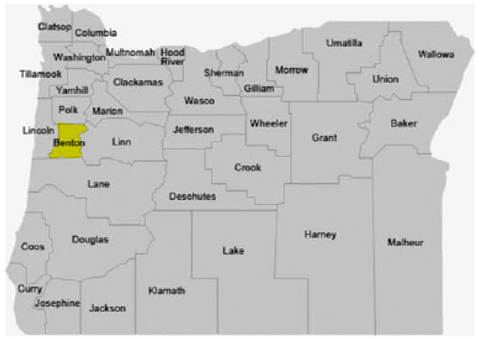
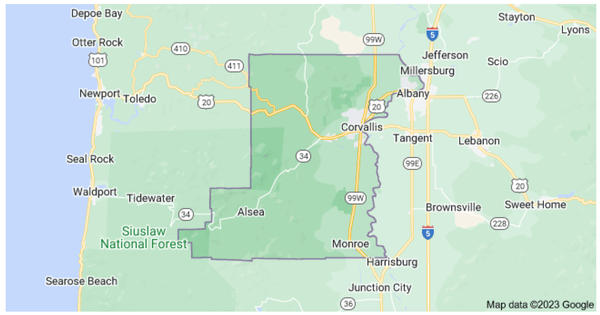
USDA AGRICULTURAL RESEARCH SERVICES LABORATORY EXHAUST

HORTICULTURAL CROPS RESEARCH LAB
3420 NW ORCHARD AVE.
CORVALLIS OR, 97331
BENTON COUNTY



OREGON STATE



BENTON COUNTY

STREET VIEW

PROJECT SUMMARY

THE USDA RESEARCH LAB IN CORVALLIS WAS CONSTRUCTED IN 1971, EXPANDED IN 1993, AND RECENTLY HAD SEVERAL ROOFTOP UNITS REPLACED. THIS PROJECT WILL ADD A NEW LABORATORY EXHAUST FAN AND RE-BALANCE THE BUILDING AIRFLOWS TO MAINTAIN PRESSURE RELATIONSHIPS IN LABORATORY AREAS.

THE CONTRACTOR SHALL COORDINATE CAREFULLY WITH THE LABORATORY STAFF AND FACILITIES TEAM REGARDING THE VARIOUS BUILDING HVAC SHUTDOWNS REQUIRED TO COMPLETE THE PROJECT.

THE ELECTRICAL DRAWINGS DETAIL THE ELECTRICAL-SPECIFIC REQUIREMENTS IN ACCORDANCE WITH THE ABOVE.

THE FINAL CRANE LIFT PLAN SHALL BE THE RESPONSIBILITY OF THE AWARDED CONTRACTOR. THE CRANE SHALL UTILIZE WOOD OR SIMILAR TO DISTRIBUTE THE OUTRIGGER POINT LOADS WHERE THEY ARE LOCATED OVER UNDERGROUND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING THE GROUND FOR THE CRANE AND RESTORING THE SITE TO ORIGINAL CONDITION AS AGREED-UPON AT TIME OF AWARD TO INCLUDE ANY NECESSARY REPAIRS TO SPRINKLERS, SIDEWALKS, ASPHALT, ETC.

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M-702	MECHANICAL SCHEDULES
	ELECTRICAL
E-001	ELECTRICAL LEGEND, SECOND FLOOR & ROOF WEST PLANS & SCHEDULES

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REGISTERED PROFESSIONAL ENGINEER
8538307
OREGON
May 10, 2011
TRACI ANNE HANEGAN
EXPIRATION DATE: 06/30/2027

HORTICULTURAL CROPS RESEARCH LAB

3420 NW ORCHARD AVE., CORVALLIS, OR 97331

USDA ARS LABORATORY EXHAUST

FINAL TURNOVER

REV	DATE	DESCRIPTION

PROJ. NO.	230612
DRAWN	PJTM
CHECKED	TAH
DATE	02/04/2026

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SHEET TITLE:
COVER SHEET

SHEET NO:
G-001

SHEET 01 OF 16

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GENERAL STRUCTURAL NOTES

GENERAL:

THE STRUCTURAL CONTRACT DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE STRUCTURE IS DESIGNED TO BE A STABLE UNIT AS A COMPLETED WHOLE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DESIGN, ERECT AND INSPECT TEMPORARY SHORES, BRACES, ETC. TO SUPPORT THE STRUCTURE AGAINST ALL ANTICIPATED LOADS INCLUDING GRAVITY, WIND AND LATERAL EARTH PRESSURE UNTIL ITS COMPLETION. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL NOT INCLUDE INSPECTION OF THESE METHODS OF CONSTRUCTION. CONSTRUCTION MATERIAL SHALL BE PLACED ON FRAMED FLOORS AND ROOFS SUCH THAT THE DESIGN LIVE LOADS ARE NOT EXCEEDED.

WORKMANSHIP AND MATERIALS SHALL COMPLY WITH THE EDITIONS OF THE INTERNATIONAL BUILDING CODE AND TESTING STANDARDS ACCEPTED BY THE AUTHORITY HAVING JURISDICTION AND APPLICABLE AT THE TIME THE PROJECT WAS PERMITTED.

NOTES AND DETAILS ON THE DRAWINGS TAKE PRECEDENCE OVER THE GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS. WHERE NOTES AND DETAILS ON DRAWINGS AND THESE GENERAL NOTES AND TYPICAL DETAILS ARE IN CONFLICT WITH THE PROJECT SPECIFICATION, THE MOST STRINGENT SHALL APPLY. WHERE NO SPECIFIC DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT SUBJECT TO REVIEW BY THE ARCHITECT AND ENGINEER. "TYPICAL" DETAILS ARE NOT FLAGGED ON THE DRAWINGS, BUT APPLY UNLESS NOTED OTHERWISE.

FRAMING MEMBERS WHICH ARE NOT DIMENSIONED SHALL BE ASSUMED EQUALLY SPACED BETWEEN DIMENSIONED POINT OF MEMBERS SUBJECT TO REVIEW BY THE ARCHITECT AND ENGINEER.

COORDINATION:

ALL DRAWINGS ARE CONSIDERED TO BE PART OF THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE STRUCTURAL DRAWINGS AND SPECIFICATIONS WITH THE DRAWINGS AND SPECIFICATIONS OF ALL OTHER DISCIPLINES, INCLUDING BUT NOT LIMITED TO ARCHITECTURAL, CIVIL, MECHANICAL, ELECTRICAL, FIRE PROTECTION, AND AMONG THE SUBCONTRACTORS PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES THAT ARE FOUND SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT PRIOR TO START OF CONSTRUCTION. ANY WORK PERFORMED IN CONFLICT WITH THE CONTRACT DOCUMENTS OR ANY CODE REQUIREMENTS SHALL BE CORRECTED BY THE CONTRACTOR AT HIS OWN EXPENSE AND AT NO EXPENSE TO THE OWNER OR DESIGN TEAM.

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS AND SITE CONDITIONS PRIOR TO STARTING CONSTRUCTION. RESOLVE ANY DISCREPANCY WITH THE ENGINEER.

COORDINATION SHALL INCLUDE, BUT NOT BE LIMITED TO, VERIFYING THE LOCATION AND WEIGHT OF ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AS WELL AS, THE SIZE AND LOCATION OF ALL MECHANICAL OPENINGS IN ROOFS, FLOORS AND WALLS. UNLESS OTHERWISE NOTED ON THE DRAWINGS, DO NOT PENETRATE ANY STRUCTURAL ELEMENTS SUCH AS BEAMS, COLUMNS, WALLS, HEADERS, JAMBS, SLABS, ETC. WITHOUT PRIOR WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER.

SUBSTITUTIONS:

CONTRACTOR REQUESTED CHANGES OR SUBSTITUTIONS MUST BE SUBMITTED IN WRITING TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OR CONSTRUCTION. CHANGES SHOWN ON THE SHOP DRAWINGS ONLY WILL NOT SATISFY THIS REQUIREMENT. CONTRACTOR WILL BE RESPONSIBLE FOR ANY ADDITIONAL ENGINEERING EFFORT AND ASSOCIATED FEES REQUIRED FOR REVIEW AND APPROVAL OF REQUESTED CHANGES AND SUBSTITUTIONS.

SHOP DRAWINGS:

SUBMIT SHOP DRAWINGS FOR STRUCTURAL ENGINEER REVIEW PRIOR TO FABRICATION/ERECTION/INSTALLATION.

THE CONTRACTOR SHALL REVIEW AND APPROVE ALL SHOP DRAWINGS PRIOR TO ENGINEERING REVIEW. ENGINEERS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. SUBMIT ELECTRONIC COPY FOR ENGINEERING REVIEW THAT INCLUDES CONTRACTOR'S REVIEW COMMENTS. DOCUMENT WILL BE MARKED AND RETURNED ELECTRONICALLY.

THE CONTRACTOR SHALL ALLOW 2 WEEKS FOR ENGINEER'S REVIEW OF SUBMITTALS. COMMENTS OR MARKS ON SUBMITTALS ARE A NORMAL AND EXPECTED PART OF THE SUBMITTAL PROCESS AND SHALL NOT BE USED AS A BASIS FOR CHANGE ORDERS. TIME REQUIRED TO REVISE AND SUBMIT ANY SUBMITTAL SHALL BE CONSIDERED INHERENT TO THE SUBMITTAL REVIEW PROCESS AND SHALL NOT BE DEEMED A CHANGE ORDER.

RE-SUBMITTALS SHALL HAVE ALL REVISIONS CLEARLY IDENTIFIED WITH DRAWINGS CLOUDS AND REVISION DATES. THE STRUCTURAL ENGINEER SHALL NOT BE RESPONSIBLE FOR THE REVIEW OF ANY UNMARKED REVISIONS.

SHOP DRAWINGS SHALL BE SUBMITTED FOR THE FOLLOWING ITEMS IN ADDITION TO ANY SUBMITTAL REQUIREMENTS SPECIFIED ON THESE PLANS OR IN THE PROJECT SPECIFICATIONS:

1. MECHANICAL EQUIPMENT CURBS.

SPECIAL INSPECTIONS:

THE OWNER WILL EMPLOY AN ICC CERTIFIED SPECIAL INSPECTOR TO PROVIDE INSPECTION OF REQUIRED ITEMS PER IBC CHAPTER 17 AND THE REQUIREMENTS OF THE APPROPRIATE LOCAL JURISDICTION:

POST INSTALLED ANCHORS; SEE INFORMATION THIS SHEET.

CODE:

2022 EDITION OF THE OREGON STRUCTURAL SPECIALTY CODE.

DESIGN LOADS:

ROOF SNOW LOAD---------- SEE SNOW LOADS BELOW

RISK CATEGORY---------- II

WIND:

WIND SPEED (3 SECOND GUST) ---------- 96 MPH
EXPOSURE CATEGORY---------- B
INTERNAL PRESSURE COEFFICIENT GCpi---------- +/- 0.18

SEISMIC:

IMPORTANCE FACTOR (Ie) ---------- 1.0
Ss ---------- 0.885
S1 ---------- 0.468
Sds ---------- 0.676
Sd1 ---------- 0.571
SITE CLASS---------- D
SEISMIC DESIGN CATEGORY---------- D
SEISMIC FORCE RESISTING SYSTEM ---------- REINFORCED MASONRY SHEAR WALLS
RESPONSE MODIFICATION COEFFICIENT (Rp) ---------- 6
SEISMIC RESPONSE FACTOR (Fp) ---------- 0.20 Wp
OVERSTRENGTH FACTOR (Ω) ---------- 2.5
ANALYSIS PROCEDURE ---------- EQUIVALENT LATERAL FORCE

SNOW:

GROUND SNOW LOAD ---------- 14 PSF
FLAT ROOF SNOW LOAD ---------- 25 PSF
SNOW EXPOSURE FACTOR (Ce) ---------- 1.0
SNOW LOAD IMPORTANCE FACTOR (Is) ---------- 1.0
THERMAL FACTOR (Ct) ---------- 1.0
SLOPE FACTOR ---------- 1.0

COLD-FORMED STEEL:

ALL COLD-FORMED STEEL FRAMING SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST EDITION OF "SPECIFICATIONS FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS" BY THE AMERICAN IRON AND STEEL INSTITUTE AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

STEEL FOR ALL 54 MIL OR GREATER STUDS AND JOISTS, TRACK AND ALL THICKNESS OF DIAGONAL TENSION STRAPS SHALL HAVE A MINIMUM YIELD STRENGTH Fy = 50 KSI. STEEL FOR ALL 43 AND 33 MIL STUDS AND JOISTS, TRACK, AND ALL THICKNESS OF BRIDGING AND ACCESSORIES SHALL HAVE A MINIMUM YIELD STRENGTH Fy = 33 KSI.

STEEL SHALL BE GALVANIZED AT LOCATIONS EXPOSED TO WEATHER AND WHENEVER NOTED ON THE DRAWINGS IN ACCORDANCE WITH ASTM A653, GRADE D, FOR Fy = 50 KSI AND ASTM A653, GRADE A, FOR Fy = 33 KSI.

ALL STUDS SHALL BE SECURELY SEATED FOR FULL END BEARING ON TOP AND BOTTOM TRACK. SPLICING OF STUDS SHALL NOT BE PERMITTED. UNLESS NOTED OTHERWISE, PROVIDE DOUBLE STUDS AT ALL BEAM BEARINGS, JAMBS, WALL CORNERS AND INTERSECTIONS. UNLESS NOTED OTHERWISE, ALL TRACK SHALL BE OF THE SAME MATERIAL AND GAGE AS THE STUDS. BRIDGING SHALL BE INSTALLED PER MANUFACTURERS RECOMMENDATIONS WITH THE FOLLOWING MINIMUM REQUIREMENTS:

FOR NON-BEARING WALLS, PROVIDE BRIDGING AT MID-HEIGHT FOR WALLS LESS THAN OR EQUAL TO 10'-0" HIGH AND 5'-0" OC MAXIMUM FOR WALLS GREATER THAN 10'-0" HIGH. FOR BEARING WALLS, PROVIDE BRIDGING EQUALLY SPACED AT 4'0" OC MAXIMUM. IN ADDITION, BRIDGING SHALL BE PROVIDED AT ROOF LINES, FLOOR LINES AND ELSEWHERE AS SHOWN ON THE DRAWINGS. SOLID BLOCKING SHALL BE INSTALLED IN LIEU OF BRIDGING WHERE NOTED ON THE DRAWINGS.

ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS EXPERIENCED IN LIGHTGAGE STEEL FRAMING WORK. USE E60 (MINIMUM) SERIES LOW HYDROGEN RODS.

STUDS SHOWN ARE NOTED USING STEEL STUD MANUFACTURERS ASSOCIATION (SSMA) DESIGNATIONS AND SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE LATEST EDITION OF THE SMA CATALOG.

FASTENERS:

HOT-DIPPED ZINC COATED STEEL FASTENERS CONFORMING TO THE REQUIREMENTS OF THE CURRENT EDITION OF ASTM A153. SUBMIT TECHNICAL INFORMATION SHOWING CONFORMANCE.

FRAMING CONNECTORS:

FRAMING CONNECTORS SHALL BE ZINC COATED SHEET STEEL (GALVANIZED) BY THE HOT-DIP OR MATTE FINISH PROCESS. THE CORROSION RESISTANT COATING SHALL BE 1.25 OZ. POT YIELD COMMERCIAL CLASS HOT-DIPPED ZINC COATING, OR 0.625 OZ. MATTE FINISH HOT-DIPPED ZINC COATING EACH SIDE AND MAY BE APPLIED TO THE STEEL SHEET BEFORE THE CONNECTOR IS STAMPED OUT. FASTENERS FOR USE WITH THE FRAMING CONNECTORS SHALL CONFORM WITH THE REQUIREMENTS ABOVE.

BASIS OF DESIGN IS SIMPSON STRONG-TIE OR SCAFCO PRODUCTS.

WOOD:

GENERAL:

DO NOT NOTCH OR DRILL JOISTS, BEAMS OR LOAD BEARING STUDS WITHOUT PRIOR APPROVAL OF THE STRUCTURAL ENGINEER THROUGH THE ARCHITECT. DOUBLE UP FLOOR JOISTS UNDER PARTITIONS. PROVIDE 1 x 3 OR METAL CROSS BRIDGING AT MIDSPAN OF ALL JOISTS. UNLESS NOTED OTHERWISE IN DRAWINGS OR DETAILS, DOUBLE UP STUDS AT JAMBS, AT GIRDER TRUSSES, AND UNDER BEAMS IN BEARING WALLS, STACKED CONTINUOUS TO FOUNDATION. AT BEAMS PERPENDICULAR TO BEARING WALLS, PROVIDE BUNDLED STUDS FOR FULL WIDTH OF BEAM STACKED CONTINUOUS TO FOUNDATION UNLESS NOTED OTHERWISE. PROVIDE 2 X SOLID BLOCKING AT MID-HEIGHT OF LOAD BEARING STUD WALLS. ALL NAILS SHALL BE COMMON NAILS. ALL NAILING NOT NOTED SHALL BE IN ACCORDANCE WITH TABLE 2304.10.1 OF THE LATEST EDITION OF THE INTERNATIONAL BUILDING CODE. ALL FRAMING ANCHORS AND CONNECTORS SHALL BE AS MANUFACTURED BY SIMPSON COMPANY OR OTHER APPROVED EQUAL WITH ICC CERTIFICATION. ALL NAIL HOLES IN FRAMING ANCHORS AND CONNECTORS SHALL BE FILLED WITH NAILS PER MANUFACTURERS PUBLISHED NAIL SIZES. ALL BOLTS SHALL BE ASTM A307 BOLTS INSTALLED WITH STEEL WASHERS.

FRAMING LUMBER:

MEMBER	Fb (PSI)	Fv (PSI)	E (PSI)	Fc// (PSI).	SPECIES & GRADE
JOISTS	900	180	1,600,000	1,350	DOUG FIR-LARCH #2
BEAMS					
4x MEMBERS (MAX)	900	180	1,600,000	1,350	DOUG FIR-LARCH #2
6x AND OVER	1,350	170	1,600,000	925	DOUG FIR-LARCH #1
POSTS					
4x MEMBERS (MAX)	900	180	1,600,000	1,350	DOUG FIR-LARCH #2
6x AND OVER	1,200	170	1,600,000	1,000	DOUG FIR-LARCH #1
STUDS	900	145	1,600,000	1,350	DOUG FIR-LARCH #2
LEDGERS, TOP AND BOT PLATES	900	180	1,600,000	1,350	DOUG FIR-LARCH #2

DOUG FIR/LARCH (NORTH) IS NOT AN ACCEPTABLE ALTERNATIVE TO DOUG FIR/LARCH LUMBER. CONTRACTOR TO SUBMIT A SUBSTITUTION REQUEST TO THE ENGINEER OF RECORD PRIOR TO START OF CONSTRUCTION IF DOUG FIR/LARCH (NORTH) SUBSTITUTION IS DESIRED.

FRAMING LUMBER SHALL COMPLY WITH THE LATEST EDITION OF THE GRADING RULES OF THE WESTERN WOOD PRODUCTS ASSOCIATION (WWPA) OR THE WEST COAST LUMBER INSPECTIONS BUREAU (WCLIB). ALL SAWN LUMBER SHALL BE STAMPED WITH THE GRADE MARK OF AN APPROVED GRADING AGENCY. MOISTURE CONTENT SHALL NOT EXCEED 19%.

