-2
IMPORTANCE FACTOR	I = 1.1	ASCE Table 1.5-2
THERMAL FACTOR	Ct = 1.0	ASCE Table 7-3
ROOF LIVE LOADS	Lr = 20 PSF	ASCE Table 4-1
NOTE: SNOW LOADS ADJACENT VERTICAL PROJECTIONS, ON LOWER ROOFS, ADJACENT TO HIGH ROOFS, OR SLOPED ROOFS ARE INCREASED FOR THE EFFECT OR DRIFTING		

WIND LOADS		
WIND CRITERIA		CODE REFERENCE
BASIC WIND SPEED (3 SEC. GUST)	V = 120 MPH	ASCE FIG. 26.5-1A, 26.5-1B, 26.5-1C
RISK CATEGORY	III	ASCE Table 1.5-1
EXPOSURE CATEGORY	B	ASCE Sec. 26.7.3
INTERNAL PRESSURE COEFFICIENT	± 0.18 (ENCLOSED)	ASCE TABLE 26.11-1
MWFRS ANALYSIS PROCEDURE	DIRECTIONAL PROCEDURE	ASCE CHAP. 27
COMPONENTS AND CLADDING	± 33 PSF MINIMUM ULTIMATE AND PER CODE REQUIREMENTS BASED ON ABOVE INFORMATION	ASCE Sec. 30.2.2

SEISWIC LOADS		
SEISWIC CRITERIA		CODE REFERENCE
SEISWIC RISK CATEGORY	III	ASCE Table 1.5-1
SEISWIC IMPORTANCE FACTOR	I = 1.25	ASCE Table 1.5-2
-0.2 SEC MAPPED SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING) Ss	Ss = .094	ASCE Sec. 11.4
-1.0 SEC MAPPED SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING) S1	S1 = .047	ASCE Sec. 11.4
SHORT PERIOR SPECTRAL RESPONSE ACCELERATION	Sds = 0.1	ASCE Sec. 11.4-3
1.0 SEC PERIOD SPECTRAL RESPONSE ACCELERATION	Sd1 = .075	ASCE Sec. 11.4-4
SOIL SITE CLASS	D	ASCE Sec. 11.4.2
SEISWIC DESIGN CATEGORY	B	ASCE Sec. 11.6
SEISWIC FORCE RESISTING SYSTEM	STEEL NOT SPECIFICALLY DETAILED FOR SEISWIC	ASCE Table 12.2-1
RESPONSE MODIFICATION FACTOR	R = 3.0	ASCE Table 12.2-1
DEFLECTION AMPLIFICATION FACTOR	Cd = 3.0	ASCE Table 12.2-1
ANALYSIS PROCEDURE	EQUIVALENT LATERAL FORCE	ASCE Sec. 12.8

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PROJECT:
CAREER TECHNICAL CENTER SHOP ROOMS - AC REPLACEMENT

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ISSUANCE:
BIDS
11/15/2024

DRAWN: RC
APPROVED: TS

GENERAL NOTES

S200

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
EWC	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
OS&Y	OUTSIDE SCREW AND YOKE
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
REL.A	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
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
	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
CO	CLEAN OUT (IN FLOOR)
CO	CLEAN OUT (IN LINE)
WCO	CLEAN OUT (WALL)
BFP	BACKFLOW PREVENTER
M	WATER METER ASSEMBLY
	HOSE BIBB, WALL HYDRANT
	DIRECTION OF PIPE PITCH
	SPRINKLER HEAD (UPRIGHT)
	SPRINKLER HEAD (SIDEWALL)
FS	FLOW SWITCH
	SIAMESE CONNECTION (YARD)
	SIAMESE CONNECTION (WALL MOUNTED)
	FIRE HYDRANT
	FLOW MEASURING DEVICE
	BALANCING VALVE
	COMBINATION FLOW MEASURING AND BALANCING DEVICE
AAV	AUTOMATIC AIR VALVE
MAV	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)
R	INCLINED RISE IN DIRECTION OF AIR FLOW (DOUBLE LINE)
R	INCLINED RISE IN DIRECTION OF AIR FLOW (SINGLE LINE)
D	INCLINED DROP IN DIRECTION OF AIR FLOW (DOUBLE LINE)
D	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	
EXISTING	FIRE DAMPER (VERTICAL)
NEW	
EXISTING	SMOKE DAMPER
NEW	
EXISTING	COMBINATION FIRE/SMOKE DAMPER (VERTICAL)
NEW	
EXISTING	COMBINATION FIRE/SMOKE DAMPER (HORIZONTAL)
NEW	
	VOLUME DAMPER (MANUALLY ADJUSTABLE)
M	MOTORIZED DAMPER
SD	SMOKE DETECTOR
CO2	CO2 SENSOR
T	THERMOSTAT OR TEMPERATURE SENSOR
H	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(140°F)	DOMESTIC 140°F HOT WATER PIPING
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

DRAWING INDEX

SHT NO	DESCRIPTION
M0.00	MECHANICAL GENERAL INFORMATION
MD1.00	MECHANICAL SHOP ROOM DEMOLITION PLANS
M1.00	MECHANICAL SHOP ROOM NEW WORK PLANS
M8.00	MECHANICAL DETAILS, SCHEDULES, AND TEMPERATURE CONTROLS

DRAWING NOTATION

SYMBOL	DESCRIPTION
1	NEW WORK KEY NOTE NO. 1
1	DEMOLITION KEY NOTE NO. 1
AHU-1	EQUIPMENT TAG
S-1 12x12 150-2	AIR TERMINAL TAG: IE: DIFFUSER TYPE = S-1 NECK SIZE = 12x12 CFM = 150 (TYPICAL FOR 2)
	EXISTING DEVICES OR EQUIPMENT
	NEW OR MODIFIED DEVICES OR EQUIPMENT
	EXISTING SYSTEM COMPONENT TO BE REMOVED
	POINT OF NEW CONNECTION

S = SUPPLY
R = RETURN
E = EXHAUST
T = TRANSFER

APPLICABLE CODES AND REGULATIONS

YEAR	CODE
2015	MICHIGAN BUILDING CODE
2015	MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS
2021	MICHIGAN PLUMBING CODE
2021	MICHIGAN MECHANICAL CODE
2015	MICHIGAN UNIFORM ENERGY CODE
2015	INTERNATIONAL FUEL GAS CODE
2012	NFPA 101 WITH BFS AMENDMENTS

