NOIRLAB HVAC PROJECT
TUCSON MAIN FACILITY

950 NORTH CHERRY AVENUE
TUCSON, ARIZONA

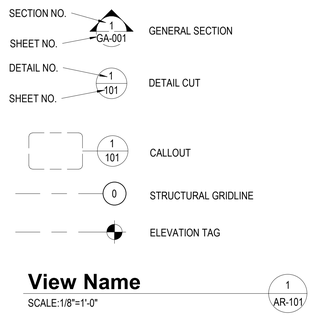
JULY 18, 2025 **BID DOCUMENTS**

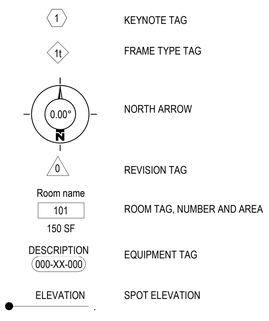
ABBREVIATIONS

AB	ANCHOR BOLT
ABC	AGGREGATE BASE COURSE
ACI	AMERICAN CONCRETE INSTITUTE
L	ANGLE (STRUCTURAL)
AFF	ABOVE FINISHED FLOOR
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE'
ARCH	ARCHITECT(URAL)
ARS	ARIZONA REVISED STATUTES
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
AVG	AVERAGE
BLDG	BUILDING
BOF	BOTTOM OF FOOTING
C/C	CENTER TO CENTER
CF	CUBIC FOOT
CJ	CONTROL JOINT
CL	CENTER LINE
CLR	CLEAR(ANCE)
COL	COLUMN
CONC	CONCRETE
CONF	CONFERENCE
CONT	CONTINUOUS
DEG	DEGREE
DEM	DEMOLISH, DEMOLITION
DIA	DIAMETER
DIM	DIMENSION
DWG(S)	DRAWING(S)
E, (E)	EXISTING TO REMAIN
EA	EACH
ELEC	ELECTRICAL
ELEV	ELEVATION
EOS	EDGE OF SLAB
EQ	EQUAL
EQUIP	EQUIPMENT
EXIST	EXISTING
EXT	EXTERIOR
FDN	FOUNDATION
F.E.	FIRE EXTINGUISHER
FF	FINISH FLOOR
FFE	FINISH FLOOR ELEVATION
F.G.	FINISHED GRADE
FT	FOOT, FEET
FTG	FOOTING
GALV	GALVANIZED
GL	GLASS, GLAZING
GWB	GYPSUM WALL BOARD
GYP	GYPSUM
HVAC	HEATING/VENTILATION/AIR CONDITIONING
INFO	INFORMATION
INT	INTERIOR
JB	JUNCTION BOX
JCT	JUNCTION
JT	JOINT
L	LENGTH
LAV	LAVATORY
LB	POUND
MAINT	MAINTENANCE
MAX	MAXIMUM
MECH	MECHANICAL
MIN	MINIMUM, MINUTES
MISC	MISCELLANEOUS
N	NEW
NEC	NATIONAL ELECTRIC CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NOM	NOMINAL
NTS	NOT TO SCALE
O.C.	ON CENTER(S)
OFOI	OWNER FURNISHED OWNER INSTALLED
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
PERP	PERPENDICULAR
REQ'D	REQUIRED
REQ'MENT	REQUIREMENT
RM	ROOM
RR	RESTROOM(S)
SCHD	SCHEDULE
SF	SQUARE FOOT (FEET)
SPECS	SPECIFICATIONS
SQ	SQUARE
STD	STANDARD
STR	STORAGE
STL	STEEL
SNP	
T.O.	TOP OF
T.O.BM	TOP OF BEAM
T.O.FTG	TOP OF FOOTING
T.O.S.	TOP OF STEEL
T.O.W.	TOP OF WALL
TV	TELEVISION
TYP	TYPICAL
UNF	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
UPC	UNIFORM PLUMBING CODE
UR	URINAL
UTIL	UTILITY(TIES)
VAR	VARIES
VCT	VINYL COMPOSITION TILE
VER	VERIFY
VERT	VERTICAL
VOL	VOLUME
W	WIDTH
W/	WITH
WD	WOOD
WH	WALL HUNG
W/O	WITHOUT
W/W	WALL TO WALL
WS	
YD	YARD

NOTE: NOT ALL ABBREVIATIONS SHOWN ABOVE ARE USED IN THIS SET OF DRAWINGS

SYMBOLS





SCOPE OF WORK

THIS PROJET IS INTENDED TO REPLACE THE EXISTING HYDRONIC 4-PIPE CHILLED WATER & HEATING WATER AIR HANDING UNITS WITH DX REFRIGERANT BASED UNITS. THE REPLACEMENT OF EXISTING AHU PNEUMATIC CONTROLS TO DIRECT DIGITAL CONTROLS (DDC) SHALL BE IMPLEMENTED ON THIS PROJECT.

ASBESTOS REMEDIATION

A. CONTRACTOR SHALL STOP WORK AND NOT DISTRUB EXISTING BUILDING MATERIALS IF ASBESTOS IS SUSPECTED.

B. THE AREA SUSPECTED OF CONTAINING HAZARDOUS MATERIALS SHALL BE MARKED-OFF WITH WARNING SIGNS TO ALERT PEOPLE OF THE PRESENCE OF ASBESTOS.

C. A CONTAINMENT AREA SHALL BE ESTABLISHED TO PREVENT THE SPREAD OF ASBESTOS FIBERS. CONTAINMENT OF THE HAZARDOUS AREA SHALL REQUIRE PLASTIC SHEETING AND SEALING TAPE AT A MINIMUM.

D. CONTRACTOR SHALL NOTIFY NOIRLAB PERSONNEL WITH THE DISCOVERY OF SUSPECTED ASBESTOS CONTAINING MATERIALS.

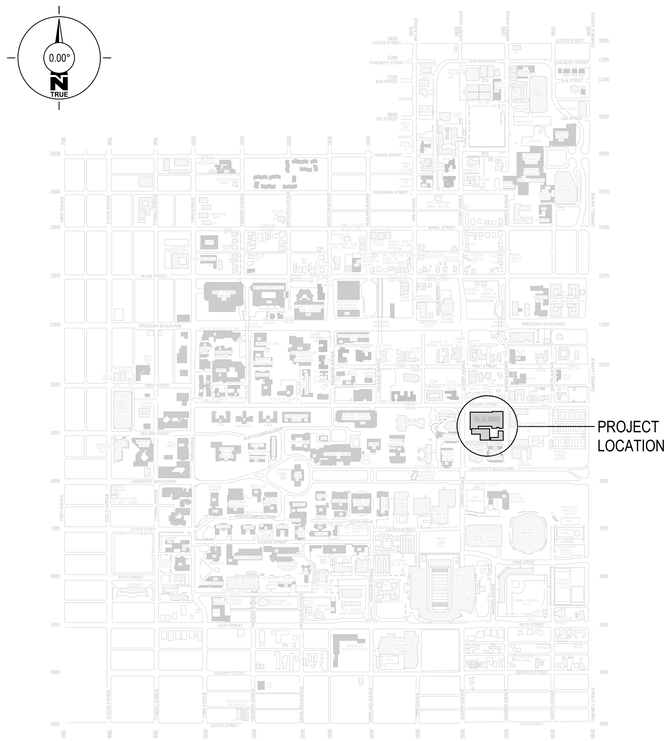
E. CONTRACTOR SHALL EMPLOY NOIRLAB'S PREFERRED ABATEMENT COMPANY (SOUTHWEST HAZARD CONTROL, INC.) FOR INSPECTION AND REMEDIATION.

F. CONTRACTOR SHALL NOT COMMENCE WORK IN SUSPECTED HAZARDOUS AREA UNTIL ABATEMENT COMPANY HAS DEEMED THE AREA SAFE FOR WORK.

APPLICABLE BUILDING CODE

2018 INTERNATIONAL BUILDING CODE
2018 INTERNATIONAL MECHANICAL CODE
2018 INTERNATIONAL PLUMBING CODE
2018 INTERNATIONAL FIRE CODE
2018 INTERNATIONAL ENERGY CONSERVATION CODE
2017 NATIONAL ELECTRICAL CODE
ALL LOCAL AMENDMENTS

LOCATION MAP



LOCATION MAP -
UNIVERSITY OF ARIZONA

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EP701 PARTIAL SINGLE LINE DIAGRAM

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: DH
Checked: EJG
Issue Date: 18 JUL 2025

GENERAL

COVER SHEET

Sheet Number
GI001

M3PN 240097

DATE: 7/17/2025 1:56:47 PM PATH: C:\Users\dhall\Documents\25 WORK\M3\Cherry\Revit\Replacement_dhall.rvt

I. GENERAL

A. GENERAL REFERENCE:
ALL WORK MUST CONFORM TO THE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE, 2024 EDITION, AND OSHA, LATEST EDITION.

B. THE GENERAL STRUCTURAL NOTES ARE AN INSTRUMENT OF THE STRUCTURAL DRAWINGS AND SHALL BE THOROUGHLY REVIEWED BY THE GENERAL CONTRACTOR AND ALL OTHER TRADES ASSOCIATED WITH THE PROJECT.

C. OWNER SHALL CONTRACT A QUALIFIED THIRD-PARTY INSPECTION AGENCY APPROVED BY THE AUTHORITY HAVING JURISDICTION. THE INSPECTION AGENCY SHALL PREPARE A QUALITY ASSURANCE AND TESTING PROGRAM IN ACCORDANCE WITH CHAPTER 17 OF THE IBC, LATEST EDITION.

D. SPECIAL INSPECTION IS REQUIRED FOR THE FOLLOWING WITH INSPECTION FREQUENCIES PER IBC 2018, TABLE 1705.2.3 AND TABLE 1705.3 W/ LOCAL AMENDMENTS.

	YES	NO	N/A
1. CONCRETE	☐	☐	☒
2. BOLTS INSTALLED IN CONCRETE	☒	☐	☐
3. FIELD WELDING	☒	☐	☐
4. HIGH STRENGTH BOLTING	☒	☐	☐
5. EPOXY SET ANCHORAGE	☒	☐	☐

E. DESIGN LOADS:
1. FLOOR LIVE LOAD - WEST BUILDING SKID - 40 PSF
2. FLOOR LIVE LOAD - EAST WING SKIDS - 40 PSF
3. BUILDING INFORMATION: OCCUPANCY CATEGORY 2
4. WIND LOADS: V_{ss} = 105 MPH (3 SECOND GUST)
   WIND LOAD IMPORTANCE FACTOR: I_W = 1.0
   EXPOSURE CATEGORY "C"
5. SEISMIC DESIGN:
   SEISMIC DESIGN CATEGORY "C"
   S_S = 0.28g ; S_1 = 0.077g
   S_{DS} = 0.28g ; S_{D1} = 0.14g
   SEISMIC IMPORTANCE FACTOR: I_E = 1.0
   C_S = 0.093g
   SOIL SITE CLASS D-DEFAULT
   BASIC SEISMIC FORCE RESISTING SYSTEM:
   STEEL SYSTEMS NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE (R = 3).
   DESIGN BASE SHEAR (ULTIMATE):
   3.3 KIPS NORTH - SOUTH
   3.3 KIPS EAST - WEST
   ANALYSIS METHOD: EQUIVALENT LATERAL FORCE PROCEDURE
6. SOILS REPORT: N/A

F. CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE MEANS OR METHOD OF CONSTRUCTION. CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO: BRACING, SHORING OF LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.

G. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS AND ANY EXISTING STRUCTURES PRIOR TO START OF CONSTRUCTION. RESOLVE ANY DISCREPANCY WITH ARCHITECT.

H. CONSTRUCTION MATERIAL SHALL BE SPREAD OUT IF PLACED ON FRAMED FLOORS OR ROOFS. LOAD SHALL NOT EXCEED THE CONSTRUCTION LIVE LOAD PER SQUARE FOOT.

I. WHERE REFERENCE IS MADE TO VARIOUS TEST STANDARDS FOR MATERIALS, SUCH STANDARDS SHALL BE THE LATEST EDITION AND/OR ADDENDUM.

J. ESTABLISH AND VERIFY ALL OPENINGS AND INSERTS FOR ARCHITECTURAL, MECHANICAL, ELECTRICAL AND PLUMBING WITH APPROPRIATE TRADES, DRAWINGS AND SUBCONTRACTORS PRIOR TO CONSTRUCTION.

K. OPTIONS ARE FOR CONTRACTOR'S CONVENIENCE. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHANGES NECESSARY IF CONTRACTOR CHOOSES AN OPTION AND CONTRACTOR SHALL COORDINATE ALL DETAILS.

L. NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS. WHERE NO SPECIFIC DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT.

M. TYPICAL DETAILS ARE NOT CUT ON DRAWINGS, BUT APPLY UNLESS NOTED OTHERWISE.

N. WHERE DISCREPANCIES OCCUR BETWEEN PLANS, DETAILS, GENERAL STRUCTURAL NOTES AND SPECIFICATIONS, THE STRICTER REQUIREMENTS SHALL GOVERN. MODIFICATION OF CERTAIN CONNECTION DETAILS AS PART OF THE SHOP DRAWING REVIEW PROCESS SHALL BE ANTICIPATED BY THE CONTRACTOR.

O. CONTRACTOR SHALL VERIFY ALL FIELD DIMENSIONS PRIOR TO ORDERING MATERIALS AND STARTING CONSTRUCTION. THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCIES OR INCONSISTENCIES.

P. ALL CONSTRUCTION BRACING AND SHORING MUST BE DESIGNED BY THE CONTRACTOR.

Q. INSPECTIONS REQUIRED FOR PERMITTING AS MANDATED BY IBC SECTION 109 AND NON-SPECIAL INSPECTIONS MANDATED BY THE MUNICIPALITY, COUNTY, OR AUTHORITY HAVING JURISDICTION WHICH ARE ALSO REQUIRED FOR BUILDING PERMITTING SHALL BE COORDINATED BY THE GENERAL CONTRACTOR. IF DISCREPANCIES OCCUR, NOTIFY THE ARCHITECT/STRUCTURAL ENGINEER OR RECORD FOR REVIEW.

R. ALL SUBSTITUTIONS SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER OF RECORD FOR REVIEW PRIOR TO CONSTRUCTION. CONTRACTOR TO SUBMIT DOCUMENTATION SEALED BY A LICENSED CIVIL OR STRUCTURAL ENGINEER TO DEMONSTRATE THAT THE PROPOSED SUBSTITUTION IS EQUAL TO THE SPECIFIED DESIGN. SUBSTITUTIONS MAY BE PERMITTED PROVIDED THEY ARE APPROVED BY THE STRUCTURAL ENGINEER OF RECORD IN WRITING.

II. EPOXY SET BOLTS OR DOWELS

A. EPOXY SET BOLTS OR DOWELS SHALL BE A THREADED ROD OR REINFORCING STEEL INSTALLED WITH THE "SET" ADHESIVE BY SIMPSON PER ICBO REPORT ESR-1772.

B. EXPANSION BOLTS SHALL BE "KWIK BOLT TZ" BY HILTI INSTALLED PER ICBO REPORT ESR-1917.

C. CONTRACTOR MAY NOT USE SUBSTITUTES FOR EPOXY SET ANCHORS WITHOUT WRITTEN PRIOR APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD.

D. FOR MINIMUM EMBEDMENT LENGTH SEE DETAILS. INSTALL ALL BOLTS AS OUTLINED IN MANUFACTURER'S SPECIFICATIONS, UTILIZING PROPER SIZE AND TYPE OF DRILL, CLEANING HOLE, DRIVING AND TIGHTENING BOLT.

E. SPECIAL INSPECTION OF ALL EPOXY SET ANCHORS IS REQUIRED.

F. LOCATION(S) OF EXISTING REINFORCEMENT SHALL BE VERIFIED AND AVOIDED PRIOR TO DRILLING FOR EMBEDMENT, U.N.O.

III. STRUCTURAL STEEL

A. STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE AISC STEEL CONSTRUCTION MANUAL, LATEST EDITION AND AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES. ALL INTERIOR AND EXTERIOR STEEL TO RECEIVE SHOP PRIME COAT AND SHOP FINISH COAT. FINISH COAT TO BE TOUCHED UP IN FIELD.

1. WIDE FLANGES: ASTM A992, Fy = 50 KSI
2. OTHER STRUCTURAL SHAPES AND PLATE: ASTM A36 Fy = 36 KSI. PROVIDE A572 PLATE Fy = 50 KSI WHERE INDICATED.
3. SQUARE OR RECTANGULAR HSS: ASTM A500, GR. B, Fy = 46 KSI
4. ROUND HSS: ASTM A500, GR. B, Fy = 42 KSI
5. STEEL PIPE: ASTM A53, GR. B, Fy = 35 KSI
6. BAR GRATING: 1-1/4"x3/16" AT 1-3/16" O.C.
7. HANDRAILS: 1-1/2" STANDARD PIPE WITH MITERED OR ROUNDED TURNS, U.N.O.
8. CONNECTIONS FOR STAIRWAYS AND LADDERS: ASTM A307, GRADE A, U.N.O.
9. TYPICAL BEAM CONNECTIONS: DOUBLE SHEAR MAXIMUM ROW OF 3/4" DIAMETER A325 BOLTS, AISC TABLE 10-1 IN CONJUNCTION WITH TABLE 10-2, CASE I.
10. WELDING OPERATIONS SHALL BE PERFORMED USING PREQUALIFIED JOINT DETAILS AS SPECIFIED IN AWS D1.1, LATEST EDITION. ELECTRODES: E70XX.
11. PRIME COAT - 2 MILS DRY-FILM THICKNESS (DFT) SHOP STANDARD APPLIED AFTER CLEANING IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS (POWER BRUSH CLEAN MINIMUM).
12. FINISH COAT - 3 MILS DRY-FILM THICKNESS SEMI-GLOSS ALKYD ENAMEL.

B. STEEL FABRICATION SHALL BE PERFORMED BY AN AISC CERTIFIED SHOP CATEGORY (STD) OR AS APPROVED BY LOCAL JURISDICTION, OR SHOP FABRICATION MUST COMPLY WITH THE REQUIREMENTS OF CHAPTER 17 OF IBC, LATEST EDITION.

C. REFER TO ARCHITECTURAL DRAWINGS FOR MISCELLANEOUS STEEL NOT SHOWN ON THE STRUCTURAL DRAWINGS.

IV. SHOP DRAWINGS

A. SHOP DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL ITEMS IN ADDITION TO ITEMS REQUIRED BY ARCHITECTURAL SPECIFICATIONS AND DEFERRED SUBMITTAL ITEMS. CONSTRUCTION DOCUMENTS SHALL NOT BE REPRODUCED FOR USE AS SHOP DRAWINGS.

B. THE CONTRACTOR SHALL REVIEW ALL SHOP DRAWINGS PRIOR TO SUBMITTAL. ITEMS NOT IN ACCORDANCE WITH CONTRACT DOCUMENTS SHALL BE FLAGGED UPON HIS/HER REVIEW. VERIFY ALL DIMENSIONS WITH ARCHITECT.