STRUCTURAL SHEATHING:

STRUCTURAL SHEATHING PROPERTIES AND ATTACHMENT

ITEM	THICKNESS	SPAN/INDEX RATIO	EDGE NAILING	INTERMEDIATE NAILING
ROOF	5/8"	32/16	8d @ 6" OC	8d @ 12" OC

STRUCTURAL SHEATHING INCLUDES ALL-VENEER PLYWOOD:

ALL STRUCTURAL SHEATHING SHALL BE APA RATED SHEATHING WITH AN EXTERIOR OR EXPOSURE 1 DURABILITY CLASSIFICATION AND SHALL BEAR THE STAMP OF AN APPROVED TESTING AGENCY. LAY UP FLOOR AND ROOF WITH THE LONG DIMENSION PERPENDICULAR TO SUPPORTS AND PROVIDE PANEL LENGTHS TO BE CONTINUOUS OVER TWO OR MORE SUPPORTS. ALL WEATHER WOOD PLYWOOD SHALL BE BONDED WITH AN EXTERIOR GLUE AND BE GRADE MARKED INDICATING CONFORMANCE WITH THE CURRENT EDITION OF U.S. DEPARTMENT OF COMMERCE PRODUCT STANDARD PS 1 "STRUCTURAL PLYWOOD (WITH TYPICAL APA TRADEMARKS)", AND STAMPED WITH AN APA GRADE MARK.

PRESSURE TREATMENT OF LUMBER AND PLYWOOD:

ALL LUMBER TO BE PRESERVATIVE TREATED SHALL BE PRESSURE TREATED IN ACCORDANCE WITH AMERICAN WOOD PRESERVERS BUREAU STANDARD AWPB-FDN AND BEAR THE QUALITY MARK OF AN APPROVED INSPECTION AGENCY PER AWPB-FDN. PLATES AND STUDS WITH ENDS CUT AFTER PRESSURE TREATING AND PLACED BELOW GRADE SHALL HAVE THE ENDS BELOW GRADE BRUSHED, DIPPED OR SOAKED WITH PRESERVATIVE UNTIL THE WOOD ABSORBS NO MORE PRESERVATIVE. USE THE FOLLOWING PRESERVATIVE FOR FIELD TREATMENT:

COPPER NAPHTHENATE CONTAINING A MINIMUM OF 2 PERCENT METALLIC COPPER IN SOLUTION.

ALL WEATHER WOOD FASTENERS:

NAILS: HOT-DIPPED ZINC COATED STEEL NAILS CONFORMING TO THE REQUIREMENTS OF THE CURRENT EDITION OF ASTM A153. SUBMIT TECHNICAL INFORMATION SHOWING COMPLIANCE.

FRAMING ANCHORS:

FRAMING ANCHORS SHALL BE OF ZINC COATED SHEET STEEL (GALVANIZED) BY THE HOT-DIP OR MATTE FINISH PROCESS. THE CORROSION RESISTANT COATING SHALL BE 1.25 OZ. POT YIELD COMMERICAL CLASS HOT-DIPPED ZINC COATING, OR 0.625 OZ. MATTE FINISH HOT-DIPPED ZINC COATING EACH SIDE, AND MAY BE APPLIED TO THE STEEL SHEET BEFORE THE ANCHOR IS STAMPED OUT. NAILS/SCREWS FOR USE WITH FRAMING ANCHORS SHALL CONFORM WITH THE REQUIREMENTS ABOVE. BASIS OF DESIGN ANCHORS ARE SIMPSON.

STEEL JOIST HANGERS SHALL BE TESTED AND APPROVED IN ACCORDANCE WITH IBC SECTION 1709.

POST-INSTALLED ANCHORAGE:

REBAR
- HILTI HIT-RE 500 V3
- SIMPSON SET-XP
- DEWALT PURE 110+

EXPANSION ANCHORS
- HILTI KWIK BOLT TZ2
- SIMPSON STRONG-BOLT 2
- DEWALT PURE 110+

ADHESIVE ANCHORS
- HILTI HIT-HY 200 V3
- SIMPSON SET-XP OR AT-XP
- DEWALT PURE 110+

SCREW ANCHORS
- HILTI KWIK KH-EZ
- SIMPSON TITEN HD
- DEWALT SCREW-BOLT+

ANCHORAGE TO GROUT FILLED CMU

EXPANSION ANCHORS
- HILTI KWIK BOLT TZ2
- STRONG BOLT 2
- DEWALT POWER-STUD+SD1

SCREW ANCHORS
- HILTI KWIK KH-EZ
- SIMPSON TITEN HD
- DEWALT SCREW-BOLT+

ADHESIVE ANCHORS
- HILTI HIT-HY 270
- SIMPSON SET-XP OR AT-XP (AT-XP CANNOT BE USED FOR ANCHORS IN THE TOP OF THE WALL) DEWALT AC+100 GOLD

REBAR
- HILTI HIT-HY 270
- SIMPSON SET-XP

POWDER ACTUATED FASTENERS (SHOT PINS) IN CONCRETE OR GROUT FILLED CMU

HILTI X-U AND X-U 15 (0.157 ")
SIMPSON PDP SERIES (0.145 " MIN)

INSTALLATION AND SPECIAL INSPECTION:

ADHESIVE ANCHORS MUST BE INSTALLED IN CONCRETE AGED A MINIMUM OF 21 DAYS (ACI 318-14 17.1.2) AND IN GROUTED MASONRY THAT HAS REACHED IT'S MINIMUM SPECIFIED COMPRESSIVE STRENGTH. ADHESIVE ANCHORS INSTALLED IN HORIZONTAL OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS SHALL BE CONTINUOUSLY INSPECTED DURING INSTALLATION BY AN INSPECTOR SPECIALLY APPROVED FOR THAT PURPOSE BY THE BUILDING OFFICIAL (ACI 318-14 17.8.2.4) PROVIDE SPECIAL INSPECTION FOR ALL MECHANICAL AND ADHESIVE ANCHORS PER THE APPLICABLE BUILDING CODE AND PER THE CURRENT ICC-ES REPORT (IBC 2018 TABLE 1705.3 NOTE B).

ANCHOR CAPACITY IS DEPENDENT UPON SPACING BETWEEN ADJACENT ANCHORS AND PROXIMITY OF ANCHORS TO EDGE OF CONCRETE OR CMU. INSTALL ANCHORS IN ACCORDANCE WITH SPACING AND EDGE CLEARANCES INDICATED ON THE DRAWINGS.

EXISTING REINFORCING BARS IN THE CONCRETE OR CMU STRUCTURE MAY CONFLICT WITH SPECIFIC ANCHOR LOCATIONS. UNLESS NOTED ON THE DRAWINGS THAT THE BARS CAN BE CUT, THE CONTRACTOR SHALL REVIEW THE EXISTING STRUCTURAL DRAWINGS AND SHALL UNDERTAKE TO LOCATE THE POSITION OF THE REINFORCING BARS AT THE LOCATIONS OF THE CONCRETE OR CMU ANCHORS, BY HILTI FERROSCAN, GPR, X-RAY OR OTHER MEANS APPROVED BY ENGINEER OF RECORD. DO NOT CUT REBAR, RELOCATE ANCHOR, OR REDUCE EMBEDMENT WITHOUT WRITTEN APPROVAL BY THE ENGINEER OF RECORD.

THREADED RODS FOR ADHESIVE ANCHORS SHALL BE CLEAN THREADED ROD. FOR USE IN INTERIOR LOCATIONS THREADED ROD TO BE ASTM F1554, GRADE 36. THREADED ROD FOR USE IN INTERIOR APPLICATIONS WITH HILTI ADHESIVE TO CONCRETE AND WITH DEWALT ADHESIVE TO GROUTED MASONRY SHALL HAVE A 0.0002-INCH THICK ZINC ELECTROPLATED COATING COMPLYING WITH ASTM B633 SC 1. THREADED ROD USED AT EXTERIOR CONDITIONS OR WHERE THE ANCHOR IS IN CONTACT WITH PRESERVATIVE-TREATED OR FIRE -RETARDANT-TREATED LUMBER SHALL BE EITHER STAINLESS STEEL OR SHALL HAVE A ZINC COATING. STAINLESS STEEL THREADED RODS SHALL CONFORM TO ASTM A193, GRADE B6, B8, OR B8M FOR SIMPSON ADHESIVE PRODUCTS TO MASONRY AND WITH REBAR TO CONCRETE AND SHALL CONFORM TO ASTM F593 (AISI 304 OR 316) FOR HILTI AND DEWALT ADHESIVE PRODUCTS AND FOR SIMPSON ADHESIVE WITH THREADED ROD TO CONCRETE. ZINC COATING ON THREADED RODS SHALL BE HOT-DIPPED IN ACCORDANCE WITH ASTM A153 CLASS C OR D COATING.OATING.

STANDARD STRUCTURAL ABBREVIATIONS

ABBR	DESCRIPTION
(A)	ABOVE
AB	ANCHOR BOLT
AC	ASPHALT CONCRETE
ACI	AMERICAN CONCRETE INSTITUTE
ADDL	ADDITIONAL
ADH	ADHESIVE
ADJ	ADJACENT
ADESS	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL
AFF	ABOVE FINISHED FLOOR
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AISI	AMERICAN IRON AND STEEL INSTITUTE
ALT	ALTERNATE
ALUM	ALUMINUM
ARCH	ARCHITECTURAL
ASPH	ASPHALT
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASNT	AMERICAN SOCIETY OF NON-DESTRUCTIVE TESTING
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWS	AMERICAN WELDING SOCIETY
(B)	BELOW
BLKG	BLOCKING
BLDG	BUILDING
BOC	BOTTOM OF CONCRETE
BOD	BOTTOM OF DECKING
BOS	BOTTOM OF STEEL
BOT	BOTTOM
BP	BASE PLATE
BRNG	BEARING
BS	BOTH SIDES
BTWN	BETWEEN
CANT	CANTILEVER
CBF	CONCENTRIC BRACED FRAME
CFS	COLD FORMED STEEL
CHAN	CHANNEL
CIP	CAST IN PLACE
CJ	CONTROL OR CONSTRUCTION JOINT
CJP	COMPLETE JOINT PENETRATION
CL	CENTER LINE
CLR	CLEAR, CLEARANCE
CM	CUBIC METER
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
COORD	COORDINATE
CP	COMPLETE PENETRATION
CTR	CENTER, CENTERED
CY	CUBIC YARD
D	BEAM DEPTH
DP	DEEP
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DEG	DEGREE
DEMO	DEMOLITION
DET	DETAIL
DIAA	DRILLED IN ADHESIVE ANCHOR
DIAG	DIAGONAL
DIAM,Ø	DIAMETER
DIEA	DRILLED IN EXPANSION ANCHOR
DIM	DIMENSION
DISA	DRILLED IN SCREW ANCHOR
DIST	DISTANCE
DN	DOWN
DO	DITTO
DWG	DRAWING(S)
DWL	DOWEL
E	EAST, MODULUS OF ELASTICITY
(E)	EXISTING
EA	EACH
EF	EACH FACE
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATION OR ELEVATOR
EMBED	EMBEDMENT
ENGR	ENGINEER
EQ	EQUAL
EQUIP	EQUIPMENT
ES	EACH SIDE
ESC	ESCALATOR
EW	EACH WAY
EXIST	EXISTING
EXP	EXPANSION, EXPOSURE
EXT	EXTERIOR
F'c	CONCRETE COMPRESSIVE STRENGTH
FCAW	FLUX CORED ARCH WELDING
FDN	FOUNDATION
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FIN	FINISH
FLG	FLANGE
F'm	CONCRETE MASONRY COMPRESSIVE STRENGTH
FLR	FLOOR
FP	FIREPROOFING, FULL PENETRATION
FRD	FACILITIES REQUIREMENTS DOCUMENT
FS	FAR SIDE
FT	FEET OR FOOT
FTG	FOOTING
GA	GAGE OR GAUGE
GALV	GALVANIZED
GEN	GENERAL
GLB	GLUED LAMINATED BEAM
GR	GRADE
GWB	GYPSUM WALLBOARD
GYP	GYPSUM
H	HIGH
HAS	HEADED ANCHOR STUD
HDR	HEADER
HGR	HANGER
HORIZ	HORIZONTAL
HS	HEADED STUD
HSB	HIGH STRENGTH BOLT
HSS	HOLLOW STRUCTURAL SECTION
HT	HEIGHT
HVAC	HEATING/VENTILATING/AIR CONDITIONING
I	MOMENT OF INERTIA
IBC	INTERNATIONAL BUILDING CODE
ICBO	INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS
ICC	INTERNATIONAL CODE COUNCIL
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IF	INSIDE FACE
IJ	ISOLATION JOINT
IN	INCHES
INFO	INFORMATION
INSUL	INSULATE, INSULATION
INV	INVERT
J	JOULES
JST	JOIST
JT	JOINT
K	KIP (1,000 POUNDS)
KSI	KIPS PER SQUARE INCH

ABBR	DESCRIPTION
L	LENGTH
LB	POUND
LD	REINF DEVELOPMENT LENGTH
LDh	REINF DEVELOPMENT LENGTH (HOOKED BARS)
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LO	LOW
LOC	LOCATION
Ls	REINF TENSION LAP SPLICE
LS	LANDSCAPE
LSH	LONG SLOTTED HOLE
LT	LIGHT
LVF	LOW VELOCITY FASTENER
LVL	LEVEL, LAMINATED VENEER LUMBER
M	METER
MAS	MASONRY
MAX	MAXIMUM
MECH	MECHANICAL
MEZZ	MEZZANINE
MF	MOMENT FRAME
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MM	MILLIMETER
MT	MAGNETIC PARTICLE TEST
(N)	NEW
N	NORTH
NA	NOT APPLICABLE
NAAMM	NATIONAL ASSOCIATION OF ARCH METAL MANUFACTURERS
NFS	NON FROST SUSCEPTABLE
NIC	NOT IN CONTRACT
NIP	NOT IN PERMIT
NO	NUMBER
NORM	NORMAL
NS	NEAR SIDE
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OH	OPPOSITE HAND
OPNG	OPENING
OPP	OPPOSITE
OVS	OVERSIZE
OWJ	OPEN WEB JOIST
PAF	POWDER ACTUATED FASTENER
PC	PRECAST
PCF	POUND PER CUBIC FOOT
PEN	PENETRATION
PIL	PILASTER
PJP	PARTIAL JOINT PENETRATION
PL	PLATE
PLCS	PLACES
PLWD	PLYWOOD
PLF	POUNDS PER LINEAR FOOT
PLWD	PLYWOOD
PNL	PANEL
PP	PARTIAL PENETRATION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT, PENETRANT TEST, POINT OF TANGENCY PRESSURE TREATED
R	RADIUS
RAD	RADIUS
RD	ROOF DRAIN
REF	REFERENCE
REINF	REINFORCE, REINFORCING
REQD	REQUIRED
RO	ROUGH OPENING
RT	RADIOGRAPHIC TEST
S	SOUTH, SECTION MODULUS
SB	STRAP BEAM
SC	SLIP CRITICAL
SCBF	SPECIAL CONCENTRIC BRACED FRAME
SCHD	SCHEDULE
SD	SNOW DRIFT
SDI	STEEL DECK INSTITUTE
SEC	SECTION
SFRS	SEISMIC FORCE RESISTING SYSTEM
SHT	SHEET
SHTG	SHEATHING
SIM	SIMILAR
SJ	SEISMIC JOINT
SJ	SLAB JOINT
SJRO	SEISMIC JOINT ROUGH OPENING
SL	SLOPE
SLB	SNOW LOAD, BALANCED
SLRS	SEISMIC LOAD RESISTING SYSTEM
SMAW	SHIELDED METAL ARC WELDING
SOG	SLAB ON GRADE
SPCS	SPACES
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
SSH	SHORT SLOTTED HOLE
SSMA	STEEL STUD MANUFACTURERS ASSOCIATION
STD	STANDARD
STIFF	STIFFENER
STL	STEEL
STRUCT	STRUCTURAL
SW	SHEAR WALL
SYM	SYMMETRICAL
TBC	THREADED BAR COUPLER
TBD	TO BE DETERMINED
TBR	TO BE REMOVED
TC	TENSION/COMPRESSION CHORD
TEMP	TEMPORARY, TEMPERATURE
Tf	FLANGE THICKNESS
THK	THICK
TL	TOTAL LOAD
T.A.	TOP OF
TOC	TOP OF CONCRETE
TOD	TOP OF DECKING
TOF	TOP OF FOOTING
TOS	TOP OF STEEL, TOP OF SLAB
TOW	TOP OF WALL
TS	TUBE STEEL
Tw	WEB THICKNESS
TYP	TYPICAL
T&B	TOP AND BOTTOM
UBC	UNIFORM BUILDING CODE
UNO	UNLESS NOTED OTHERWISE
UT	ULTRASONIC TESTING
VERT	VERTICAL
W	WIDTH, WEST, WIDE FLANGE DESIGNATION
WF	WIDE FLANGE
WHS	WELDED HEADED STUD
WP	WORK POINT, WATER PROOFING
WT	WEIGHT
WWF	WELDED WIRE FABRIC
W/	WITH
W/C	WATER/ CEMENT RATIO
W/CM	WATER/ CEMENTITIOUS MATERIALS RATIO
W/O	WITHOUT

GENERAL LEGEND

SYMBOL	DESCRIPTION
A / B	DETAIL SYMBOL: A = IDENTIFYING NUMBER; B = SHEET WHERE DETAIL IS SHOWN
A / B	SECTION SYMBOL: A = IDENTIFYING LETTER; B = SHEET WHERE SECTION IS SHOWN
	SECTION CUT LINE INDICATOR
	ELEVATION SYMBOL
1	REVISION CLOUD AND REVISION NUMBER
	INDICATES STEP IN ELEVATION
S — — S	INDICATES STEP IN FOOTING ELEVATION
	INDICATES DECK SPAN DIRECTION
	INDICATES MOMENT CONNECTION
	CMU (CONCRETE MASONRY UNIT) WALL (PLAN VIEW)
	INDICATES DIAGONAL BRACING (PLAN VIEW)
X	INDICATES FOOTING MARK, SEE PLAN AND SCHEDULE
1	INDICATES PIER/PEDESTAL MARK, SEE PLAN AND SCHEDULE
XXX	INDICATES SHEAR WALL MARK, SEE PLAN AND SCHEDULE
GB1	INDICATES GRADE BEAM MARK, SEE PLAN AND SCHEDULE

DRAWING INDEX

DWG. NO.	TITLE
S-001	GENERAL STRUCTURAL NOTES
S-101	EXISTING ROOF FRAMING PLAN

COFFMAN ENGINEERS
10 N. Post Street,
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RENEWS: 06-30-25

HORTICULTURAL CROPS RESEARCH LAB
3420 NW ORCHARD AVE., CORVALLIS, OR 97331

USDA ARS LABORATORY EXHAUST

FINAL TURNOVER

REV	DATE	DESCRIPTION

PROJ. NO. 230612
DRAWN KLC
CHECKED SWH
DATE 02/04/26

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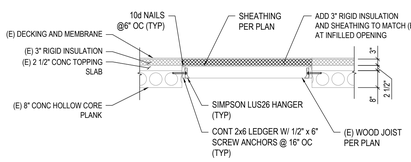
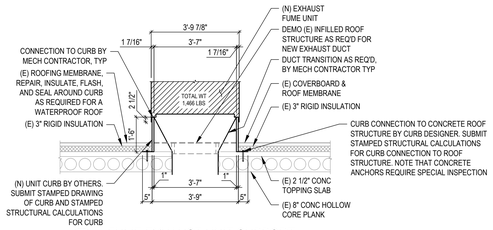
SHEET TITLE:
GENERAL STRUCTURAL NOTES