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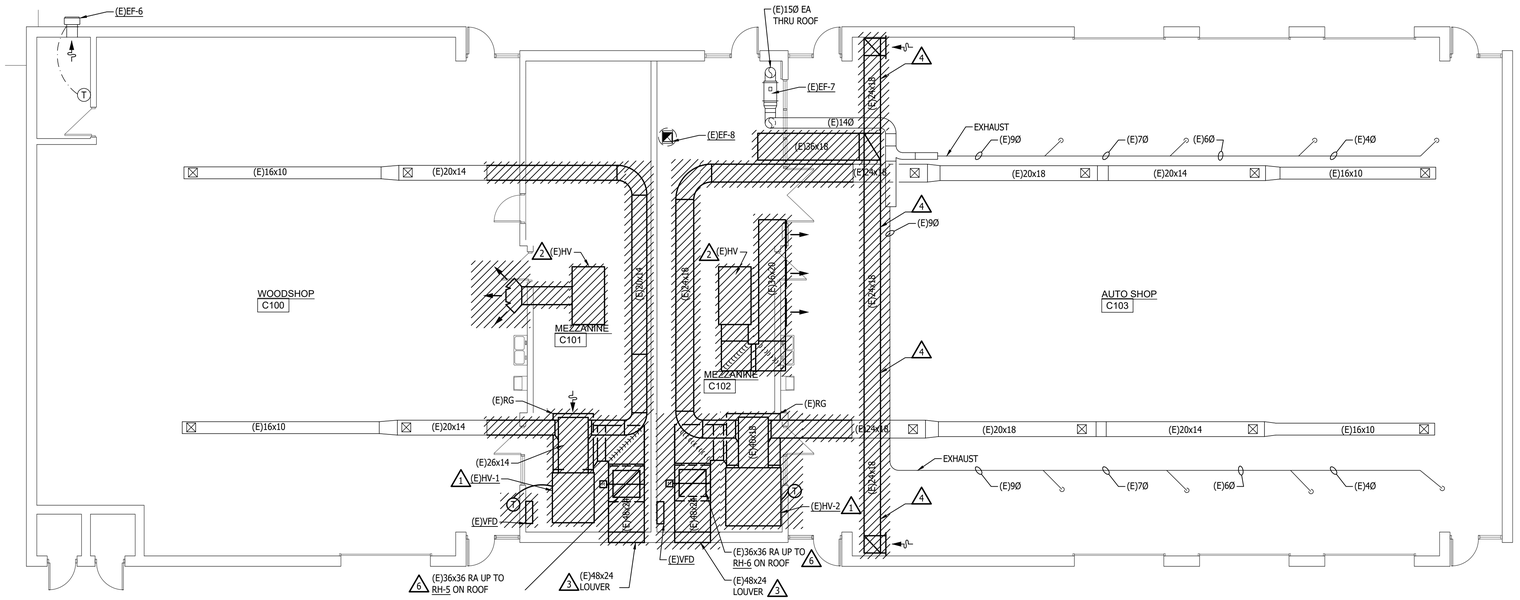
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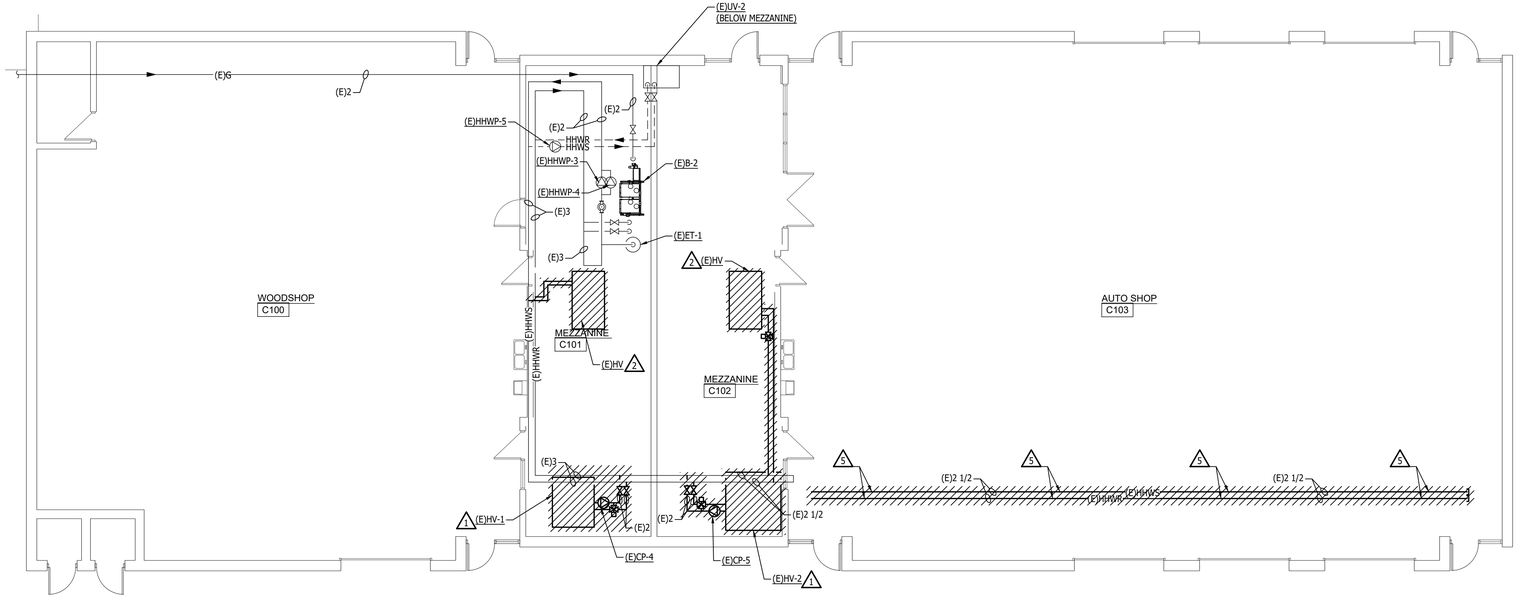
MECHANICAL GENERAL INFORMATION

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MECHANICAL HVAC DEMOLITION PLAN - SHOP ROOMS

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



MECHANICAL PIPING DEMOLITION PLAN - SHOP ROOMS

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

GENERAL DEMOLITION NOTES

A	THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF WORK TO BE PERFORMED. THE EXACT EXTENT OF DEMOLITION SHALL BE DETERMINED BY THE NEW WORK.
B	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.
C	PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH EXISTING SITE CONDITIONS, SYSTEMS, AND UTILITIES. NOTIFY DESIGN PROFESSIONAL OF ANY INTERFERENCES OR DISCREPANCIES.
D	ALL ITEMS INDICATED WITH CROSS-HATCHING SHALL BE REMOVED COMPLETELY WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, INSULATION, CONTROLS, ETC. CAP ALL OPEN-ENDED PIPES AND DUCTS.
E	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.
F	VERIFY DEPTH, SIZE, LOCATIONS, AND CONDITIONS OF EXISTING UTILITIES IN THE FIELD, INCLUDING POINTS OF CONNECTION, PRIOR TO STARTING ANY WORK.
G	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.
H	ALL EXISTING WORK TO REMAIN SHALL BE PROTECTED FROM DAMAGE. WHERE DUCT WORK PIPE INSULATION HAS BEEN DAMAGED DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR INSULATION AS REQUIRED TO MATCH EXISTING.

DEMOLITION KEYED NOTES

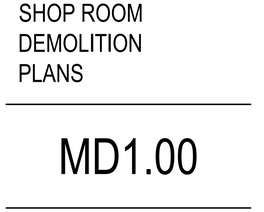
1	REMOVE HEATING AND VENTILATING UNIT COMPLETE INCLUDING ALL CONTROLS, DUCTWORK, HEATING HOT WATER COIL, HWHS & HWHR PIPING BACK TO MAIN, CIRCULATION PUMPS, INTAKE LOUVER, RELIEF HOOD AND ACCESSORIES. SEAL ROOF OPENING WEATHER TIGHT.
2	REMOVE HEATING AND VENTILATING UNIT COMPLETE INCLUDING ALL CONTROLS, DUCTWORK, HEATING HOT WATER COIL,HWHS & HWHR PIPING BACK TO MAIN AND ACCESSORIES.
3	BLANK OFF LOUVER COMPLETE AND SEAL WEATHER TIGHT.
4	REMOVE ABANDONED DUCT WORK COMPLETE INCLUDING ALL HANGERS AND SUPPORTS.
5	DEMO ABANDONED HWHS AND HWHR PIPING COMPLETE INCLUDING ALL HANGERS AND SUPPORTS.
6	REMOVE RELIEF HOOD COMPLETE. INCLUDING ALL DUCTWORK, CONTROLS AND ACCESSORIES COMPLETE. CAP OPENING AND SEAL WEATHER TIGHT.

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15125 FARMINGTON RD.
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PROJECT:
CAREER TECHNICAL CENTER SHOP ROOMS - AC REPLACEMENT