C. ANY CHANGES, SUBSTITUTIONS, OR DEVIATIONS FROM CONTRACT DOCUMENTS SHALL BE CLOUDED BY MANUFACTURER OR FABRICATOR. ANY OF THE AFOREMENTIONED WHICH ARE NOT CLOUDED OR FLAGGED BY SUBMITTING PARTIES, SHALL NOT BE CONSIDERED ALLOWED AFTER ENGINEER'S REVIEW, UNLESS NOTED ACCORDINGLY BY THE STRUCTURAL ENGINEER OF RECORD.

D. STRUCTURAL ENGINEER HAS THE RIGHT TO APPROVE OR DISAPPROVE ANY CHANGES TO CONTRACT DOCUMENTS AT ANY TIME BEFORE OR AFTER SHOP DRAWING REVIEW.

E. SHOP DRAWINGS DO NOT REPLACE THE CONTRACT DOCUMENTS. ITEMS OMITTED OR SHOWN INCORRECTLY AND ARE NOT FLAGGED BY THE STRUCTURAL ENGINEER OR ARCHITECT ARE NOT TO BE CONSIDERED CHANGES TO CONTRACT DOCUMENTS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE ITEMS ARE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

F. ADEQUACY OF ENGINEERING DESIGNS AND LAYOUTS PERFORMED BY OTHERS RESTS SOLELY WITH THE DESIGNING OR SUBMITTING PARTY.

G. THE REVIEW IS INTENDED FOR GENERAL CONFORMANCE WITH THE CONSTRUCTION DRAWINGS. RESPONSIBILITY FOR CORRECTNESS AND COMPLETENESS SHALL REST SOLELY WITH THE CONTRACTOR.

H. SHOP DRAWINGS WILL BE RETURNED FOR RESUBMITTAL IF MAJOR ERRORS ARE FOUND DURING REVIEW.

I. ALLOW 10 WORKING DAYS FOR REVIEW OF SHOP DRAWINGS BY THE STRUCTURAL ENGINEER. ALL SUBMITTALS WITH A REQUESTED REVIEW TIME LESS THAN 10 WORKING DAYS MAY BE RETURNED WITHOUT REVIEW AT THE ENGINEER'S DISCRETION.

V. ASBESTOS REMEDIATION

A. CONTRACTOR SHALL STOP WORK AND NOT DISTURB EXISTING BUILDING MATERIALS IF ASBESTOS IS SUSPECTED WITHIN THE AREA OF WORK.

B. THE AREA SUSPECTED OF CONTAINING HAZARDOUS MATERIALS SHALL BE MARKED-OFF WITH WARNING SIGNS TO ALERT PEOPLE OF THE PRESENCE OF ASBESTOS.

C. A CONTAINMENT AREA SHALL BE ESTABLISHED TO PREVENT THE SPREAD OF ASBESTOS FIBERS, CONTAINMENT OF THE HAZARDOUS AREA SHALL REQUIRE PLASTIC SHEETING AND SEALING TAPE AT A MINIMUM.

D. CONTRACTOR SHALL NOTIFY NOIRLAB PERSONNEL WITH THE DISCOVERY OF SUSPECTED ASBESTOS CONTANING MATERIALS.

E. CONTRACTOR SHALL EMPLOY NOIRLAB'S PREFERRED ABATEMENT COMPANY (SOUTHWEST HAZARD CONTROL, INC.) FOR INSPECTION AND REMEDIATION.

F. CONTRACTOR SHALL NOT COMMENCE WORK IN SUSPECTED HAZARDOUS AREA UNTIL ABATEMENT COMPANY HAS DEEMED THE AREA SAFE FOR WORK.

ABBREVIATIONS (NOT ALL ABBREVIATIONS SHOWN BELOW ARE USED IN THIS SET OF DRAWINGS)

&	AND
@	AT
A.B.	ANCHOR BOLT
AC	ASPHALT CONCRETE
ABC	AGGREGATE BASE COURSE
ACI	AMERICAN CONCRETE INSTITUTE
L	ANGLE (STEEL)
AFF	ABOVE FINISHED FLOOR
AFGE	ABOVE FINISHED GRADE ELEVATION
AF&PA	AMERICAN FOREST & PAPER ASSOCIATION
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AISI	AMERICAN IRON AND STEEL INSTITUTE
ALT	ALTERNATE
ALUM	ALUMINUM
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATELY
ARCH, ARCH'L	ARCHITECTURAL
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASD	ALLOWABLE STRESS DESIGN
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASPH	ASPHALT
ASTM	AMERICAN SOCIETY FOR TESTING & MATERIALS
AWC	AMERICAN WOOD COUNCIL
AWPA	AMERICAN WOOD-PRESERVERS' ASSOCIATION
AVG	AVERAGE
BLDG	BUILDING
BFFE	BELOW FINISHED FLOOR ELEVATION
BFGE	BELOW FINISHED GRADE ELEVATION
BLK(G)	BLOCKING
B	BEAM
BOB	BOTTOM OF BEAM
BOF	BOTTOM OF FOOTING
BOT	BOTTOM
BRBF	BUCKLING RESTRAINED BRACED FRAME
BRG	BEARING
C	CHANNEL (STEEL)
CBC	CALIFORNIA BUILDING CODE
CF	CUBIC FOOT
CIP	CAST IN PLACE
CJ	CONTROL JOINT
CJP	COMPLETE JOINT PENETRATION
CL	CENTER LINE
CLR	CLEAR(ANCE)
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CTR	CENTER
CVN	CHARPY V-NOTCH
CY	CUBIC YARD(S)
° OR DEG	DEGREE(S)
∅	DIAMETER
d	PENNY NAIL SIZE
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DEL	DELETE
DET	DETAIL
DETL	DETAIL(S)
DEMO	DEMOLISH
LL	DOUBLE ANGLE (STEEL)
DT	DOUBLE TEE (PRECAST)
DIAG	DIAGONAL
DIA	DIAMETER
DIM	DIMENSION(S)
DL	DEAD LOAD
DN	DOWN
DO	DITTO
DR	DOOR
DWG(S)	DRAWINGS
E	EASTING
E, (E)	EXISTING
EA	EACH
EBF	ECCENTRICALLY BRACED FRAME
EF, E/F	EACH FACE
EL, ELEV	ELEVATION
ELEC, ELEC'L	ELECTRICAL
EMBED	EMBEDDED, EMBEDMENT
EW, E/W	EACH WAY
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR
FDN	FOUNDATION
FF	EXTERIOR
FFE	FINISHED FLOOR ELEVATION
FG	FINISHED GRADE
FGE	FINISHED GRADE ELEVATION
FIN	FINISH(ED)
FLR	FLOOR
FS	FAR SIDE
FT	FOOT, FEET
FTG	FOOTING
GALV	GALVANIZED
GL	GRID LINE
GLB	GLULAM BEAM
GSN	GENERAL STRUCTURAL NOTES
GWB	GYPSUM WALL BOARD
GYP	GYPSUM
H	H SHAPE
HAS, HSA	HEADED ANCHOR STUD
HGT	HEIGHT
HORIZ	HORIZONTAL
HSS	HOLLOW STRUCTURAL SECTION
HVAC	HEATING/VENTILATING/AIR CONDITIONING
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
ILO	IN LIEU OF
INFO	INFORMATION
INT	INTERIOR
JCT	JUNCTION
JT	JOINT
K, KIPS	KILO POUNDS
KLF	KILO POUNDS PER LINEAR FOOT
KSF	KILO POUNDS PER SQUARE FOOT
L	LENGTH
LAST	LOWEST ANTICIPATED SERVICE TEMPERATURE
LAM	LAMINATE(D)
LB(S)	POUND(S)
LF	LINEAL FOOT/FEET
LFRS	LATERAL FORCE RESISTING SYSTEM
LLBB	LONG LEG BACK TO BACK
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LOC	LOCATION(S)
LRFD	LOAD RESISTANCE FACTOR DESIGN
LT	LIGHT
LW	LIGHT WEIGHT
LVL	LAMINATED VENEER LUMBER
LL	(LIVE LOAD)
M	M SHAPE (STEEL)
MACH	MACHINE
MAINT	MAINTENANCE
MAS	MASONRY
MAT'L	MATERIAL(S)
MAX	MAXIMUM
MB	MACHINE BOLTS
MC	MISCELLANEOUS CHANNEL
MCJ	MASONRY CONTROL JOINT
MDF	MEDIUM DENSITY FIBERBOARD
MECH, MECH'L	MECHANICAL
MED	MEDIUM
MF	MOMENT FRAME
MFR	MANUFACTURE(R)

ABBREVIATIONS (CONT.)

MT	STRUCTURAL TEE (STEEL)
#, NO.	NUMBER
N, (N)	NEW
N	THREADS INCLUDED
N	NORTHING
NA, N/A	NOT APPLICABLE
NIC	NOT IN CONTRACT
NOM	NOMINAL
NS	NEAR SIDE
NTS	NOT TO SCALE
O/	OVER
OC, O/C	ON CENTER
OCBF	ORDINARY CONCENTRICALLY BRACED FRAME
OD	OUTSIDE DIAMETER
OH	OPPOSITE HAND
OMF	ORDINARY MOMENT FRAME
OPP	OPPOSITE
OS, O/S	OVERSIZED
OSB	ORIENTED STRAND BOARD
%	PERCENT(AGE)
P	PIPE
P/C	PRECAST CONCRETE
PCI	PRECAST CONCRETE INSTITUTE
PJP	PARTIAL JOINT PENETRATION
PL	PLATE
PLB	PLUMBING
PLF	POUNDS PER LINEAR FOOT
PNL	PANEL(S)
PLY	PLYWOOD
PSF	POUNDS PER SQUARE FOOT
PSL	PARALLEL STRAND LUMBER
PTI	(POST-TENSIONING INSTITUTE)
RAD	RADIUS
REINF	REINFORCEMENT
REQ'D	REQUIRED
REQ'MENT	REQUIREMENT(S)
REF	REFER(ENCE)
REV	REVISION
RFI	REQUEST FOR INFORMATION
RO	ROUGH OPENING
S	S SHAPE (STEEL)
SC	SLIP CRITICAL
SCBF	SPECIAL CONCENTRICALLY BRACED FRAME
SCM	STEEL CONSTRUCTION MANUAL
SDM	SEISMIC DESIGN MANUAL
SCH, SCHED	SCHEDULE
SECT	SECTION
SER	STRUCTURAL ENGINEER OF RECORD
SF	SQUARE FOOT
SHT	SHEET
SIM	SIMILAR
SLBB	SHORT LEG BACK TO BACK
SLH	SHORT LEG HORIZONTAL
SLRS	SEISMIC LOAD RESISTING SYSTEM
SLV	SHORT LEG VERTICAL
SMF	SPECIAL MOMENT FRAME
STMF	SPECIAL TRUSS MOMENT FRAME
STRUC	STRUCTURAL
ST	STRUCTURAL TEE (STEEL)
SW	SHEAR WALL
TBD	TO BE DETERMINED
TL	(TOTAL LOAD)
T&B	TOP AND BOTTOM
TO	TOP OF
TOB	TOP OF BEAM
TOC	TOP OF CONCRETE
TOF	TOP OF FOOTING
TOM	TOP OF MASONRY
TOP	TOP OF PARAPET
TOS	TOP OF STEEL
TOW	TOP OF WALL
TS	TUBE STEEL
TYP	TYPICAL
UBC	UNIFORM BUILDING CODE
ULT	ULTIMATE
UNO	UNLESS NOTED OTHERWISE
UON	UNLESS OTHERWISE NOTED
UTIL	UTILITIES
VAR	VARIES
VER	VERIFY
VERT	VERTICAL
VOL	VOLUME
W, WF	WIDE FLANGE
W/	WITH
WDT	WIDTH
WGT	WEIGHT
W/O	WITHOUT
WT	WIDE FLANGE TEE (STEEL)
WP	(WORK POINT)
WWF	WELDED WIRE FABRIC
WSD	WORKING STRESS DESIGN
X	THREADS EXCLUDED
YD	YARD(S)

LEGEND (NOT ALL SYMBOLS SHOWN BELOW ARE USED IN THIS SET OF DRAWINGS)

SYMBOL	DESCRIPTION
STEEL BEAM / MOMENT CONNECTION	DENOTES MOMENT CONNECTION AND PLAN LOCATION(S)
BRACED FRAME / BF-3 / BRACED FRAME LOCATION / FRAME ID NUMBER	BRACED FRAME NUMBER AND PLAN LOCATION(S)
MOMENT FRAME / MF-5 / MOMENT FRAME LOCATION / FRAME ID NUMBER	MOMENT FRAME NUMBER AND PLAN LOCATION(S)
SPAN DIRECTION	CONCRETE OVER STEEL DECK
SPAN DIRECTION	STEEL DECK
SPAN DIRECTION	STEEL GRATING
SEE PLAN FOR SPAN	STEEL CHECKERED PLATE
SEE PLAN FOR SPAN	SMOOTH STEEL PLATE
SEE PLAN FOR SPAN	CONCRETE
	UNDISTURBED NATIVE SOIL
	AGGREGATE

KEYING SYMBOLS (NOT ALL SYMBOLS SHOWN BELOW ARE USED IN THIS SET OF DRAWINGS)

B / SFU401 — SECTION NUMBER / SHEET NUMBER	GENERAL BUILDING SECTION
11 / SFU503 — DETAIL NUMBER / SHEET NUMBER	DETAIL CUT
KEYNOTE NUMBER: 5	KEYNOTE

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Revisions

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STRUCTURAL STEEL

GENERAL STRUCTURAL NOTES SHEET 1

Sheet Number
SF101

M3PN 240097

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V. SPECIAL INSPECTIONS - STRUCTURAL STEEL BOLTING

REQUIRED SPECIAL INSPECTIONS FOR STRUCTURAL STEEL BOLTING

VERIFICATION AND INSPECTION	FREQUENCY		REFERENCE STANDARDS	REMARKS
INSPECTION OF BOLTING				
INSPECTION TASK PRIOR TO BOLTING	**QC**	**QA**		
1. MANUFACTURER'S CERTIFICATION AVAILABLE FOR FASTENER MATERIALS	O	P	AISC 360 N5.6 RCSC SPECIFICATION	
2. FASTENERS MARKED IN ACCORDANCE WITH ASTM REQUIREMENTS	O	O		
3. PROPER FASTENERS SELECTED FOR THE JOINT DETAIL (GRADE, TYPE, BOLT LENGTH IF THREADS ARE TO BE EXCLUDED FROM SHEAR PLANE)	O	O		
4. PROPER BOLTING PROCEDURE SELECTED FOR JOINT	O	O		
5. CONNECTION ELEMENTS, INCLUDING THE APPROPRIATE FAYING SURFACE CONDITION AND HOLE PREPARATION. IF SPECIFIED, MEET APPLICABLE REQUIREMENTS	O	O		
6. PRE-INSTALLATION VERIFICATION TESTING BY INSTALLATION PERSONNEL OBSERVED AND DOCUMENTED FOR FASTENER ASSEMBLIES AND METHODS USED	P	O		NOT APPLICABLE FOR SNUG-TIGHT JOINTS
7. PROPER STORAGE FOR BOLTS, WASHERS AND OTHER FASTENER COMPONENTS	O	O		
INSPECTION TASK DURING BOLTING	**QC**	**QA**		
1. FASTENER ASSEMBLIES OF SUITABLE CONDITION, PLACED IN ALL HOLES AND WASHERS (IF REQUIRED) ARE POSITIONED AS REQUIRED	O	O	AISC 360 N5.6 RCSC SPECIFICATION	1. FOR SNUG-TIGHT JOINTS, MONITORING OF THE INSTALLATION PROCEDURE IS NOT APPLICABLE. THE INSPECTOR NEED NOT BE PRESENT DURING THE INSTALLATION. 2. FOR PRETENSIONING JOINTS AND SLIP CRITICAL JOINTS, WHEN THE TURN-OF-NUT METHOD WITH MATCHMARKING TECHNIQUES, THE DIRECT-TENSION-INDICATOR METHOD, OR THE TWIST-OFF-TYPE TENSION CONTROL BOLT METHOD IS USED, MONITORING OF BOLT PRETENSIONING PROCEDURES SHALL BE APPLICABLE. THE INSPECTOR NEED NOT BE PRESENT DURING THE INSTALLATION. 3. FOR PRETENSIONED JOINTS AND SLIP CRITICAL JOINTS, WHEN CALIBRATED WRENCH METHOD OR TURN-OF-NUT METHOD WITHOUT MATCHMARKING, MONITORING OF BOLTS SHALL BE APPLICABLE. THE INSPECTOR SHALL BE ENGAGED IN HIS/HER ASSIGNED INSPECTION DURING THE INSTALLATION.
2. JOINT BROUGHT TO SNUG-TIGHT CONDITION PRIOR TO THE PRETENSIONING OPERATION	O	O		
3. FASTENER COMPONENT NOT TURNED BY THE WRENCH PREVENTED FROM ROTATING	O	O		
4. FASTENERS ARE PRETENSIONED IN ACCORDANCE WITH THE RCSC SPECIFICATION, PROGRESSING SYSTEMATICALLY FROM THE MOST RIGID POINT TOWARD THE FREE EDGES	O	O		
INSPECTION TASK AFTER BOLTING	**QC**	**QA**		
1. DOCUMENT ACCEPTANCE OR REJECTION OF BOLTED CONNECTIONS	P	P	AISC 360 N5.6 RCSC SPECIFICATION	

P - PERFORM THESE TASKS FOR EACH ITEM, JOINT, CONNECTION OR MEMBER.
O - OBSERVE THESE ITEMS ON RANDOM BASIS, OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS.