SHEET NO:
S-001

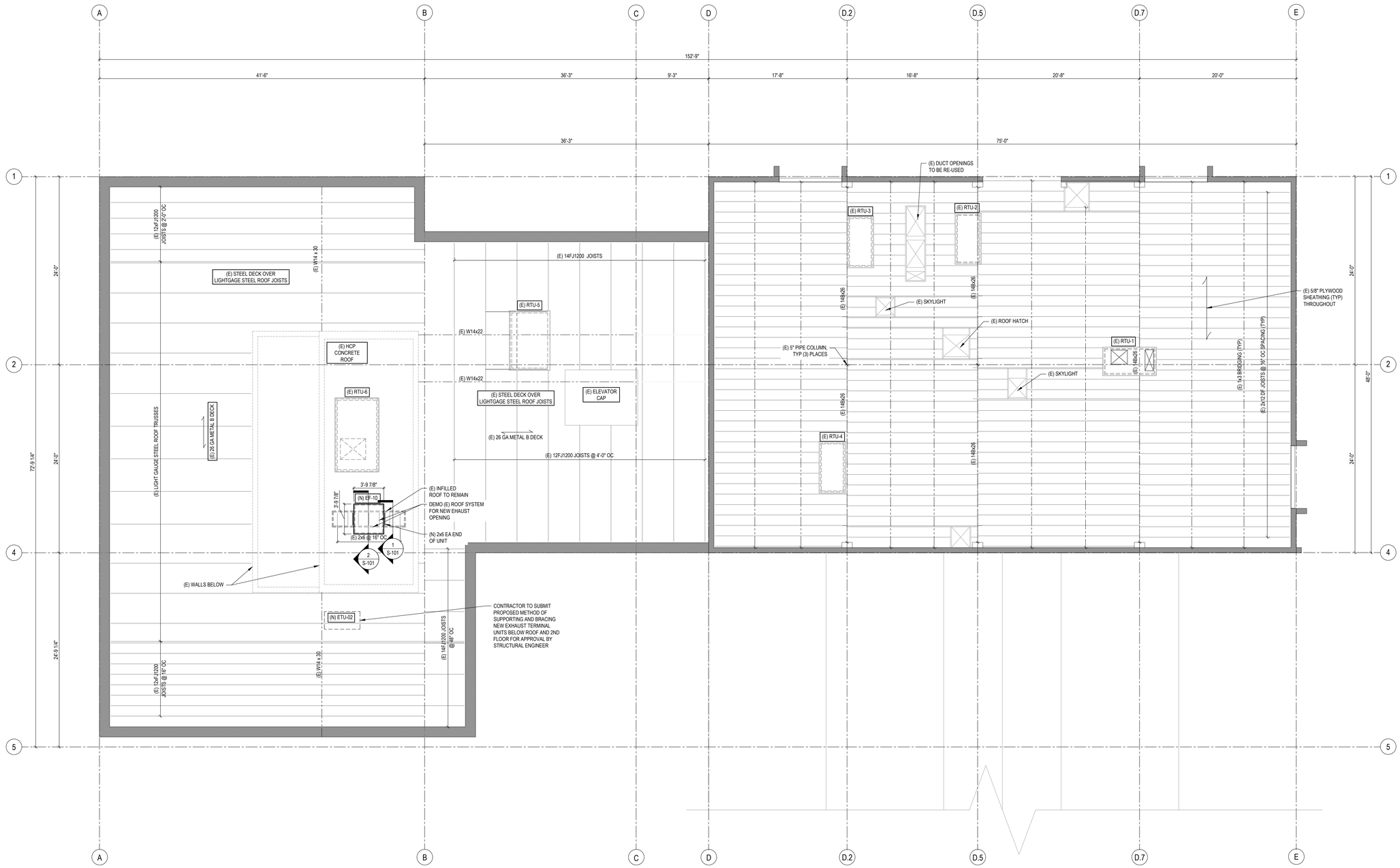
P:\SPO\23JOBS\230612 CORVALLIS ARS AHU REPLACEMENTS\0.0 DWGS\S\230612_S-001.DWG.230612_S-001 : CLINE, KEVIN : LAST SAVED: January 9, 2026 : PLOT DATE: 2/3/26



1 SECTION: INFILL DETAIL @ ROOF OPENING (AS REQUIRED)
SCALE: 3/8" = 1'-0"



2 FUME EXHAUST UNIT SUPPORT
SCALE: 3/8"=1'-0" HOLLOW CORE PLANK CONCRETE ROOF



PROJECT NORTH

ROOF FRAMING PLAN
SCALE: 3/16" = 1'-0"

3/16"=1'-0" 0 2 4 8 12 16

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STRUCTURAL
REGISTERED PROFESSIONAL ENGINEER
84614PE
OREGON
RENEWS: 06-30-25
2-3-2026

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USDA ARS LABORATORY EXHAUST

FINAL TURNOVER

REV	DATE	DESCRIPTION

PROJ. NO.	230612
DRAWN	KLC
CHECKED	SWH
DATE	02/04/26

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SHEET TITLE:
EXISTING ROOF FRAMING PLAN

SHEET NO:
S-101

SHEET 03 OF 16

P:\SPO\23\D\S\230612 CORVALLIS ARS AHU REPLACEMENT\S\0 DWGS\230612_S-101.DWG 230612_S-101, CLINE, KEVIN - LAST SAVED: February 3, 2026 - PLOT DATE: 2/3/26

PLUMBING/PIPING SYMBOLS LEGEND

- VALVE
- GATE VALVE
- BALL VALVE
- GLOBE VALVE
- PLUG VALVE
- BUTTERFLY VALVE
- NEEDLE VALVE
- V# SPECIALTY VALVE
- A BALANCING VALVE
- AUTOMATIC BALANCING VALVE
- OS & Y VALVE
- STOP COCK
- PRESSURE REDUCING VALVE
- PRESSURE REGULATING VALVE
- CHECK VALVE
- SPRING CHECK VALVE
- RELIEF VALVE
- F FUEL ANTI-SIPHON VALVE
- FUSIBLE OIL SAFETY VALVE
- M M MOTORIZED VALVE
- S S SOLENOID VALVE
- AUTOMATIC CONTROL VALVE
- STRAINER
- STRAINER W/ BLOWDOWN
- BACKFLOW PREVENTER
- FS FLOW SWITCH
- PS PRESSURE SWITCH
- PIPE ELBOW DOWN (OR AWAY)
- PIPE ELBOW UP (OR TOWARDS)
- PIPE TEE DOWN (OR AWAY)
- PIPE TEE UP (OR AWAY)
- FLOW DIRECTION
- S=2% PIPE SLOPE & DIRECTION
- REDUCER, CONCENTRIC
- REDUCER, ECCENTRIC
- UNION
- FLANGES
- BLIND FLANGE
- END CAP
- HOSE QUICK DISCONNECT
- PT PLUG (TEST PORT)
- FLEX CONNECTOR/ COUPLING
- EXPANSION JOINT
- EXPANSION GUIDE
- PIPE ANCHOR
- HOSE THREAD DRAIN BALL VALVE
- HOSE BIBB
- WALL HYDRANT
- HOSE THREAD DRAIN VALVE
- FIRE DEPARTMENT CONNECTION
- WATER HAMMER ARRESTOR
- WATER HAMMER ARRESTOR (PLAN)
- THERMOWELL
- THERMOMETER
- T DIAL THERMOMETER
- P PRESSURE GAUGE W/ COCK
- P PRESSURE GAUGE W/ COCK & SIPHON
- A AIR VENT
  - A - AUTOMATIC
  - C - COIN
  - M - MANUAL
  - H - HIGH VOLUME
- BASKET STRAINER
- AIR FILTER W/ COALESCER & DRAIN
- AIR FILTER W/ COALESCER, DRAIN, REGULATOR & GAUGE
- PUMP (SYMBOLIC - ARROW INDICATES FLOW DIRECTION)
- M WATER METER

GENERAL LEGEND

NOTES:

- (1) SPECIFIC TO LOCATION(S) INDICATED.
- A. NOTE APPLIES TO ENTIRE SHEET.
- XX-X MECHANICAL EQUIPMENT, SEE MECHANICAL SCHEDULES.
- XX-X PLUMBING FIXTURE TAG, SEE PLUMBING SCHEDULES
- (E) EXISTING
- (N) NEW
- (NL) NEW LOCATION
- (REL) RELOCATE
- POINT OF CONNECTION (POC)

LINETYPES:

- EXISTING (THIN)
- NEW (MEDIUM)
- EXISTING TO BE DEMOLISHED
- T x THERMOSTAT. ADJACENT NUMBER INDICATES TERMINAL UNIT CONTROLLED
- H HUMIDISTAT
- S SENSOR
- CO2 CO2 SENSOR
- SD DUCT SMOKE DETECTOR
- SP DUCT STATIC PRESSURE
- A/B DETAIL SYMBOL: A = IDENTIFYING NUMBER, B = SHEET WHERE DETAIL IS SHOWN
- A/B SECTION SYMBOL: A = IDENTIFYING NUMBER, B = SHEET WHERE DETAIL IS SHOWN

HVAC DUCTWORK LEGEND

DUCTWORK

DUCT SIZES SHOWN ON DRAWINGS ARE CLEAR INSIDE DIMENSIONS OF DUCT. DUCT SIZE SHOWN DOES NOT INCLUDE INSULATION OR LINING UNLESS NOTED OTHERWISE. SEE BELOW FOR DUCT SIZE TAG LEGEND.

- DUCT SIZE
- 24x12 S/A — RECTANGULAR DUCT SIZE (INCHES) FIRST DIMENSION IS SIDE OF DUCT SHOWN
- DUCT SYSTEM ABBREVIATION (NOT ALWAYS BE SHOWN)
- 24x12ø — FLAT OVAL DUCT SIZE (INCHES) FIRST DIMENSION IS SIDE OF DUCT SHOWN
- 24ø — ROUND DUCT
- 24x12 / 18ø — CHANGE IN DUCT SIZE AND/OR SHAPE
- INSULATED DUCT
- SOUND LINED DUCT
- FLEXIBLE DUCT
- AIRFLOW DIRECTION
- SOUND ATTENUATOR

DAMPERS

- VOLUME/BALANCING DAMPER
- FIRE DAMPER (FD)
- SMOKE DAMPER (SD)
- FIRE/SMOKE DAMPER (FSD)
- BACKDRAFT DAMPER
- M MOTORIZED DAMPER

DUCT SYSTEM ABBREVIATIONS

SA	SUPPLY AIR
OSA	OUTSIDE AIR
CA	COMBUSTION AIR
RA	RETURN AIR
TA	TRANSFER AIR
EA	EXHAUST AIR

SUPPLY AIR (SA) OUTSIDE AIR (OSA)

- RECTANGULAR DUCT TURNED UP/SECTION
- ROUND/FLAT OVAL DUCT TURNED UP/SECTION
- RECTANGULAR DUCT TURNED DOWN/AWAY
- ROUND/FLAT OVAL DUCT TURNED DOWN/AWAY

RETURN AIR (RA)

- RECTANGULAR DUCT TURNED UP/SECTION
- ROUND/FLAT OVAL DUCT TURNED UP/SECTION
- RECTANGULAR DUCT TURNED DOWN/AWAY
- ROUND/FLAT OVAL DUCT TURNED DOWN/AWAY

EXHAUST AIR (EA)

- RECTANGULAR DUCT TURNED UP/SECTION
- ROUND/FLAT OVAL DUCT TURNED UP/SECTION
- RECTANGULAR DUCT TURNED DOWN/AWAY
- ROUND/FLAT OVAL DUCT TURNED DOWN/AWAY

DUCT SYMBOLS

- DUCT END CAP
- AD — DUCT ACCESS DOOR
- X/CFM OR X-CFM — AIR TERMINAL IDENTIFICATION
- SUPPLY AIR (SA) TERMINAL
- RETURN AIR (RA) OR TRANSFER AIR (TA) TERMINAL
- EXHAUST AIR (EA) TERMINAL
- GRILLE, REGISTER, OR OPEN DUCT

PIPING LEGEND

CS	CONDENSER WATER SUPPLY
CR	CONDENSER WATER RETURN
CWS	CHILLED WATER SUPPLY
CWR	CHILLED WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HWR	HEATING HOT WATER RETURN
HGS	HEATING GLYCOL SUPPLY
HGR	HEATING GLYCOL RETURN
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
SMS	SNOWMELT GLYCOL SUPPLY
SMR	SNOWMELT GLYCOL RETURN
GWS	GEOTHERMAL WATER SUPPLY
GWR	GEOTHERMAL WATER RETURN
D	CONDENSATE DRAIN (D)
VAC	VACUUM (VAC)
RL	REFRIGERANT LIQUID LINE
RS	REFRIGERANT SUCTION LINE
HRS	HIGH PRESSURE REFRIGERANT SUCTION LINE
G	NATURAL GAS
PG	PROPANE GAS
LPG	LIQUID PETROLEUM GAS
CA	COMPRESSED AIR
LPS	LOW PRESSURE STEAM SUPPLY
LPR	LOW PRESSURE STEAM RETURN
LPC	LOW PRESSURE CONDENSATE
MPS	MEDIUM PRESSURE STEAM SUPPLY
MPR	MEDIUM PRESSURE STEAM RETURN
MPC	MEDIUM PRESSURE CONDENSATE
HPS	HIGH PRESSURE STEAM SUPPLY
HPR	HIGH PRESSURE STEAM RETURN
HPC	HIGH PRESSURE CONDENSATE

GENERAL ABBREVIATIONS

ø	ROUND or DIAMETER
AAV	AUTOMATIC AIR VENT
ABV	ABOVE
AD	ACCESS DOOR
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
AL	ACOUSTIC LINED
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AWT	AVERAGE WATER TEMPERATURE
BB	BASEBOARD
BBD	BACKDRAFT DAMPER
BFF	BELOW FINISH FLOOR
BHP	BRAKE HORSEPOWER
BG	BELOW GROUND/GRADE
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
C	CENTIGRADE
CC	COOLING COIL
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
CG	CEILING GRILLE
CI	CAST IRON
CLG	CEILING
CO	CLEANOUT
COG	CLEANOUT TO GRADE
CMU	CONCRETE MASONRY UNIT
CM	CONDENSATE METER
CONC	CONCRETE
CONN	CONNECT or CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUATION
(D)	DEMOLISH
DB	DECIBEL or DRY BULB
DDC	DIRECT DIGITAL CONTROL
DIA	DIAMETER
DIM	DIMENSION
DN	DOWN
DOAS	DEDICATED OUTDOOR AIR SYSTEM
DPR	DAMPER
DPS	DIFFERENTIAL PRESSURE SWITCH
DWG	DRAWING
(E)	EXISTING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EG	EXHAUST GRILLE
ELEC	ELECTRIC or ELECTRICAL
ELEV	ELEVATION
EMCS	ENERGY MANAGEMENT CONTROL SYSTEM
ERV	ENERGY RECOVERY VENTILATOR
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXST	EXISTING
F	FAHRENHEIT
FCO	FLOOR CLEANOUT
FCU	FAN COIL UNIT
FD	FLOOR DRAIN
FD	FIRE DAMPER
FFD	FUNNEL FLOOR DRAIN
FF	FINAL FILTER
FLR	FLOOR
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOOR SINK
FSD	COMBINATION FIRE/SMOKE DAMPER
FT	FOOT/FEET
FTR	FINNED TUBE RADIATION
FV	FACE VELOCITY
GA	GAGE or GAUGE
GAL	GALLON
GALV	GALVANIZED
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRD	GRILLE, REGISTER, OR DIFFUSER
H	HEIGHT
HB	HOSE BIBB
HD	HEAD
HP	HORSEPOWER
HRV	HEAT RECOVERY VENTILATOR
HTG	HEATING
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HWG	HIGH WALL GRILLE
HWR	HIGH WALL REGISTER
HZ	HERTZ
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCH or INCHES
INSUL	INSULATION
INV	INVERT
KH	KICKSPACE HEATER
KW	KILOWATT
KWH	KILOWATT HOUR
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LF	LINEAR FOOT/FEET
LVG	LEAVING
LWG	LOW WALL GRILLE
LWR	LOW WALL REGISTER
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MAV	MANUAL AIR VENT
MBH	1000 BRITISH THERMAL UNITS PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MCC	MOTOR CONTROL CENTER
MFR	MANUFACTURER
MOP	MAXIMUM OVERCURRENT PROTECTION
MUA	MAKEUP AIR UNIT
MIN	MINIMUM
MISC	MISCELLANEOUS
MTD	MOUNTED
MTG	MOUNTING
(N)	NEW
(NL)	NEW LOCATION
N/A	NOT APPLICABLE
N/C	NORMALLY CLOSED
N/O	NORMALLY OPEN
NC	NOISE CRITERIA
N.I.C.	NOT IN CONTRACT
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
O/C	ON CENTER
OD	OUTSIDE DIAMETER
OPNG	OPENING
PVC	PRESSURE CONTROL VALVE
PD	PRESSURE DROP
PH	PHASE
PLCS	PLACES
POC	POINT OF CONNECTION
POUA	POINT OF USE ALARM
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH (GAGE)
(REL)	RELOCATE
RA	RETURN AIR
RAG	RETURN AIR GRILLE
REQD	REQUIRED
R.O.	ROUGH OPENING
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SD	SMOKE DETECTOR
SF	SUPPLY FAN
SHT	SHEET
SIM	SIMILAR
SL	SOUNDLINING
SP	STATIC PRESSURE
SQ	SQUARE
SQ FT	SQUARE FOOT/FEET
SS	STAINLESS STEEL
STD	STANDARD
TAB	TESTING, ADJUSTING & BALANCING
THK	THICK
TP	TRAP PRIMER or TEST PLUG
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
TU	TERMINAL UNIT
UBC	UNIFORM BUILDING CODE
UFC	UNIFORM FIRE CODE
UMC	UNIFORM MECHANICAL CODE
UPC	UNIFORM PLUMBING CODE
UG	UNDERGROUND
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
VA	VALVE
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VEL	VELOCITY
VFD	VARIABLE FREQUENCY DRIVE
VRF	VARIABLE REFRIGERANT FLOW
VTR	VENT THRU ROOF
W	WIDE
W/	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER COLUMN
WCO	WALL CLEANOUT
WG	WATER GAGE
WGE	WASTE GAS EVACUATION
WH	WALL HYDRANT
WPD	WATER PRESSURE DROP
WT	WEIGHT

GENERAL HVAC NOTES

1. SHEET METAL DUCTWORK AND COMPONENTS INCLUDING HANGING, SEALING, PLENUMS, & ACCESSORIES SHALL BE CONSTRUCTED IN STRICT ACCORDANCE WITH THE LATEST EDITION OF SMACNA STANDARDS FOR HVAC DUCT CONSTRUCTION, NFPA 90A, & 90B STANDARDS.
2. ALL DUCTWORK OPENINGS SHALL BE COVERED DURING CONSTRUCTION.
3. ALL DAMPERS SHALL BE SET FULLY OPEN PRIOR TO BALANCING.
4. CONTRACTOR TO PROVIDE TRANSITION TO CONNECT TO ALL MECHANICAL EQUIPMENT. PROVIDE FLEXIBLE CONNECTION ON INTAKE AND DISCHARGE OF ALL MECHANICAL EQUIPMENT.
5. DUCT DIMENSIONS SHOWN ARE INSIDE SHEET METAL DIMENSIONS OR CLEAR OPENING INSIDE LINED DUCT.
6. DRAWINGS ARE DIAGRAMMATIC IN NATURE AND DO NOT ATTEMPT TO SHOW ALL REQUIRED OFFSETS. COORDINATE WITH OTHER TRADES AND PROVIDE ALL NECESSARY OFFSETS.
7. PROVIDE 1" THICK DUCT LINER IN ALL TRANSFER AIR DUCTWORK UNLESS NOTED OTHERWISE.
8. ALL ELBOWS SHALL BE LONG RADIUS ELBOWS WHEREVER POSSIBLE, OR SHALL HAVE TURNING VANES WHERE INDICATED ON PLANS. NO SQUARE THROAT OR ZERO RADIUS ELBOWS ALLOWED.
9. ALL DUCT BRANCH CONNECTIONS TO DIFFUSER OR GRILLES, TO OR FROM MAIN DUCTS, SHALL INCLUDE MANUAL VOLUME DAMPERS. ALL SPIN-IN FITTINGS SHALL BE CONICAL, RECTANGULAR BRANCH DUCT TAKEOFFS SHALL HAVE 45° TAKEOFFS.
10. PROVIDE CONCEALED DAMPER REGULATORS OR ACCESS DOORS FOR ALL MANUAL VOLUME DAMPERS LOCATED THAT ARE INACCESSIBLE. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES. ALL FINAL ACCESS DOOR LOCATIONS SHALL BE APPROVED BY ARCHITECT PRIOR TO INSTALLATION.
11. 24"x24" ACCESS DOORS SHALL BE PROVIDED FOR ALL MECHANICAL EQUIPMENT LOCATED ABOVE GYPSUM BOARD CEILINGS. ALL FINAL ACCESS DOOR LOCATIONS SHALL BE APPROVED BY ARCHITECT PRIOR TO INSTALLATION.
12. PROVIDE DIFFUSER AND GRILLE FRAMES COMPATIBLE WITH ARCHITECTURAL CEILING TYPES AND COORDINATE LOCATIONS WITH THE ARCHITECTURAL REFLECTED CEILING PLAN AND ELECTRICAL LIGHTING LAYOUT.
13. ALL DUCTWORK VISIBLE THROUGH RETURN OR SUPPLY GRILLES TO BE PAINTED FLAT BLACK.
14. ALL SUPPLY, RETURN AND EXHAUST AIR DUCTS SHALL HAVE THE TRANSVERSE JOINTS, LONGITUDINAL SEAMS, AND DUCT WALL PENETRATIONS SEALED AIRTIGHT WITH DUCT SEALANT (SMACNA SEAL CLASS "A").
15. COORDINATE EXACT LOCATIONS OF ALL ROOM THERMOSTATS AND/OR ROOM TEMPERATURE SENSORS WITH ARCHITECT/OWNER PRIOR TO INSTALLATION.
16. BALANCE AIR SYSTEM TO QUANTITIES SHOWN, AND SUBMIT A COPY OF THE BALANCE REPORT TO THE ENGINEER FOR REVIEW.