KEY PLAN

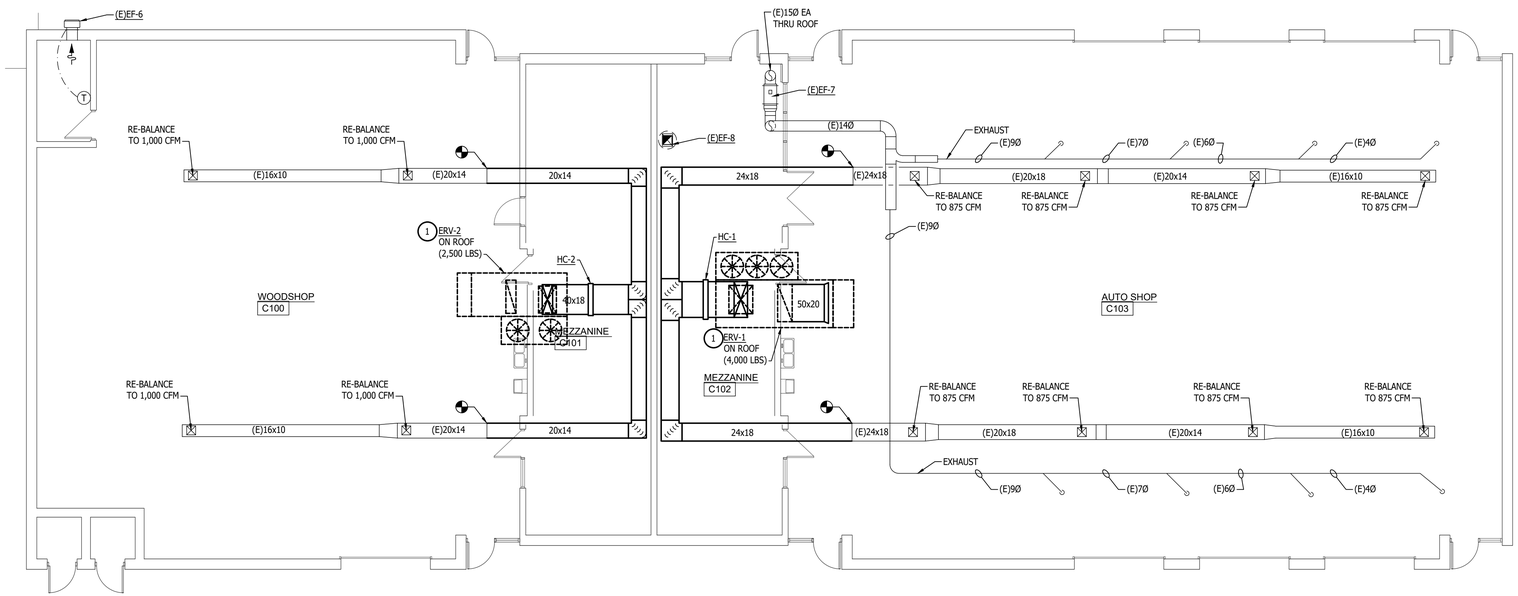


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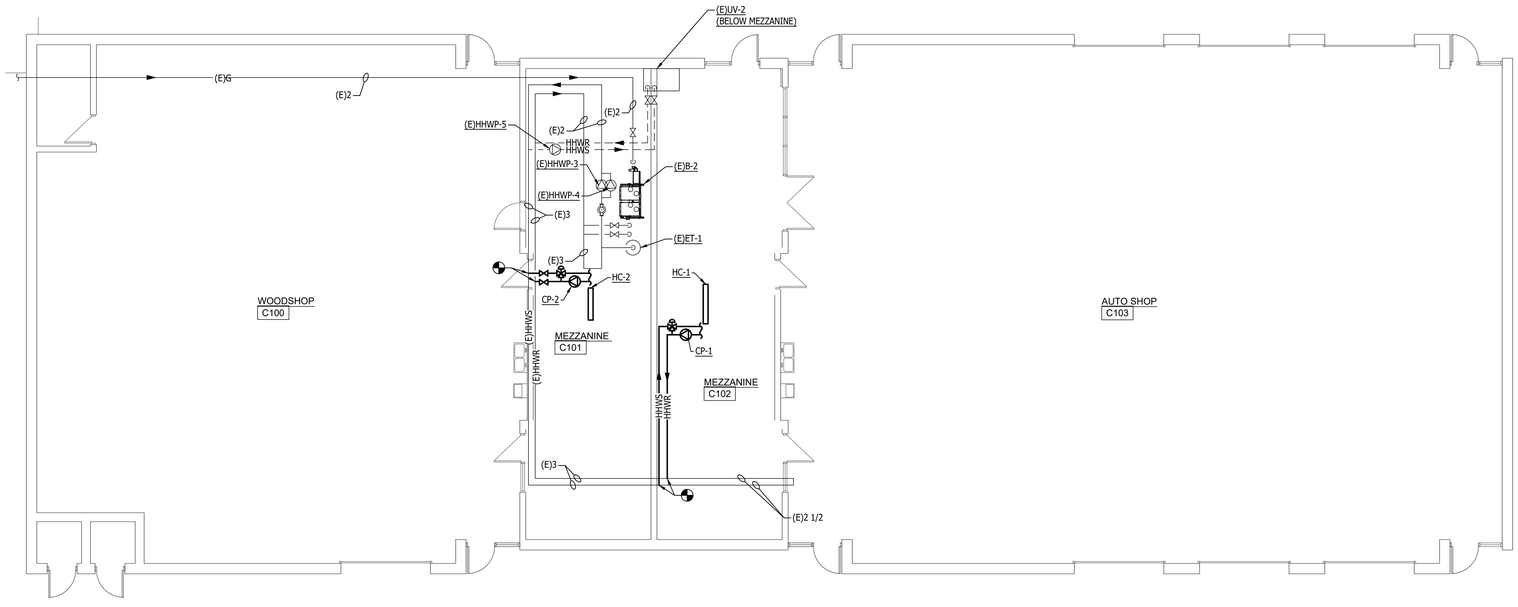
MECHANICAL SHOP ROOM DEMOLITION PLANS

MD1.00



MECHANICAL HVAC NEW WORK PLAN - SHOP ROOMS

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



MECHANICAL PIPING NEW WORK PLAN - SHOP ROOMS

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

HVAC GENERAL NOTES

A	THESE DRAWINGS ARE DIAGRAMMATIC AND REPRESENT THE GENERAL EXTENT OF THE WORK TO BE PERFORMED. PROVIDE AND EXECUTE ALL HVAC SYSTEMS PER ENGINEER'S SPECIFICATION, AND LOCAL APPLICABLE CODES INCLUDING AMENDMENTS, BULLETINS, ETC. AS WELL AS THE STANDARDS OF INSTALLATION AND EQUIPMENT ESTABLISHED FOR THE BUILDINGS, AND REQUIREMENTS OF THE OWNER.
B	EXCEPT FOR CHANGES AS MAY BE SPECIFICALLY APPROVED BY THE ENGINEER OF RECORD, IN ACCORDANCE WITH ALTERNATES OF OPTIONS AS STATED HEREINAFTER, ALL WORK MUST BE IN FULL ACCORDANCE WITH THE INTENT OF THE PLANS AND SPECIFICATIONS. SYSTEMS ARE TO BE COMPLETE, EFFICIENT, AND SATISFACTORY OPERATION WHEN PROJECT IS DELIVERED TO THE OWNER.
C	THE CONTRACTOR AND EACH SUBCONTRACTOR COVENANTS AND AGREES TO INDEMNIFY, DEFEND, AND HOLD HARMLESS THE CONSULTING ENGINEER, ARCHITECT, AND OWNER FROM AND AGAINST ANY LIABILITY, LOSS, DAMAGE, OR EXPENSE INCLUDING ATTORNEYS ARISING FROM A FAILURE OR ALLEGED FAILURE ON THE PART OF THE CONTRACTOR, SUBCONTRACTORS, AND THEIR AGENTS/EMPLOYEES PROPERLY TO DISCHARGE THE OBLIGATIONS ASSUMED BY HIM/HER IN THE PERFORMANCE OF THE WORK, INCLUDING ANY ACT OR OMISSION ALLEGEDLY RESULTING IN DEATH, PERSONAL INJURY, PROPERTY DAMAGE, OR IMPROPER CONSTRUCTION PROTOCOL.
D	CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND APPROVAL FROM GOVERNING AUTHORITIES AND FILE NECESSARY FORMS, PAY ALL INSPECTION FEES.
E	CONTRACTOR TO EXAMINE ALL ADJOINING WORK BEFORE COMMENCEMENT OF HIS/HER SCOPE OF WORK. REPORT ANY DISCREPANCIES TO THE CONSTRUCTION MANAGER FOR REVIEW AND APPROVAL. COORDINATE ALL WORK WITH OTHER TRADES TO ENSURE THAT INSTALLATION IS MADE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
F	PROVIDE REQUIRED CLEARANCE IN FRONT OF ELECTRICAL EQUIPMENT; DUCTWORK/PIPING SHALL NOT INTERFERE WITH ELECTRICAL EQUIPMENT CLEARANCE.
G	CONNECTION TO EQUIPMENT SHALL BE VERIFIED WITH MANUFACTURER'S CERTIFIED DRAWINGS. ALL PIPING CONNECTIONS SHALL BE MINIMUM 3/4" UNLESS NOTED OTHERWISE.
H	FURNISH ADEQUATE LIABILITY INSURANCE AND BONDING DOCUMENTS AS REQUIRED BY THE OWNER.
J	SUPPORT ALL ANCHORS SECURED TO THE BOTTOM OF FLOOR SLABS SHALL BE DROP-IN OR SLEEVE ANCHOR TYPE. ALL SUPPORTING STEEL SHALL BE PROVIDED BY THE CONTRACTOR.
K	DUCTWORK/PIPING SHALL NOT BE INSTALLED IN A LOCATION THAT RESTRICTS THE ACCESS TO MECHANICAL DEVICES REQUIRING ACCESS.
L	THE CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL FOR THE PROPER INSTALLATION OF MECHANICAL SYSTEMS.
M	BRANCH DUCTWORK TO GRILLES, REGISTERS, AND DIFFUSERS SHALL BE THE SAME SIZE AS THE TERMINAL DEVICE NECK SIZE WHERE NO DUCT SIZE IS INDICATED.

(X) NEW WORK KEYED NOTES

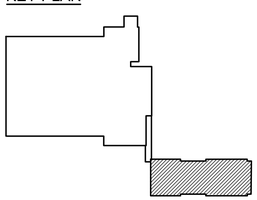
1	INSTALL PACKAGED ENERGY RECOVERY UNIT. PROVIDE NEW 18" CURB IN A LOCATION TO MEET MANUFACTURERS CLEARANCE REQUIREMENTS AND LOCAL CODES AS REQUIRED. SEAL ALL OPENING WEATHER TIGHT. COORDINATE NEW ROOF PENETRATIONS. BALANCE SYSTEM TO MEET AIRFLOW SHOWN ON DRAWING.