VI. SPECIAL INSPECTIONS - STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL

VERIFICATION AND INSPECTION	FREQUENCY		REFERENCE STANDARDS	REMARKS
	CONT.	PER.		
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 DECKING WELDS	–	X	AWS D1.3	
B. REINFORCING STEEL:				
1. VERIFICATION OF WELDABILITY OF REINFORCING STEEL OTHER THAN ASTM A706	–	X	AWS D1.4 ACI 318 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		

VII. SPECIAL INSPECTIONS - STRUCTURAL STEEL WELDING

REQUIRED SPECIAL INSPECTION OF WELDING

VERIFICATION AND INSPECTION	FREQUENCY		REFERENCE STANDARDS	REMARKS
INSPECTIONS OF WELDING				
INSPECTION TASK PRIOR TO WELDING	**QC**	**QA**		
1. WELDER QUALIFICATION RECORDS AND CONTINUITY RECORDS	P	O	AISC 360 N5.4 AWS D1.1	
2. WELDING PROCEDURE SPECIFICATIONS (WPS'S) AVAILABLE	P	P		
3. MANUFACTURER'S CERTIFICATION FOR WELDING CONSUMABLES AVAILABLE	P	P		
4. MATERIAL IDENTIFICATION (TYPE/GRADE)	O	O		
5. WELDER IDENTIFICATION SYSTEM	O	O		THE FABRICATOR OR ERECTOR, AS APPLICABLE, SHALL MAINTAIN A SYSTEM BY WHICH WHO HAS WELDED A JOINT MEMBER CAN BE IDENTIFIED
6. FIT-UP OF GROOVE WELDS (INCLUDING JOINT GEOMETRY) - JOINT PENETRATION - 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		
7. FIT-UP OF CJP GROOVE WELDS OF HSS T-, Y-, AND K JOINTS WITHOUT BACKING (INCLUDING JOINT GEOMETRY) - JOINT PENETRATIONS CLEANLINESS (CONDITION OF STEEL SURFACES) - DIMENSIONS (ALIGNMENT, ROOT OPENING, ROOT FACE, BEVEL) - CLEANLINESS (CONDITION OF STEEL SURFACES) - TACKING (TACK WELD QUALITY AND LOCATION)	P	O		
8. CONFIGURATION AND FINISH OF ACCESS HOLES	O	O		
9. FIT-UP OF FILLET WELDS - DIMENSIONS (ALIGNMENT, GAPS AT ROOT) - CLEANLINESS (CONDITION OF STEEL SURFACES) - TACKING (TACK WELD QUALITY AND LOCATION)	O	O		
10. CHECK WELDING EQUIPMENT	O	–		
INSPECTION TASK DURING WELDING	**QC**	**QA**		
1. PLACEMENT AND INSTALLATION OF STEEL HANDED STUD ANCHORS	P	P	AISC 360 N5.4 AWS D1.1	
2. CONTROL AND HANDLING OF WELDING CONSUMABLES - PACKAGING - EXPOSURE CONTROL	O	O		
3. NO WELDS OVER CRACKED TACK WELDS	O	O		
4. ENVIRONMENT CONDITIONS - WIND SPEED WITHIN LIMITS - PRECIPITATION AND TEMPERATURE	O	O		
5. WPS FOLLOWED - SETTING 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		
6. WELDING TECHNIQUES - INTERPASS AND FINAL CLEANING - EACH PASS WITHIN PROFILE LIMITATIONS - EACH PASS MEETS QUALITY REQUIREMENTS	O	O		
INSPECTION TASK AFTER WELDING	**QC**	**QA**		
1. WELDS CLEANED	O	O	AISC 360 N5.4 AWS D1.1	
2. SIZE, LENGTH AND LOCATION OF WELDS	P	P		
3. WELDS MEET VISUAL ACCEPTANCE CRITERIA - CRACK PROHIBITION - WELD/BASE-METAL FUSION - CRATER CROSS SECTION - WELD PROFILE - WELD SIZE - UNDERCUT - POROSITY	P	P		
4. ARC STRIKES	P	P		
5. K-AREA	P	P		WHEN WELDING DOUBLE PLATES, CONTINUITY PLATES OR STIFFENERS HAS BEEN PERFORMED IN THE K-AREA, VISUALLY INSPECT THE WEB K-AREA FOR CRACKS WITHIN 3 IN. OF THE WELD.
6. BACKING REMOVED AND WELD TABS REMOVED (IF APPLICABLE)	P	P		
7. REPAIR ACTIVITIES	P	P		
8. DOCUMENT ACCEPTANCE OR REJECTION OF WELDED JOINT OR MEMBER	P	P		

P - PERFORM THESE TASKS FOR EACH ITEM, JOINT, CONNECTION OR MEMBER.
O - OBSERVE THESE ITEMS ON RANDOM BASIS, OPERATIONS NEED NOT BE DELAYED PENDING THESE INSPECTIONS.

VIII. SPECIAL INSPECTIONS - CONCRETE

REQUIRED SPECIAL INSPECTIONS AND TESTS FOR CONCRETE CONSTRUCTION PER TABLE 1705.3 OF 2024 IBC

TYPE	CONTINUOUS SPECIAL INSPECTIONS	PERIODIC SPECIAL INSPECTIONS	REFERENCE STANDARDS	IBC REFERENCE
4. INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS[a]. A. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS.	X	–	ACI 318: 26.13..3.2	–
B. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 4A.	–	X	ACI 318: 26.13.3	

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STRUCTURAL STEEL

GENERAL STRUCTURAL NOTES SHEET 2

Sheet Number
SF102

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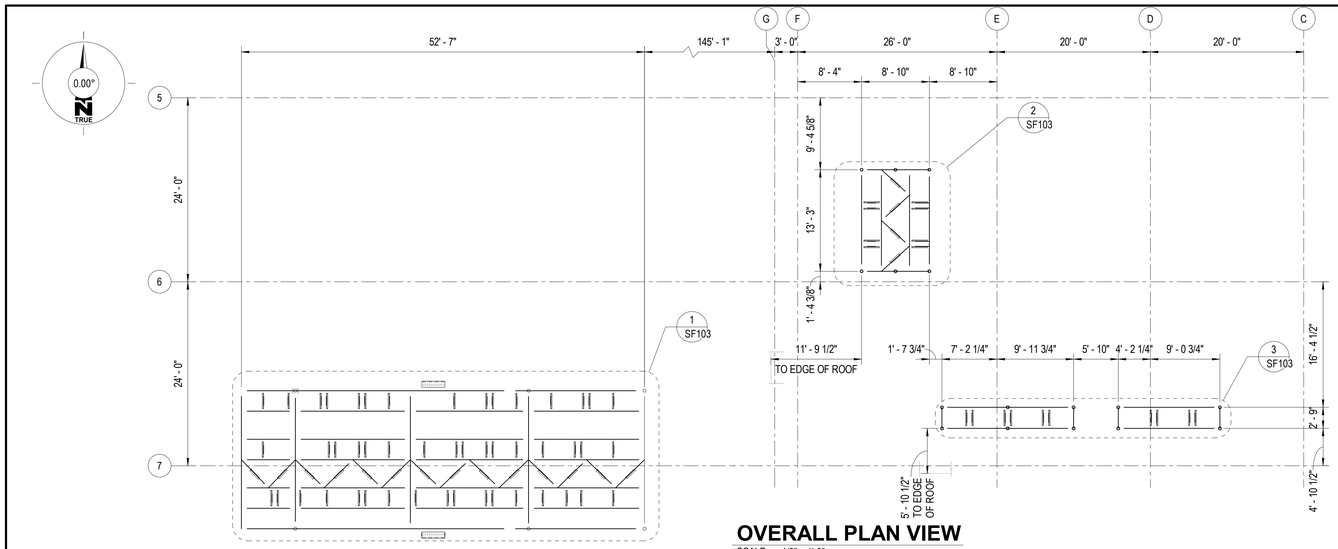
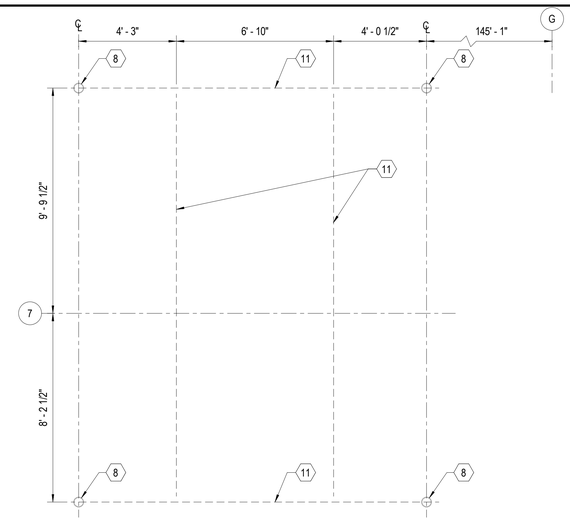
DATE: 7/18/2025 4:58:21 PM PATH: C:\Users\NCR\Documents\2021\240097.03 NOIRLAB HVAC Replacement_nocrdetail.rvt



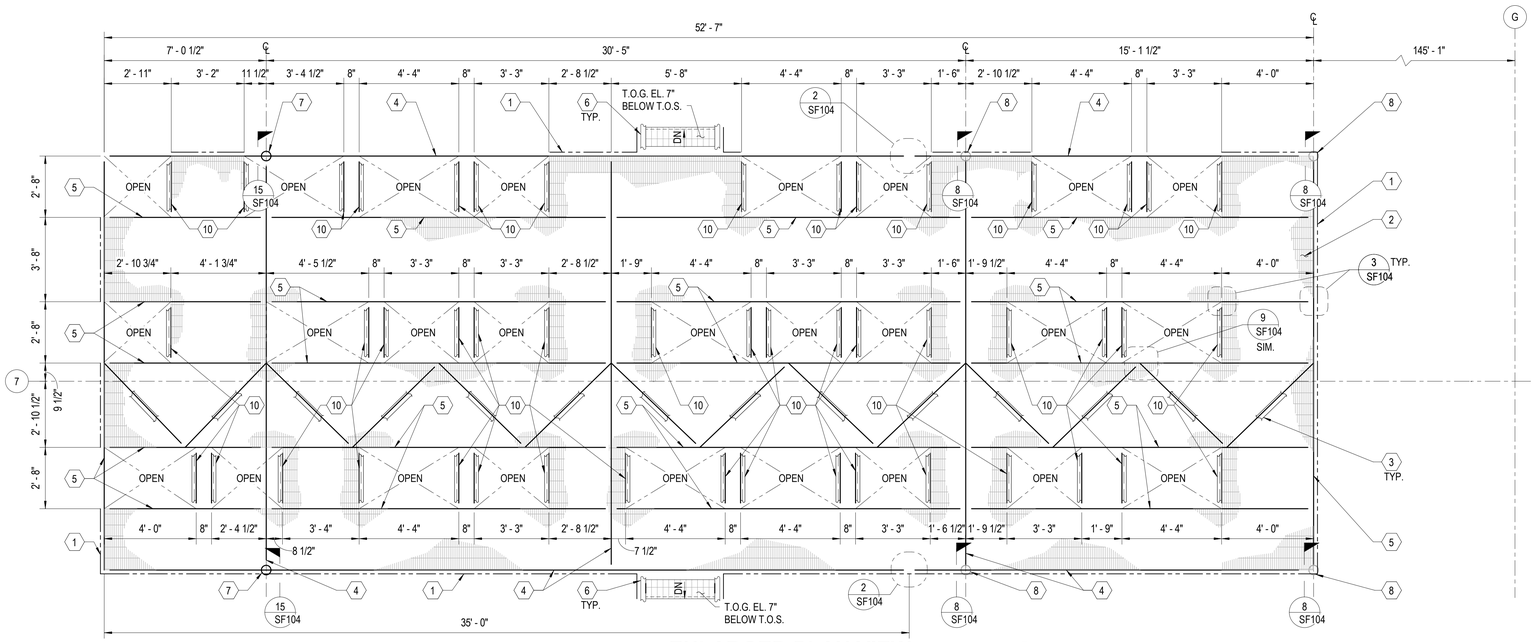
OVERALL PLAN VIEW

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



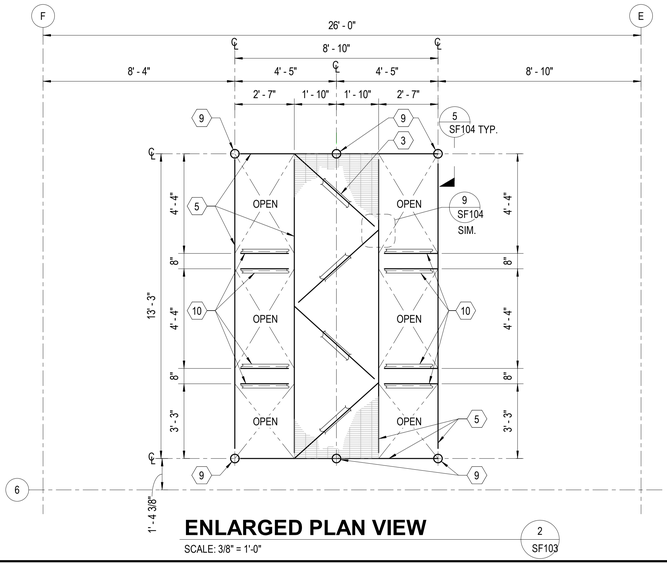
ENLARGED DEMO. PLAN VIEW

SCALE: 3/8" = 1'-0"



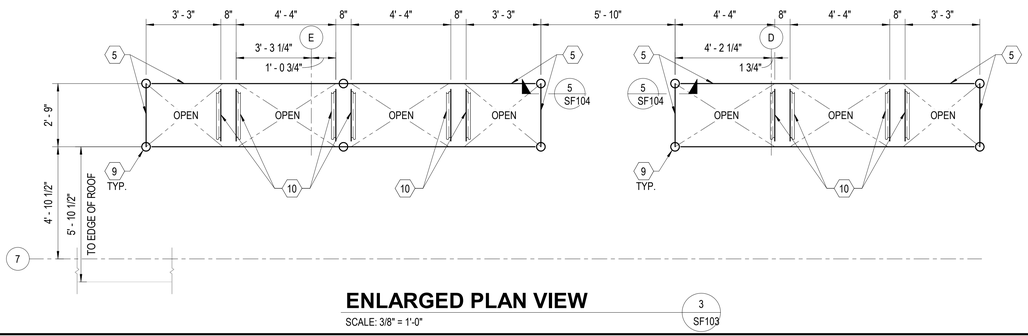
ENLARGED PLAN VIEW

SCALE: 3/8" = 1'-0"



ENLARGED PLAN VIEW

SCALE: 3/8" = 1'-0"



ENLARGED PLAN VIEW

SCALE: 3/8" = 1'-0"

KEYNOTES

1 GUARDRAIL, TYP. - SEE DETAIL 10/SF104.
2 1 1/4" STEEL GRATING, TYP.
3 L3x3x1/4, TYP.
4 W12x40 BEAM.
5 W8x18 BEAM.
6 C10x15.3 STEP SUPPORT.
7 HSS 5.0x3/16 COLUMN.
8 (E) PIPE COLUMN.
9 4" STD. PIPE.
10 C8x11.5 BEAM.
11 4- (E) BEAMS TO BE REMOVED, CUT DIRECTLY UNDER BEAMS BOTTOM FLANGE KEEPING EXISTING STUB INTACT.

GENERAL NOTES

A. CONTRACTOR SHALL VERIFY DIMENSIONS IN FIELD.

B. CONTRACTOR TO VERIFY EXISTING CONDITIONS ARE AS ASSUMED ON DRAWINGS. IF BUILDING COLUMNS ARE NOT A SINGLE COLUMN PROTUDING THE ROOF CREATING THE STUB, NOTIFY THE ENGINEER.

C. WHERE INDICATED, STEEL BEAMS SHALL BE DEMOLISHED FLUSH WITH EXISTING TOP OF STUB SURFACE, PRESERVING EXISTING STUB SUPPORT AS INDICATED IN THE PLANS.

D. CONTRACTOR SHALL COORDINATE DISPOSAL OF DEMOLITION MATERIAL WITH THE OWNER TO MINIMIZE IMPACT TO ONGOING OPERATIONS AND TO ENSURE PROPER DISPOSAL IN ACCORDANCE WITH THE SITE ENVIRONMENTAL POLICIES & PRACTICES.

E. DEMOLITION OF THE SPECIFIED BEAMS SHALL BE PERFORMED IN A MANNER THAT DOES NOT NEGATIVELY IMPACT THE INTEGRITY OF THE STRUCTURE AND EQUIPMENT NEAR THE WORK AREA. ANY DAMAGE THAT MAY OCCUR AS A RESULT OF THE DEMOLITION SHALL BE IMMEDIATELY REPORTED TO THE OWNER AND REPAIRED BY THE CONTRACTOR AT THE CONTRACTORS EXPENSE.

F. GRATING SHALL BE STANDARD RECTANGULAR PATTERN WELDED STEEL GRATING WITH 1 1/4" x 3/16" BEARING BARS SPACED 1 3/16" CENTER TO CENTER, UNLESS OTHERWISE NOTED. FIXED GRATING SHALL HAVE EVERY 6TH BAR TACK WELDED TO THE SUPPORTING STEEL. FASTEN REMOVABLE GRATING WITH SADDLE CLIPS.

G. GRATING SHALL EXTEND BEYOND OUTSIDE EDGE OF TOEBOARD. TRIM AS REQUIRED AT POST.

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

8' 4' 0' 8' 16'
1/8" = 1'-0"

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STRUCTURAL STEEL

PLAN VIEWS

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SF103

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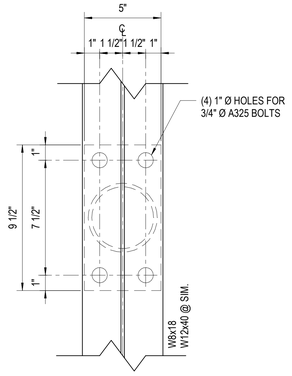
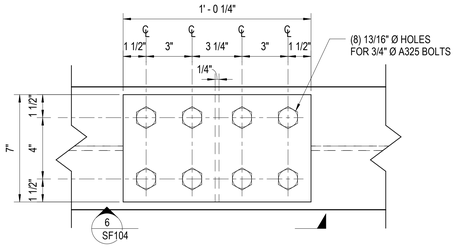
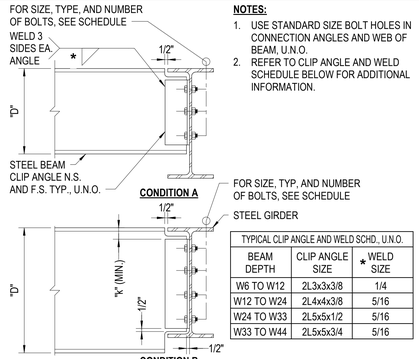


DETAIL
SCALE: 3" = 1'-0" — 1 SF104



NOTE:
(19) 3/4"Ø TOTAL BOLTS ON EACH SPLICE.

DETAIL
SCALE: 3" = 1'-0" — 2 SF103



NOTES:
1. USE STANDARD SIZE BOLT HOLES IN CONNECTION ANGLES AND WEB OF BEAM, U.N.O.
2. REFER TO CLIP ANGLE AND WELD SCHEDULE BELOW FOR ADDITIONAL INFORMATION.

TYPICAL CLIP ANGLE AND WELD SCHD., U.N.O.		
BEAM DEPTH	CLIP ANGLE SIZE	* WELD SIZE
W6 TO W12	2L3x3x3/8	1/4
W12 TO W24	2L4x4x3/8	5/16
W24 TO W33	2L5x5x1/2	5/16
W33 TO W44	2L5x5x3/4	5/16

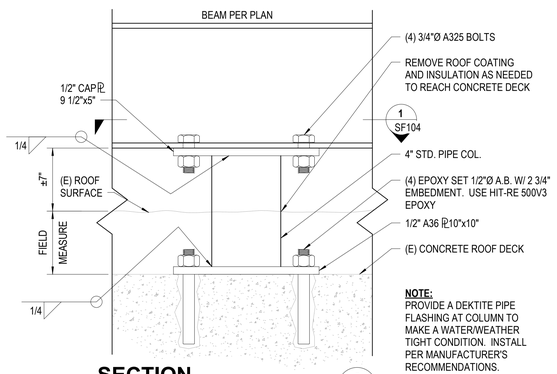
TYP. STEEL BEAM TO BEAM CONNECTION

DETAIL
SCALE:NTS — 3 SF103

NOMINAL BEAM DEPTH "D"	NUMBER OF 3/4"Φ ASTM, A325
6"	2
8"	2
10" - 14"	3
16"	4
18"	5
21"	6
24"	7
27"	7
30"	8
33"	9
36"	10
40"	11
44"	12

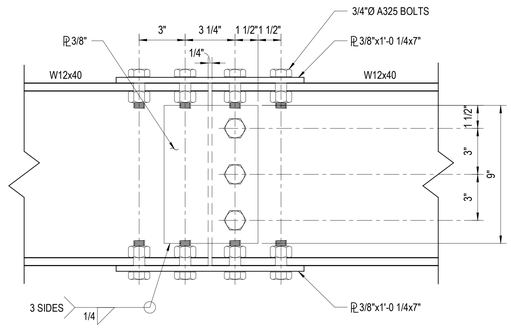
FRAMING NOTES:
1. THE TYPICAL STEEL BEAM TO STEEL COLUMN OR STEEL BEAM TO STEEL BEAM CONNECTION CONSISTS OF DOUBLE CLIP ANGLES w/ 3/4" Ø ASTM A325 BOLTS (U.N.O.).
2. BOLT HOLES MAY BE FABRICATED IN EITHER THE BEAM WEB OR COLUMN FLANGE USING STANDARD-SIZED HOLES OF SHORT-SLOTTED (HORIZONTAL) HOLES PER LATEST AISC SPECIFICATIONS.