GENERAL NOTES

1. CONTRACTOR SHALL SECURE, MAINTAIN, AND PAY FOR ALL REQUIRED PERMITS, LICENSES, AND INSPECTIONS FOR DURATION OF WORK UNLESS DIRECTED OTHERWISE.
2. ALL WORK SHALL COMPLY WITH THE OWNER'S REQUIREMENTS, AND WITH ALL APPLICABLE STATE AND LOCAL CODES, OR AUTHORITY HAVING JURISDICTION.
3. SUBSTITUTIONS OF EQUIPMENT OTHER THAN AS SPECIFIED SHALL BE THE COMPLETE RESPONSIBILITY OF THE CONTRACTOR, ANY ADDITIONAL ELECTRICAL, STRUCTURAL, MECHANICAL, OR ARCHITECTURAL REQUIREMENTS SHALL BE PROVIDED AT NO ADDITIONAL EXPENSE TO THE OWNER.
4. DRAWINGS ARE DIAGRAMMATIC IN NATURE AND DO NOT ATTEMPT TO SHOW ALL REQUIRED OFFSETS. COORDINATE WITH OTHER TRADES AND PROVIDE ALL NECESSARY OFFSETS. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR CONSTRUCTION DETAILS.
5. REFER TO PROJECT MANUAL (SPECIFICATIONS) FOR ADDITIONAL REQUIREMENTS. PLANS AND SPECIFICATIONS SHALL BE TAKEN TOGETHER. PROVIDE ALL WORK CALLED FOR IN EITHER. IN CASE OF CONFLICT BETWEEN SPECIFICATIONS AND PLANS THE MORE STRINGENT SHALL APPLY.
6. ALL EQUIPMENT AND MATERIAL ON THE JOB SITE PRIOR TO INSTALLATION SHALL BE COVERED AND PROTECTED FROM RAIN, DIRT, DUST, AND DAMAGE.
7. VERIFY PHYSICAL DIMENSIONS OF EQUIPMENT TO ENSURE THAT ACCESS CLEARANCES CAN BE MET. COORDINATE FINAL EQUIPMENT LOCATIONS W/ GENERAL CONTRACTOR AND OTHER TRADES TO ALLOW FOR REQUIRED MECHANICAL EQUIPMENT CLEARANCES.
8. PROVIDE AN UNOBSTRUCTED PASSAGEWAY MEASURING NO LESS THAN 36" WIDE BY 80" HIGH FROM DOOR INTO THE SPACE TO SERVICEABLE MECHANICAL EQUIPMENT. A LEVEL WORKING SPACE MEASURING NO LESS THAN 30" WIDE BY 36" DEEP MUST BE PROVIDED IN FRONT OF CONTROL SIDE OF EQUIPMENT FOR SERVICING.
9. PROVIDE NEC CODE MINIMUM HORIZONTAL AND VERTICAL WORKING CLEARANCES FOR ALL ELECTRICAL PANELS AND EQUIPMENT. OFFSET MECHANICAL WORK AS REQUIRED.
10. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF INSTALLATION STANDARDS AND CONSTRUCTION CONDITIONS. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS PRIOR TO SHOP FABRICATION AND/OR FIELD INSTALLATION. DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONSTRUCTION DRAWINGS SHALL BE CALLED TO THE ATTENTION OF THE ENGINEER.
11. ALL MECHANICAL EQUIPMENT, MATERIALS, AND INSTALLATION SHALL BE PROVIDED BY THE CONTRACTOR. ALL EQUIPMENT SHALL BE COMPLETE, INSTALLED, AND FULLY FUNCTIONAL PRIOR TO FINAL ACCEPTANCE OF THE WORK.
12. INSTALL ALL EQUIPMENT PER MANUFACTURERS RECOMMENDATIONS AND REQUIREMENTS. ANY CONFLICTS BETWEEN THE MANUFACTURERS DOCUMENTATION AND THE CONTRACT DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
13. DO NOT ALLOW ANY WORK TO BE COVERED UP OR ENCLOSED UNTIL INSPECTED, TESTED AND APPROVED BY OWNER'S REPRESENTATIVE OR AUTHORITY HAVING JURISDICTION.
14. MECHANICAL EQUIPMENT SHALL NOT BE USED FOR TEMPORARY HEATING OR COOLING DURING CONSTRUCTION.
15. PIPES AND WIRING IN PLENUM SHALL BE RATED FOR PLENUM USE. PVC, ABS, AND PLASTIC PIPING IS NOT ACCEPTABLE IN PLENUM APPLICATIONS.
16. ALL DETAILS ARE TYPICAL UNLESS NOTED OTHERWISE.

DESIGN CONDITIONS

LOCATION	CORVALLIS, OR	
CLIMATE ZONE	4C (BENTON COUNTY)	
OUTDOORS	COOLING	92.7°F DB / 67.0°F WB
	HEATING	11.8°F DB
INDOOR	COOLING	72°F
	HEATING	68°F
VENTILATION	USDA ARS 242.1M 2024	
ELEVATION	250 FT ABOVE SEA LEVEL	

MECHANICAL SHEET INDEX

SHEET NUMBER	SHEET NAME
M-001	MECHANICAL LEGENDS AND ABBREVIATIONS
MD-101	FIRST FLOOR PLAN WEST MECHANICAL DEMO PLAN
MD-102	SECOND FLOOR PLAN WEST MECHANICAL DEMO PLAN
MD-103	MECHANICAL ROOF DEMO PLAN
M-201	FIRST FLOOR WEST ZONE PLAN
M-202	SECOND FLOOR WEST ZONE PLAN
M-203	FIRST FLOOR WEST MECHANICAL PLAN
M-204	SECOND FLOOR WEST MECHANICAL PLAN
M-205	MECHANICAL ROOF PLAN
M-501	MECHANICAL DETAILS
M-701	MECHANICAL CONTROLS
M-702	MECHANICAL SCHEDULES

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REGISTERED PROFESSIONAL ENGINEER 85383PE OREGON May 10, 2011 TRACI ANNE HANEGAN

EXPIRATION DATE: 06/30/2027

HORTICULTURAL CROPS RESEARCH LAB

3420 NW ORCHARD AVE., CORVALLIS, OR 97331

USDA ARS LABORATORY EXHAUST

FINAL TURNOVER

REV	DATE	DESCRIPTION

PROJ. NO.	230612
DRAWN	PJTM
CHECKED	TAH
DATE	02/04/2026

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SHEET TITLE:

MECHANICAL LEGENDS AND ABBREVIATIONS

SHEET NO:

M-001

2/3/2026 12:13:56 PM

GENERAL NOTES

A. THESE DRAWINGS HAVE BEEN PREPARED USING OWNER PROVIDED RECORD DRAWINGS DATED 06-01-93 AND THROUGH FIELD OBSERVATIONS. VERIFY EXISTING CONDITIONS AS THEY APPLY TO THIS PROJECT AND INCLUDE IN BID A SUFFICIENT ALLOWANCE TO COVER ANY DISCREPANCY BETWEEN THE DRAWINGS AND THE ACTUAL CONDITIONS AS THEY CURRENTLY EXIST.

B. EXISTING WORK IS SHOWN WITH LIGHT LINES AND DEMO WORK IS SHOWN WITH BOLD BROKEN LINES, TYP.

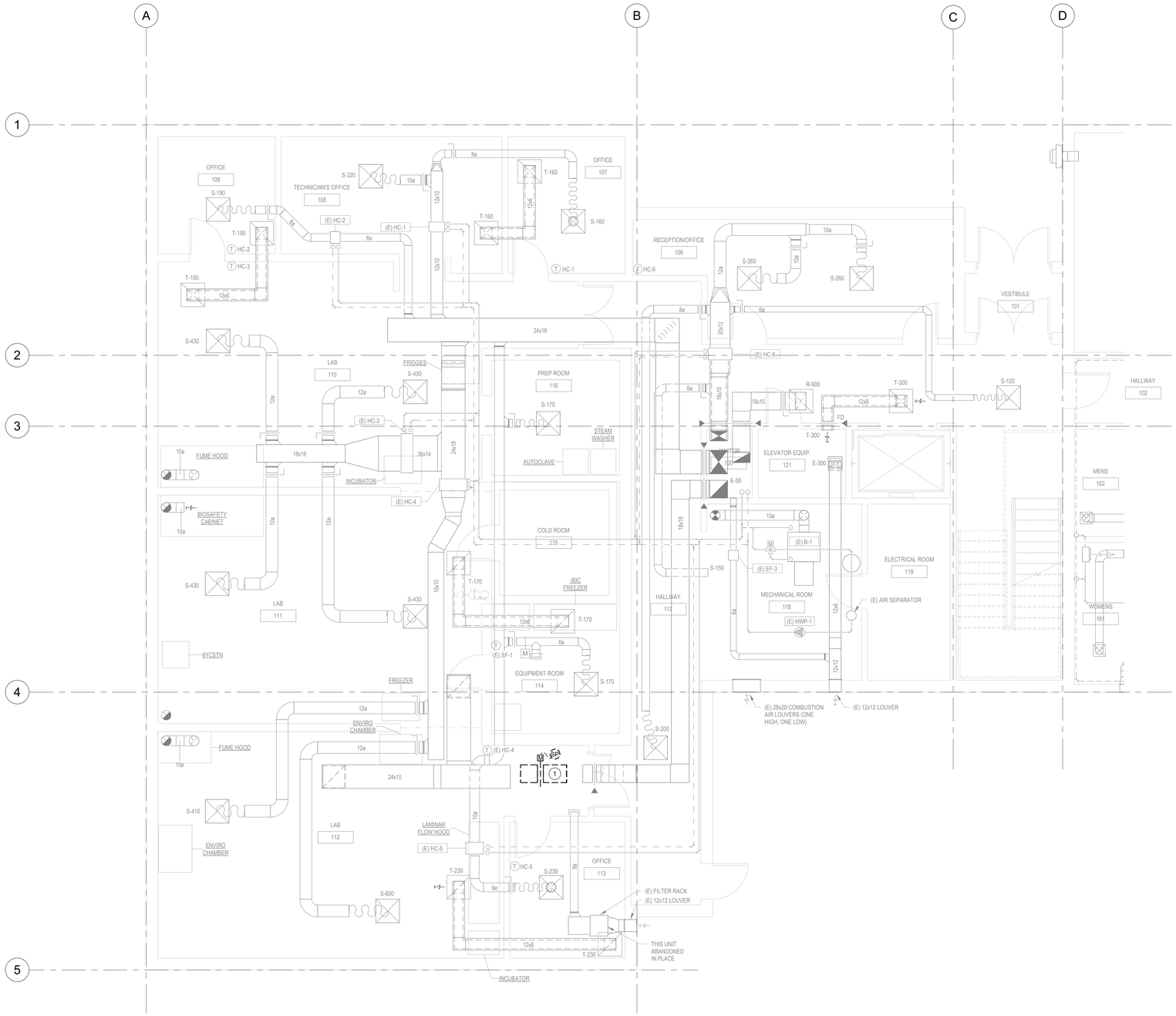
C. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL EQUIPMENT THE OWNER DOES NOT WISH TO RETAIN FOR FUTURE USE.

D. CONTRACTOR SHALL COORDINATE ANY SHUT DOWN OF SYSTEMS WITH OWNER.

E. AIRFLOWS SHOWN ON DEMO SHEETS CORRESPOND WITH PREVIOUS DESIGN AND TAB REPORTS.

KEY NOTES

1 LOCATE AND DEMOLISH EXISTING MOTORIZED DAMPER AND STATIC PRESSURE SENSOR. DUCT WILL BE RECONNECTED WITH NEW EXHAUST TERMINAL UNIT.



1 FIRST FLOOR PLAN WEST MECHANICAL DEMO PLAN

1/4" = 1'-0"

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TANCI ANNE HANGAN

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SHEET TITLE:

FIRST FLOOR PLAN WEST MECHANICAL DEMO PLAN

SHEET NO:

MD-101

SHEET 05 OF 16

2/3/2026 12:13:57 PM

GENERAL NOTES

A. THESE DRAWINGS HAVE BEEN PREPARED USING OWNER PROVIDED RECORD DRAWINGS DATED 06-01-93 AND THROUGH FIELD OBSERVATIONS. VERIFY EXISTING CONDITIONS AS THEY APPLY TO THIS PROJECT AND INCLUDE IN BID A SUFFICIENT ALLOWANCE TO COVER ANY DISCREPANCY BETWEEN THE DRAWINGS AND THE ACTUAL CONDITIONS AS THEY CURRENTLY EXIST.

B. EXISTING WORK IS SHOWN WITH LIGHT LINES AND DEMO WORK IS SHOWN WITH BOLD BROKEN LINES, TYP.

C. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL EQUIPMENT THE OWNER DOES NOT WISH TO RETAIN FOR FUTURE USE.

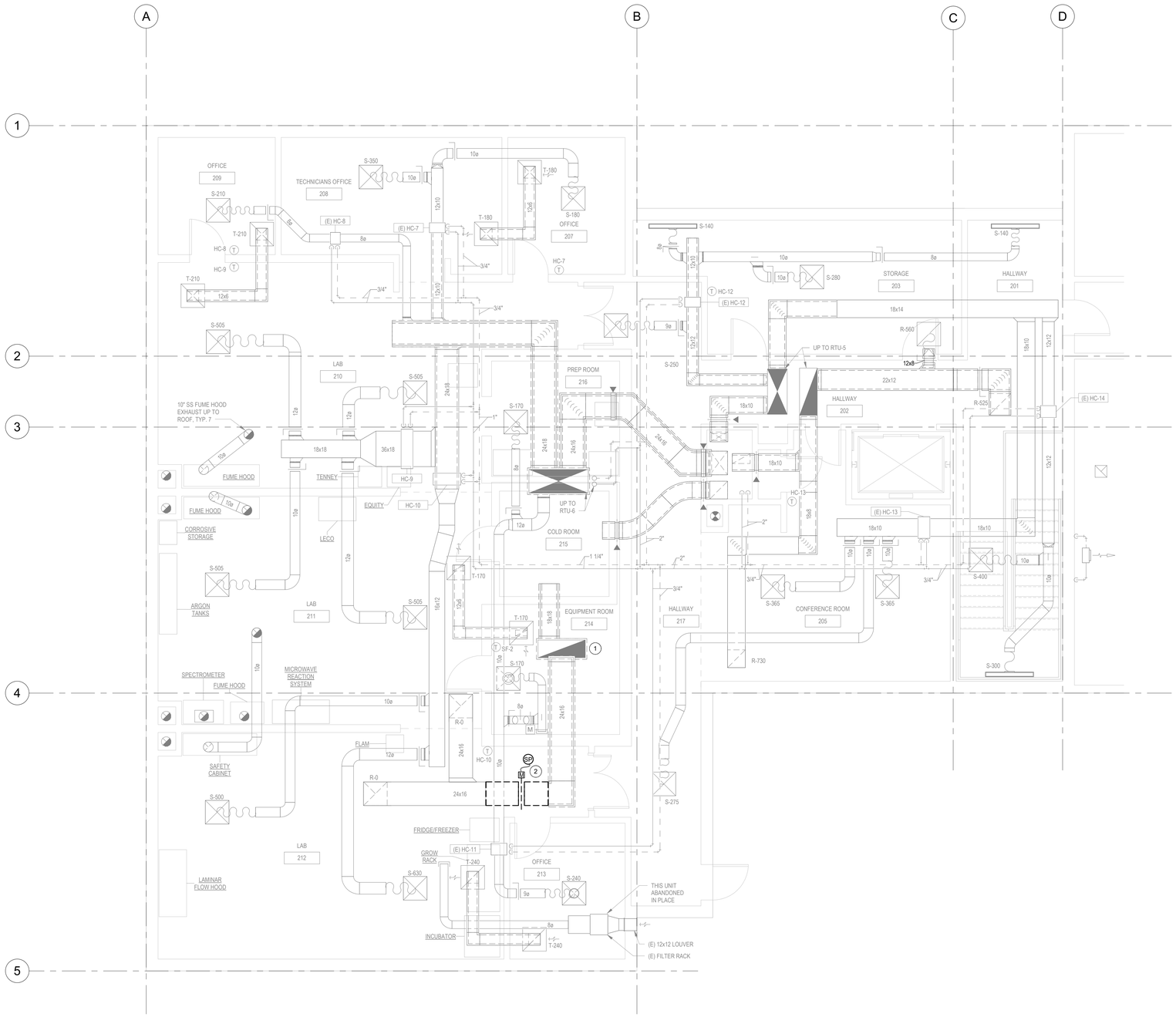
D. CONTRACTOR SHALL COORDINATE ANY SHUT DOWN OF SYSTEMS WITH OWNER.

E. AIRFLOWS SHOWN ON DEMO SHEETS CORRESPOND WITH PREVIOUS DESIGN AND TAB REPORTS.

KEY NOTES

1 EXISTING DUCT UP TO ROOF IS CURRENTLY CAPPED BELOW ROOF INFILL. REMOVE CAP AND PREPARE THE DUCT TO CONNECT TO NEW EXHAUST FAN.

2 LOCATE AND DEMOLISH EXISTING MOTORIZED DAMPER AND STATIC PRESSURE SENSOR IN CEILING SPACE. DUCT WILL BE RECONNECTED WITH NEW EXHAUST TERMINAL UNIT. REMOVE EXISTING ACOUSTIC GPY. BOARD FROM AROUND DUCTWORK AS NECESSARY TO REPLACE THE TERMINAL UNIT.



1 SECOND FLOOR PLAN WEST MECHANICAL DEMO PLAN

1/4" = 1'-0"

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SHEET TITLE:

SECOND FLOOR PLAN WEST MECHANICAL DEMO PLAN

SHEET NO:

MD-102

SHEET 06 OF 16

2/3/2026 12:13:57 PM

GENERAL NOTES

A. THESE DRAWINGS HAVE BEEN PREPARED USING OWNER PROVIDED RECORD DRAWINGS DATED 06-01-93 AND THROUGH FIELD OBSERVATIONS. VERIFY EXISTING CONDITIONS AS THEY APPLY TO THIS PROJECT AND INCLUDE IN BID A SUFFICIENT ALLOWANCE TO COVER ANY DISCREPANCY BETWEEN THE DRAWINGS AND THE ACTUAL CONDITIONS AS THEY CURRENTLY EXIST.