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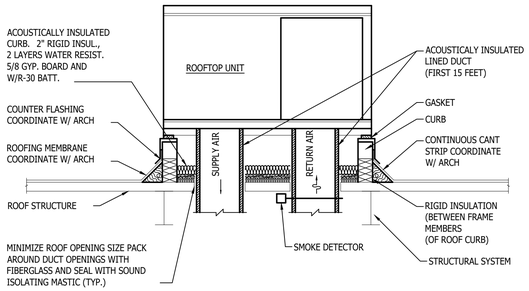


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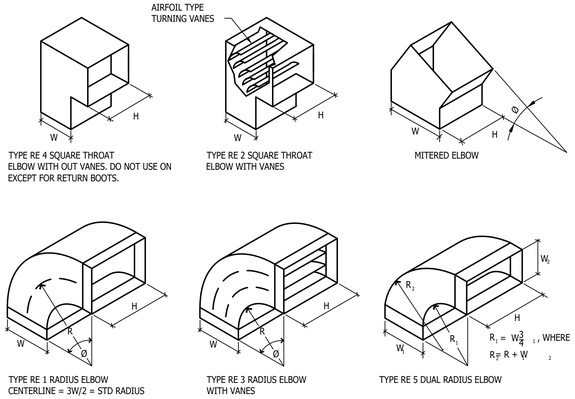
MECHANICAL SHOP ROOM NEW WORK PLANS

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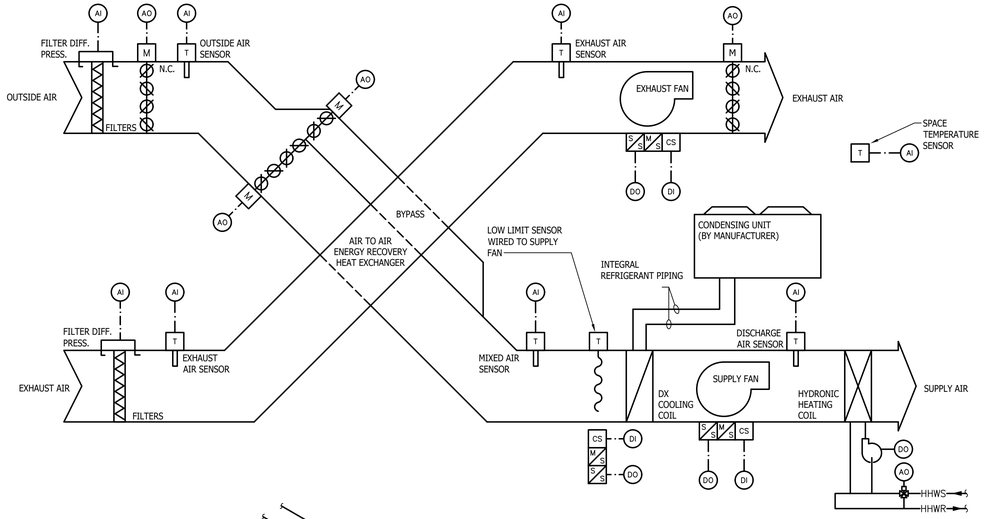
ROOFTOP UNIT - CURB MOUNTING DETAIL

NO SCALE



RECTANGULAR SHEET-METAL ELBOWS

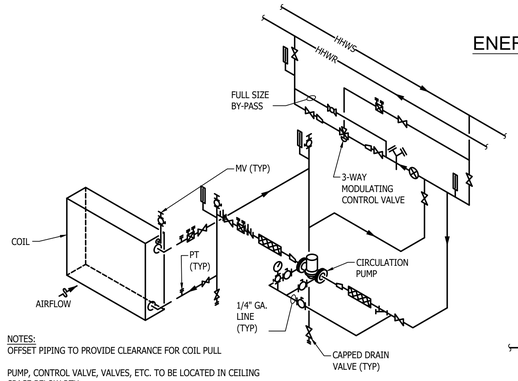
NO SCALE



ENERGY RECOVERY UNIT CONTROL DIAGRAM

ENERGY RECOVERY UNIT SEQUENCE OF OPERATIONS:
ALL SETPOINTS AND TIME INTERVALS SHALL BE ADJUSTABLE BY THE SYSTEM OPERATOR.

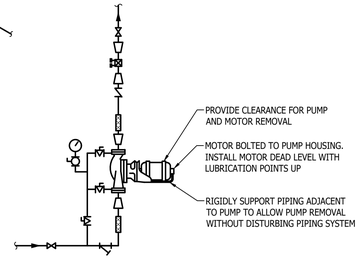
1. WITH THE SUPPLY AND EXHAUST FANS' HAND/OFF/AUTO SWITCH IN THE "AUTO" POSITION, THE SUPPLY FAN SHALL BE AUTOMATICALLY STARTED AND STOPPED WITH THE DDC SYSTEM OCCUPANCY SCHEDULE.
2. OCCUPIED MODE: WHEN THE DDC SYSTEM ENERGIZES THE SUPPLY FAN IT SHALL RUN CONTINUOUSLY. THE EXHAUST FAN SHALL BE INTERLOCKED WITH THE SUPPLY FAN. THE SUPPLY AND EXHAUST FANS WILL PROVE FLOW TO THE DDC SYSTEM WITH THEIR CURRENT SENSING SWITCH. IF THE FAN FAILS, THE SYSTEM WILL BE DE-ENERGIZED AND AN ALARM WILL BE SENT TO THE DDC SYSTEM.
3. THE DISCHARGE AIR TEMPERATURE SENSOR SHALL MODULATE THE DX STAGES OF COOLING AND THE HEATING COIL CONTROL VALVE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SENSOR SETPOINT. THE SPACE TEMPERATURE SENSORS SHALL MODULATE THE TEMPERING COIL CONTROL VALVE TO MAINTAIN SPACE TEMPERATURE SETPOINT.
4. UNOCCUPIED MODE: IF ANY SPACE TEMPERATURE SENSORS DROPS BELOW 60°F, THE SUPPLY FAN SHALL BE ENERGIZED AND THE HEATING COIL CONTROL VALVE SHALL OPEN FULLY. AFTER ALL OF THE SPACES HAVE REACHED 63°F (ADJ), THE UNIT SHALL BE DE-ENERGIZED.
5. THE ENERGY RECOVERY VENTILATOR PACKAGED DEFROST CONTROLLER SHALL MODULATE THE FACE AND BYPASS DAMPERS AS REQUIRED TO PREVENT FROSTING OF THE HEAT EXCHANGER. THE CONTROLLER ALSO ACTS AS AN AIR ECONOMIZER THAT WILL BYPASS AIR AROUND THE HEAT EXCHANGER AT THE APPROPRIATE TIMES.
6. THE DDC SYSTEM SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTERS. AN ALARM SHALL BE SENT TO THE DDC SYSTEM WHEN THE HIGH LIMIT SETPOINT IS REACHED (1.25" W.G.).
7. IF THE FREEZE-STAT SETPOINT IS REACHED (35°F OR BELOW), THEN THE SUPPLY FAN SHALL BE DE-ENERGIZED. CIRCULATION PUMP SHALL BE ENERGIZED. IF THE DUCT MOUNTED SMOKE DETECTORS DETECT SMOKE, THEN THE SUPPLY FAN SHALL BE DE-ENERGIZED.
8. WHEN THE SUPPLY FAN IS DE-ENERGIZED, THE OUTSIDE AND RELIEF DAMPERS SHALL BE CLOSED. THE RETURN AIR DAMPER SHALL BE OPEN.
9. WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW 40°F. THE HEATING COIL CIRCULATION PUMP SHALL BE ENERGIZED AND RUN CONTINUOUSLY. THE PUMP SHALL PROVE FLOW TO THE DDC SYSTEM WITH ITS CURRENT SWITCH. IF THE PUMP FAILS, AN ALARM SHALL BE SENT TO DDC.
10. THE BUILDING DDC SYSTEM SHALL MONITOR AND GRAPHICALLY SHOW THE FOLLOWING POINTS: EXHAUST AIR TEMPERATURE, DISCHARGE AIR TEMPERATURE (BOTH UNIT AND TEMPERING COIL), ROOM TEMPERATURE, ROOM TEMPERATURE SET POINT, STAGES OF COOLING, HEATING COIL VALVE POSITION, SUPPLY FAN STATUS, EXHAUST FAN STATUS, MIXED AIR TEMPERATURE, FILTER PRESSURE DIFFERENTIAL.



NOTES:
OFFSET PIPING TO PROVIDE CLEARANCE FOR COIL PULL

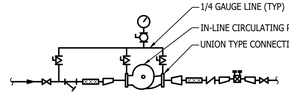
PUMP, CONTROL VALVE, VALVES, ETC. TO BE LOCATED IN CEILING SPACE BELOW RTU

HEATING COIL WITH CIRCULATION PUMP PIPING DIAGRAM



UP FLOW VERTICAL INSTALLATION

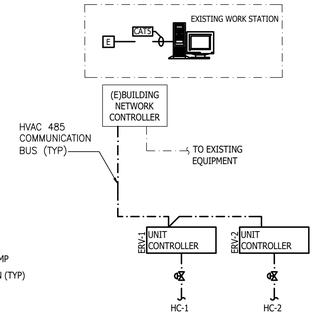
NOTES:
1. PUMP SHALL BE SUPPORTED INDEPENDENTLY FROM PIPING.
2. PROVIDE WITH FLEXIBLE CONNECTION FOR PUMPS WITH MOTORS 1/2 HORSEPOWER AND GREATER.