BOLT SCHEDULE FOR TYPICAL STEEL CONNECTION

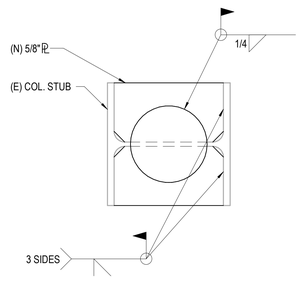


NOTE:
PROVIDE A DEKTITE PIPE FLASHING AT COLUMN TO MAKE A WATER/WEATHER TIGHT CONDITION. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

SECTION
SCALE: 3" = 1'-0" — 5 SF104

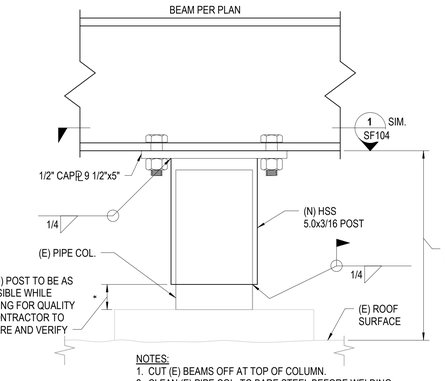


SECTION
SCALE: 3" = 1'-0" — 6 SF104



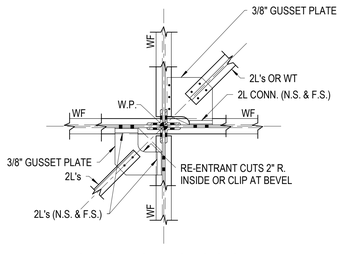
NOTES:
1. CUT OR GRIND (E) COL. TO BE LEVEL AND FLUSH WITH (N) PLATES.
2. CONTRACTOR TO VERIFY EXISTING STUB IS LONG ENOUGH FOR (N) STIFFENERS TO NOT BEAR ON ROOF.

DETAIL
SCALE: 3" = 1'-0" — 7 SF104



NOTES:
1. CUT (E) BEAMS OFF AT TOP OF COLUMN.
2. CLEAN (E) PIPE COL. TO BARE STEEL BEFORE WELDING.

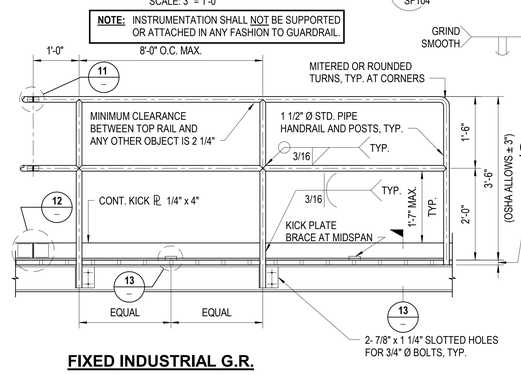
DETAIL
SCALE: 3" = 1'-0" — 8 SF103



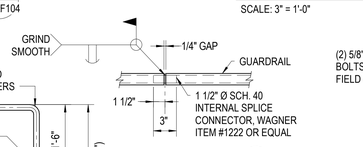
FOR SINGLE ANGLE BRACE, USE SINGLE CLIP L's. FOR DOUBLE ANGLE BRACE, USE DOUBLE CLIP L's.

HORIZONTAL BRACING AT BEAMS

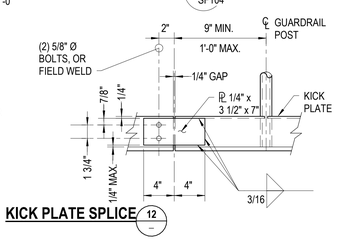
DETAIL
SCALE:NTS — 9 SF103



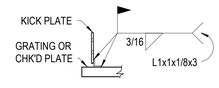
FIXED INDUSTRIAL G.R.



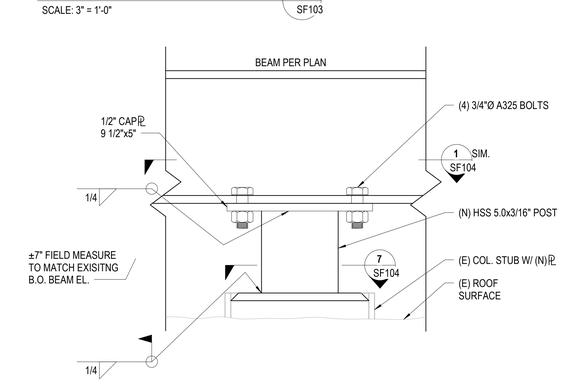
GUARDRAIL SPLICE 11



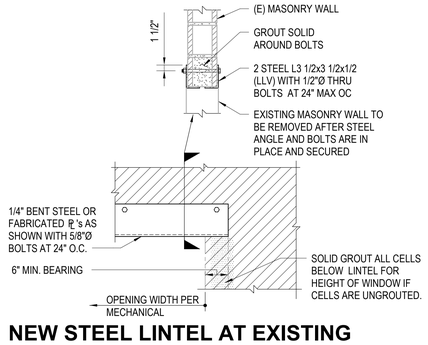
KICK PLATE SPLICE 12



KICK PLATE BRACE 13

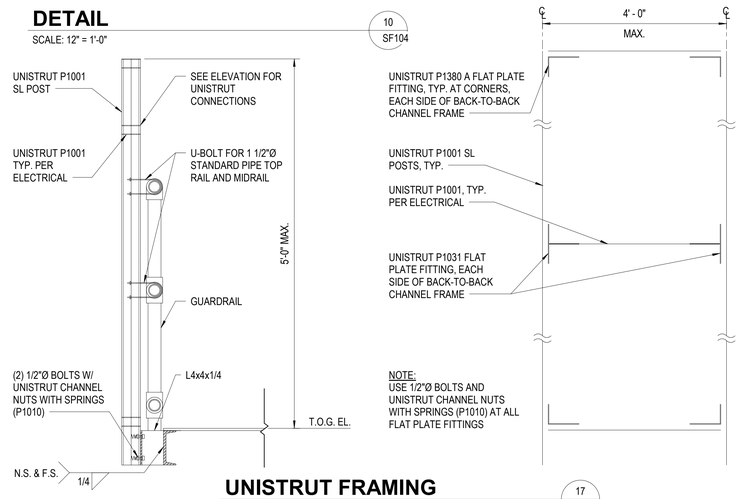


SECTION
SCALE: 3" = 1'-0" — 15 SF103



NEW STEEL LINTEL AT EXISTING MASONRY WALL
SCALE: 3/4" = 1'-0" — 16 SF104

DETAIL
SCALE: 12" = 1'-0" — 10 SF104



NOTE:
USE 1/2"Ø BOLTS AND UNISTRUT CHANNEL NUTS WITH SPRINGS (P1010) AT ALL FLAT PLATE FITTINGS

UNISTRUT FRAMING
SCALE: 3/4" = 1'-0" — 17 SF104

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

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Issue Date: 18 JUL 2025

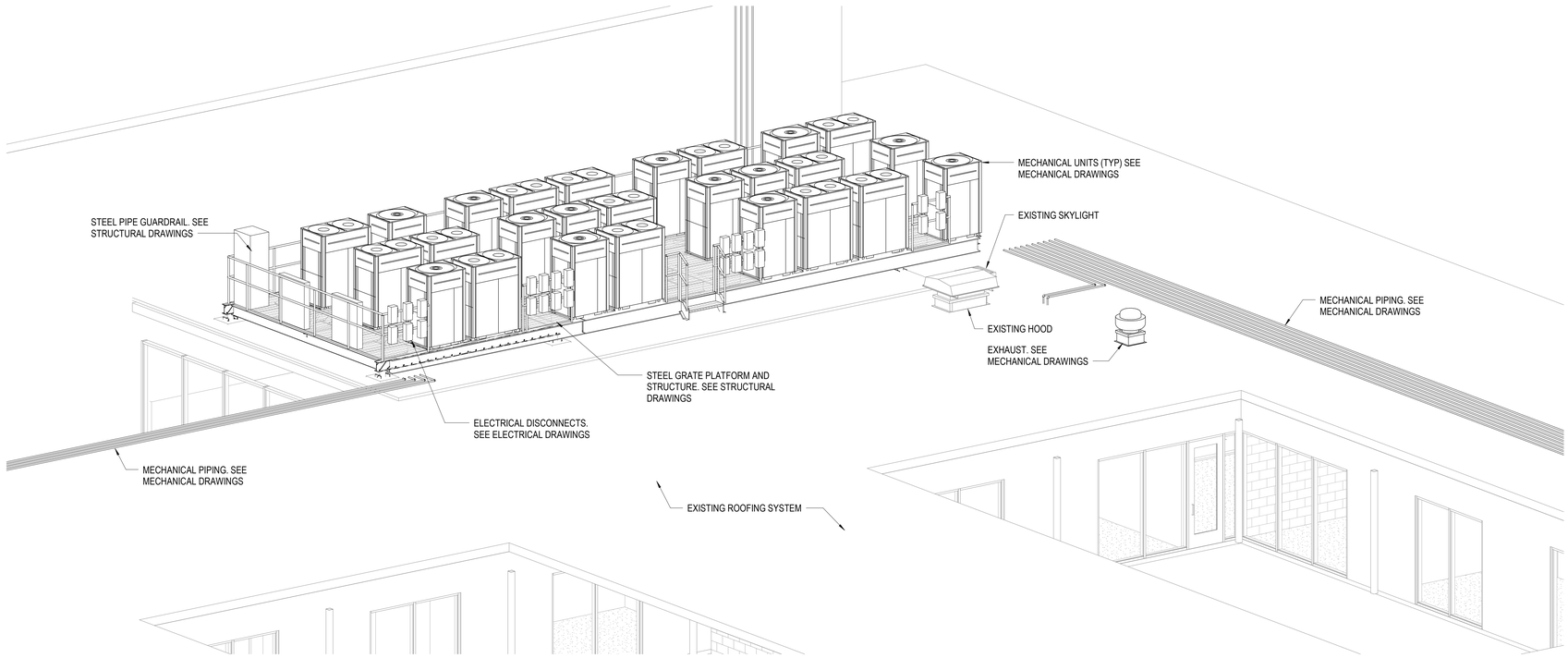
STRUCTURAL STEEL

SECTIONS AND DETAILS

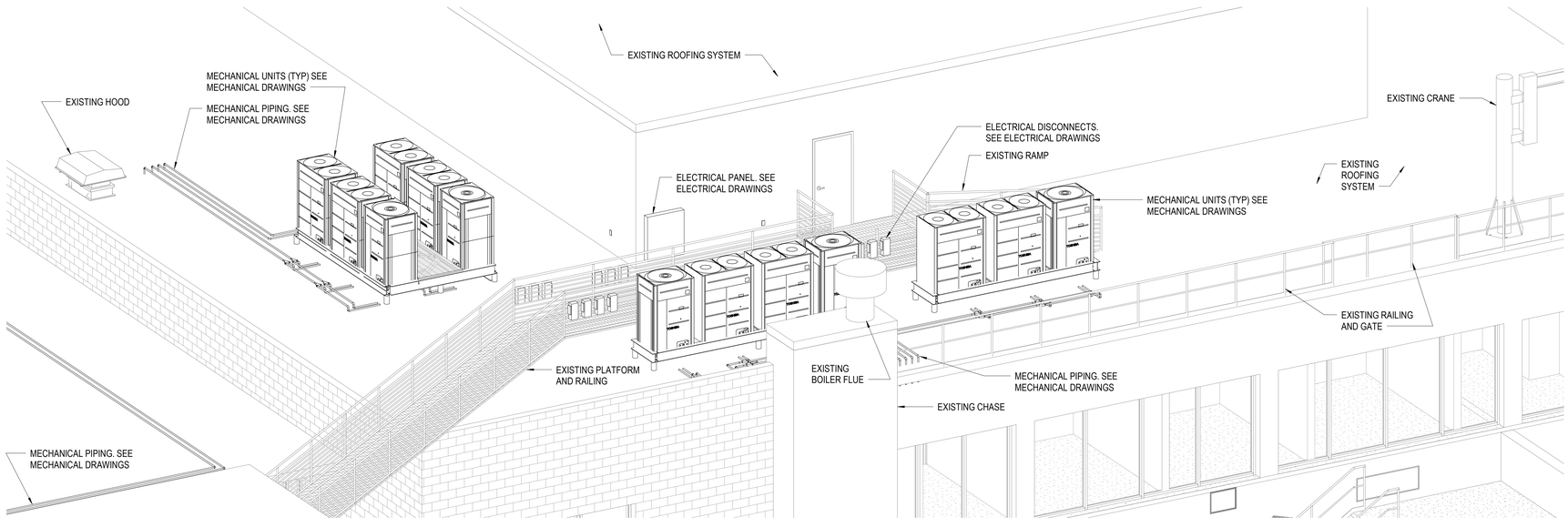
Sheet Number
SF104

M3PN 240097

DATE: 7/18/2025 8:51:11 AM PATH: C:\Users\NCR\Documents\M3_Current WIP\Documents\M3_2025\07 25\NOIRLab HVAC Replacement_Local.rvt



3D VIEW 1



3D VIEW 2

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ARCHITECTURAL

ROOF PLAN - 3D VIEW

Sheet Number
AR101

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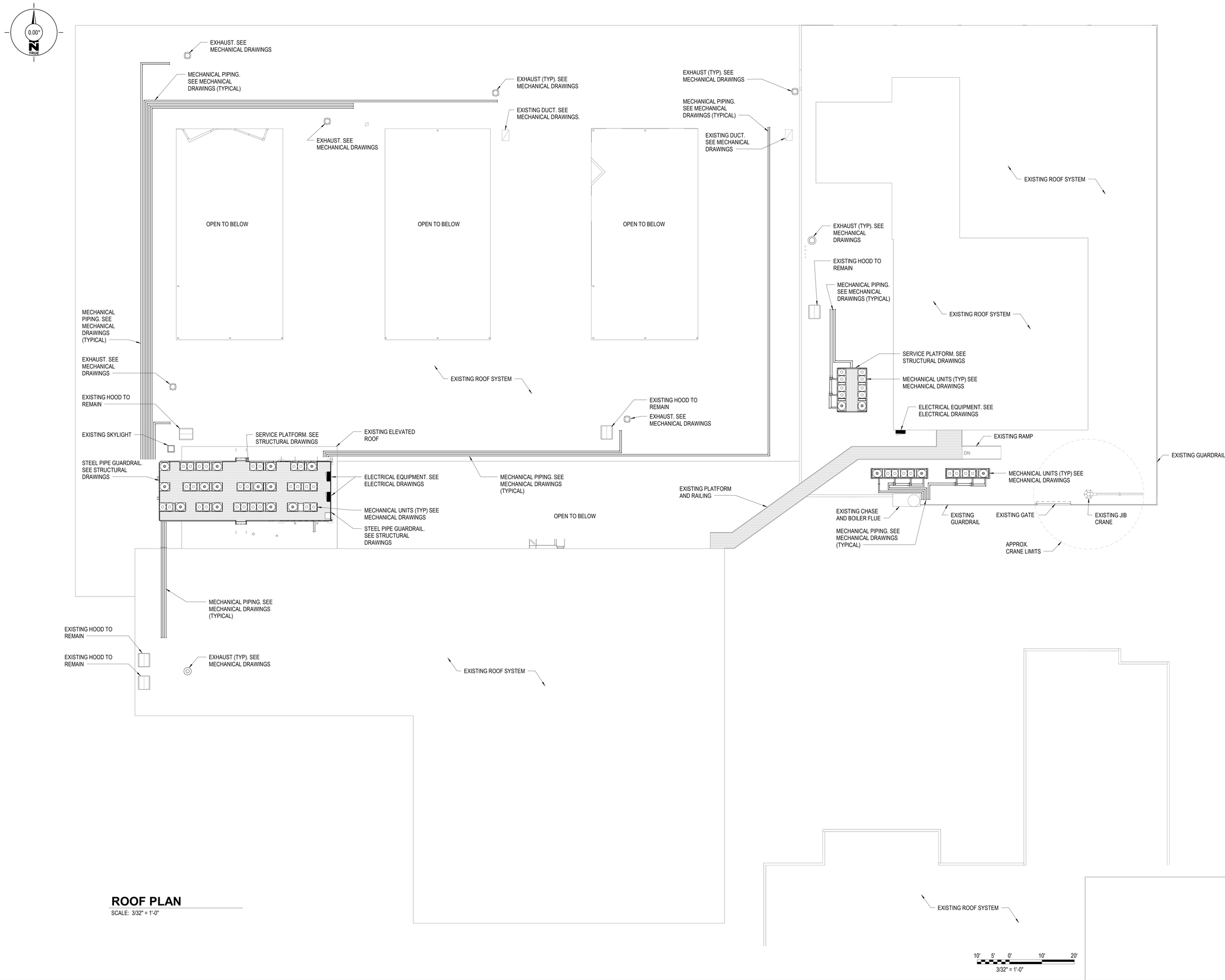

ROOF PLAN

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

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ARCHITECTURAL

ROOF PLAN

Sheet Number
AR102

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DATE: 7/17/2025 3:08:43 PM By: C:\Users\dhill\Documents\2210097 NOIRLab HVAC Replacement_dhill.rvt