B. EXISTING WORK IS SHOWN WITH LIGHT LINES AND DEMO WORK IS SHOWN WITH BOLD BROKEN LINES, TYP.

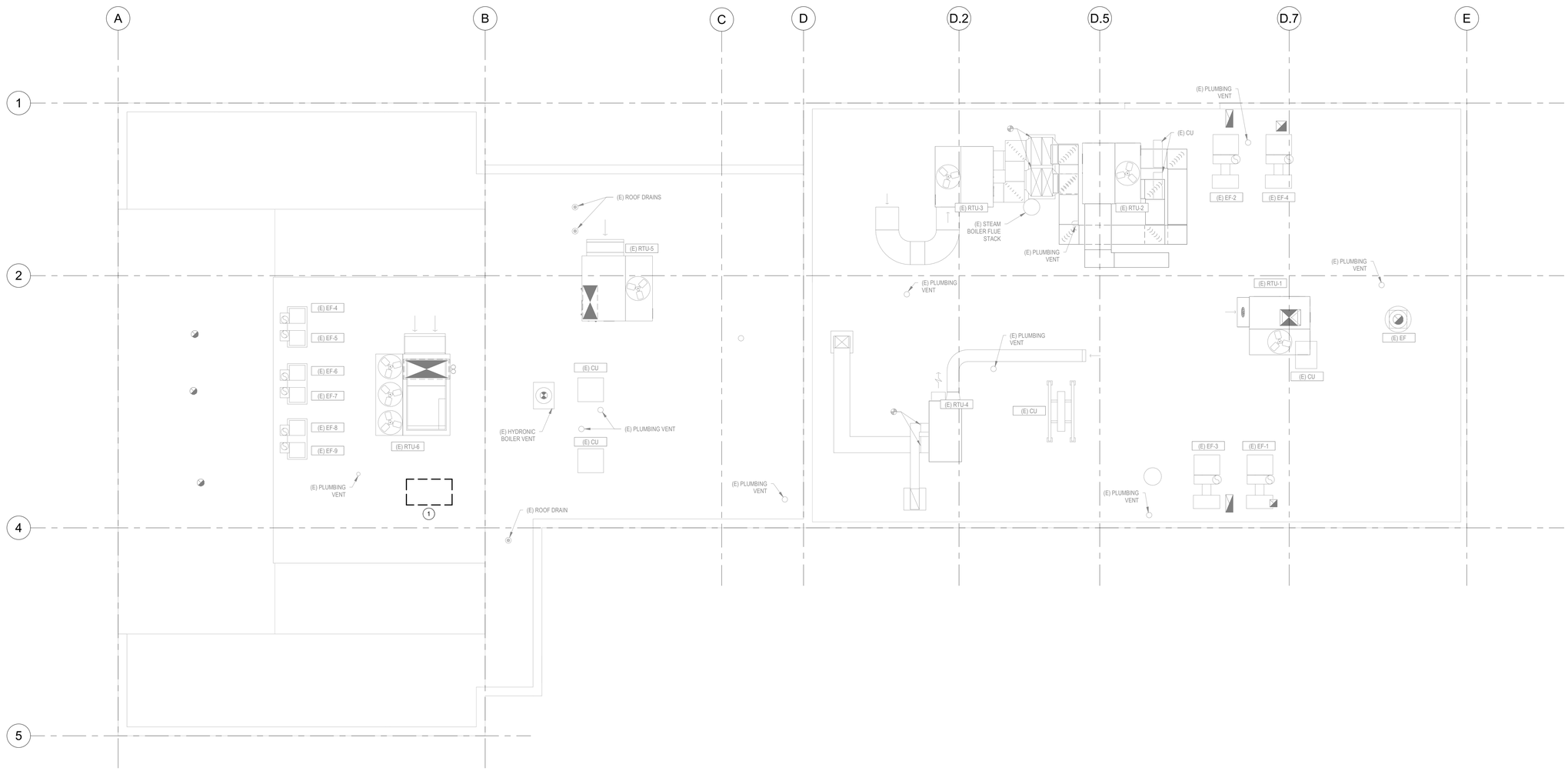
C. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSAL OF ALL EQUIPMENT THE OWNER DOES NOT WISH TO RETAIN FOR FUTURE USE.

D. CONTRACTOR SHALL COORDINATE ANY SHUT DOWN OF SYSTEMS WITH OWNER.

E. AIRFLOWS SHOWN ON DEMO SHEETS CORRESPOND WITH PREVIOUS DESIGN AND TAB REPORTS.

KEY NOTES

1 CREATE ROOF OPENING AS NECESSARY TO ACCESS EXISTING CAPPED DUCTWORK AND INSTALL NEW EXHAUST FAN CURB.



1 MECHANICAL ROOF DEMO PLAN
3/16" = 1'-0"

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MECHANICAL ROOF DEMO PLAN

SHEET NO:

MD-103

SHEET 07 OF 16

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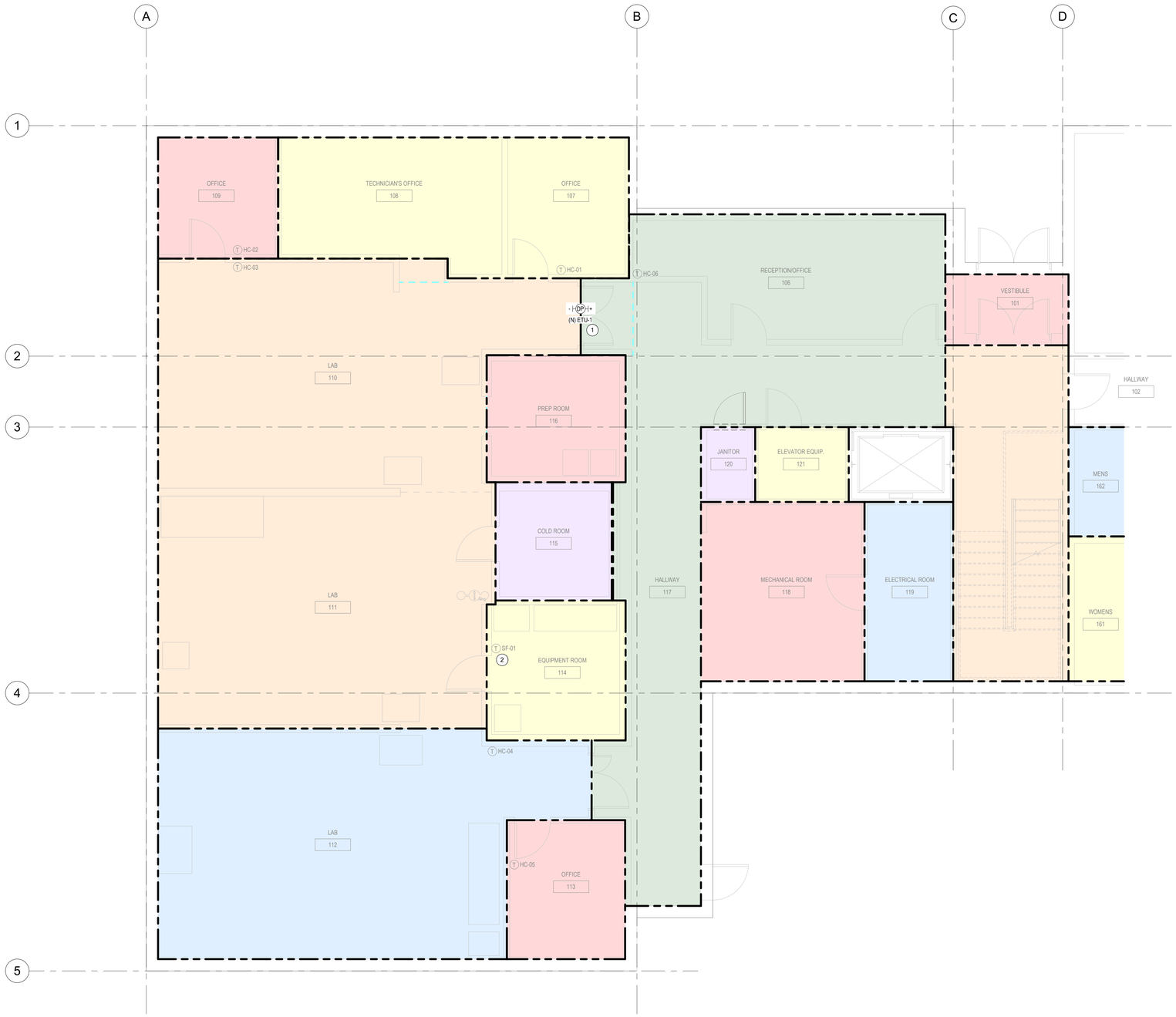
KEY NOTES

1. INSTALL NEW DIFFERENTIAL PRESSURE SENSOR ABOVE EXISTING DOORWAY BETWEEN LABORATORY AND HALLWAY. SENSOR SHALL CONNECT TO THE BAS AND WILL BE USED TO CONTROL ETU AIRFLOW SETPOINT. SEE 4/M-501.
2. EXISTING THERMOSTAT FOR EXHAUST FAN ABANDONED-IN-PLACE. SHOWN FOR CLARITY, NO SCOPE IN THIS PROJECT.



1 FIRST FLOOR WEST ZONE PLAN
1/4" = 1'-0"

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EXPIRATION DATE: 06/30/2027

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SHEET TITLE:
FIRST FLOOR WEST ZONE PLAN

SHEET NO:
M-201

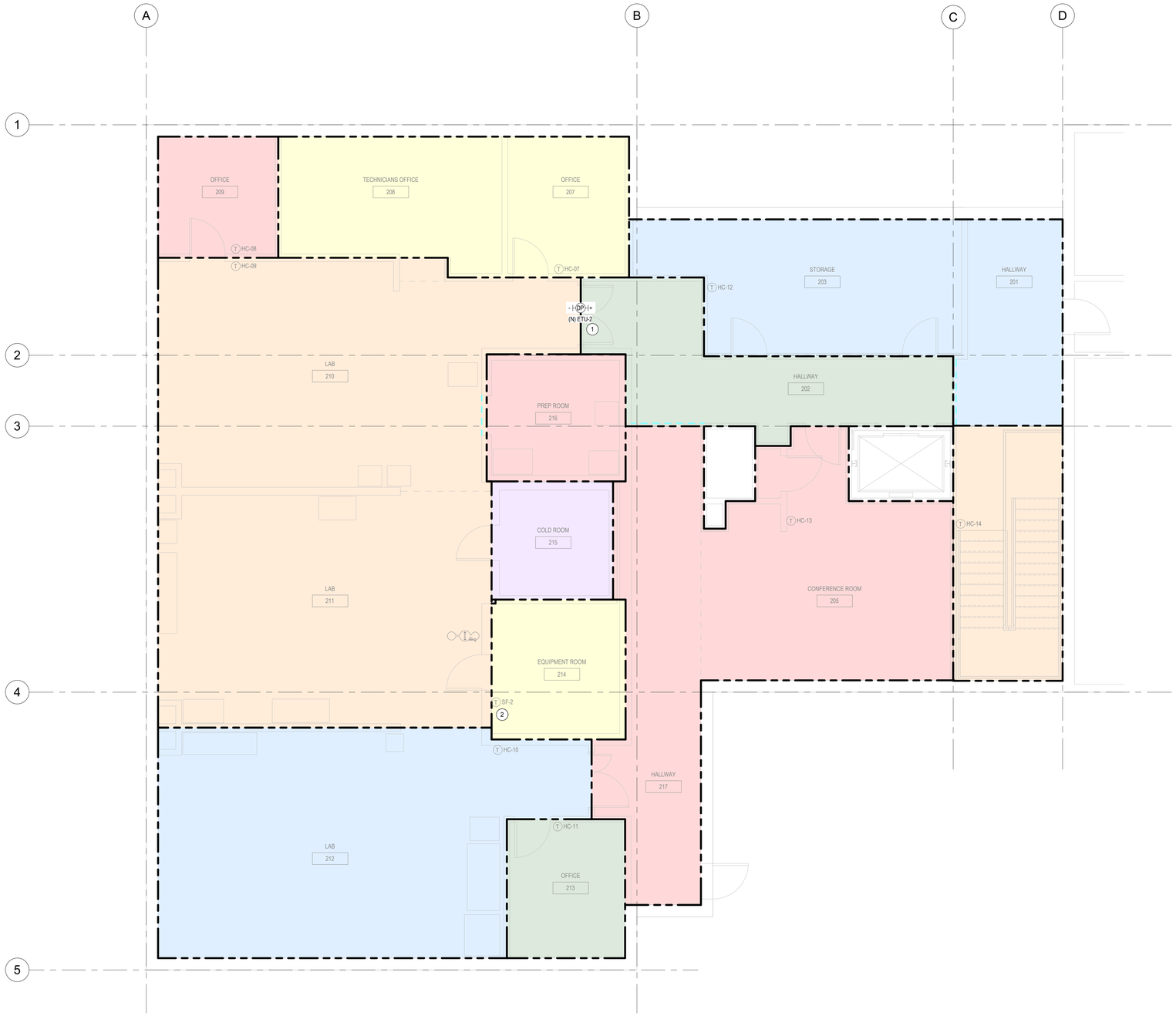
SHEET 08 OF 16

2/3/2026 8:26:25 AM

KEY NOTES

1 INSTALL NEW DIFFERENTIAL PRESSURE SENSOR ABOVE EXISTING DOORWAY BETWEEN LABORATORY AND HALLWAY. SENSOR SHALL CONNECT TO THE BAS AND WILL BE USED TO CONTROL ETU AIRFLOW SETPOINT. SEE 4/M-501.

2 EXISTING THERMOSTAT FOR EXHAUST FAN ABANDONED-IN-PLACE. SHOWN FOR CLARITY, NO SCOPE IN THIS PROJECT.



1 SECOND FLOOR WEST ZONE PLAN
1/4" = 1'-0"

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NOV. 10, 2011
TANCI ANNE HANGAN
EXPIRATION DATE: 06/30/2027

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SHEET TITLE:
SECOND FLOOR WEST ZONE PLAN

SHEET NO:
M-202

SHEET 09 OF 16

2/3/2026 8:26:25 AM

GENERAL HVAC NOTES

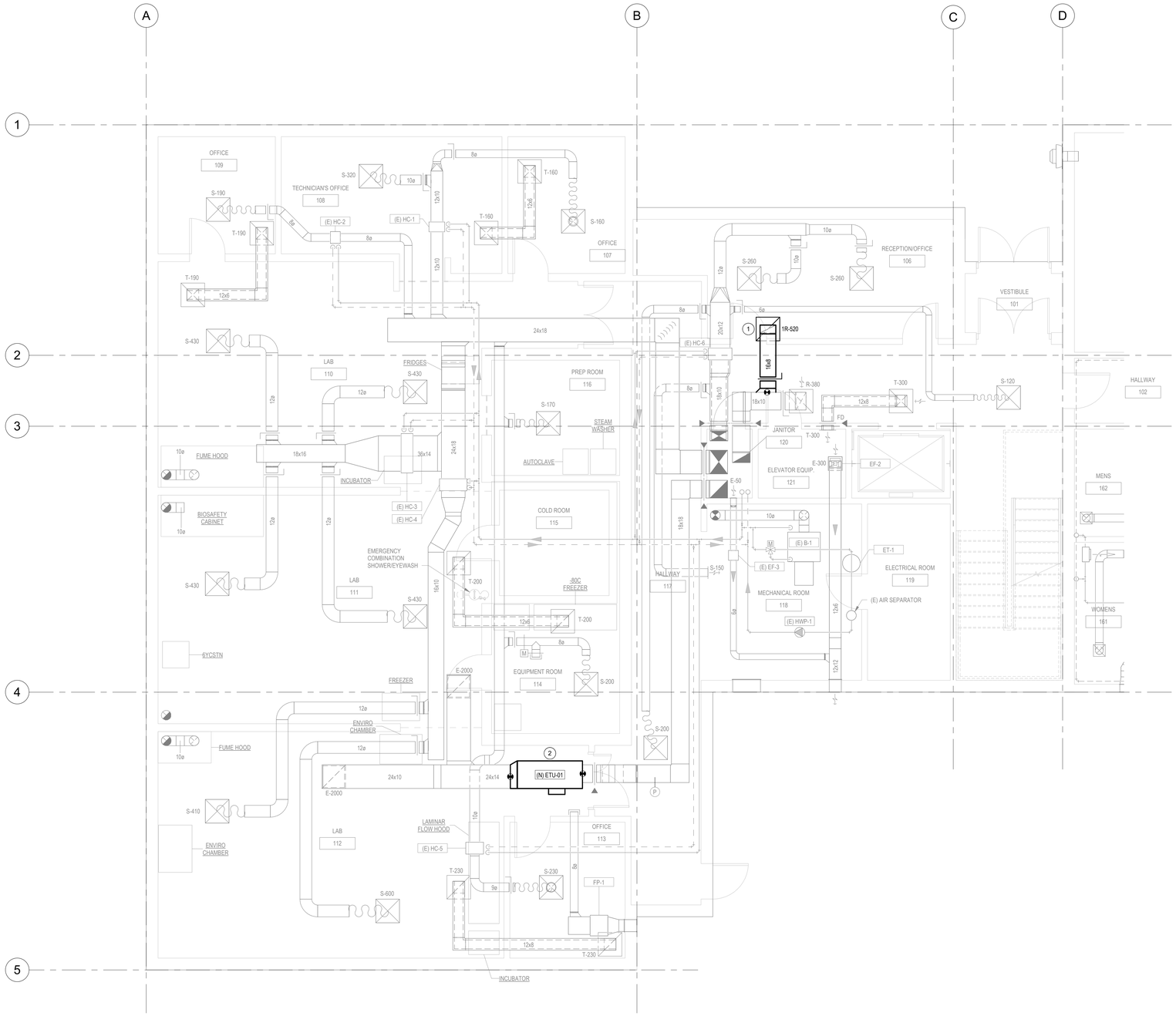
A. INSTALL NEW EXHAUST TERMINAL UNIT IN EXISTING DUCTWORK.

B. CONTRACTOR TO BALANCE AIRFLOWS TO THOSE SHOWN ON THE NEW PLANS; LAB GENERAL EXHAUST AIRFLOWS SHOWN ARE ONLY APPLICABLE IF THERE IS NO LOCAL EXHAUST FROM FUME HOODS, SAFETY CABINETS, ETC. SUPPLY SYSTEM IS CONSTANT VOLUME.

KEY NOTES

1 INSTALL NEW RETURN GRILLE AND CONNECTING DUCTWORK TO RETURN AIR FROM RECEPTION AREA. RETURN GRILLE SHALL VISUALLY MATCH OTHER RETURN GRILLES WITHIN THE AREA.

2 INSTALL NEW EXHAUST TERMINAL UNIT IN CEILING SPACE CONNECTED TO EXISTING DUCTWORK. CONTRACTOR TO CONFIRM SUFFICIENT SPACE FOR NEW TERMINAL UNIT (INCLUDING MANUFACTURER'S MINIMUM STRAIGHT DUCT AND ACCESS CLEARANCES) PRIOR TO INSTALLING UNIT. IF INSUFFICIENT SPACE IN LOCATION SHOW, TERMINAL UNIT LOCATION MAY SHIFT TO HALLWAY 117.