HORIZONTAL INSTALLATION

IN-LINE CIRCULATING PUMP PIPING DIAGRAM

NO SCALE



PUMP SCHEDULE

UNIT ID	SYSTEM SERVED	TYPE	FLOW (GPM)	HEAD (FT)	MIN % EFF					DISCONNECT			STARTER			MANUFACTURER/ MODEL NO.	REMARKS
						BHP	HP	VOLTS	PHASE	FURN. BY	INST. BY	TYPE	TYPE	FURN. BY	INST. BY		
CP-1	HEATING HOT WATER	INLINE	25	35	48.1	1.21	1.0	120	1	MC	MC	DIV 26	MC	MC		BELL AND GOSSETT / E-60 - 1.5x1.5x6.25	
CP-2	HEATING HOT WATER	INLINE	7	15	-	-	0.5	120	1	MC	MC	DIV 26	MC	MC		BELL AND GOSSETT / E-60-ECM 1x1x5.25	

NOTES:
1. PERFORMANCE BASED ON WATER, UNLESS OTHERWISE INDICATED.
2. PUMPS SHALL BE NON-OVERLOADING.

HEATING HOT WATER COIL SCHEDULE

UNIT ID	SYSTEM SERVED	MIN NO. OF ROWS	CAPACITY MBH	AIR				MIN FACE AREA (SQ FT)	FINNED DIMENSIONS (HEIGHT x LENGTH) (IN.)	WATER				CONTROL VALVE WPD (FT HD)	CONTROL VALVE CONFIGURATION	MODEL NO.	REMARKS
				AIRFLOW CFM	EDB °F	LDB °F	MAX APD (IN WG)			FLOW (GPM)	EWT °F	LWT °F	MAX WPD (FT HD)				
HC-1	ERV-1	2	244.6	7,000	58.5	90.8	0.40	6.94	20x50	12.4	160	120	16.2	5	2-WAY	W2-5020-11B-QCA-R	
HC-2	ERV-2	2	129.4	4,000	61.0	90.9	0.39	5.00	18x40	3.2	160	120	3.2	5	2-WAY	W8-4018-09B-3CA-R	

NOTES:
1. MODEL NUMBERS ARE CAPITAL COIL & AIR UNLESS OTHERWISE NOTED.
2. COIL SELECTION BASED ON 0.00025 FOULING FACTOR.
3. CONTROL BY ERV CONTROL PANEL, VALVE PROVIDED BY TCC.
4. CONTROL BE SPACE THERMOSTAT.

PACKAGED ROOFTOP ENERGY RECOVERY UNIT SCHEDULE - (DX - HGR)

UNIT ID	SUPPLY FAN						EXHAUST FAN						ENTHALPY WHEEL - SUMMER								ENTHALPY WHEEL - WINTER				POST ENTHALPY WHEEL CONDITIONING									HOT GAS RE-HEAT COIL			FILTERS		ELECTRICAL					DISCONNECT		CURB HEIGHT (IN)	MANUFACTURER/ MODEL NO.	REMARKS
													OUTSIDE AIR				EXHAUST AIR				OUTSIDE AIR		EXHAUST AIR			DX COOLING COIL										AIR													
	ESP (IN WG)	FLOW (CFM)	FAN TYPE	DRIVE TYPE	BHP	HP	ESP (IN WG)	FLOW (CFM)	FAN TYPE	DRIVE TYPE	BHP	HP	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	EDB (°F)	RH	LDB (°F)	LWB (°F)	EDB (°F)	LDB (°F)	EDB (°F)	RH	LDB (°F)	TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	APD (IN WG)	MIN. EFFICIENCY (EER)	REFRIGERANT TYPE	RE-HEAT (MBH)	EDB (°F)	LDB (°F)	PRE FILTER	FINAL FILTER	MOCP	MCA	FLA	VOLTS	PHASE	FURN. BY	INST. BY			
ERV-1	0.75	7,000	SWSI	DIRECT	4.84	7.5	0.25	3,600	SWSI	DIRECT	4.15	5.0	95.0	75.0	79.4	66.1	74.0	86.78	89.3	71.4	-10.0	47.6	70.0	8.22	10.5	194.0	161.8	76.8	64.2	57.0	55.4	0.15	11.27	R-454B	120.2	55.3	71.3	2" MERV 8	4" MERV 13	60	53	50	460	3	MC	MC	18	AAON / RNA-016-C-A-3-GAA0C-00000:00-0FGAJ-KCK-00000-ABLBJ-EC-CB0B-00-E0-0-AN0-E0-N000-00-000-B00A00-C00A0B-000000B	
ERV-2	0.75	4,000	SWSI	DIRECT	2.58	3.0	0.25	1,600	SWSI	DIRECT	1.21	2.0	95.0	75.0	79.4	66.1	74.0	87.11	89.3	71.5	-10.0	47.6	70.0	8.02	10.4	119.7	94.5	76.2	63.7	55.9	53.9	0.15	12.9	R-454B	71.9	54.2	70.9	2" MERV 8	4" MERV 13	35	28	26	460	3	MC	MC	19	AAON / RNA-011-B-A-3-GAA0C-00000:00-0ACAG-KCK-00000-ABJBG-EC-CB0B-00-E0-0-AN0-E0-N000-00-000-B00A00-C00A0B-000000B	

NOTES:
1. MODEL NUMBER IS AAON.
2. DUAL INPUT ENTHALPY CONTROL ECONOMIZER.
3. 2" PLEATED MEDIA ENERGY RECOVERY WHEEL FILTERS.
4. DISCONNECT SWITCH.
5. 115V SERVICE RECEPTACLE
6. REFRIGERATION COMPRESSORS SHALL BE VARIABLE SPEED OR DIGITAL.
7. ALL FANS SHALL BE ECM.
8. PROVIDE WITH REFRIGERATION CONTROLS ONLY. UNIT DDC CONTROLLER TO BE AUTOMATED LOGIC DDC FIELD INSTALLED BY TCC.
9. MODULATING GAS HEAT.

UNIFIED BUILDING SYSTEMS ENGINEERING
69 S. GRATIOT AVE
MT. CLEMENS, MI 48043
UBS PROJ. ID: 001.24.01

CLIENT:
LIVONIA PUBLIC SCHOOLS
15125 FARMINGTON RD.
LIVONIA, MI 48154

PROJECT:
CAREER TECHNICAL CENTER SHOP ROOMS - AC REPLACEMENT

11/15/2024

ISSUANCE:
BIDS

DRAWN: TDD
APPROVED: MPH

MECHANICAL DETAILS, SCHEDULES, AND TEMPERATURE CONTROLS

M8.00

LIGHTING SYMBOL LIST

SYMBOL	DESCRIPTION
	LIGHT FIXTURE - CEILING/GRID MOUNT
	LIGHT FIXTURE - INTERIOR WALL MOUNT LINEAR
	LIGHT FIXTURE - DOWNLIGHT WITH WALLWASH DIST.
	LIGHT FIXTURE - INTERIOR WALL SCONCE
	LIGHT FIXTURE - INTERIOR SURFACE MOUNT
	LIGHT FIXTURE - INTERIOR WALL MOUNTED
	LIGHT FIXTURE - INTERIOR PENDANT MOUNT
	LIGHT FIXTURE - INTERIOR PENDANT MOUNT CYLINDER
	TRACK AND TRACK MOUNTED LIGHT FIXTURES
	EXIT LIGHT - CEILING MOUNTED - ARROWS AS INDICATED ON PLAN (SHADED AREA INDICATES FACE(S) OF FIXTURE)
	EXIT LIGHT - WALL MOUNTED - ARROWS AS INDICATED ON PLAN (SHADED AREA INDICATES FACE(S) OF FIXTURE)
	EMERGENCY LIGHT FIXTURE - EMERGENCY BATTERY UNIT
	EMERGENCY LIGHT FIXTURE - BATTERY UNIT/EXIT SIGN
	LIGHT FIXTURE - EXTERIOR POLE MOUNT TYPE
	LIGHT FIXTURE - EXTERIOR WALL MOUNT TYPE
	LIGHT FIXTURE - EXTERIOR POST TOP TYPE
	LIGHT FIXTURE - EXTERIOR BOLLARD TYPE

NOTES:
1. LIGHTING SYMBOLS AS INDICATED ON PLANS ARE NOT DRAWN TO SCALE UNLESS NOTED OTHERWISE.