ABBREVIATIONS

A	AIR
ABS	ABSOLUTE
ABV	ABOVE
AC	AIR CONDITIONER
AD	ACCESS DOOR
ADA	AMERICAN DISABILITIES ACT
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
ALT	ALTITUDE / ALTERNATE
AP	ACCESS PANEL
ARCH	ARCHITECTURAL
BBD	BOILER BLOW DOWN
BEL	BELOW
BFF	BELOW FINISHED FLOOR
BFW	BOILER FEED WATER
BLDG	BUILDING
BLR	BOILER
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
℄	CENTER LINE
C	CELSIUS
CAV	CONSTANT AIR VOLUME
CBBD	COUNTER-BALANCED BACKDRAFT DAMPER
CCW	COUNTER CLOCKWISE
CD	CONDENSATE DRAIN
CFCI	CONTRACTOR FURNISHED CONTRACTOR INSTALLED
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CLG	CEILING
CNTRL	CONTROLLER
CO	CLEAN OUT
COL	COLUMN
COMP	COMPRESSOR
CONC	CONCRETE
COND	CONDENSATE
CONN	CONNECTION OR CONNECT
COP	COEFFICIENT OF PERFORMANCE
CU	CONDENSING UNIT
CV	CONTROL VALVE
CW	COLD WATER
DB	DRY BULB TEMPERATURE
DCW	DOMESTIC COLD WATER
DEG	DEGREE
DEMO	DEMOLITION
DH	DUCT HEATER
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RETURN
DIA	DIAMETER
DN	DOWN
DP	DEWPOINT
DUC	DOOR UNDERCUT
DW	DISHWASHER
(E)	EXISTING
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EBB	ELECTRIC BASE BOARD
ECON	ECONOMIZER
ECU	EVAPORATIVE COOLING UNIT
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EFF	EFFICIENCY
EL	ELEVATION
EMCS	ENERGY MANAGEMENT CONTROL SYSTEM
ENCL	ENCLOSURE
EQUIP	EQUIPMENT
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
EWT	ENTERING WATER TEMPERATURE
F	FAHRENHEIT
FCO	FLOOR CLEANOUT
FCU	FAN COIL UNIT
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FFE	FINISHED FLOOR ELEVATION
FH	FIRE HOSE
FIXT	FIXTURE
FLEX	FLEXIBLE
FLR	FLOOR
FNPT	FEMALE NATIONAL PIPE THREAD
FP	FIRE PROTECTION
FSD	FIRE SMOKE DAMPER
F.U.	FIXTURE UNITS
FURN	FURNACE
FV	FACE VELOCITY
FW	FIRE WATER
GAL	GALLON
GCO	GRADE CLEANOUT
GPM	GALLONS PER MINUTE
GW	GREY WASTE
H	HEIGHT
HB	HOSE BIB
HC	HOSE CLOSET
HDPE	HIGH DENSITY POLYETHYLENE
HEPA	HIGH EFFICIENCY PARTICULATE AIR (FILTER)
HOA	HAND, OFF, AUTO
HP	HORSEPOWER
HVAC	HEATING, VENTILATION, AND AIR CONDITIONING
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HZ	FREQUENCY
IAQ	INDOOR AIR QUALITY
ID	INSIDE DIAMETER
IN WC	INCHES, WATER COLUMN
INCL	INCLUDE
INSUL	INSULATE
INV ELEV	INVERT ELEVATION
KW	KILOWATT
L	LITRE
L/S	LITRE PER SECOND
LAT	LEAVING AIR TEMPERATURE
LB	POUND
LVR	LOUVER
MAU	MAKE UP AIR HANDLING UNIT
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MBH	BTU/HR X 1,000,000
MIN	MINIMUM
MNPT	MALE NATIONAL PIPE THREAD
MTD	MOUNTED
MVD	MANUAL VOLUME DAMPER
MUA	MAKE UP AIR
(N)	NEW
NC	NOISE CRITERIA / NORMALLY CLOSED
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAD	OUTSIDE AIR DUCT
OAT	OUTSIDE AIR TEMPERATURE
OBD	OPPOSED BLADE DAMPER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
PD	PRESSURE DROP
PLUMB	PLUMBING
POC	POINT OF CONNECTION
POD	POINT OF DEMOLITION
PSIA	POUNDS PER SQUARE INCH, ABSOLUTE
PSIG	POUNDS PER SQUARE INCH, GAGE
PVC	POLYVINYL CHLORIDE
PW	POTABLE WATER
RA	RETURN AIR
RD	ROOF DRAIN
RENO	RENOVATION
RH	RELATIVE HUMIDITY
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RR	REST ROOM
RTD	RESISTIVE THERMAL DEVICE
RTU	ROOF TOP UNIT
S	SEWER
SA	SUPPLY AIR
SC	SENSIBLE CAPACITY
SCFM	STANDARD CUBIC FEET PER MINUTE
SD	SPLITTER DAMPER
SIM	SIMILAR
SM	SHEET METAL
SOV	SHUTOFF VALVE
SP	STATIC PRESSURE
SQ FT	SQUARE FEET
SS	STAINLESS STEEL / SERVICE SINK
STD	STANDARD
STP	STANDARD TEMPERATURE AND PRESSURE
T&P	TEMPERATURE & PRESSURE
TA	TRANSFER AIR
TAB	TEST ADJUST & BALANCE
TB	TERMINAL BOX
TC	TOTAL CAPACITY
TDH	TOTAL DYNAMIC HEAD
TDV	TRIPLE DUTY VALVE
TEMP	TEMPERATURE
TG	TRANSFER GRILLE
TGM	TOXIC GAS MONITORING
THRU	THROUGH
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
V	VENT
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VB	VACUUM BREAKER
VD	VOLUME DAMPER
VERT	VERTICAL
VTR	VENT THRU ROOF
W	WATTS / WIDTH / WASTE
W/	WITH
WBT	WET BULB TEMPERATURE
WCO	WALL CLEAN OUT
WG	WATER GAGE
WH	WATER HEATER
WHA	WATER HAMMER ARRESTOR
WV	WASTE VENT

SYMBOLS

FC — FLEX CONNECTION

M — MOTORIZED DAMPER (RECT. & ROUND)

MANUAL VOLUME DAMPER IN DUCTWORK

BLASTGATE DAMPER IN DUCTWORK

PARALLEL BLADE DAMPER

OPPOSED BLADE DAMPER

RADIUSED ELBOW

DUCT TAP WITH MANUAL VOLUME DAMPER

SUPPLY DUCT UP

RETURN DUCT UP

EXHAUST DUCT UP

MITER ELBOW WITH TURNING VANES

24"X36" — SHEET METAL DUCT (1ST FIGURE SIDE SHOWN)

26"X38" — INTERNALLY INSULATED SHEET METAL DUCT (SIZE SHOWN IS SHEETMETAL DIMENSIONS)

BLOWER OR FAN

SUPPLY DIFFUSER (4 WAY UNLESS NOTED OTHERWISE)

RETURN DIFFUSER/GRILLE

EXHAUST DIFFUSER/GRILLE

SUPPLY DIFFUSER (1 WAY)

WALL DIFFUSER

AD AD — ACCESS DOOR

8"ø (A) / 255 CFM — TOP: (DIFFUSER TYPE FROM SCHEDULE), NECKSIZE
BOTTOM: AIRFLOW @ DIFFUSER

T — THERMOSTAT

H — HUMIDISTAT

SP — STATIC PRESSURE SENSOR

SD — SMOKE DETECTOR

2" — STATIC PRESSURE

- — KEY NOTE

1 — REVISION TAG

POINT OF CONNECTION

AHXX — EQUIPMENT TAG

DUCTWORK SYSTEM DESIGNATION

DUCTWORK ABBREVIATIONS

OA	OUTSIDE AIR DUCTWORK
RA	RETURN AIR DUCTWORK
RELIEF	REFLIEF AIR DUCTWORK
SA	SUPPLY AIR DUCTWORK

DUCTWORK SUMMARY

SUMMARY OF AIR SYSTEM DUCT AND INSULATION REQUIREMENTS

AIR CONDITIONING UNITS, ALL:

1. DUCT MATERIAL: GALVANIZED.

2. PRESSURE CLASS:
   SUPPLY - FROM UNIT TO AIR DEVICE (+) PLUS 2 IN WG.
   RETURN - FROM AIR DEVICE TO UNIT (-) MINUS 2 IN WG.
   OUTSIDE AIR - FROM AIR DEVICE TO UNIT (-) MINUS 2 IN WG.

3. INSULATION: REFER TO SPECIFICATION FOR R-VALUE
   SUPPLY - WRAPPED WITH FIBERGLASS BLANKET WITH FOIL BACKING. (LINING FOR RECTANGULAR DUCTWORK)
   RETURN - WRAPPED WITH FIBERGLASS BLANKET WITH FOIL BACKING. (LINING FOR RECTANGULAR DUCTWORK)
   OUTSIDE AIR - WRAPPED WITH FIBERGLASS BLANKET WITH FOIL BACKING.

EXHAUST FANS, ALL:

1. DUCT MATERIAL: GALVANIZED.

2. PRESSURE CLASS:
   EXHAUST (-) MINUS 2 IN WG.

3. INSULATION: NONE.

NOIRLAB HVAC PROJECT
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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

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MECHANICAL

GENERAL NOTES, SYMBOLS AND ABBREVIATONS

Sheet Number
MH001

M3PN 240097

DATE: 7/17/2025 2:53:27 PM, FILE: K:\Active\19\Documents\24 0097 #FOR ed\HVAC\Replotted\ gmanda's version\MH1.rvt

MECHANICAL SPECIFICATIONS

GENERAL

1. PROVIDE ALL LABOR, EQUIPMENT, MATERIALS, SERVICE AND RELATED ITEMS NECESSARY TO COMPLETE THE INSTALLATION OF THE MECHANICAL AND PLUMBING EQUIPMENT INDICATED AND SPECIFIED.
2. ALL WORK DESCRIBED AND EXECUTED UNDER THIS SECTION SHALL COMPLY WITH THE GENERAL REQUIREMENTS ON SHEET GI001.
3. THIS SECTION VALID ONLY WHEN CONSIDERED IN TOTAL WITH OTHER CONTRACT DOCUMENTS.
4. NOTATIONS ON DRAWINGS WHICH EXCEED REQUIREMENTS OF THIS SECTION GOVERN WORK.
5. CROSS-REFERENCES ARE FOR CONVENIENCES OF READER AND THEIR INCLUSION IN OR OMISSION FROM ANY SECTION IN NO WAY LIMITS ITS SCOPE OR INTENT OF ANY CONTRACT DOCUMENTS.
6. ALL WORK SHALL COMPLY WITH THE FOLLOWING QUALITY CONTROL STANDARDS AS A BARE MINIMUM:

   NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS (NFPA)
   AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
   AMERICAN SOCIETY OF HEATING, REFRIGERATION & AIR CONDITIONING ENGINEERS (ASHRAE)
   SHEETMETAL & AIR CONDITIONING CONTRACTOR'S NATIONAL ASSOCIATION STANDARDS (SMACNA)
   AIR CONDITIONING AND REFRIGERATION INSTITUTE STANDARDS (ARI)
   - 2018 INTERNATIONAL BUILDING CODE
   - 2018 INTERNATIONAL MECHANICAL CODE
   - 2018 INTERNATIONAL PLUMBING CODE
   - 2018 INTERNATIONAL FIRE CODE
   - 2017 NATIONAL ELECTRICAL CODE
   - 2018 INTERNATIONAL ENERGY CONSERVATION CODE
7. COMPLY WITH ALL THE REQUIREMENTS AND AMENDMENTS OF ALL LOCAL AND STATE AGENCIES
8. MATERIALS AND EQUIPMENT SHALL BE STANDARD PRODUCTS OF A REPUTABLE MANUFACTURER REGULARLY ENGAGED IN MANUFACTURE OF THE SPECIFIED ITEM. WHERE MORE THAN ONE UNIT IS REQUIRED OF ANY ITEM, FURNISH BY THE SAME MANUFACTURER, EXCEPT WHERE SPECIFIED OTHERWISE. INSTALL MATERIAL AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. SHOULD VARIANCE BETWEEN PLANS AND SPECIFICATIONS OCCUR WITH THESE, CONTACT OWNER'S REPRESENTATIVE IMMEDIATELY FOR RESOLUTION.
9. DELIVER MATERIALS OR EQUIPMENT TO THE PROJECT IN THE MANUFACTURER'S ORIGINAL, UNOPENED, LABELED CONTAINERS, ADEQUATELY PROTECT AGAINST MOISTURE, TAMPERING OR DAMAGE FROM IMPROPER HANDLING OR STORAGE. DO NOT DELIVER MATERIALS TO THE JOB BEFORE THEY ARE READY FOR INSTALLATION, UNLESS ADEQUATE SECURITY IS PROVIDED.
10. OWNER'S REPRESENTATIVE MAY REQUIRE REMOVAL FROM THE PREMISES OF SUCH MATERIAL OR WORK AS, IN THE OPINION OF THE OWNER'S REPRESENTATIVE, IS NOT IN ACCORDANCE WITH SPECIFICATIONS. THE OWNER'S REPRESENTATIVE MAY ALSO REQUIRE SUBSTANTIATION, WITHOUT DELAY, OF SATISFACTORY WORK OR MATERIAL. OWNER'S REPRESENTATIVE HAS THE AUTHORITY TO STOP WORK WHENEVER SUCH STOPPAGE MAY BE NECESSARY TO ENSURE PROPER EXECUTION OF CONTRACT.
11. DRAWINGS ARE GENERALLY DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE OF WORK AND TO INDICATE GENERAL ARRANGEMENT OF EQUIPMENT, DUCTS, CONDUITS, PIPING AND FIXTURES. THEY ARE NOT INTENDED TO SHOW EVERY OFFSET OR FITTINGS OR EVERY STRUCTURAL DIFFICULTY THAT MAY BE ENCOUNTERED DURING INSTALLATION OF THE WORK. LOCATIONS OF ITEMS NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. EXACT LOCATIONS NECESSARY TO SECURE BEST CONDITIONS AND RESULTS MUST BE DETERMINED AT TIME OF CONSTRUCTION AND SHALL HAVE APPROVAL OF OWNER'S REPRESENTATIVE BEFORE BEING INSTALLED. COORDINATE WITH OTHER TRADES PRIOR TO INSTALLATION OF EQUIPMENT. DO NOT SCALE DRAWINGS.
12. IF SO DIRECTED BY OWNER'S REPRESENTATIVE, WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHERS TRADES OR FOR PROPER EXECUTION OF WORK.
13. INCLUDE MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR PROPER INSTALLATION AND OPERATION OF A SYSTEM, OR PIECE OF EQUIPMENT, THE SAME AS IF SPECIFIED OR SHOWN.
14. MAKE NOTES OF ANY CHANGES MADE IN LAYOUT AND INCORPORATE IN "RECORD" DRAWINGS.
15. ALL TESTS SHALL BE WITNESSED BY OWNER'S REPRESENTATIVE.
16. SUBMIT SHOP DRAWINGS OR LITERATURE FOR APPROVAL IN PDF FORMAT ON THE FOLLOWING ITEMS: AIR HANDLING UNITS, HVAC CONTROLS, HEATING COILS, DIFFUSERS, REGISTERS AND GRILLES, DUCT INSULATION AND ACCESS DOORS.
17. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY ADDED DESIGN OR INSTALLATION EXPENSE RESULTING FROM SUBSTITUTION OF EQUIPMENT.
18. THE CONTRACTOR SHALL PROVIDE ALL OPENINGS REQUIRED THROUGH THE ROOF OR WALLS.
19. CONTRACTOR SHALL FURNISH ANY MISCELLANEOUS ITEMS NORMALLY USED, SPECIFICALLY MENTIONED OR NOT, TO RENDER A COMPLETE INSTALLATION.
20. COORDINATE ALL FINAL THERMOSTAT LOCATIONS WITH OWNER PRIOR TO INSTALLATION.
21. INSTALL DUCTS, UNLESS OTHERWISE INDICATED, VERTICALLY AND HORIZONTALLY AND PARALLEL AND PERPENDICULAR TO BUILDING LINES; AVOID DIAGONAL RUNS.
22. COORDINATE WITH OWNER PRIOR TO ANY AIR SYSTEM SHUTDOWN, OBTAIN WRITTEN PERMISSION AT LEAST TWO DAYS PRIOR.
23. COORDINATE ALL ABOVE CEILING DUCTWORK WITH TRUSS CROSS MEMBERS AND EXISTING UTILITIES PRIOR TO DUCTWORK FABRICATION.
24. SALVAGE ANY DEMOLISHED EQUIPMENT, DAMPERS OR MONITORING DEVICES BACK TO OWNER.
25. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.
26. ALL MATERIALS OF CONSTRUCTION SHALL ADHERE TO PROJECT SPECIFICATIONS.
27. LABEL ALL UTILITIES WITH SERVICE AND FLOW DIRECTION PER PROJECT SPECIFICATIONS.