1 FIRST FLOOR WEST MECHANICAL PLAN
1/4" = 1'-0"

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SHEET TITLE:
FIRST FLOOR WEST MECHANICAL PLAN

SHEET NO:
M-203

SHEET 10 OF 16

2/3/2026 12:13:59 PM

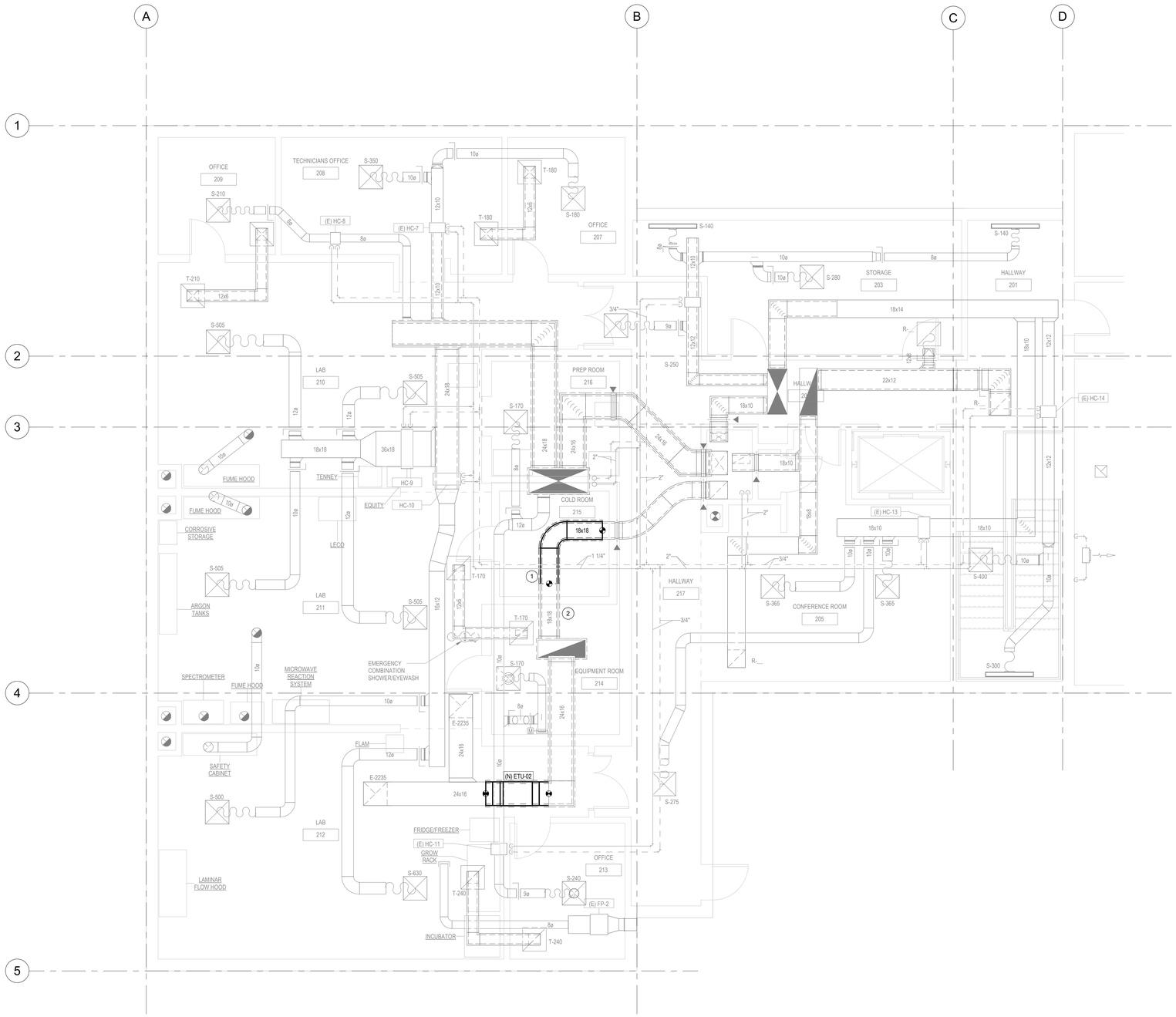
GENERAL HVAC NOTES

A. INSTALL NEW EXHAUST TERMINAL UNIT IN EXISTING DUCTWORK.

B. CONTRACTOR TO BALANCE AIRFLOWS TO THOSE SHOWN ON THE NEW PLANS; LAB GENERAL EXHAUST AIRFLOWS SHOWN ARE ONLY APPLICABLE IF THERE IS NO LOCAL EXHAUST FROM FUME HOODS, SAFETY CABINETS, ETC. SUPPLY SYSTEM IS CONSTANT VOLUME.

KEY NOTES

1. CONTRACTOR TO INSTALL NEW CONNECTING DUCTWORK BETWEEN OPEN EXISTING DUCTS ABOVE CEILING. EXISTING DUCTWORK IS MINIMUM 22 GAUGE STEEL, ACOUSTICALLY LINED DUCT.
2. INSTALL NEW DRYWALL AROUND DUCTWORK TO MATCH EXISTING 2 LAYERS OF 5/8" GYP. BOARD WITH STAGGERED SEAMS, TAPED AND SEALED AIRTIGHT FOR SOUND ATTENUATION.



1 SECOND FLOOR WEST MECHANICAL PLAN

1/4" = 1'-0"

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TANCI ANNE HANGAN

EXPIRATION DATE: 06/30/2027

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SHEET TITLE:

SECOND FLOOR WEST MECHANICAL PLAN

SHEET NO:

M-204

SHEET 11 OF 16

2/3/2026 12:13:59 PM

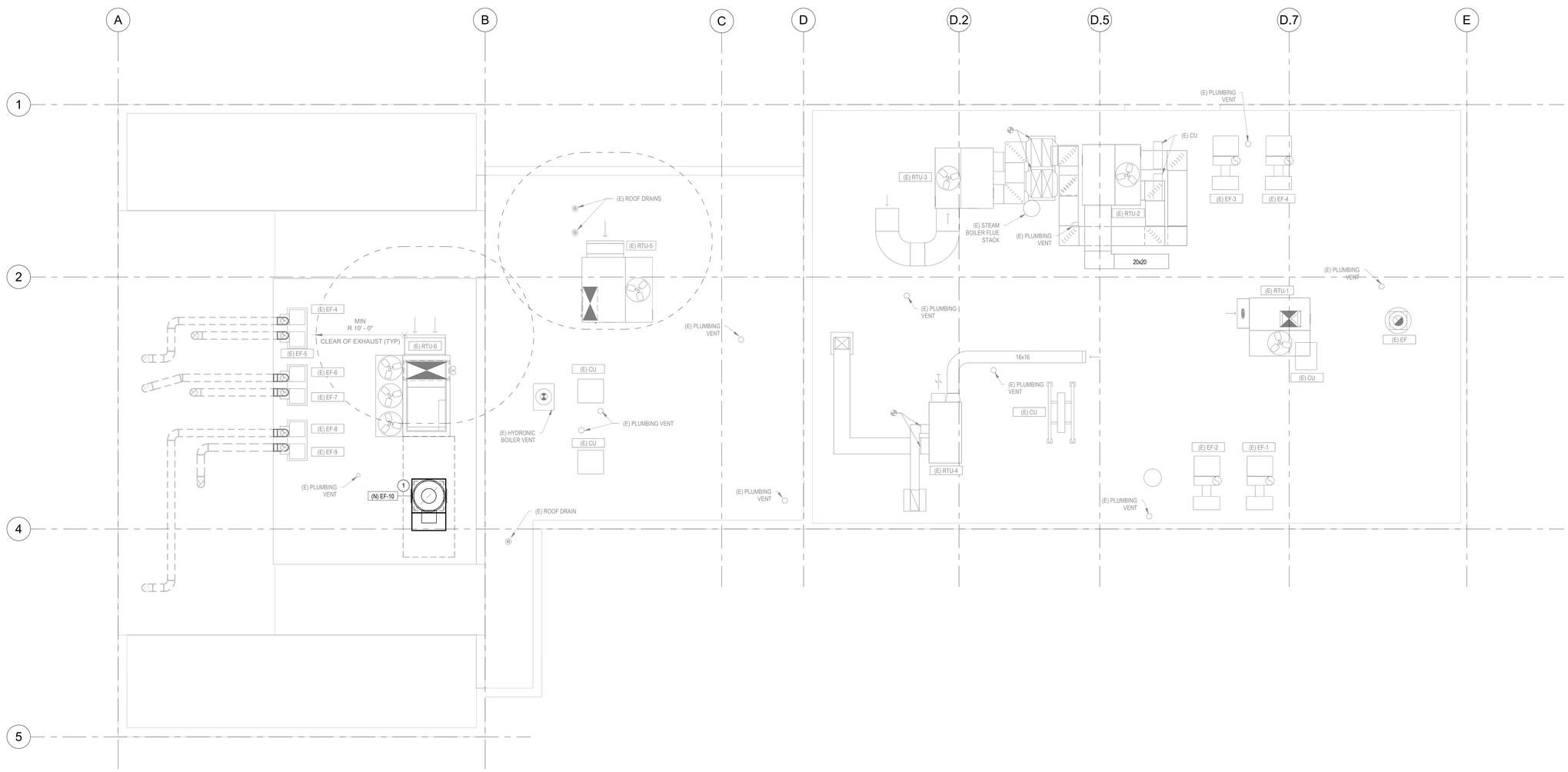
GENERAL NOTES

A. LOCATE PLUMBING VENTS AND EXHAUST FANS 10-0" MIN. FROM HVAC AIR INTAKES.

B. LOCATE ALL SERVICABLE EQUIPMENT 10'-0" MIN. FROM ROOF EDGE OR PARAPET.

KEY NOTES

1 NEW LAB GENERAL EXHAUST FAN USES EXHAUST PLUME AT MINIMUM 3,000 FPM TO REMOVE LABORATORY AIR FROM THE BUILDING. MINIMUM OF 10'-0" HORIZONTAL CLEARANCE SHALL BE MAINTAINED FROM EXHAUST STACK OPENING AND ALL EXISTING BUILDING AIR INTAKES.



1 MECHANICAL ROOF PLAN
3/16" = 1'-0"

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SHEET TITLE:

MECHANICAL ROOF PLAN

SHEET NO:

M-205

SHEET 12 OF 16

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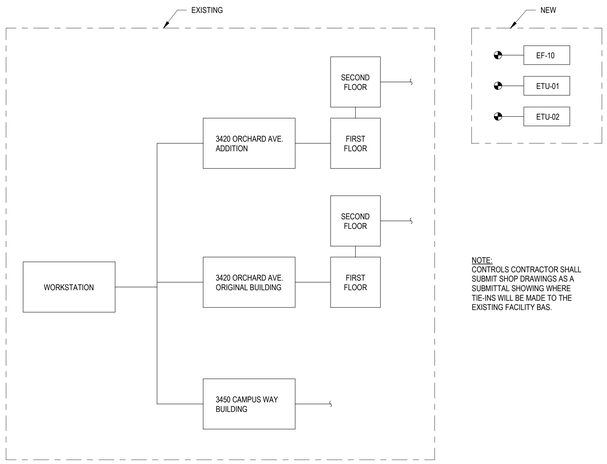
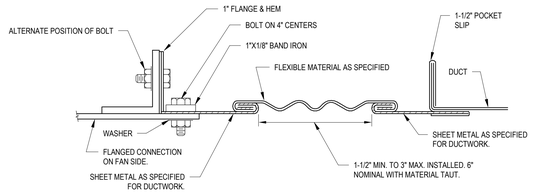
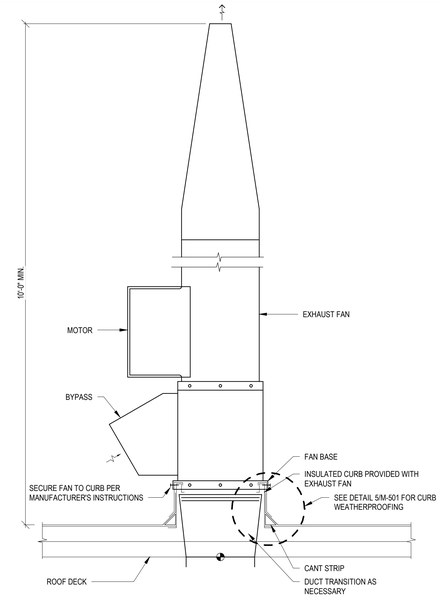


NOTE:
CONTROLS CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AS A SUBMITTAL SHOWING WHERE TIE-INS WILL BE MADE TO THE EXISTING FACILITY BAS.

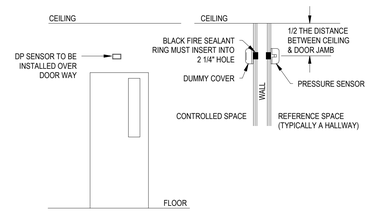
1 DDC SYSTEM ARCHITECTURE DIAGRAM
NTS



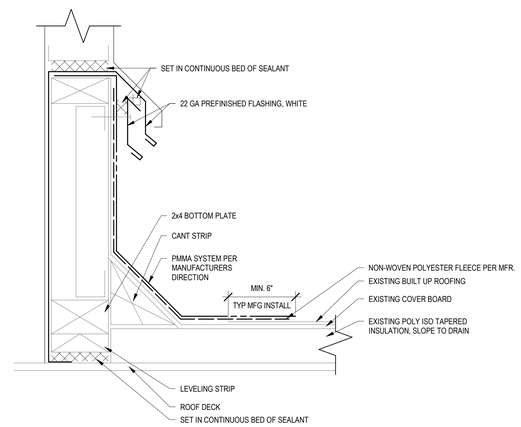
2 RECTANGULAR FLEXIBLE DUCT CONNECTION
NTS



3 ROOF EXHAUST FAN - BOTTOM INLET
NTS



4 DIFFERENTIAL PRESSURE SENSOR INSTALLATION
NTS



5 INSULATED ROOF CURB WHEATHERPROOFING
6" = 1'-0"

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SHEET TITLE:
MECHANICAL DETAILS

SHEET NO:
M-501

SHEET 13 OF 16

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CONTROLS ABBREVIATIONS AND LEGEND

ADJ	ADJUSTABLE
AFMS	AIR FLOW MEASURING STATION
AI	ANALOG INPUT
ALM	ALARM
AO	ANALOG OUTPUT
AVG	AVERAGE/AVERAGING
B	BOILER
BAS	BUILDING AUTOMATION SYSTEM
CAV	CONSTANT AIR VOLUME
CC	COOLING COIL
CH	CHILLER
CS	CURRENT SWITCH
CT	CURRENT TRANSDUCER/ COOLING TOWER
DDC	DIRECT DIGITAL CONTROL
DI	DIGITAL INPUT
DEM	DIGITAL ENERGY MONITOR
DMPR	DAMPER
DO	DIGITAL OUTPUT
DPT	DIFFERENTIAL PRESSURE TRANSDUCER
DPS	DIFFERENTIAL PRESSURE SWITCH
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EF	EXHAUST FAN
EH	ELECTRIC HEATER
ES	END SWITCH
F	FAN
HPS	HIGH PRESSURE SWITCH
HX	HEAT EXCHANGER
LPS	LOW PRESSURE SWITCH
LTD	LOW TEMPERATURE DETECTOR
M	MOTORIZED ACTUATOR
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
OA	OUTSIDE AIR
OCC	OCCUPANCY
P	PRESSURE/PUMP
RA	RETURN AIR
RE	RELAY
RF	RETURN FAN
RFP	REMOTE FIELD PANEL
RH	RELATIVE HUMIDITY
SA	SUPPLY AIR
SC	STEAM COIL
SD	SMOKE DETECTOR
T	TEMPERATURE
TEC	TERMINAL EQUIPMENT CONTROLLER
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE
VLV	VALVE
XFMR	TRANSFORMER

1 **RTU-1 CONTROL DIAGRAM (EXISTING)**
NTS

2 **RTU-2, RTU-3, RTU-4 CONTROL DIAGRAM (EXISTING)**
NTS

3 **RTU-5 CONTROL DIAGRAM (EXISTING)**
NTS

4 **RTU-6 CONTROL DIAGRAM (EXISTING)**
NTS

5 **EF-10 CONTROL DIAGRAM (NEW)**
NTS

GENERAL NOTES

A. SIX ROOFTOP UNITS (RTU-1, RTU-2, RTU-3, RTU-4, RTU-5, AND RTU-6) WERE RECENTLY REPLACED WITH NEW UNITS. CONTROL DIAGRAMS FOR THOSE UNITS ARE PROVIDED FOR REFERENCE ONLY.

B. NEW EXHAUST FAN EF-10 USES BYPASS MAKEUP AIR TO MAINTAIN MINIMUM STACK VELOCITY. DAMPERS ARE INTERLOCKED AND MODULATE TO CONTROL THE AMOUNT OF AIR EXHAUSTED FROM THE GENERAL LAB AREA WHILE THE FAN RUNS AT A CONSTANT SPEED. THE LAB SHALL BE NEGATIVELY PRESSURIZED AT ALL TIMES.

C. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH MECHANICAL AND ELECTRICAL CONTRACTORS REGARDING WHO WILL PROVIDE AND INSTALL EXHAUST FAN FLOW MEASUREMENT AND VFD, 24V TRANSFORMERS, ETU CONTROLLER, ETC.

DESCRIPTION OF OPERATION
EXISTING BUILDING AUTOMATION SYSTEM:
EXISTING SYSTEM IS TO REMAIN UNCHANGED EXCEPT AS MODIFIED BY THE FOLLOWING REQUIREMENTS:

RTU-1 (EXISTING):
RTU-1 IS A 100% OUTSIDE AIR UNIT THAT PROVIDES TEMPERED MAKEUP AIR TO THE LABORATORY SPACES OF THE ORIGINAL BUILDING. WHEN IN OCCUPIED MODE, THE UNIT WILL RUN AT CONSTANT VOLUME TO MAINTAIN THE PRESSURE DIFFERENTIAL BETWEEEN THE LABORATORY ROOMS AND THE HALLWAY. DIFFERENTIAL PRESSURE SENSORS ARE EXISTING TO REMAIN, THIS UNIT WILL BE BALANCED TO THE SAME AIRFLOW AS THE EXISTING UNIT.
OCCUPIED MODE:
1. THE SUPPLY FAN SHALL BE ENERGIZED AND RUN WITH OUTSIDE AIR DAMPER OPEN.
2. THE SUPPLY FAN SHALL MODULATE SPEED TO MAINTAIN THE PRESSURE DIFFERENTIAL SETPOINT BETWEEN THE LABORATORY AND HALLWAY.
3. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE 60°F (ADJ).
4. WHEN OUTSIDE AIR TEMPERATURE IS BELOW SUPPLY AIR TEMPERATURE SETPOINT DEADBAND, OPEN STEAM VALVE AND MODULATE TO MAINTAIN SUPPLY TEMPERATURE SETPOINT.
5. SMOKE DETECTION CONTACTS SHALL BE WIRED TO DISABLE THE SUPPLY FAN THROUGH A HARD-WIRED INTERLOCK. UPON SMOKE DETECTION IN THE SUPPLY DUCT, THE SUPPLY FAN SHALL DE-ENERGIZE AND DAMPER SHALL RETURN TO FAIL POSITION. RTU OPERATION WILL RETURN TO NORMAL UPON MANUAL RESET.

UNOCCUPIED MODE:
6. THE SUPPLY FAN SHALL RUN CONTINUOUSLY. IF THE FAN IS COMMANDED OFF, OUTSIDE AIR DAMPER SHALL CLOSE.

RTU-2, RTU-3 (EXISTING):
RTU'S PROVIDE SINGLE-ZONE COOLING AND VENTILATION FOR FIRST AND SECOND FLOOR SPACES OF THE ORIGINAL BUILDING. THE OCCUPANCY MODE SHALL BE DETERMINED THROUGH A USER-ADJUSTABLE, GRAPHICAL, SEVEN-DAY SCHEDULE WITH HOLIDAY SCHEDULE. HEATING FOR THESE SPACES IS PROVIDED BY STEAM RADIATORS. RTU'S WILL NOT ENTER COOLING MODE WHEN RADIATORS ARE HEATING.
OCCUPIED MODE:
1. THE SUPPLY AND EXHAUST FANS SHALL BE ENERGIZED AND RUN WITH MINIMUM OUTSIDE AIR.
2. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE RESET FROM T-MIN (55°F ADJ) WHEN THE OUTSIDE AIR TEMPERATURE IS 70°F AND ABOVE TO T-MAX (75°F ADJ) WHEN THE OUTSIDE AIR TEMPERATURE IS 65°F AND BELOW.
3. UPON CALL FOR COOLING, INITIATE FIRST STAGE COOLING AND MAINTAIN COOLING AIR SUPPLY TEMPERATURE SETPOINT. IF UNABLE TO MAINTAIN SETPOINT, ACTIVATE SECOND STAGE COOLING AND INCREASE SUPPLY FAN SPEED. SEPARATE THE TWO STAGES BY AN ADJUSTABLE TEMPERATURE DEAD BAND TO ACHIEVE NO MORE THAN 4 COMPRESSOR STARTS PER HOUR.
4. ECONOMIZER COOLING IS ENABLED WHEN OUTSIDE AIR TEMPERATURE IS BELOW SUPPLY AIR TEMPERATURE SETPOINT AND DISABLED WHEN OUTSIDE AIR TEMPERATURE FALLS BELOW 35°F (ADJ) WITH A MIXED AIR TEMPERATURE LOW LIMIT OF 52°F (ADJ). WHEN ECONOMIZER COOLING IS ENABLED, DAMPERS OPEN TO MAXIMUM OUTSIDE AIR AND FANS RUN AT HIGH SPEED. IF COOLING SETPOINT IS NOT REACHED, ACTIVATE FIRST STAGE MECHANICAL COOLING.
5. SMOKE DETECTION CONTACTS SHALL BE WIRED TO DISABLE THE SUPPLY FAN THROUGH A HARD-WIRED INTERLOCK. UPON SMOKE DETECTION IN THE SUPPLY DUCT, THE SUPPLY AND EXHAUST FANS SHALL DE-ENERGIZE AND DAMPERS SHALL RETURN TO FAIL POSITION. RTU OPERATION WILL RETURN TO NORMAL UPON MANUAL RESET.