LIGHTING CONTROLS LEGEND

SYMBOL	DESCRIPTION
$	SWITCH SINGLE POLE
$O	OCCUPANCY SENSOR SWITCH
$V	VACANCY SENSOR SWITCH
$D	LOW VOLTAGE DIMMER SWITCH
$VD	VACANCY DIMMER SENSOR SWITCH
OS	CEILING MOUNTED OCCUPANCY SENSOR
VS	CEILING MOUNTED VACANCY SENSOR
$3	SWITCH THREE-WAY
$K	SINGLE POLE KEY SWITCH

POWER SYMBOL LIST

SYMBOL	DESCRIPTION
	CONDUIT DOWN
	CONDUIT UP
C	CONTACTOR
	DISCONNECT SWITCH - NON FUSED
	DISCONNECT SWITCH - FUSED
	DISCONNECT SWITCH - COMB. MOTOR STARTER
	ELECTRICAL PANEL - 208/240 VOLTS
	ELECTRICAL PANEL - 480 VOLTS
	GROUNDING ROD
	GROUND
	GROUNDING BAR
J	JUNCTION BOX
J	JUNCTION BOX WITH HARDWIRED CONNECTION
M	METER
	MOTOR - SINGLE PHASE
	MOTOR - THREE PHASE
$M	MOTOR RATED SWITCH
	POWER RECEPTACLE - SIMPLEX TYPE
	POWER RECEPTACLE - DUPLEX TYPE
	POWER RECEPTACLE - DUPLEX 6" ABOVE COUNTER
USB	POWER RECEPTACLE - USB/DUPLEX COMBO. DEVICE
	POWER RECEPTACLE - QUADRUPLEX TYPE
	POWER RECEPTACLE - RECESSED FLOOR TYPE
	POWER RECEPTACLE - SPECIALTY TYPE
SPD	SURGE PROTECTION DEVICE
TC	TIME CLOCK
T	TRANSFORMER (REFER TO SCHEDULES FOR INFO)
VSD	VARIABLE SPEED DRIVE

NOTES:
1. ALL DEVICE RATINGS/SIZES SHALL BE COORDINATED WITH PLANS AND SCHEDULES.

AUXILIARY SYST. SYMBOL LIST

SYMBOL	DESCRIPTION
	CAMERA
CR	CARD READER
	COMMUNICATIONS DEVICE - 6" ABOVE COUNTER
	COMMUNICATIONS DEVICE - FLOOR
	COMMUNICATIONS DEVICE - WALL
DH	MAGNETIC DOOR HOLDER
	PUSH BUTTON
S	SPEAKER
	WALL CLOCK - SINGLE FACE
	WALL CLOCK - DOUBLE FACE
S	WALL CLOCK AND SPEAKER UNIT

NOTES:
1. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR BOX AND CONDUIT FOR ALL DEVICES INDICATED.
2. LOW VOLTAGE CONTRACTOR SHALL PROVIDE EXACT SPECIFICATIONS AND LOCATIONS OF ALL DEVICES.

FIRE ALARM SYMBOL LIST

SYMBOL	DESCRIPTION
S	DETECTION DEVICE
S	DETECTION DEVICE - DUCT MOUNTED
FS	DETECTION DEVICE - FLOW SWITCH
TS	DETECTION DEVICE - TAMPER SWITCH
FAA	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FD	FIRE DEPARTMENT COMMUNICATION OUTLET
F	MANUAL DEVICE - PULL STATION
F	NOTIFICATION DEVICE - WALL MOUNTED
F	NOTIFICATION DEVICE - CEILING MOUNTED

NOTES:
1. DRAWINGS INDICATE DESIGN INTENT ONLY, FINAL LOCATIONS AND DEVICE SPECIFICATIONS SHALL BE PROVIDED BY FIRE ALARM MANUFACTURER. REFER TO PROJECT SPECIFICATIONS FOR APPROVED MANUFACTURERS.

ELECTRICAL ABBREVIATIONS

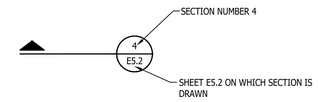
ABBREV.	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
A	AMPERE
AF	AMPERE FUSE/AMPERE FRAME
AWG	AMERICAN WIRE GAUGE
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AIC	AVAILABLE INTERRUPTING CURRENT (AMPS)
C	CONDUIT OR CEILING MOUNTED
CB	CIRCUIT BREAKER
CU	COPPER
CT	CURRENT TRANSFORMER
DIA	DIAMETER
DISC	DISCONNECT
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 ASSOCIATION
N/NEU	NEUTRAL
NF	NON-FUSIBLE
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NIC	NOT IN CONTRACT
OF/CI	OWNER FURNISHED / CONTRACTOR INSTALLED
OF/OI	OWNER FURNISHED / OWNER INSTALLED
PH. OR Ø	PHASE
P	POLE
PF	POWER FACTOR
PVC	POLYVINYL CHOLRIDE (PLASTIC)
(R)	RELOCATED EXISTING ELECTRICAL EQUIPMENT
(RR)	REMOVE AND REINSTALL
RMC	RIGID METALLIC CONDUIT
RP	RECEPTACLE PANEL
SPEC/SPECS	SPECIFICATIONS
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

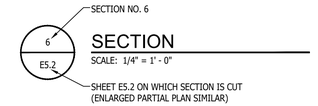
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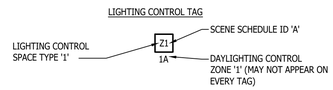
SHT NO	DESCRIPTION
E0.00	ELECTRICAL GENERAL INFORMATION
EP1.00	ELECTRICAL POWER DEMOLITION AND NEW WORK PLANS
E5.00	ELECTRICAL DETAILS, SCHEDULES, AND DIAGRAMS

DRAWING NOTATION

SYMBOL	DESCRIPTION
LA	LIGHTING FIXTURE TAG
1	CONSTRUCTION KEY NOTE NUMBER 1
1	DEMOLITION KEY NOTE NUMBER 1
1	FEEDER SIZE TAG (REFER TO FEEDER SCHEDULE ON THIS SHEET)
EF-1	EQUIPMENT DESIGNATION, (I.E. EXHAUST FAN NUMBER 1)
	EXISTING DEVICES OR EQUIPMENT
	NEW OR MODIFIED DEVICES OR EQUIPMENT
	NEW OR MODIFIED UNDERGROUND WIRING
	EXISTING SYSTEM COMPONENT TO BE REMOVED







APPLICABLE CODES AND REGULATIONS

YEAR	CODE
2015	MICHIGAN BUILDING CODE
2015	MICHIGAN ENERGY CODE
2023	MICHIGAN ELECTRICAL CODE RULES, PART 8
2023	NATIONAL ELECTRICAL CODE (NFPA 70)
2013	NFPA 20
2013	NFPA 72
2012	NFPA 101
2013	NFPA 110
2009	ICC A117.1 ACCESSIBLE AND USABLE BUILDINGS & FACILITIES

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ISSUANCE:
BIDS

DRAWN: RDL
APPROVED: MPH

ELECTRICAL GENERAL INFORMATION

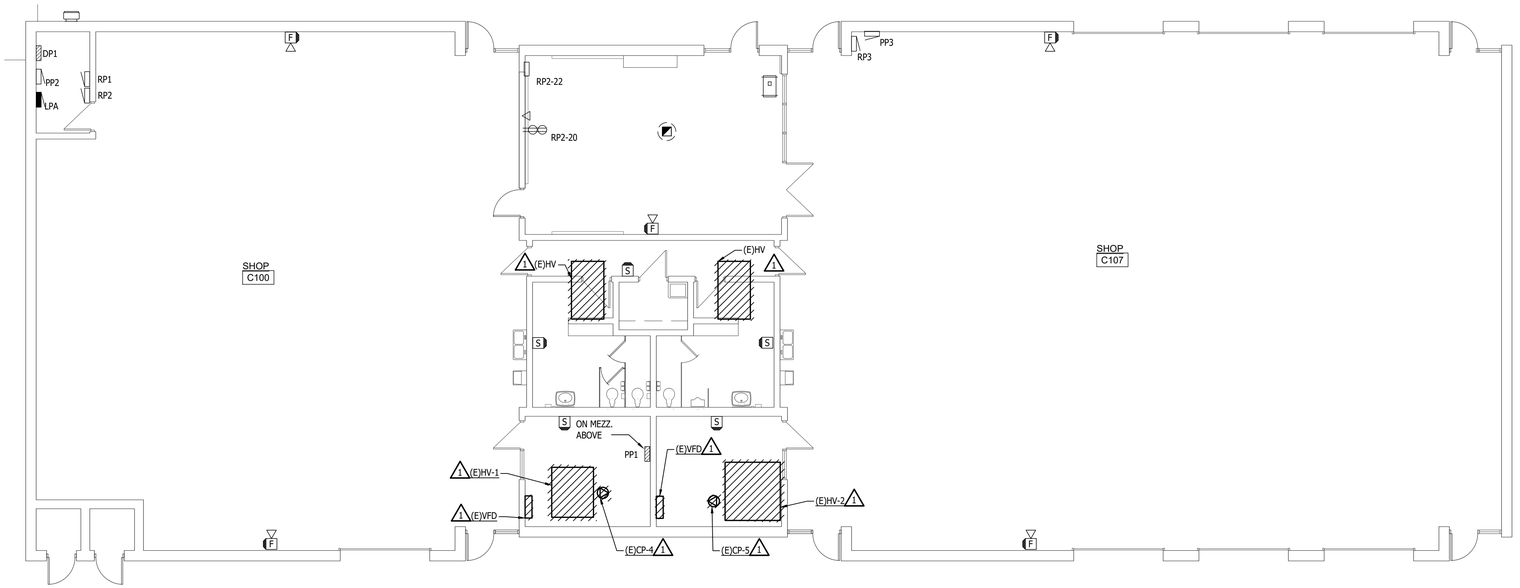
E0.00

GENERAL DEMOLITION NOTES

A	THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF WORK TO BE PERFORMED. THE EXACT EXTENT OF DEMOLITION SHALL BE DETERMINED BY THE NEW WORK.
B	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.
C	PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH EXISTING SITE CONDITIONS, SYSTEMS, AND UTLITIES. NOTIFY DESIGN PROFESSIONAL OF ANY INTERFERENCES OR DISCREPANCIES.
D	ALL ITEMS INDICATED WITH CROSS-HATCHING SHALL BE REMOVED COMPLETELY WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, INSULATION, CONTROLS, ETC. CAP ALL OPEN-ENDED PIPES AND DUCTS.
E	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.
F	VERIFY DEPTH, SIZE, LOCATIONS, AND CONDITIONS OF EXISTING UTILITIES IN THE FIELD. INCLUDING POINTS OF CONNECTION PRIOR TO STARTING ANY WORK.
G	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.
H	ALL EXISTING WORK TO REMAIN SHALL BE PROTECTED FROM DAMAGE. WHERE DUCT WORK PIPE INSULATION HAS BEEN DAMAGED DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR INSULATION AS REQUIRED TO MATCH EXISTING.