METAL DUCTS AND ACCESSORIES

1. CHANGES TO LAYOUT OR CONFIGURATION OF DUCT SYSTEM MUST BE SPECIFICALLY APPROVED IN WRITING BY ARCHITECT. PROVIDE SCALE DRAWING OF PROPOSED CHANGES.
2. DUCTWORK SIZES SHOWN ARE SHEET METAL DIMENSIONS, FLEXIBLE DUCT SIZES ARE CLEAR INSIDE DIMENSIONS. ALL RECTANGULAR ELBOWS SHALL HAVE SINGLE THICKNESS TURNING VANES CONSTRUCTED PER SMACNA STANDARDS. ALL RECTANGULAR BRANCH ENTRY/TAKEOFFS SHALL HAVE 45 DEG ENTRY FITTING. ALL ROUND ELBOWS SHALL HAVE A MINIMUM RADIUS TO DIAMETER RATIO OF 1.5.
3. COMPLY WITH NFPA 90A "INSTALLATION OF AIR CONDITIONING AND VENTILATION SYSTEMS" OR NFPA 90B "INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS". COMPLY WITH NFPA 96 "VENTILATION CONTROL AND FIRE PROTECTION OF COMMERCIAL COOKING OPERATIONS" CHAPTER 3 "DUCT SYSTEMS" FOR RANGE HOOD DUCTS, UNLESS OTHERWISE INDICATED. ALL COMPONENTS USED IN THE DUCT SYSTEM SHALL HAVE A MAXIMUM FLAME SPREAD INDEX OF 25 AND SMOKE DEVELOPED INDEX OF 50 WHEN TESTED ACCORDING TO ASTM E 84.
4. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES AND DUCT CONSTRUCTION METHODS, UNLESS OTHERWISE INDICATED. USE GALVANIZED SHEET STEEL, LOCK FORMING QUALITY COMPLYING WITH ASTM A 653/A 653 M AND HAVING G60 COATING DESIGNATION, DUCTS SHALL HAVE MILL-PHOSPHATIZED FINISH FOR SURFACES EXPOSED TO VIEW. ALL PANELS 18" AND WIDER SHALL BE CROSS-BROKEN UNLESS INTERNAL LINING IS APPLIED TO THE DUCT. IN LIEU OF CROSS-BREAKING, METAL OF ONE GAUGE HEAVIER THAN INDICATED ON THE TABLE MAY BE USED. ALL DUCTS SHALL BE FREE FROM VIBRATION UNDER THE STATIC PRESSURE OF THE SYSTEM.
5. REFER TO 'DUCT SUMMARY' FOR REQUIRED PRESSURE CLASSIFICATION OF DUCTWORK.
6. INSTALL DUCT LINER AS CALLED OUT ON DRAWINGS. LINER SHALL HAVE A THICKNESS OF 1 INCH AND THERMAL CONDUCTIVITY (K-VALUE) OF 0.26 AT 75 DEG F MEAN TEMPERATURE. ALL SURFACES EXPOSED TO THE AIR STREAM INCLUDING BUTT JOINTS SHALL BE COATED TO PREVENT EROSION OF GLASS FIBERS. LINER SHALL BE ATTACHED TO DUCT WITH LINER ADHESIVE AND MECHANICAL FASTENERS. EXPOSED EDGES OF DUCT LINER FACING AIR STREAM SHALL HAVE CHANNEL OR Z PROFILES TO PROTECT LEADING EDGE FROM EROSION.
7. INSULATE DUCTS AS CALLED OUT ON DRAWINGS. INDOOR DUCT USE R-6 MINIMUM, INORGANIC GLASS FIBER BLANKET INSULATION ASTM C 553 TYPE II, CLASS F-1, JACKETED WITH VAPOR BARRIER. INSULATION SHALL INCLUDE COVERAGE OF AIR DEVICE BACKPANS. OUTDOOR DUCT USE R-8 MINIMUM, INORGANIC GLASS FIBER BOARD INSULATION ASTM C 612 CLASS 2 SEMI RIGID JACKETED WITH VAPOR BARRIER. COVER EXTERIOR BOARD INSULATION WITH 0.024 INCH STUCCO EMBOSSED ALUMINUM METAL JACKET WITH 1/2" WIDE ALUMINUM BANDS PLACED 18 INCHES APART.
8. SECURE BOARD INSULATION TIGHT AND SMOOTH WITH AT LEAST 50 PERCENT COVERAGE OF ADHESIVE. INSTALL BANDS SPACED 12 INCHES APART. PROTECT INSULATION UNDER BANDS AND AT EXTERIOR CORNERS WITH METAL CORNER ANGLES OR SPEED WASHERS AND WELDED PINS SPACED 18 INCHES APART EACH WAY AND 3 INCHES FROM INSULATION JOINTS. FILL JOINTS, SEAMS, BREAKS, PUNCTURES AND CHIPPED EDGES WITH VAPOR BARRIER COMPOUND.
9. SECURE BLANKET INSULATION TIGHT AND SMOOTH. SECURE TO DUCT WITH LONG SIDES OR DIAMETERS SMALLER THAN 24 INCHES WITH BONDING ADHESIVE APPLIED IN 6 INCH WIDE TRANSVERSE STRIPS ON 12 INCH CENTERS. DUCTS WITH LONG SIDES OR DIAMETERS GREATER THAN 24 INCHES USE ANCHOR PINS SPACED 12 INCHES APART EACH WAY. APPLY BONDING ADHESIVE TO PREVENT SAGGING OF THE INSULATION. OVERLAP JOINTS 3 INCHES AND SEAL JOINTS, BREAKS, AND PUNCTURES WITH VAPOR BARRIER COMPOUND.
10. SEAL ALL JOINTS AND SEAMS AIR TIGHT; APPLY SEALANT TO MALE END CONNECTORS BEFORE INSERTION AND AFTERWARD TO COVER ENTIRE JOINT AND SHEET METAL SCREWS. SEALANT ON OUTDOOR DUCT SHALL BE RATED FOR SUCH USE.
11. APPLY INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS EXCEPT FIRE RATED ASSEMBLIES. TERMINATE INSULATION AT PENETRATIONS OF FIRE RATED ASSEMBLIES. SEAL INSULATION ENDS WITH VAPOR BARRIER COATING. SEAL AROUND PENETRATION WITH FIRE STOPPING OR FIRE RESISTANT JOINT SEALER.
12. INSTALL FIRE DAMPER UL 555 LABELED OR COMBINATION FIRE SMOKE DAMPERS UL 555S LABELED AT RATED PARTITIONS PER MANUFACTURERS INSTRUCTIONS. AN ACCESS DOOR SHALL BE PROVIDED AND CLEARLY LABELED.
13. VOLUME DAMPERS SHALL BE FACTORY FABRICATED WITH BLADES STIFFENED TO PREVENT FLUTTER, AND LOCKING HAND QUADRANT. MULTIPLE BLADE DAMPER SHALL BE OF OPPOSED BLADE DESIGN. LOCATE DAMPER A MINIMUM OF 5 FEET FROM AIR DEVICE.
14. INSTALL FLEXIBLE CONNECTORS AT ALL FANS AND FAN DRIVEN EQUIPMENT. CONNECTOR SHALL HAVE SUFFICIENT SLACK AS TO NOT TRANSMIT VIBRATION TO DUCT.
15. PAINT ALL VISIBLE SHEET METAL DUCTWORK BEHIND GRILLES AND REGISTERS FLAT BLACK.
16. HORIZONTAL AND VERTICAL DUCTS SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE WITH GALVANIZED IRON STRAPS OR RODS. THE SIZE AND SPACING OF HANGERS TO BE PER SMACNA OR AS REQUIRED BY LOCAL CODE.
17. INSULATED FLEXIBLE DUCT SHALL BE UL 181 CLASS 1, 2-PLY VINYL FILM SUPPORTED BY HELICALLY WOUND SPRING STEEL WIRE, FIBROUS GLASS INSULATION, METALLIZED VAPOR BARRIER FILM. DUCT SHALL BE RATED FOR 10 INCH POSITIVE AND MINUS 1 INCH NEGATIVE PRESSURE R AND A TEMPERATURE RANGE FROM MINUS 10 TO 250 DEG F. SUPPORT FROM STRUCTURE WITH GALVANIZED STEEL STRAP AND 12" LONG SHEET METAL SADDLE OR PER MANUFACTURER'S INSTRUCTION IF THEY ARE MORE STRINGENT. USE FITTINGS TO MAKE CHANGES OF DIRECTION GREATER THAN 45 DEG OR SUPPORT DUCT SO IT CREATES A MINIMUM CENTERLINE BEND RADIUS OF R/D = 1.5.
18. EXPOSED DUCT SHALL BE PAINTED PER ARCHITECTURAL REQUIREMENTS.
19. SUPPORT DUCTWORK PER SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE", TABLES 5-1 (5-1-M) AND 5-2 (5-2 M).

AIR HANDLING UNITS

1. UNIT SHALL BE ARI CERTIFIED AND LISTED. THE ENERGY EFFICIENCY RATIO (EER) OR COEFFICIENT OF PERFORMANCE (COP) MUST BE EQUAL TO OR GREATER THAN SHOWN ON EQUIPMENT SCHEDULE. A PERFORMANCE RUN SHOWING COIL CAPACITIES, FAN CURVE AND ELECTRICAL REQUIREMENTS INCLUDING WIRING DIAGRAM SHALL BE SUBMITTED.
2. GALVANIZED STEEL CASING WITH POLYESTER POWDER OR ENAMEL PAINT FINISH, REMOVABLE PANELS OR ACCESS DOORS WITH NEOPRENE GASKETS FOR ACCESS TO INTERNAL PARTS, MINIMUM ½ INCH THICK THERMAL INSULATION FOIL FACED ON INDOOR AIR SIDE, KNOCKOUTS FOR ELECTRICAL AND PIPING CONNECTIONS, EXTERIOR CONDENSATE DRAIN CONNECTION, AND LIFTING LUGS. CENTRIFUGAL FANS SHALL BE FORWARD CURVED WITH STEEL OR ALUMINUM WHEELS IN A STEEL FAN SCROLL, BELT OR DIRECTLY DRIVEN.
3. HERMETIC COMPRESSOR WITH INTEGRAL VIBRATION ISOLATORS, INTERNAL OVER CURRENT AND OVER TEMPERATURE PROTECTION, INTERNAL PRESSURE RELIEF AND CRANKCASE HEATER. COMPRESSOR SHALL ALSO BE PROTECTED BY HIGH AND LOW PRESSURE SWITCHES, AND SHORT CYCLE TIMER.
4. ELECTRIC RESISTANCE HEATER (WHERE USED) SHALL BE UL LISTED AND FACTORY MOUNTED AND WIRED. HEATING ELEMENT WIRE SHALL BE 80% NICKEL AND 20% CHROMIUM. MANUAL AND AUTOMATIC DISC TYPE THERMAL OVERLOAD PROTECTION SHALL BE PROVIDED. A DOOR INTERLOCKED DISCONNECT SWITCH SHALL BE PROVIDED.
5. PROVIDE ONE EXTRA SET OF FILTERS AND BELTS.
6. UNIT TO HAVE SINGLE POINT OF POWER CONNECTION AND 24V CONTROL POWER TRANSFORMER.

FAN COIL UNITS

1. THE FAN COILS SHALL MEET THE CAPACITY REQUIREMENTS AS LISTED IN THE SCHEDULE AND BE UL LISTED. A PERFORMANCE RUN SHOWING COIL CAPACITIES, FAN CURVE AND ELECTRICAL REQUIREMENTS INCLUDING WIRING DIAGRAM SHALL BE SUBMITTED.
2. THE CABINET SHALL BE OF GALVANIZED STEEL WITH INSULATED WALL OVER ENTIRE UNIT. REMOVABLE SIDE PANELS FOR ACCESS TO ALL INTERNAL COMPONENTS. INSULATED DRAIN PAN WITH CONDENSATE AND OVERFLOW CONNECTIONS. REFRIGERANT COILS WITH COPPER TUBES AND MECHANICALLY BONDED ALUMINUM FINS. CENTRIFUGAL FANS SHALL BE FORWARD CURVED WITH STEEL OR ALUMINUM WHEELS IN A STEEL FAN SCROLL, BELT OR DIRECTLY DRIVEN.
3. ELECTRIC RESISTANCE HEATER (WHERE USED) SHALL BE UL LISTED AND FACTORY MOUNTED AND WIRED. HEATING ELEMENT WIRE SHALL BE 80% NICKEL AND 20% CHROMIUM. MANUAL AND AUTOMATIC DISC TYPE THERMAL OVERLOAD PROTECTION SHALL BE PROVIDED. A DOOR INTERLOCKED DISCONNECT SWITCH SHALL BE PROVIDED.
4. FAN COIL SHALL HAVE A SINGLE POINT OF POWER CONNECTION AND 24V CONTROL POWER TRANSFORMER.
5. REFRIGERATION PIPING BETWEEN CONDENSING UNIT AND FAN COIL SHALL BE INSULATED WITH 1" PREFORMED MINERAL FIBER OR CLOSED-CELL FOAM INSULATION WITH VAPOR BARRIER (INDOOR) OR CLOSED-CELL FOAM INSULATION WITH VAPOR BARRIER AND ALUMINUM JACKET (OUTDOOR). MANUFACTURER'S REQUIREMENTS SHALL GOVERN.

EQUIPMENT

1. MECHANICAL CONTRACTOR TO VERIFY AND COORDINATE AVAILABLE VOLTAGE WITH ELECTRICAL CONTRACTOR PRIOR TO ORDERING EQUIPMENT.
2. SET A/C UNITS TO OUTSIDE AIR QUANTITIES AS SPECIFIED.
3. ALL HVAC EQUIPMENT (A/C UNITS, EXHAUST FANS, ETC.) SHALL BE U.L. LISTED.
4. ALL MOTORS SHALL BE INHERENTLY THERMALLY PROTECTED.
5. CONTRACTOR SHALL MOUNT ALL MECHANICAL EQUIPMENT LEVEL IN CONFORMANCE WITH MANUFACTURER'S INSTRUCTIONS.

REFRIGERANT LEAK DETECTOR

1. PROVIDE DUCT MOUNTED REFRIGERANT LEAK DETECTOR.
   MANUFACTURER: BAPI
   MODEL: BA/RLD-D-BB
   VOLTAGE: 24 VOLTS
   OPTIONS: BACNET COMPATIBLE, AUXILLARY CONTACTS

PIPING

1. HANGERS AND SUPPORTS:
   CLEVIS HANGERS ADJUSTABLE HEIGHT, MAXIMUM 10' C, 3/8" ROD UP TO 5" PIPE, WHERE EXTRA HANGER SUPPORTS ARE REQUIRED, THEY SHALL BE PROVIDED BY THE CONTRACTOR.
2. DRAINS:
   FURNISH AND INSTALL ALL CONDENSATE DRAINS, DRAINS SHALL BE TYPE M, COPPER WITH WROUGHT COPPER FITTINGS AND 95-5 SILVER SOLDER.

PIPING INSULATION

1. CONDENSATE DRAINS:
   INSULATE ALL CONDENSATE PIPING WITH 1/2" ARMAFLEX.

   REFRIGERANT PIPING:
   INSULATE PIPING PER EQUIPMENT MANUFACTURER'S RECOMMENDATION.

TESTING ADJUSTING AND BALANCING

1. BALANCER SHALL BE A CERTIFIED MEMBER OF NEBB OR AABC WITH A MINIMUM OF 5 YEARS OF EXPERIENCE. REPORTS SHALL BE GENERATED ON AABC OR NEBB APPROVED FORMS. SUBMIT CERTIFICATION ALONG WITH INSTRUMENT TYPE AND CALIBRATION, AND SAMPLE REPORT FORMS FOR SYSTEMS TO BE BALANCED.
2. CUT INSULATION ON DUCTS, PIPES AND EQUIPMENT CABINETS FOR INSTALLATION OF TEST PROBES TO THE MINIMUM EXTENT NECESSARY TO ALLOW ADEQUATE PERFORMANCE OF TEST AND BALANCE PROCEDURES. AFTER TESTING AND BALANCING, CLOSE PROBE HOLES AND PATCH INSULATION WITH NEW MATERIAL IDENTICAL TO THOSE REMOVED. RESTORE VAPOR BARRIER AND FINISH ACCORDING TO INSULATION SPECIFICATIONS.
3. MARK EQUIPMENT AND BALANCING DEVICES SETTINGS WITH PAINT OR SUITABLE, PERMANENT IDENTIFICATION MATERIAL, INCLUDING DAMPER-CONTROL POSITIONS, VALVE POSITION INDICATORS, FAN SPEED-CONTROL LEVERS, AND SIMILAR CONTROL DEVICES TO SHOW FINAL SETTINGS.
4. SET HVAC SYSTEM AIRFLOW RATES WITHIN THE FOLLOWING TOLERANCES:
   MAIN AIR DUCTS: PLUS OR MINUS 5 PERCENT.
   INDIVIDUAL TERMINALS: PLUS OR MINUS 10 PERCENT.
   VALUES NOT LISTED: TOLERANCES IN ACCORDANCE WITH ASHRAE STANDARD 111-2008.
5. PROVIDE FINAL REPORT IN PDF FORMAT, TABULATED AND DIVIDED INTO SECTIONS BY TESTED AND BALANCED SYSTEM. INCLUDE A CERTIFICATION SHEET IN SIGNED AND SEALED BY THE CERTIFIED TESTING AND BALANCING ENGINEER.

MECHANICAL GENERAL NOTES

1. ALL ABBREVIATIONS AND SYMBOLS MAY NOT APPLY TO THIS PROJECT.
2. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.
3. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS, UNO.
4. PROVIDE OPPOSED BLADE BALANCING DAMPER ON AIR DEVICES AT HARD CEILINGS AND WHERE NOTED ON PLANS.
5. COORDINATE ALL EXTERIOR WALL AND ROOF PENETRATIONS WITH STRUCTURE PRIOR TO DUCTWORK FABRICATION.
6. MAINTAIN ALL EXHAUST AIR DISCHARGES TO ATMOSPHERE 10'-0" MINIMUM CLEARANCE FROM OUTSIDE AIR INTAKES.
7. CONTRACTOR SHALL VERIFY FIELD CONDITIONS PRIOR TO BEGINNING WORK.

ASBESTOS REMEDIATION

A. CONTRACTOR SHALL STOP WORK AND NOT DISTURB EXISTING BUILDING MATERIALS IF ASBESTOS IS SUSPECTED WITHIN THE AREA OF WORK.

B. THE AREA SUSPECTED OF CONTAINING HAZARDOUS MATERIALS SHALL BE MARKED-OFF WITH WARNING SIGNS TO ALERT PEOPLE OF THE PRESENCE OF ASBESTOS.

C. A CONTAINMENT AREA SHALL BE ESTABLISHED TO PREVENT THE SPREAD OF ASBESTOS FIBERS, CONTAINMENT OF THE HAZARDOUS AREA SHALL REQUIRE PLASTIC SHEETING AND SEALING TAPE AT A MINIMUM.

D. CONTRACTOR SHALL NOTIFY NOIRLAB PERSONNEL WITH THE DISCOVERY OF SUSPECTED ASBESTOS CONTAINING MATERIALS.

E. CONTRACTOR SHALL EMPLOY NOIRLAB'S PREFERRED ABATEMENT COMPANY (SOUTHWEST HAZARD CONTROL, INC.) FOR INSPECTION AND REMEDIATION.

F. CONTRACTOR SHALL NOT COMMENCE WORK IN SUSPECTED HAZARDOUS AREA UNTIL ABATEMENT COMPANY HAS DEEMED THE AREA SAFE FOR WORK.

PROJECT BIDDING AND BID ALTERNATE

A. CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO SUBMITTING BID DOCUMENTS.

B. CONTRACTOR SHALL BID DOCUMENTS TO REMOVE UTILITIES TO INDICATED POINT AS SPECIFIED IN CONSTRUCTION DOCUMENTS.

C. CONTRACTOR SHALL PROVIDE AN ALTERNATE BID FOR REMOVAL OF ALL EQUIPMENT AND UTILITIES FOR THE FOLLOWING SYSTEMS IN ITS ENTIRETY:
   a. CT-01 CHILLER SYSTEM - ALL COOLING TOWER ABANDONED PIPING AND EQUIPMENT IN ITS ENTIRETY.
   b. CH-02 CHILLER SYSTEM - ALL CHILLER ABANDONDED PIPING AND EQUIPMENT IN ITS ENTIRETY.
   c. B-1 BOILER SYSTEM - ALL BOILER HOT WATER ABANDONDED PIPING AND EQUIPMENT IN ITS ENTIRETY.