UNOCCUPIED MODE:
6. THE SUPPLY AND EXHAUST FANS SHALL BE DE-ENERGIZED AND OUTSIDE AIR DAMPER CLOSED, RETURN DAMPER OPEN.

RTU-4 (EXISTING):
RTU-4 PROVIDES SINGLE-ZONE HEATING, COOLING, AND VENTILATION FOR THE WORKROOM ON THE SECOND FLOOR OF THE ORIGINAL BUILDING. THE OCCUPANCY MODE SHALL BE DETERMINED THROUGH A USER-ADJUSTABLE, GRAPHICAL, SEVEN-DAY SCHEDULE WITH HOLIDAY SCHEDULE.
OCCUPIED MODE:
1. THE SUPPLY AND EXHAUST FANS SHALL BE ENERGIZED AND RUN AT LOW SPEED WITH MINIMUM OUTSIDE AIR.
2. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE RESET FROM T-MIN (55°F ADJ) WHEN THE OUTSIDE AIR TEMPERATURE IS 70°F AND ABOVE TO T-MAX (75-90°F) WHEN THE OUTSIDE AIR TEMPERATURE IS 65°F AND BELOW.
3. UPON CALL FOR HEATING, INITIATE HEAT PUMP HEATING MODE AND MAINTAIN HEATING AIR SUPPLY TEMPERATURE SETPOINT OF 85°F (ADJ). IF SPACE SETPOINT IS STILL NOT MET, INCREASE SUPPLY FAN SPEED TO HIGH. IF DISCHARGE AIR SETPOINT CANNOT BE MET, OR THE HEAT PUMP ENTERS DEFROST, ENGAGE ELECTRIC RESISTANCE HEAT TO MAINTAIN SUPPLY TEMPERATURE SETPOINT.
4. UPON CALL FOR COOLING, INITIATE FIRST STAGE COOLING AND MAINTAIN COOLING AIR SUPPLY TEMPERATURE SETPOINT. IF UNABLE TO MAINTAIN SETPOINT, ACTIVATE SECOND STAGE COOLING AND INCREASE SUPPLY FAN SPEED. SEPARATE THE TWO STAGES BY AN ADJUSTABLE TEMPERATURE DEAD BAND TO ACHIEVE NO MORE THAN 4 COMPRESSOR STARTS PER HOUR.
5. ECONOMIZER COOLING IS ENABLED WHEN OUTSIDE AIR TEMPERATURE IS BELOW SUPPLY AIR TEMPERATURE SETPOINT AND DISABLED WHEN OUTSIDE AIR TEMPERATURE FALLS BELOW 35°F (ADJ) WITH A MIXED AIR TEMPERATURE LOW LIMIT OF 52°F (ADJ). WHEN ECONOMIZER COOLING IS ENABLED, DAMPERS OPEN TO MAXIMUM OUTSIDE AIR AND FANS RUN AT HIGH SPEED. IF COOLING SETPOINT IS NOT REACHED, ACTIVATE FIRST STAGE MECHANICAL COOLING.
6. SMOKE DETECTION CONTACTS SHALL BE WIRED TO DISABLE THE SUPPLY FAN THROUGH A HARD-WIRED INTERLOCK. UPON SMOKE DETECTION IN THE SUPPLY DUCT, THE SUPPLY AND EXHAUST FANS SHALL DE-ENERGIZE AND DAMPERS SHALL RETURN TO FAIL POSITION. RTU OPERATION WILL RETURN TO NORMAL UPON MANUAL RESET.

UNOCCUPIED MODE:
1. THE SUPPLY AND EXHAUST FANS SHALL BE DE-ENERGIZED AND OUTSIDE AIR DAMPER CLOSED, RETURN DAMPER OPEN.
2. WHEN THE SPACE TEMPERATURE DROPS BELOW THE UNOCCUPIED SETPOINT, THE SUPPLY FAN WILL ENERGIZE AND RUN AT LOW SPEED BUT OUTSIDE AIR DAMPERS WILL REMAIN CLOSED AND EXHAUST FAN DE-ENERGIZED. HEATING WILL ACTIVATE UNTIL SETPOINT IS REACHED.

RTU-5 (EXISTING):
RTU PROVIDES PRE-HEATING, COOLING, AND VENTILATION FOR FIRST AND SECOND FLOOR SPACES OF THE ADDITION BUILDING. THE OCCUPANCY MODE SHALL BE DETERMINED THROUGH A USER-ADJUSTABLE, GRAPHICAL, SEVEN-DAY SCHEDULE WITH HOLIDAY SCHEDULE.
OCCUPIED MODE:
1. THE SUPPLY AND EXHAUST FANS SHALL BE ENERGIZED AND RUN AT LOW SPEED WITH MINIMUM OUTSIDE AIR.
2. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE RESET FROM T-MIN (55°F ADJ) WHEN THE OUTSIDE AIR TEMPERATURE IS 70°F AND ABOVE TO T-MAX (75°F ADJ) WHEN THE OUTSIDE AIR TEMPERATURE IS 65°F AND BELOW.
3. WHEN UNIT SUPPLY AIR TEMPERATURE IS BELOW SETPOINT DEADBAND, ENABLE GAS FURNACE HEATING AND MODULATE TO MAINTAIN SUPPLY TEMPERATURE SETPOINT.
4. UPON CALL FOR COOLING, INITIATE FIRST STAGE COOLING AND MAINTAIN COOLING AIR SUPPLY TEMPERATURE SETPOINT. IF UNABLE TO MAINTAIN SETPOINT, ACTIVATE SECOND STAGE COOLING AND INCREASE SUPPLY FAN SPEED. SEPARATE THE TWO STAGES BY AN ADJUSTABLE TEMPERATURE DEAD BAND TO ACHIEVE NO MORE THAN 4 COMPRESSOR STARTS PER HOUR.
5. ECONOMIZER COOLING IS ENABLED WHEN OUTSIDE AIR TEMPERATURE IS BELOW SUPPLY AIR TEMPERATURE SETPOINT AND DISABLED WHEN OUTSIDE AIR TEMPERATURE FALLS BELOW 35°F (ADJ) WITH A MIXED AIR TEMPERATURE LOW LIMIT OF 52°F (ADJ). WHEN ECONOMIZER COOLING IS ENABLED, DAMPERS OPEN TO MAXIMUM OUTSIDE AIR AND FANS RUN AT HIGH SPEED. IF COOLING SETPOINT IS NOT REACHED, ACTIVATE FIRST STAGE MECHANICAL COOLING.
6. SMOKE DETECTION CONTACTS SHALL BE WIRED TO DISABLE THE SUPPLY FAN THROUGH A HARD-WIRED INTERLOCK. UPON SMOKE DETECTION IN THE SUPPLY DUCT, THE SUPPLY AND EXHAUST FANS SHALL DE-ENERGIZE AND DAMPERS SHALL RETURN TO FAIL POSITION. RTU OPERATION WILL RETURN TO NORMAL UPON MANUAL RESET.

UNOCCUPIED MODE:
1. THE SUPPLY AND EXHAUST FANS SHALL BE DE-ENERGIZED AND OUTSIDE AIR DAMPER CLOSED, RETURN DAMPER OPEN.

RTU-6 (MODIFIED):
RTU-6 IS A 100% OUTSIDE AIR UNIT THAT PROVIDES TEMPERED MAKEUP AIR TO THE WEST LABORATORY SPACES. WHEN IN OCCUPIED MODE, THE UNIT WILL RUN AT CONSTANT VOLUME TO MAINTAIN 8 MINIMUM AIR CHANGES PER HOUR IN THE LAB SPACE (6,000 CFM).
OCCUPIED MODE:
1. THE SUPPLY FAN SHALL BE ENERGIZED AND RUN WITH OUTSIDE AIR DAMPER OPEN.
2. THE SUPPLY AIR TEMPERATURE SETPOINT SHALL BE 60°F (ADJ).
3. WHEN OUTSIDE AIR TEMPERATURE IS BELOW SUPPLY AIR TEMPERATURE SETPOINT DEADBAND, OPEN HEATING VALVE AND MODULATE TO MAINTAIN SUPPLY TEMPERATURE SETPOINT.
4. SMOKE DETECTION CONTACTS SHALL BE WIRED TO DISABLE THE SUPPLY FAN THROUGH A HARD-WIRED INTERLOCK. UPON SMOKE DETECTION IN THE SUPPLY DUCT, THE SUPPLY FAN SHALL DE-ENERGIZE AND DAMPER SHALL RETURN TO FAIL POSITION. RTU OPERATION WILL RETURN TO NORMAL UPON MANUAL RESET.
5. DUCT REHEAT COILS SHALL INCREASE SUPPLY AIR TEMPERATURE FOR THERMAL CONTROL BASED ON ZONE THERMOSTAT.

UNOCCUPIED MODE:
1. THE SUPPLY FAN SHALL RUN CONTINUOUSLY. IF THE FAN IS COMMANDED OFF, OUTSIDE AIR DAMPER SHALL CLOSE.

SAFETY SHUTDOWNS (ALL ROOFTOP UNITS):
1. INDIVIDUAL UNIT FANS WILL DE-ENERGIZE AND DAMPERS TO THE OUTSIDE WILL SHUT UPON LOCAL DUCT SMOKE DETECTION. MANUAL RESET WILL BE REQUIRED TO RESTART THE SYSTEM.

ALARMS REPORTED AT BAS WORKSTATION (ALL ROOFTOP UNITS):
1. SMOKE DETECTION.
2. FAN STATUS.
3. COMPRESSOR FAILURE.

TRENDS TO BE LOGGED AT BAS WORKSTATION (ALL ROOFTOP UNITS):
1. SETPOINT TEMPERATURES, SUPPLY AND RETURN AIR TEMPERATURES, ECONOMIZER POSITION, AND FAN SPEEDS.
2. SPACE TEMPERATURES.
3. COMPRESSOR STATUS.

EF-10
EF-10 PROVIDES GENERAL LAB EXHAUST FOR THE FIRST AND SECOND FLOOR LAB SPACES ON THE WEST END OF THE BUILDING. EF-10 OPERATES IN TANDEM WITH RTU-6: BEFORE THE RTU STARTS, THE EF MUST START AND BE TUNED TO RAMP UP IN TANDEM TO PREVENT OVER-PRESSURIZATION OF THE SPACES. THE OCCUPANCY MODE SHALL BE THE SAME AS THE RTU. EF-10 MAINTAINS A NEGATIVE PRESSURIZATION IN THE LAB AREA. BY MODULATING THE AMOUNT OF AIR COMING OUT OF THE LAB WHILE MAINTAINING MINIMUM FAN SPEED; THIS MAINTAINS MINIMUM STACK VELOCITY OF 3000 FPM OUT OF THE FAN WHILE ACCOUNTING FOR CHANGES IN FUME EXHAUST AIRFLOW WITHIN THE LAB. FAN SPEED SHALL BE MAINTAINED WHILE VOLUME CONTROL DAMPER MODULATES. IF STATIC PRESSURE IS STILL NOT MET WITH VOLUME DAMPER ALL THE WAY OPEN, FAN SPEED SHALL BE INCREASED. FAN SPEED AND VOLUME CONTROL DAMPER SHALL NOT MODULATE AT THE SAME TIME.

OCCUPIED MODE:
1. THE EXHAUST FAN SHALL BE ENERGIZED AND RUN WITH LAB VOLUME CONTROL DAMPER OPEN (BYPASS DAMPER CLOSED).
2. THE LAB VOLUME CONTROL DAMPER WILL SLOWLY MODULATE POSITION TO MAINTAIN DUCT STATIC PRESSURE SETPOINT OF 1.0" (ADJ.).
3. THE DUCT STATIC PRESSURE SETPOINT SHALL BE ADJUSTED UP OR DOWN AS REQUIRED TO KEEP THE MOST DEMANDING TERMINAL UNIT SATISFIED WHEN THE TU DAMPER IS WIDE OPEN.

EXHAUST TERMINAL UNITS:
1. TERMINAL UNIT SHALL MODULATE ITS DAMPER POSITION TO MAINTAIN A MINIMUM DIFFERENTIAL PRESSURE SETPOINT (0.05" ADJ.) IN THE LAB RELATIVE TO THE HALLWAY.

UNOCCUPIED MODE:
1. IF RTU-6 SHUTS OFF, EF-10 WILL ALSO TURN OFF AND CONTROL DAMPER SHALL CLOSE.

ALARMS REPORTED AT BAS WORKSTATION:
1. FAN ALARM
2. STATIC PRESSURE LOW LIMIT
3. IF THE LABORATORY SPACE DIFFERENTIAL PRESSURE SENSOR REPORTS POSITIVE PRESSURIZATION IN A NEGATIVE ROOM FOR MORE THAN 5 MINUTES, UNIT SHALL ALARM TO THE BAS.

TRENDS TO BE LOGGED AT BAS WORKSTATION:
1. LAB DIFFERENTIAL PRESSURE
2. TERMINAL UNIT AND EXHAUST FAN FLOW RATES

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REGISTERED PROFESSIONAL ENGINEER 85383PE OREGON May 10, 2011 TRACI ANNE HANEGAN
EXPIRATION DATE: 06/30/2027

HORTICULTURAL CROPS RESEARCH LAB

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USDA ARS LABORATORY EXHAUST

FINAL TURNOVER

REV	DATE	DESCRIPTION

PROJ. NO.	230612
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DATE	02/04/2026

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SHEET TITLE:
MECHANICAL CONTROLS

SHEET NO:
M-701

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EXISTING ROOFTOP UNIT SCHEDULE (PROVIDED FOR REFERENCE ONLY)

TAG	MANUFACTURER/ MODEL	NOMINAL CAPACITY (TONS)	SUPPLY FAN						EXHAUST/RETURN FAN						HEATING COIL			COOLING COIL						CONDENSER			UNIT POWER REQMTS				UNIT WT. (LBS)	REMARKS
			COOLING CFM	OA CFM	ESP (IN WC)	TSP (IN WC)	MOTOR DATA HP	MOTOR DATA RPM	MOTOR DATA FLA	TOTAL CFM	ESP (IN WC)	TSP (IN WC)	MOTOR DATA HP	MOTOR DATA RPM	MOTOR DATA FLA	INPUT MBh	TOTAL MBh	EAT (F)	LAT (F)	TOTAL MBh	SENS. MBh	EAT (F) DB	EAT (F) WB	LAT (F) DB	LAT (F) WB	AAT (°F)	IEER/ SEER2	REFRIG.	VOLTS	Ø	MCA	MOCP		
(E) RTU-1	AAON/ RN-007-8-0-EA09-CJM	7	2,400	2,400	0.15	1.3	2.0	1,760	7.5	-	-	-	-	-	-	-	189.7	11.8	85.0	74.8	72.4	92.7	67.0	62.4	56.4	95	14.6/ -	R-410A	208	3	36	50	1,101	1,3,4,6,8,9, 13
(E) RTU-2	AAON/ RN-008-8-0-EB09-000	7.5	3,000	600	1.00	2.6	2.0	1,760	7.5	3,000	0.25	1.05	3	1,760	10.6	-	-	58.1	58.1	90.9	79.7	78.5	63.0	51.5	51.4	95	14.8/ 11.2	R-410A	208	3	54	70	1,292	2,3,5,6,7,9, 13
(E) RTU-3	AAON/ RQ-005-8-H-EB09-000	5	2,000	400	0.75	2.7	2.0	1,760	7.5	2,000	0.25	0.48	1	1,750	7.0	-	-	58.1	58.1	58.5	51.4	78.5	63.0	51.7	51.5	95	- / 13.4	R-410A	208	3	38	50	959	2,3,5,6,7,9, 13
(E) RTU-4	AAON/ RQ-003-8-H-K60E-12A	3	1,500	500	1.20	2.9	2.0	1,760	7.5	1,500	0.25	0.42	1	1,750	7.0	-	51.4	53.3	85.0	39.2	35.0	80.9	63.7	56.0	54.6	95	- / 13.4	R-410A	208	3	70	70	888	2,3,5,6,9,10, 13
(E) RTU-5	AAON/ RN-011-8-0-HB09-3FB	10	3,500	900	0.50	1.6	2.0	1,760	7.5	3,500	0.25	0.46	1	1,760	4.6	390	315.9	54.1	85.0	118.7	94.2	79.6	63.3	56.0	54.6	95	14.8/ 11.2	R-410A	208	3	55	70	2,047	2,3,4,6,11,13
(E) RTU-6	AAON/ RN-030-8-0-EB09-EJN	30	8,470	8,470	0.75	2.9	10.0	1,760	30.8	-	-	-	-	-	-	-	618.8	11.8	71.0	345.0	340.0	92.7	67.0	55.2	53.4	95	13.2/ -	R-410A	208	3	168	200	2,730	1,3,4,6,9,12, 13

1. UNIT IS LABORATORY MAKEUP AIR ONLY AND DOES NOT RETURN AIR.
2. UNIT WILL RETURN AIR FROM OCCUPIED SPACE, PROVIDE UNIT WITH POWER EXHAUST AND FULL ECONOMIZER COOLING CAPABILITIES. EXHAUST FAN CFM ON SCHEDULE IS FOR SIZING ECONOMIZER MODE, NOT MINIMUM OUTSIDE AIR BALANCE.
3. PROVIDE UNIT WITH MOTORIZED LOW-LEAKAGE DAMPERS ON OUTSIDE AIR AND EXHAUST (WHERE APPLICABLE).
4. UNIT WILL BE INSTALLED ON NEW INSULATED ROOF CURB, PROVIDE UNIT WITH CONNECTIONS THROUGH THE BOTTOM. MINIMUM 14" TALL CURB, COORDINATE HEIGHT OF CURB AND UNIT SO THAT RTU DOES NOT CONFLICT WITH EXISTING ROOFTOP ITEMS TO REMAIN.
5. UNIT WILL USE SIDE CONNECTIONS BUT REQUIRES NEW ROOF CURB. SUPPLY 14" (MINIMUM) ROOF CURB. SIDE CONNECTIONS SHALL BE MINIMUM OF 8" VERTICALLY ABOVE THE BASE OF THE CURB.
6. UNITS TO BE SUPPLIED BACNET CONTROLS COMPATIBLE WITH EXISTING FACILITY'S "METASYS" BAS. CONTROLS INCLUDE MINIMUM 2-STAGE COOLING, VARIABLE SPEED SUPPLY FAN, TEMPERATURE SENSORS FOR SUPPLY, OUTSIDE, AND RETURN AIR, FILTER DP. VFD/ECM ON FANS SHALL BE FACTORY INSTALLED AND WIRED.
7. DOES NOT REQUIRE HEAT. SERVED ZONES ARE HEATED BY PERIMETER STEAM RADIATORS.
8. PROVIDE UNIT WITH A STEAM COIL FOR HEAT, LOW PRESSURE STEAM SUPPLIED AT 5 PSI. STEAM COIL SHALL HAVE FREEZE PROTECTION WITH EITHER FACE/BYPASS OR TUBE-IN-TUBE VERTICAL DISTRIBUTION WITH STEAM IN THE INNER TUBE.
9. PROVIDE UNITS WITH FACTORY-WIRED CONVENIENCE OUTLET AND FACTORY DISCONNECT.
10. HEAT PUMP UNIT. AUXILIARY HEAT SOURCE IS ELECTRIC COIL SIZED FOR ENTIRE HEATING LOAD AT CONDITIONS LISTED. HEAT PUMP WILL ALWAYS BE PRIMARY HEAT. ELECTRIC RESISTANCE ONLY USED WHEN HEAT PUMP CANNOT MEET DISCHARGE AIR SETPOINT.
11. PROVIDE UNIT WITH A NATURAL GAS FURNACE FOR HEAT (MIN 10:1 TURNDOWN), GAS PRESSURE REGULATOR FIELD SUPPLIED AND INSTALLED FOR UNIT-SPECIFIC INLET PRESSURE REQUIREMENT.
12. PROVIDE UNIT WITH A HYDRONIC HEATING COIL, HOT WATER SUPPLIED AT 180F AND LEAVING AT 140F AT 31 GPM. 3-WAY CONTROL VALVE SUPPLIED BY CONTROLS CONTRACTOR.
13. PROVIDE WITH PRE-FILTER AND MERV 13 FILTER. UNIT SHALL COME WITH INSTALLED MAGNEHELIC GAUGE AND DIFFERENTIAL PRESSURE SENSOR.