DEMOLITION KEYED NOTES

1	MECHANICAL EQUIPMENT TO BE REMOVED COMPLETE BY MECHANICAL TRADES. EC TO DISCONNECT AND MAKE SAFE. REMOVE SWITCH, TAKE CONDUIT AND WIRING BACK TO SOURCE. MARK BREAKER AS SPARE AND UPDATE PANEL SCHEDULE.



ELECTRICAL POWER DEMOLITION PLAN - SHOP ROOMS

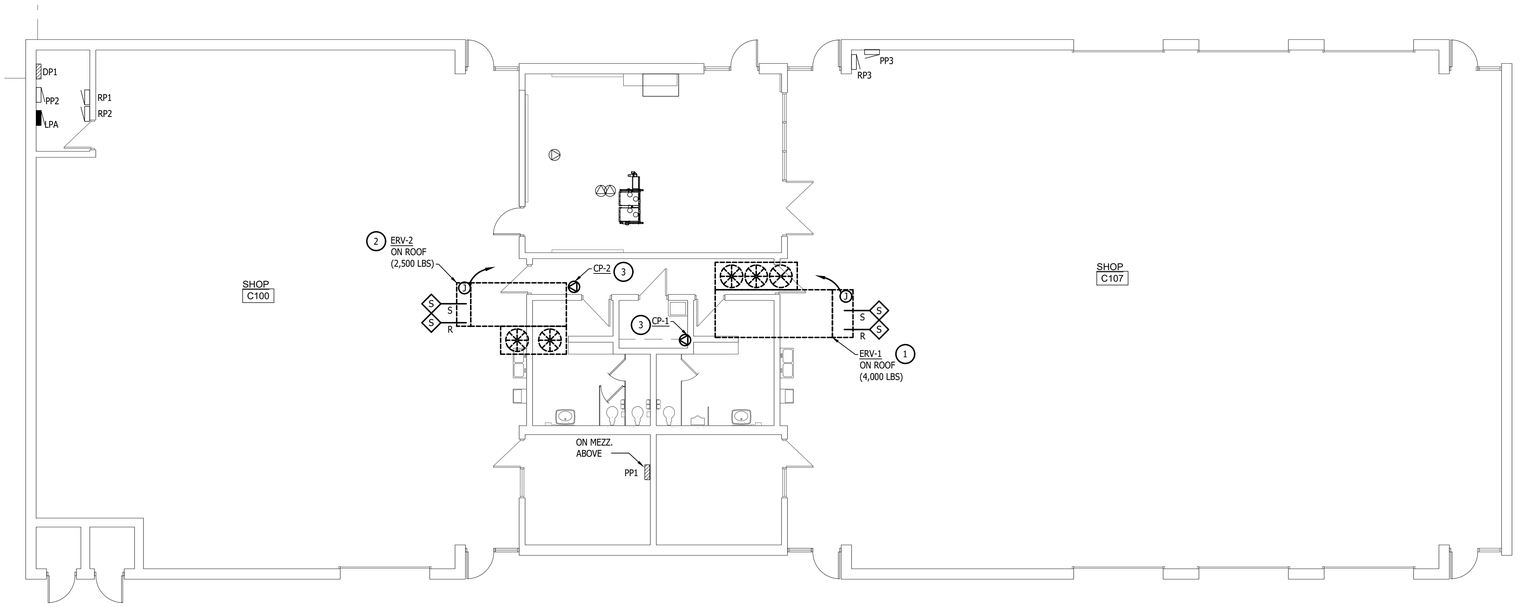
SCALE: 1/8" = 1'-0"

POWER GENERAL NOTES

A	THESE DRAWINGS ARE DIAGRAMMATIC AND REPRESENT THE GENERAL EXTENT OF THE WORK TO BE PERFORMED. PROVIDE AND EXECUTE ALL HVAC SYSTEMS PER ENGINEER'S SPECIFICATION, AND LOCAL APPLICABLE CODES INCLUDING AMENDMENTS, BULLETINS, ETC. AS WELL AS THE STANDARDS OF INSTALLATION AND EQUIPMENT ESTABLISHED FOR THE BUILDINGS, AND REQUIREMENTS OF THE OWNER.
B	EXCEPT FOR CHANGES AS MAY BE SPECIFICALLY APPROVED BY THE ENGINEER OF RECORD IN ACCORDANCE WITH ALTERNATES OF OPTIONS AS STATED HEREINAFTER, ALL WORK MUST BE IN FULL ACCORDANCE WITH THE INTENT OF THE PLANS AND SPECIFICATIONS. SYSTEMS ARE TO BE COMPLETE, EFFICIENT, AND SATISFACTORY OPERATION WHEN PROJECT IS DELIVERED TO THE OWNER.
D	CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND APPROVAL FROM GOVERNING AUTHORITIES AND FILE NECESSARY FORMS, PAY ALL INSPECTION FEES.
E	ELECTRICAL CONTRACTOR SHALL COMPLY WITH THE LATEST NATIONAL ELECTRICAL CODE, LIFE SAFETY CODE AND APPLICABLE STATE AND LOCAL CODES AND ORDINANCES.
F	ELECTRICAL EQUIPMENT AND WIRING SHALL BE NEW AND SHALL BE FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR, UNLESS OTHERWISE NOTED.
G	WIRING SHALL BE IN CONDUIT. CONDUIT SHALL BE 3/4" CONDUIT MINIMUM. CONDUITS IN FINISHED AREAS SHALL BE CONCEALED.
H	NEW WIRES SHALL BE TYPE THHN. MINIMUM SIZE SHALL BE #12 AWG, UNLESS OTHERWISE NOTED. FINAL CONNECTIONS TO EQUIPMENT, FURNISHED AND INSTALLED BY OTHERS, SHALL BE PROVIDED BY THIS CONTRACTOR.
J	ALL PA AND SPEAKER SCOPE BY OTHERS. REFER TO TECH DRAWINGS FOR FURTHER INFORMATION.

NEW WORK KEYED NOTES

1	ERV-1 BEING INSTALLED BY MECHANICAL TRADES, ELECTRICAL CONTRACTOR SHALL PROVIDE ALL FINAL CONNECTIONS USING NEW WIRING AND FEEDER. RUN 3#4&1#10G IN 1"C TO PP-2. REFER TO PANEL SCHEDULES ON E5.00
2	ERV-2 BEING INSTALLED BY MECHANICAL TRADES, ELECTRICAL CONTRACTOR SHALL PROVIDE ALL FINAL CONNECTIONS USING NEW WIRING AND FEEDER. RUN 3#8&1#10G IN 3/4"C TO PP-1. REFER TO PANEL SCHEDULES ON E5.00
3	CP BEING INSTALLED BY MECHANICAL TRADES, ELECTRICAL CONTRACTOR SHALL CIRCUIT TO EXISTING SPARE BREAKER MADE AVAILABLE FROM DEMOLITION.