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TUCSON MAIN FACILITY
BID DOCUMENTS
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MECHANICAL
NOTES AND SPECIFICATIONS

Sheet Number
MH002

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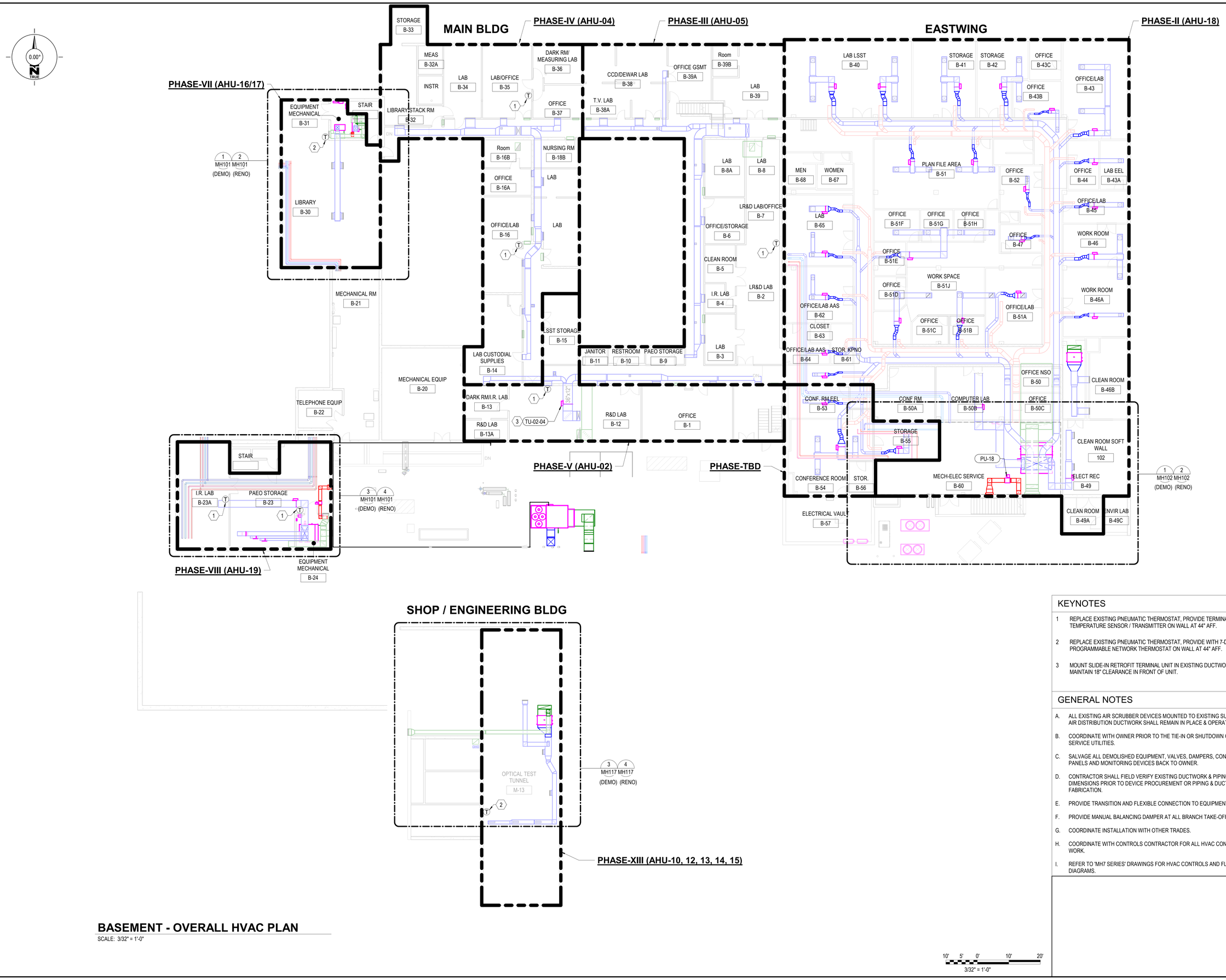

KEYNOTES

1. REPLACE EXISTING PNEUMATIC THERMOSTAT, PROVIDE TERMINAL UNIT TEMPERATURE SENSOR / TRANSMITTER ON WALL AT 44" AFF.
2. REPLACE EXISTING PNEUMATIC THERMOSTAT, PROVIDE WITH 7-DAY PROGRAMMABLE NETWORK THERMOSTAT ON WALL AT 44" AFF.
3. MOUNT SLIDE-IN RETROFIT TERMINAL UNIT IN EXISTING DUCTWORK, MAINTAIN 18" CLEARANCE IN FRONT OF UNIT.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

BASEMENT - OVERALL HVAC PLAN

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

10' 5' 0' 10' 20'
3/32" = 1'-0"

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

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MECHANICAL

BASEMENT OVERALL HVAC PLAN

Sheet Number
MH100

M3PN 240097

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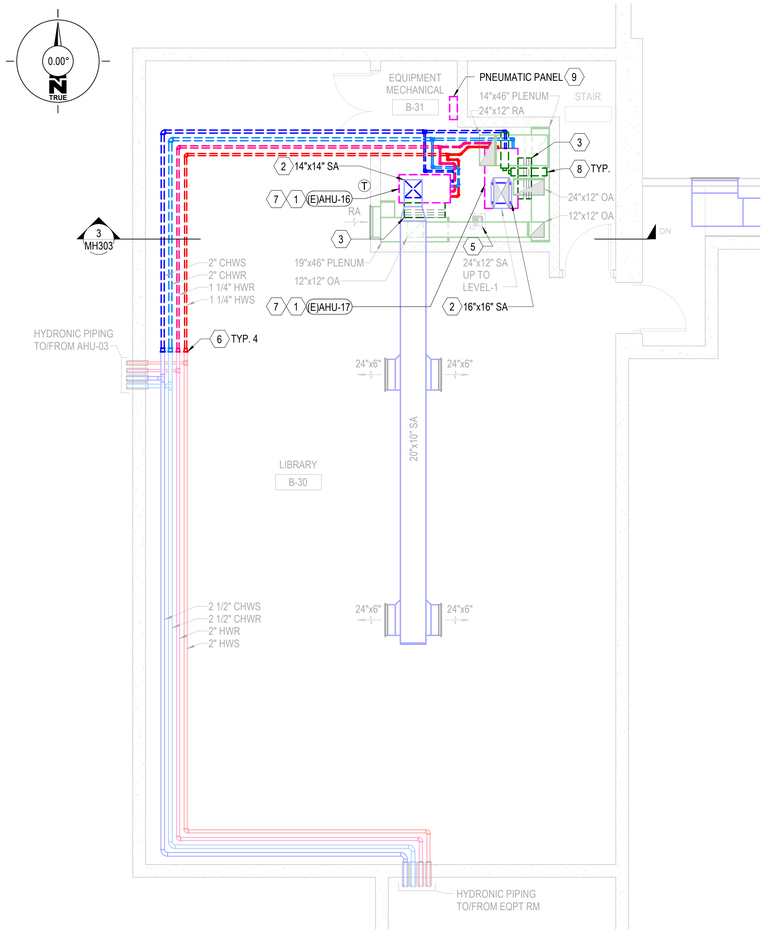
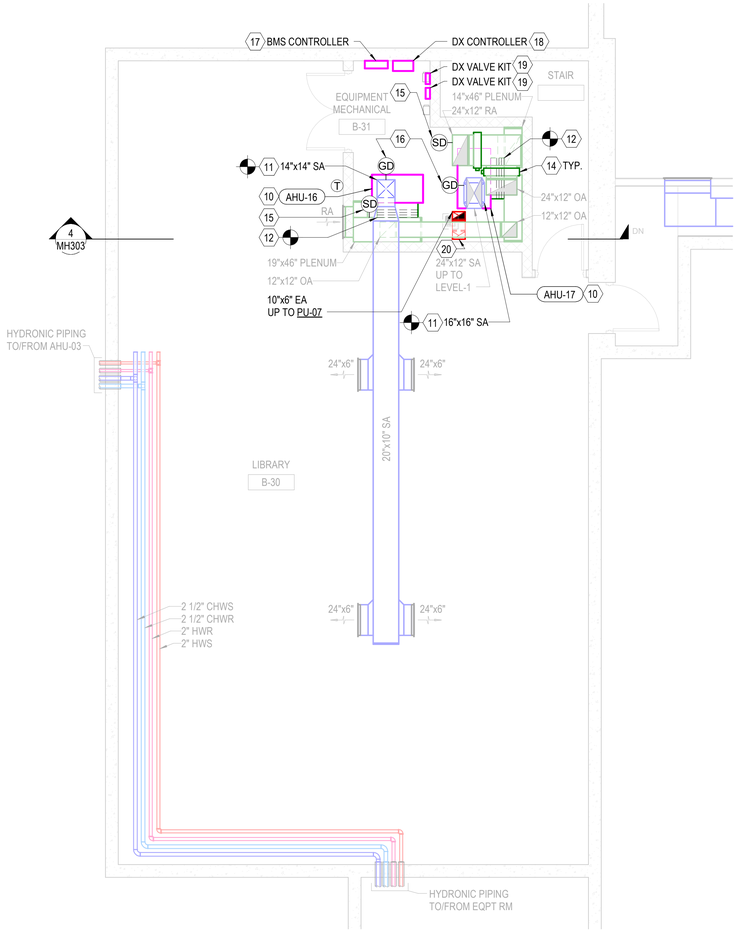


BASEMENT - AHU-16 & AHU-17 - HVAC DEMO PLAN

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

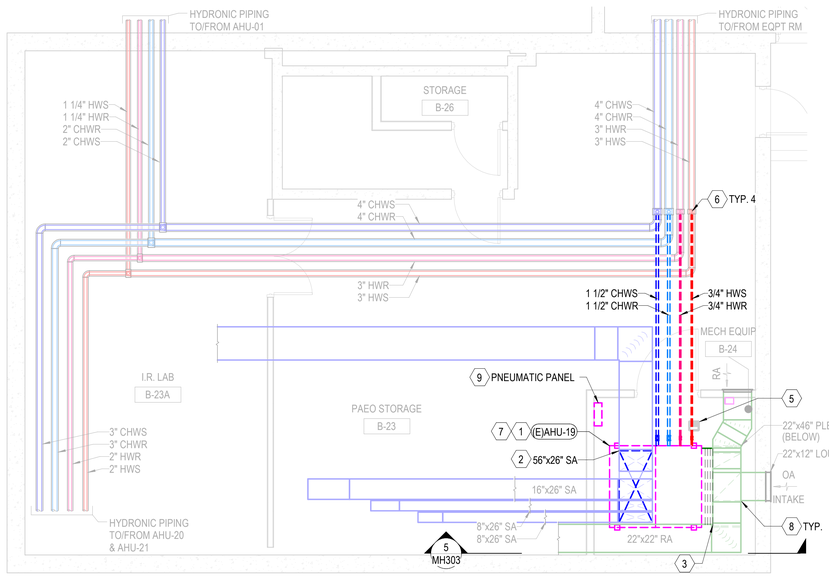
1 MH100



BASEMENT - AHU-16 & AHU-17 - HVAC RENO PLAN

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

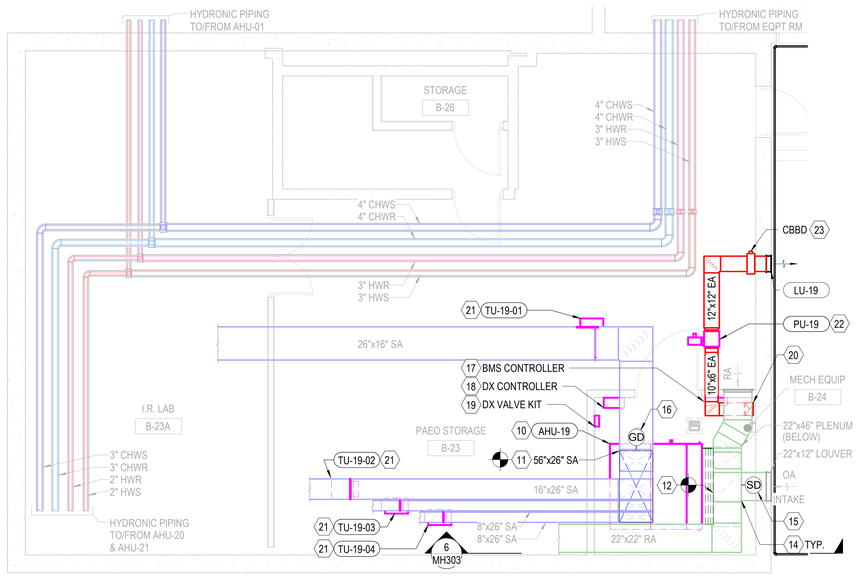
2 MH100



BASEMENT - AHU-19 - HVAC DEMO PLAN

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

3 MH100



BASEMENT - AHU-19 - HVAC RENO PLAN

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

4 MH100

4' 2' 0' 4' 8'
1/4" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE AHU AT EXISTING SUPPLY AIR FLEXIBLE CONNECTION, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

3 REMOVE AHU AT FLEXIBLE CONNECTION TO EXISTING MIXING BOX PLENUM TO REMAIN, EXISTING FILTER RACK ATTACHED OR WITHIN PLENUM BOX TO BE REMOVED, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

4 NOT USED.

5 REMOVE CONDENSATE DRAIN PIPING FROM AHU IN ITS ENTIRETY.

6 REMOVE CHW / HW PIPING FROM AHU BACK TO INDICATED POINT, PROVIDE ENDCAP.

7 EXISTING DUCT MOUNTED SMOKE DETECTOR TO BE REPLACED ON AHU RETURN AIR DUCTWORK, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

8 REMOVE EXISTING PNEUMATIC ACTUATOR & CONTROL DAMPER, INCLUDING ALL ASSOCIATED PNEUMATIC LINES AND CONTROLS, REFER TO RENO PLAN ON THIS SHEET FOR NEW REQUIREMENTS.

9 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

10 INSTALL NEW AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD OR FINISHED FLOOR, MAINTAIN ALL SERVICE CLEARANCES PER AHU MANUFACTURER'S DIRECTION.

11 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT DISCHARGE TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK.

12 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT TO EXISTING AIR MIXING BOX PLENUM.

13 NOT USED.

14 PROVIDE NEW CONTROL DAMPER IN DUCTWORK, RUSKIN MODEL CD50 WITH ELECTRIC ACTUATOR, BELIMO MODEL LF24-SR OR EQUAL, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

15 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

16 PROVIDE DUCT MOUNTED REFRIGERANT GAS DETECTOR IN MAIN SUPPLY AIR DISCHARGE DUCT, INTERLOCK TO SHUTDOWN ASSOCIATED AHU & CONDENSING UNIT, ROOM PURGE EXHAUST FAN SHALL START UPON GAS DETECTION, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

17 MOUNT BMS CONTROLLER ON WALL AT 48" AFF, PROVIDE 120/1/60 CIRCUIT, ROUTE 24 VOLT POWER FROM CONTROLLER TO DAMPER ELECTRIC ACTUATORS, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

18 MOUNT DX CONTROLLER ON WALL AT 48" AFF, PROVIDE 208-230/1/60 CIRCUIT, ROUTE CONTROL WIRING TO ASSOCIATED DX VALVE KIT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

19 MOUNT DX VALVE KIT ON WALL AT 48" AFF, ROUTE REFRIGERANT PIPING FROM ASSOCIATED CONDENSING UNIT THRU VALVE KIT TO DX COILS ON AIR HANDLING UNIT.

20 TERMINATE REFRIGERANT PURGE EXHAUST DUCT 12" AFF, PROVIDE 1/2" MESH SCREEN ON INLET.

21 PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK FOR SLIDE-IN RETROFIT TERMINAL UNIT, SEAL DUCTWORK ACCORDING TO MANUFACTURER REQUIREMENTS.

22 SUSPEND FAN FROM STRUCTURE ABOVE, PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO UNIT.

23 PROVIDE COUNTER BALANCED BACKDRAFT DAMPER, RUSKIN MODEL CBD2 OR EQUAL.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

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MECHANICAL

MAIN BLDG / EAST WING BASEMENT AHU-16, 17, 19 HVAC PLANS

Sheet Number
MH101

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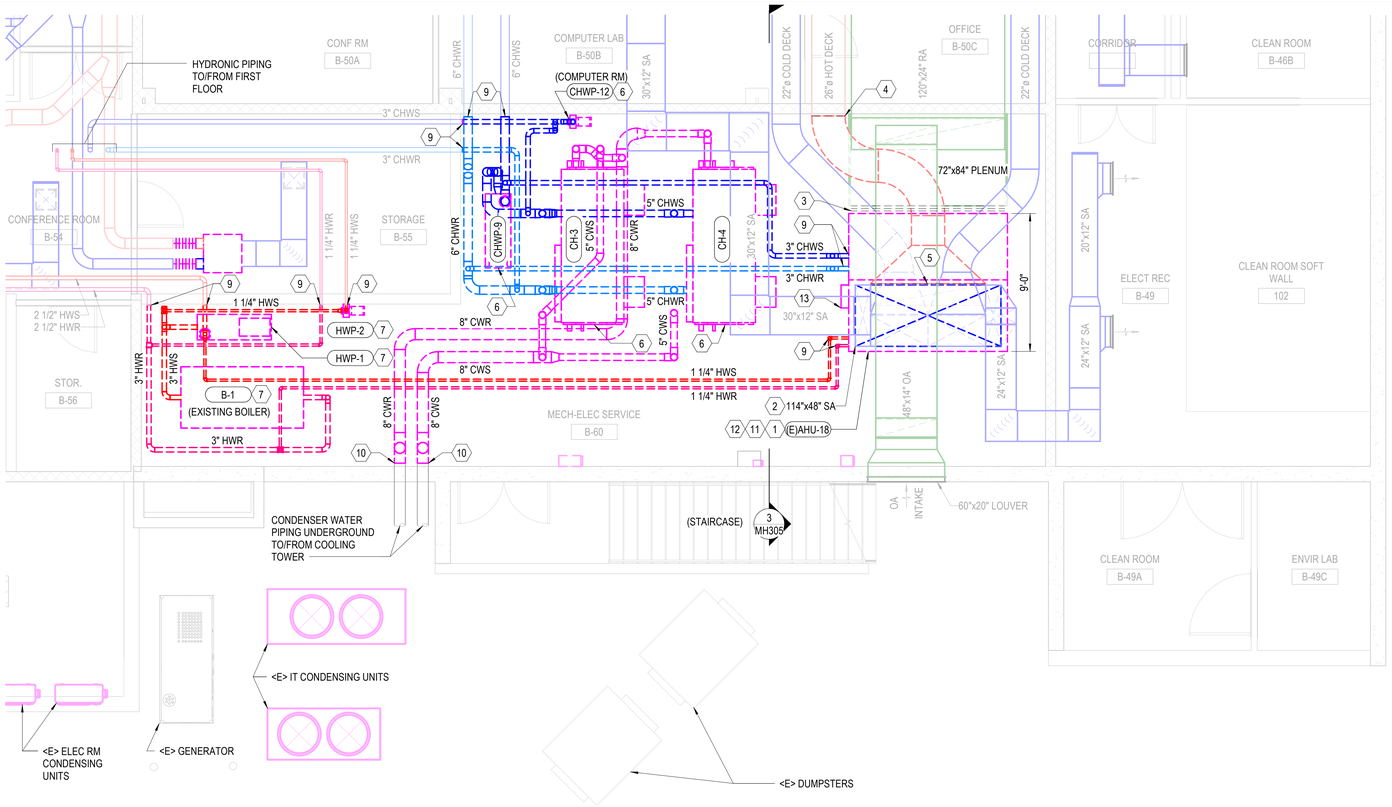
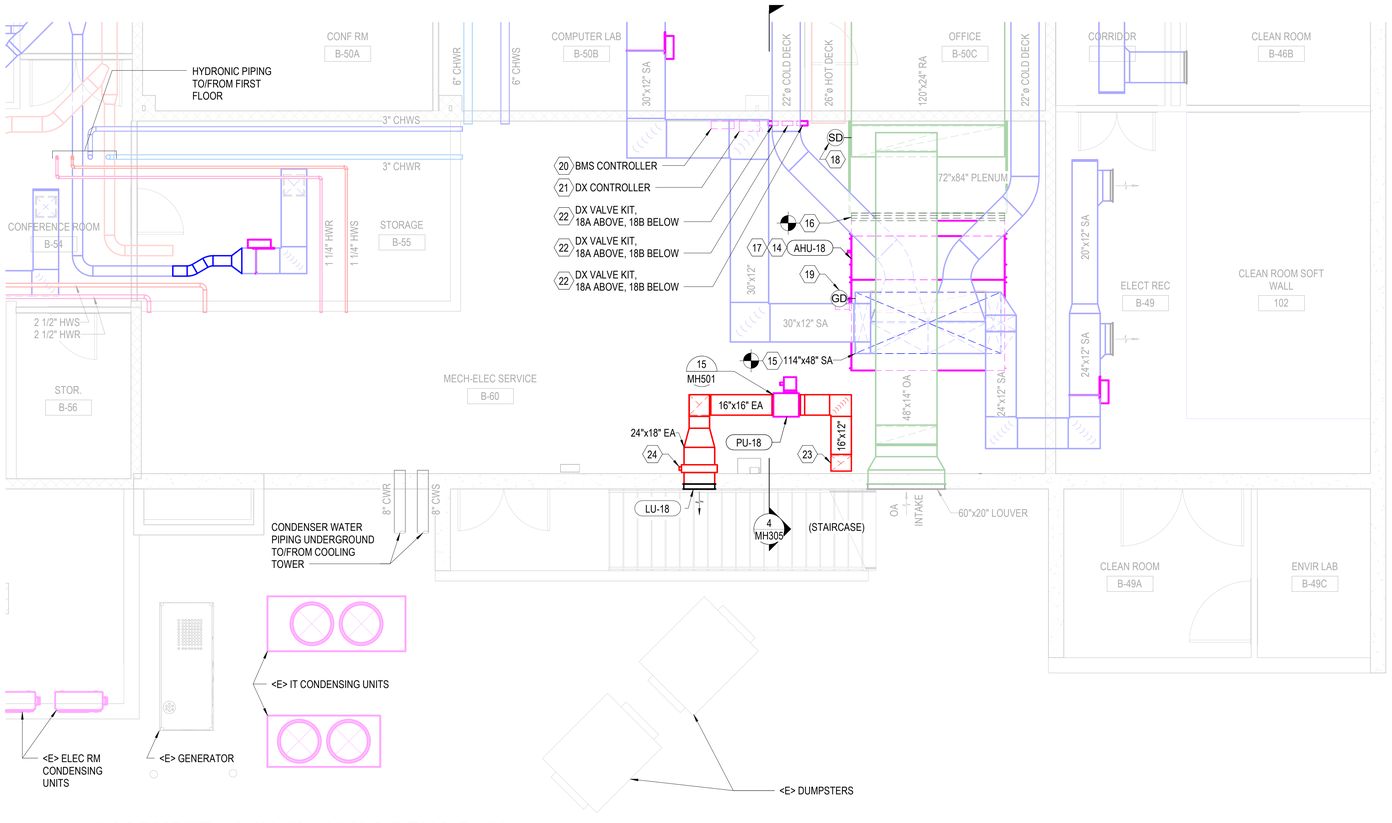


BASEMENT - AHU-18 - HVAC DEMO PLAN

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

1 MH100



BASEMENT - AHU-18 - HVAC RENO PLAN

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

2 MH100

4' 2' 0' 4' 8'
1/4" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE AHU AT EXISTING SUPPLY AIR FLEXIBLE CONNECTION, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

3 REMOVE AHU AT FLEXIBLE CONNECTION TO EXISTING MIXING BOX PLENUM TO REMAIN, EXISTING FILTER RACK ATTACHED OR WITHIN PLENUM BOX TO BE REMOVED, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

4 REMOVE EXISTING HOT DECK DUCTWORK FROM AHU BACK TO INDICATED POINT, PROVIDE ENDCAP.

5 REMOVE EXISTING HOT DECK DUCTWORK FROM AHU AT ELBOW, PROVIDE ENDCAP.

6 REMOVE EXISTING CHILLERS INCLUDING ALL ASSOCIATED PUMPS, HEAT EXCHANGERS, PIPING, SUPPORTS AND CONTROLS BACK TO INDICATED POINT, PROVIDE ENDCAP.