DUCTWORK CONSTRUCTION AND LEAKAGE TESTING

SYSTEM	ROUND/ OVAL		RECTANGULAR		REMARKS
	PRESS. CLASS (IN WC)	DUCT SEAL CLASS	PRESS. CLASS (IN WC)	DUCT SEAL CLASS	
GENERAL EXHAUST DUCT UPSTREAM OF ETU	2	A	2	A	
GENERAL EXHAUST DUCT FROM ETU TO FAN	4	A	4	A	

FAN SCHEDULE

TAG	SERVES	MANUFACTURER/ MODEL	DESCRIPTION		FAN PERFORMANCE				MOTOR ELECTRICAL REQUIREMENTS				VFD YES/NO	UNIT WT. (LBS)	REMARKS
			TYPE	DRIVE	TOTAL CFM	ESP (" WC)	SPEED (RPM)	BHP	HP	VOLTS	Ø	FLA			
EF-10	WEST LAB GENERAL EXHAUST	GREENHECK/ VEKTOR-H-24	ROOFTOP UPBLAST LAB EXHAUST FAN	BELT	8,470	1.75	1,201	7.12	7 1/2	208	3	-	YES	1,405	1,2,3,4,5,6,7

1. PROVIDE WITH MINIMUM 14" ROOF CURB, BIRDSCREEN, AND FACTORY MOUNTED DISCONNECT.
2. FAN REQUIRES DISCHARGE STACK AT LEAST 10FT TALL AND MINIMUM NOZZLE DISCHARGE VELOCITY OF 3,000 FPM.
3. PROVIDE WITH BOTTOM-INLET (THROUGH-CURB) CONNECTION. FAN IS LOCATED OVER ROOF PENETRATION FOR CONNECTION TO EXISTING DUCTWORK.
4. PROVIDE UNIT WITH BYPASS AIR PLENUM CONFIGURATION, INCLUDING WEATHERHOOD AND BIRDSCREEN OVER BYPASS DAMPER.
5. PROVIDE WITH ISOLATION DAMPER AND ACTUATOR, EITHER FACTORY INSTALLED OR SHIPPED LOOSE FOR FIELD INSTALL.
6. PROVIDE NEMA 4X VFD WITH FAN FOR FIELD INSTALLATION, BASIS-OF-DESIGN: ABB ACH580 WITH NATIVE BACNET. COORDINATE WITH CONTROLS SUBCONTRACTOR.
7. PROVIDE PRESSURE SENSING PROBES FOR AIRFLOW MEASUREMENT. BASIS-OF-DESIGN GREENHECK SURE-AIRE.

TERMINAL UNIT SCHEDULE

TAG	ZONE	MANUFACTURER/ MODEL	UNIT SIZE	OUTLET SIZE	CFM MIN.	CFM MAX	MAX APD (IN WC)	REHEAT COIL MBH	REHEAT COIL EAT (˚F)	REHEAT COIL LAT (˚F)	REHEAT COIL GPM	REHEAT COIL EWT (˚F)	REHEAT COIL LWT (˚F)	REHEAT COIL ROWS	REMARKS
ETU-01	WEST LAB FIRST FLOOR	NAILOR/ D30X	16	28 x 12.5	1,500	4,000	1.25	-	-	-	-	-	-	-	1,2,3
ETU-02	WEST LAB SECOND FLOOR	NAILOR/ D30X	16	28 x 12.5	1,500	4,470	1.50	-	-	-	-	-	-	-	1,2,3

1. VARIABLE VOLUME EXHAUST AIR TERMINAL UNIT, AIRFLOW CONTROLLED BY ZONE DIFFERENTIAL PRESSURE READING.
2. FIELD MOUNTED DDC CONTROLS PROVIDED BY CONTROLS CONTRACTOR. PROVIDE UNIT WITH CONTROLS ENCLOSURE FOR FIELD-MOUNTED CONTROLS.
3. PROVIDE TU WITH SOLID METAL LINER.

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REGISTERED PROFESSIONAL ENGINEER 85380PE OREGON NOV. 10, 2011 JACI ANNE HANGAN

EXPIRATION DATE: 06/30/2027

HORTICULTURAL CROPS RESEARCH LAB

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USDA ARS LABORATORY EXHAUST

FINAL TURNOVER

REV	DATE	DESCRIPTION

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DATE 02/04/2026

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SHEET TITLE:
MECHANICAL SCHEDULES

SHEET NO:
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SHEET 15 OF 16

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SYMBOLS LEGEND

- EQUIPMENT CONNECTION
- 208V PANELBOARD

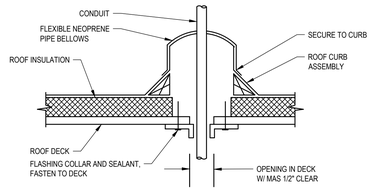
MECHANICAL EQUIPMENT SCHEDULE

Project No:241884

Notes:
A. FURNISHED AND INSTALLED BY DIVISION 23
B. FURNISHED BY DIVISION 23, INSTALLED BY DIVISION 26
C. FURNISHED AND INSTALLED BY DIVISION 26
D. FURNISHED BY OTHERS, INSTALLED BY DIVISION 26
E. FURNISHED AND INSTALLED BY OTHERS
F. NEMA 5-15R RECEPTACLE
G. NEMA 5-20R RECEPTACLE
H. NEMA 6-20R RECEPTACLE
I. NEMA 5-50R RECEPTACLE
J. DIRECT CONNECTION

Key:
FLA - FULL LOAD AMPS
MCA - MINIMUM CIRCUIT AMPS
VFD - VARIABLE FREQUENCY DRIVE
HP- HORSE POWER

UNIT ID	DESCRIPTION	LOCATION	VOLTS	PHASE	HP	LOAD (KVA)	FLA	MCA	MOCP	BREAKER POLE	BREAKER AMPS	UNIT DISCONNECT POLE	UNIT DISCONNECT AMPS	UNIT DISCONNECT FUSE	UNIT DISCONNECT NOTES	WIRES PHASE NO.	WIRES PHASE SZ	WIRES GND SZ	WIRES CONDUIT SIZE	STARTER COMBO	STARTER FVNR	STARTER SOFT	STARTER VFD	STARTER NOTES	CONNECTION CORD AND PLUG	CONNECTION DIRECT CONNECT	CONNECTION CAPACITR	CONNECTION NOTES	SHORT CIRCUIT CURRENT (A)	CIRCUIT NUMBER	REMARKS
EF-10	EXHAUST FAN	ROOF	208	3	7.5	8.65	24.00	30.00	30	3	30	3	30			3	#10	#10	3/4"C							X				J:37,39,41	



1 ROOF PENETRATION
SCALE: NTS

GENERAL NOTES

A. ALL WORK SHALL COMPLY WITH THE CURRENT EDITION OF THE NEC AS ADOPTED BY THE STATE OF OREGON OR LOCAL AUTHORITY HAVING JURISDICTION.

B. NAMING CONVENTION IN USE AT FACILITY IS INCOMPLETE AND INCONSTANT. IGNORE TAGS PAINTED ON EXISTING MECHANICAL UNITS AND REFER TO TAGS ON THESE DRAWINGS FOR SCOPE. NEW UNITS SHALL FOLLOW THE NAMING CONVENTION LISTED IN THESE DOCUMENTS.

C. CONTRACTOR TO NOTIFY ENGINEER OF ANY EXISTING CONDITIONS THAT DO NOT MATCH DRAWINGS RELATED TO SCOPE OF WORK, AND ANY CODE VIOLATIONS FOUND DURING CONSTRUCTION.

KEY NOTES

1. PROVIDE NEW POWER FEED FOR NEW EXHAUST FAN AS SHOWN. REFER TO DETAIL 1/E001 FOR ROOF PENETRATION

PROJECT: USDA ARS Laboratory Exhaust — **PANEL: J**
Location: Hall 202 — Feed-Thru to: — Date: 2/3/2026

Ckt	Description	Phase	Amp	Poles	Notes	Ckt Totals
1	(E) RECEP HALL W 203	A	20	1		0.72
3	(E) RECEP HALL W 203	B	20	1		0.72
5	SPARE	C	20	1		
7	(E) RTU-5	A	70	3		6.60
9	-	B	-	-		6.60
11	-	C	-	-		6.60
13	SPARE	A	20	1		
15	SPARE	B	20	1		
17	SPARE	C	20	1		
19	(E) EF-4	A	20	1		0.90
21	(E) EF-5	B	20	1		0.90
23	(E) EF-6	C	20	1		0.90
25	(E) EF-7	A	20	1		0.90
27	(E) EF-8	B	20	1		0.90
29	(E) EF-9	C	20	1		0.90
31	SPARE	A	20	1		
33	SPARE	B	20	1		
35	SPARE	C	20	1		
37	**EF-10**	A	30	3	1	2.88
39	**-**	B	-	-		2.88
41	**-**	C	-	-		2.88
2	(E) REC TEELEPHONE	A	20	1		0.36
4	(E) REC HALL	B	20	1		0.90
6	(E) SMOKE DAMPER	C	20	1		1.08
8	(E) REC CONF ROOM	A	20	1		0.72
10	(E) WATER COOLER	B	20	1		0.54
12	(E) REC CONF ROOM	C	20	1		0.54
14	(E) REC CONF ROOM	A	20	1		0.54
16	(E) REC STORAGE 203	B	20	1		0.54
18	(E) REC STORAGE 204	C	20	1		0.54
20	SPARE	A	20	1		
22	(E) REC ROOF	B	20	1		0.40
24	(E) E 203 N. W/M RECEPT	C	20	1		0.90
26	(E) E 203 S. W/M RECEPT	A	20	1		0.90
28	(E) W 203 N. W/M RECEPT	B	20	1		0.90
30	(E) W 203 S. W/M RECEPT	C	20	1		0.90
32	SPARE	A	20	1		
34	SPARE	B	20	1		
36	SPACE	C		1		
38	(E) PANEL F	A	100	3		
40	-	B	-	-		
42	-	C				

Specifications	
Voltage (L-L):	208
Phase/Wire:	3PH / 4W
Bus Current Rating (Amps):	400
Bus Material:	Cu/Al
Short Circuit Current Rating (Amps)	22kA
Main Type:	MLO
Main Rating:	225
Neutral Type:	FULL
Mounting/Encl.: SURFACE	NEMA1

NEC Sections Used in Demand Calculations

Factor #	NEC Reference	Notes
1	TBL 220.44 Receptacles ND	1st 10k @100%, Remainder @50%
2	TBL 220.42 Apartments General Lighting	1st 20k@50%, 20-100k @40%, >100k @30%
3	430.24 Motors	Largest @125% Remainder @100%
4	210.19(A)1 Cont Loads	125%
5	Non-Cont Loads	100%
6	220.51 Heating	100%

Feeder Load Breakdown	Conn(KVA)	Dmd Fact
Non-Dwelling Receptacles	11.20	0.95
Dwelling General Illumination	0.00	0.00
Non-Continuous Lighting	0.00	1.00
Continuous Lighting	0.00	1.25
Exterior Lighting	0.00	1.25
Kitchen Appliances	0.00	1.00
Motors	33.85	1.00
Largest Motor (per phase)	6.60	0.25
Fixed Heating	0.00	1.00
Fixed Cooling	0.00	1.00
Non-Diversity Loads	0.00	1.00
Other	0.00	1.00

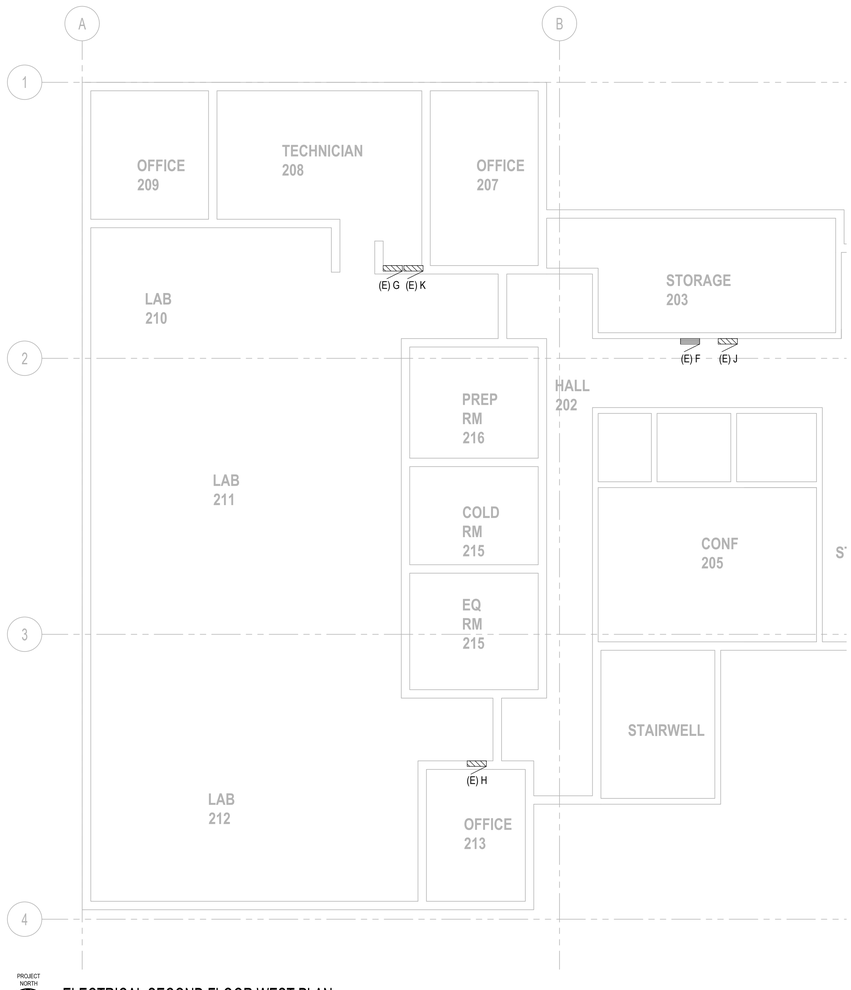
Connected Feeder Load Summary

	CONN KVA	CONN AMPS	NEC KVA	NEC AMPS
PHASE A:	14.52	120.94	16.00	133.23
PHASE B:	15.28	127.27	16.72	139.22
PHASE C:	15.24	126.93	16.68	138.91
TOTAL:	45.05	125.05	49.40	137.12

Notes: 1. INSERT 3 POLE 30A BREAKER. MATCH EXISTING PANELBOARD BRAND.

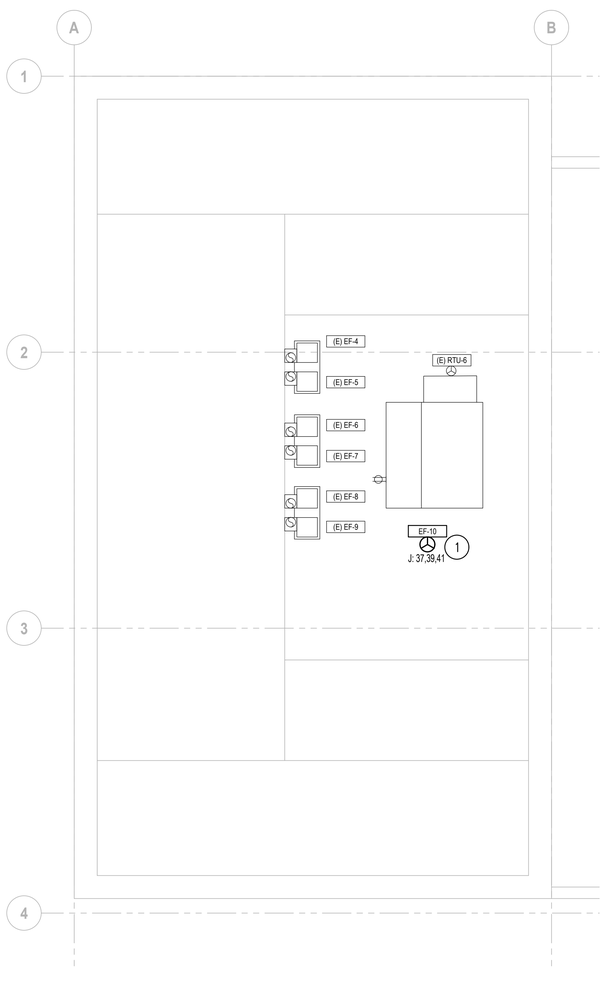
Panel Loading: ACCEPTABLE

JOB NAME:	CORVALLIS ARS LABORATORY EXHAUST	
JOB NUMBER:	230612	DATE: 6/14/2023
PANEL NAME:	MDB	LOCATION:
PEAK DEMAND recorded 6/6/2016 by permanently placed meter	=	278.5KVA
POWER FACTOR	/	1PF
APPARENT PEAK DEMAND	=	279KVA
ADJUSTMENT FACTOR	X	1.25
ADJUSTED PEAK DEMAND	=	348.13KVA
LOAD ADDED FROM PHASE 1		134.7KVA
LOAD ADDED THIS PROJECT		8.65KVA
NEW CALCULATED LOAD	=	491.5KVA
		208VOLTS
		1364AMPS
EXISTING EQUIPMENT CAPACITY	=	2000AMPS
NOTES:	NEW PANEL LOADING:	ACCEPTABLE



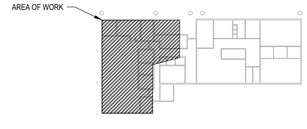
PROJECT NORTH

ELECTRICAL SECOND FLOOR WEST PLAN
SCALE: 3/16" = 1'-0"



PROJECT NORTH

ELECTRICAL ROOF WEST PLAN
SCALE: 3/16" = 1'-0"



PROJECT NORTH

KEY PLAN
SCALE: NTS

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ph 509.328.2994
CEI# 230612
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REGISTERED PROFESSIONAL ENGINEER — 97666PE — OREGON — DEC. 14, 2025 — ANDREW M YANOSY

RENEWS: 06-30-26

HORTICULTURAL CROPS RESEARCH LAB
3420 NW ORCHARD AVE., CORVALLIS, OR 97331

USDA ARS LABORATORY EXHAUST

FINAL TURNOVER

REV	DATE	DESCRIPTION

PROJ. NO. 230612
DRAWN AGS
CHECKED ADY
DATE 02/04/26

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SHEET TITLE:

ELECTRICAL LEGEND, SECOND FLOOR & ROOF WEST PLANS & SCHEDULES

SHEET NO:

E-001

SHEET 16 OF 16

P:\SPO\2JOBS\230612 CORVALLIS ARS AHU REPLACEMENT\00 DWGS\E\230612_E001 DWG,230612_E001 | SCOTT, ADDISON | LAST SAVED: February 2, 2026 | PLOT DATE: 2/3/26