ELECTRICAL POWER NEW WORK PLAN - SHOP ROOMS

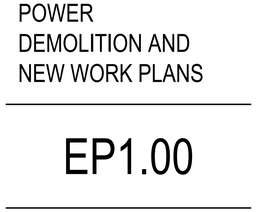
SCALE: 1/8" = 1'-0"

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KEY PLAN



11/15/2024

ISSUANCE:
BIDS

DRAWN: RDL
APPROVED: MPH

ELECTRICAL POWER DEMOLITION AND NEW WORK PLANS

EP1.00

Panel Designation: (E)PP-1 | **Main:** MLO | **P-P Voltage:** 480
Panel Location: MEZZ | **Bussing:** 100 | **P-N Voltage:** 277
Fed From: EXISTING | **Ground Bus:** STANDARD | **Phase:** 3
Feeder Size: EXISTING | **Mounting:** SURFACE | **Wire:** 4
Neutral: 100% | **Min SC Interrupting Rating:** EXISTING

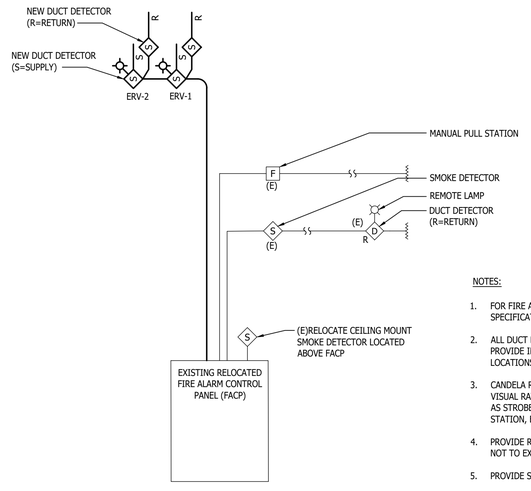
Remarks	Light Load	Recept Load	Cont Load	nonC Load	OC Prot	CKT	Ø A	Ø B	Ø C	CKT	OC Prot	nonC Load	Cont Load	Recept Load	Light Load	Remarks
				7427		1	X			2						
ERV-2				7427	35	3		X		4	40					(E) - SPARE
				7427		5			X	6						
				3661		7	X			8		3661				
(E) - HOT WATER TANK				3661	20	9		X		10	20	3661				(E) - AIR COMP.
				3661		11			X	12		3661				
				2746		13	X			14						
(E) - EX FAN 2				2746	15	15		X		16	15					(E) - SPARE
				2746		17			X	18						
						19	X			20						
(E) - SPARE					15	21		X		22	15					(E) - SPARE
						23			X	24						
						25	X			26						
						27		X		28						(E) - SPARE
						29			X	30						

	Connected Load				Demand	Demand Load				
Load Description	ØA	ØB	ØC	Total	Factor	ØA	ØB	ØC	Total	
Lighting or Continous Load (Volt-Amps)	0	0	0	0	1.00	0	0	0	0	
180VA Receptacle Load (Volt-Amps)	0	0	0	0	1.00 (First 10kVA)	0	0	0	0	Receptacle Demand Factor per Article 220.44 of the
	Amount over 10kVA			0	0.50 (> 10kVA)	0	0	0	0	National Electrical Code.
Continuous Load (Volt-Amps)	0	0	0	0	1.00	0	0	0	0	
Non-Continuous Load (Volt-Amps)	17494	17494	17494	52483	1.00	17494	17494	17494	52483	
Total Load (kVA)	17.49	17.49	17.49	52.48	125% of Light/Cont and Recept	17.49	17.49	17.49	52.48	
Total Ampacity (Amps)	63.1	63.1	63.1	63.1	(<10kVA) load plus other load	63.1	63.1	63.1	63.1	
Minimum Feeder Sizing (Amps)	63.1	63.1	63.1	63.1	<---- per NEC Article 215.2 ---->	63.1	63.1	63.1	63.1	

Panel Designation: (E)PP-2 | **Main:** 100A | **P-P Voltage:** 480
Panel Location: ELEC ROOM | **Bussing:** 100 | **P-N Voltage:** 277
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
				8489		1	X			2		14059				
RP-2				8489	40	3		X		4	60	14059				ERV-1
				8489		5			X	6		14059				
						7	X			8						
(E) - SPACE						9		X		10						(E) - SPACE
						11			X	12						
						13	X			14						
(E) - SPACE						15		X		16						(E) - SPACE
						17			X	18						
						19	X			20						
(E) - SPACE						21		X		22						(E) - SPACE
						23			X	24						
						25	X			26						
(E) - SPACE						27		X		28						(E) - SPACE
						29			X	30						

	Connected Load				Demand	Demand Load				
Load Description	ØA	ØB	ØC	Total	Factor	ØA	ØB	ØC	Total	
Lighting or Continous Load (Volt-Amps)	0	0	0	0	1.00	0	0	0	0	
180VA Receptacle Load (Volt-Amps)	0	0	0	0	1.00 (First 10kVA)	0	0	0	0	Receptacle Demand Factor per Article 220.44 of the
	Amount over 10kVA			0	0.50 (> 10kVA)	0	0	0	0	National Electrical Code.
Continuous Load (Volt-Amps)	0	0	0	0	1.00	0	0	0	0	
Non-Continuous Load (Volt-Amps)	22548	22548	22548	67643	1.00	22548	22548	22548	67643	
Total Load (kVA)	22.55	22.55	22.55	67.64	125% of Light/Cont and Recept	22.55	22.55	22.55	67.64	
Total Ampacity (Amps)	81.4	81.4	81.4	81.4	(<10kVA) load plus other load	81.4	81.4	81.4	81.4	
Minimum Feeder Sizing (Amps)	81.4	81.4	81.4	81.4	<---- per NEC Article 215.2 ---->	81.4	81.4	81.4	81.4	



FIRE ALARM RISER

NO SCALE

NOTES:

1. FOR FIRE ALARM EQUIPMENT SPECIFICATION AND ADDITIONAL REQUIREMENTS, SEE SPECIFICATIONS.
2. ALL DUCT DETECTORS SHALL BE WIRED TO ACTIVATE ALARM SYSTEM AND SHUT DOWN FAN. PROVIDE INDICATOR LIGHT WHERE SMOKE DETECTORS ARE INSTALLED IN CONCEALED LOCATIONS OR ARE MORE THAN 10FT. ABOVE THE FINISHED FLOOR.
3. CANDELA RATING ARE INTENDED TO BE 15cd UNLESS NOTED OTHERWISE. ALL AUDIO AND VISUAL RATINGS SHALL MEET OR EXCEED NFPA REQUIREMENTS. MINOR DEVIATIONS SUCH AS STROBE RATING, MISSING OF AUDIO/VISUAL UNITS, SMOKE DETECTORS UNITS, PULL STATION, ETC. (MAX OF 10) SHALL BE INCLUDED AS PART OF THIS BID.
4. PROVIDE REMOTE POWER SUPPLIES AS REQUIRED FOR NOTIFICATION APPLIANCE CIRCUITS, NOT TO EXCEED 80% OF CAPACITY.
5. PROVIDE SMOKE DETECTOR ABOVE EACH REMOTE POWER SUPPLY PANEL.
6. PROVIDE BATTERY, CURRENT LOAD AND VOLTAGE DROP CALCULATIONS PER SPECIFICATIONS.
7. SEAL AROUND ALL PIPES & CONDUITS IN MASONRY AND DRYWALL WALLS.
8. ALL FIRE ALARM WIRING SHALL BE MINIMUM #14 AWG AND IN CONDUIT MIN 3/4" IN EXPOSED CEILING AREAS, CABLE IS ACCEPTABLE ABOVE LAY-IN CEILINGS IN J-HOOKS.
9. FIRE ALARM CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHARGES INVOLVED IN OBTAINING APPROVAL AND CERTIFICATION FROM STATE ELECTRICAL INSPECTOR FOR A COMPLETE SYSTEM. CERTIFIED CONTRACTOR TO PAY ALL FEES REQUIRED.
10. THE ELEVATION DIAGRAM IS FOR REFERENCE PURPOSES. EXACT QUANTITIES OF DEVICES AND LOCATIONS SHALL COMPLY WITH NFPA GUIDELINES AND MEET APPROVAL OF THE STATE ELECTRICAL INSPECTOR. FIRE ALARM CONTRACTOR SHALL HAVE SHOP DRAWINGS APPROVED BY THE STATE ELECTRICAL INSPECTOR PRIOR TO COMMENCEMENT OF WORK.
11. FOR FIRE ALARM SYMBOL LEGEND SEE DRAWING E000.
12. PROVIDE COVER WITH SIREN FEATURE TO ALL FIRE ALARM MANUAL PULL STATION.
13. FIRE ALARM VENDOR TO PROVIDE INSTALLATION DRAWINGS AS PART OF SUBMITTALS.
14. THE FIRE ALARM SYSTEM SHOWN ON THE DRAWINGS AND SPECIFICATIONS ARE A PERFORMANCE SPECIFICATION SYSTEM WITH DEVICE LOCATIONS. FIRE ALARM VENDOR AND CONTRACTOR MUST PROVIDE A COMPLETE SYSTEM PER CODE.
15. ALL STROBES EXISTING AND NEW SHALL BE SYNCHRONIZED.

UNIFIED BUILDING SYSTEMS ENGINEERING
69 S. GRATIOT AVE
MT. CLEMENS, MI 48043
UBS PROJ. ID: 001.24.01

CLIENT:
LIVONIA PUBLIC SCHOOLS
15125 FARMINGTON RD.
LIVONIA, MI 48154

PROJECT:
CAREER TECHNICAL CENTER SHOP ROOMS - AC REPLACEMENT

11/15/2024

ISSUANCE:
BIDS

DRAWN: RDL
APPROVED: MPH

ELECTRICAL DETAILS, SCHEDULES, AND DIAGRAMS

E5.00