7 REMOVE EXISTING HEATING WATER BOILER INCLUDING ALL ASSOCIATED PUMPS, HEAT EXCHANGERS, PIPING, SUPPORTS AND CONTROLS BACK TO INDICATED POINT, PROVIDE ENDCAP.

9 REMOVE EXISTING CHILLED WATER & HEATING WATER PIPING BACK TO INDICATED POINT, PROVIDE ENDCAP.

10 REMOVE CONDENSER WATER PIPING FROM CHILLERS TO BE DEMOLISHED BACK TO INDICATED POINT, PROVIDE ENDCAP.

11 EXISTING DUCT MOUNTED SMOKE DETECTOR TO BE REPLACED ON AHU RETURN AIR DUCTWORK, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

12 REMOVE EXISTING PNEUMATIC ACTUATORS & CONTROL DAMPERS, INCLUDING ALL ASSOCIATED PNEUMATIC LINES AND CONTROLS, REFER TO RENO PLAN ON THIS SHEET FOR NEW REQUIREMENTS.

13 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

14 INSTALL NEW AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD OR FINISHED FLOOR, MAINTAIN ALL SERVICE CLEARANCES PER AHU MANUFACTURER'S DIRECTION.

15 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT DISCHARGE TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK.

16 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT TO EXISTING AIR MIXING BOX PLENUM.

17 PROVIDE NEW CONTROL DAMPERS IN DUCTWORK, RUSKIN MODEL CD50 WITH ELECTRIC ACTUATOR, BELIMO MODEL LF24-SR OR EQUAL, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

18 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

19 PROVIDE DUCT MOUNTED REFRIGERANT GAS DETECTOR IN MAIN SUPPLY AIR DISCHARGE DUCT, INTERLOCK TO SHUTDOWN ASSOCIATED AHU & CONDENSING UNIT, ROOM PURGE EXHAUST FAN SHALL START UPON GAS DETECTION, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

20 MOUNT BMS CONTROLLER ON WALL AT 48" AFF, PROVIDE 120/1/60 CIRCUIT, ROUTE 24 VOLT POWER FROM CONTROLLER TO DAMPER ELECTRIC ACTUATORS, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

21 MOUNT DX CONTROLLER ON WALL AT 48" AFF, PROVIDE 208-230/1/60 CIRCUIT, ROUTE CONTROL WIRING TO ASSOCIATED DX VALVE KIT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

22 MOUNT DX VALVE KIT ON WALL AT 48" AFF, ROUTE REFRIGERANT PIPING FROM ASSOCIATED CONDENSING UNIT THRU VALVE KIT TO DX COILS ON AIR HANDLING UNIT.

23 TERMINATE REFRIGERANT PURGE EXHAUST DUCT 12" AFF, PROVIDE 1/2" MESH SCREEN ON INLET.

24 PROVIDE COUNTER BALANCED BACKDRAFT DAMPER, RUSKIN MODEL CBD2 OR EQUAL.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

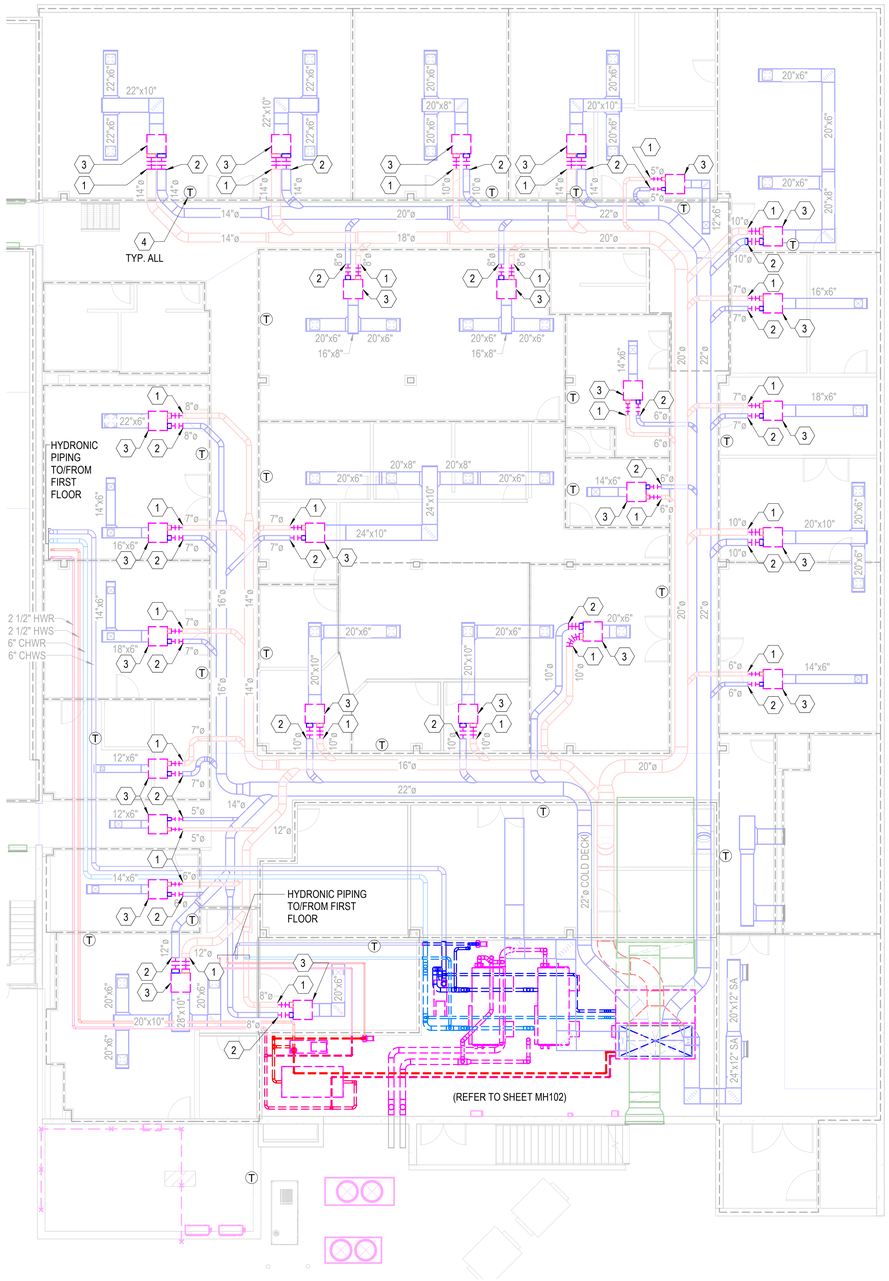
MECHANICAL

MAIN BLDG / EAST WING
BASEMENT AHU-18 HVAC PLANS

Sheet Number
MH102

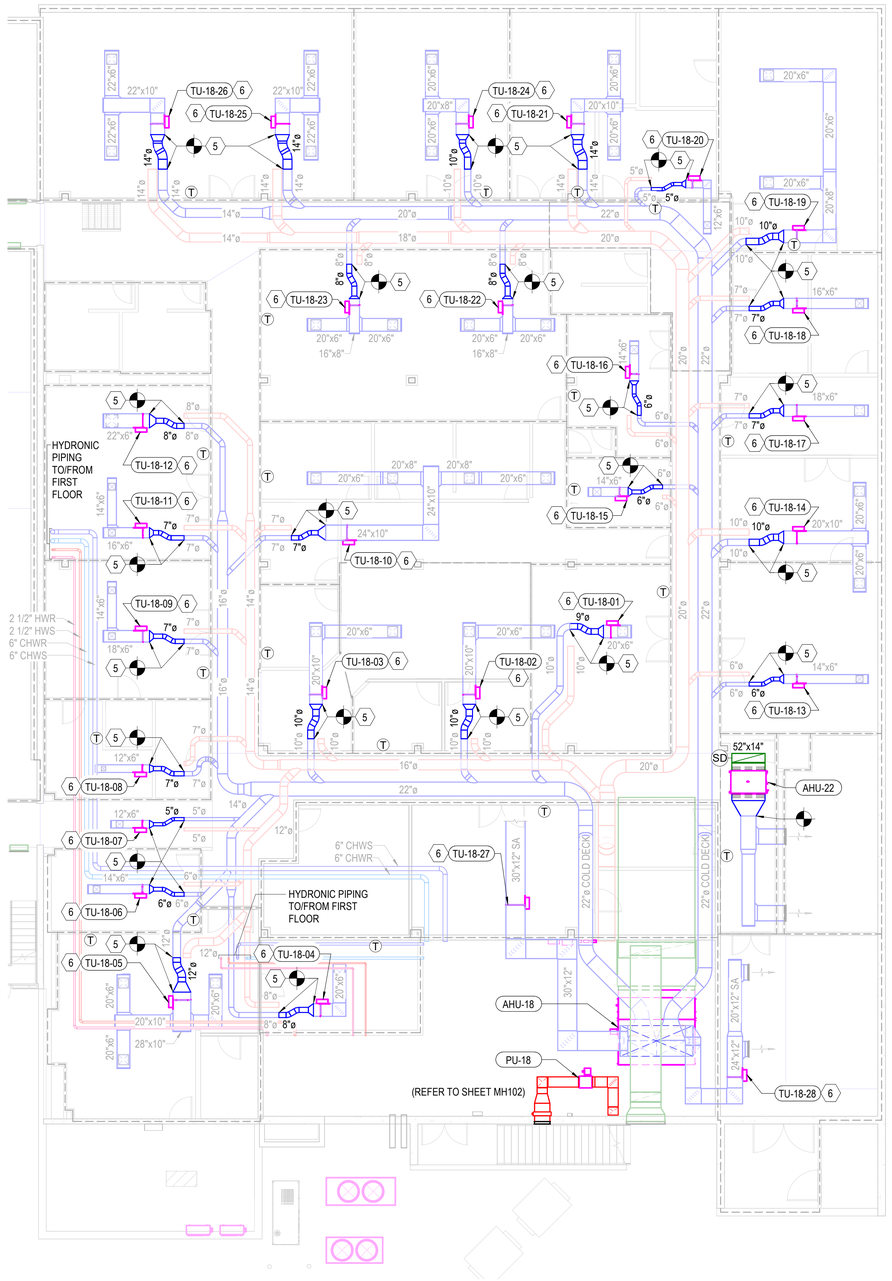
M3PN 240097

DATE: 7/17/2025 3:33:33 PM PATH: C:\Documents 3\Documents\M3\240097 NOIRLab HVAC Replacement_arvanis.ryanwest@nl.edu



BASEMENT - EAST WING HVAC DEMO PLAN

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



BASEMENT - EAST WING HVAC RENO PLAN

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

8' 4' 0' 8' 16'
1/8" = 1'-0"

KEYNOTES

1. REMOVE EXISTING HOT DECK DUCTWORK FROM MIXING BOX BACK TO INDICATED POINT, PROVIDE ENDCAP.
2. REMOVE EXISTING COLD DECK DUCTWORK FROM MIXING BOX BACK TO INDICATED POINT, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.
3. REMOVE EXISTING MIXING BOX, INCLUDING ALL ASSOCIATED CONTROLS AND SUPPORT HANGERS, REFER TO RENO PLAN ON THIS SHEET FOR NEW EQUIPMENT AND CONNECTION.
4. REMOVE EXISTING PNEUMATIC THERMOSTAT, INCLUDING ALL ASSOCIATED CONTROL LINES, REFER TO RENO PLAN ON THIS SHEET FOR REPLACEMENT, TYPICAL ALL.
5. PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK
6. PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK FOR SLIDE-IN RETROFIT TERMINAL UNIT, SEAL DUCTWORK ACCORDING TO MANUFACTURER REQUIREMENTS.
7. PROVIDE & INSTALL TERMINAL UNIT TEMPERATURE SENSOR / TRANSMITTER ON WALL AT 44" AFF, COORDINATE WITH WALL MOUNTED DEVICES AND FURNITURE, TYPICAL ALL.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

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MECHANICAL

MAIN BLDG / EAST WING BASEMENT HVAC PLANS

Sheet Number
MH103

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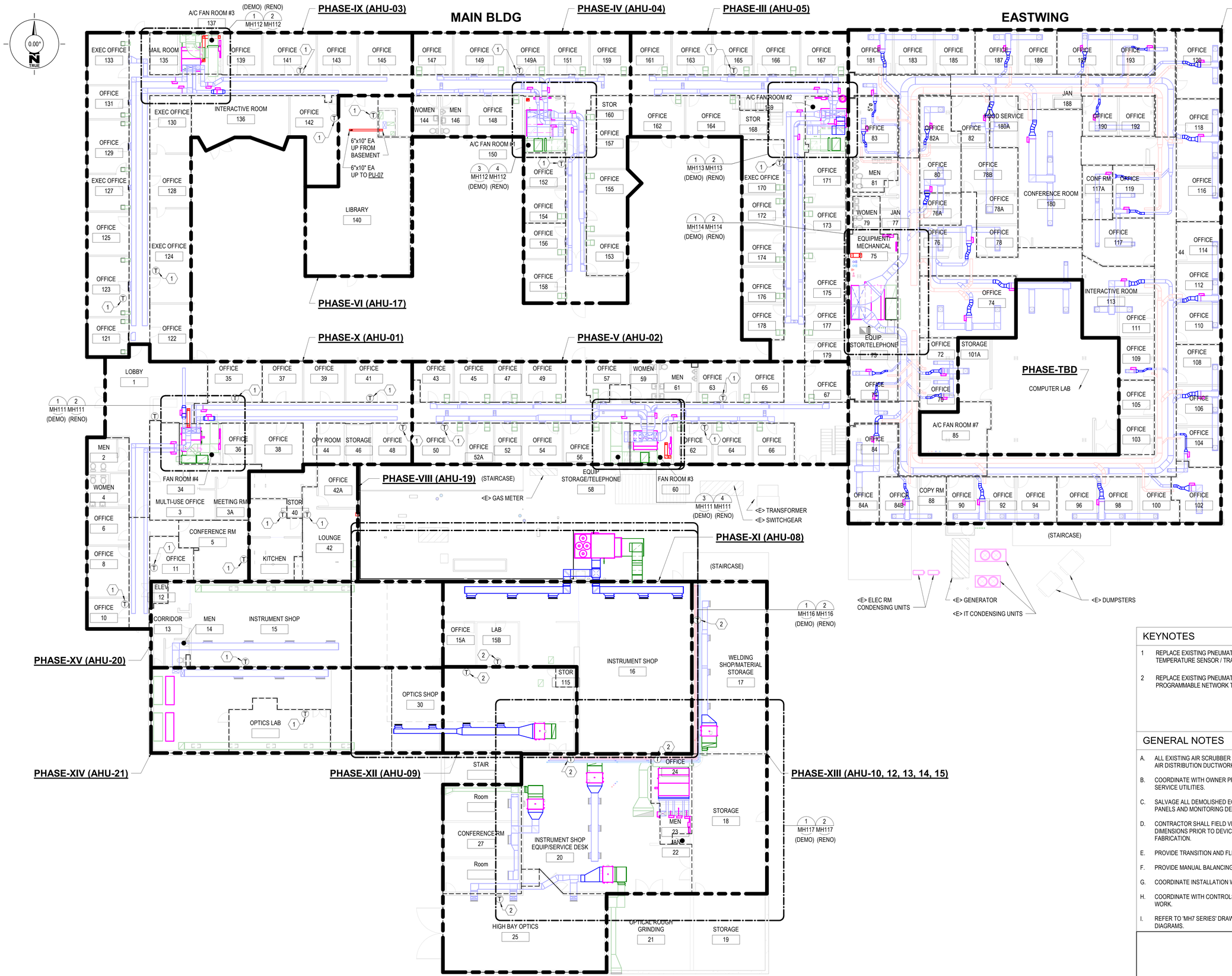
DATE: 7/17/2025 4:43:19 PM C:\Users\WDB\Documents\M3_2025\07_PW_WORK_at_HVAC_Replacement_project\ann.wdb.rvt



KEYNOTES

1 REPLACE EXISTING PNEUMATIC THERMOSTAT, PROVIDE TERMINAL UNIT TEMPERATURE SENSOR / TRANSMITTER ON WALL AT 44" AFF.

2 REPLACE EXISTING PNEUMATIC THERMOSTAT, PROVIDE WITH 7-DAY PROGRAMMABLE NETWORK THERMOSTAT ON WALL AT 44" AFF.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

FIRST FLOOR - OVERALL HVAC PLAN

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

10' 5' 0' 10' 20'
3/32" = 1'-0"

NOIRLAB HVAC PROJECT
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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

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MECHANICAL

FIRST FLOOR OVERALL HVAC PLAN

Sheet Number
MH110

M3PN 240097

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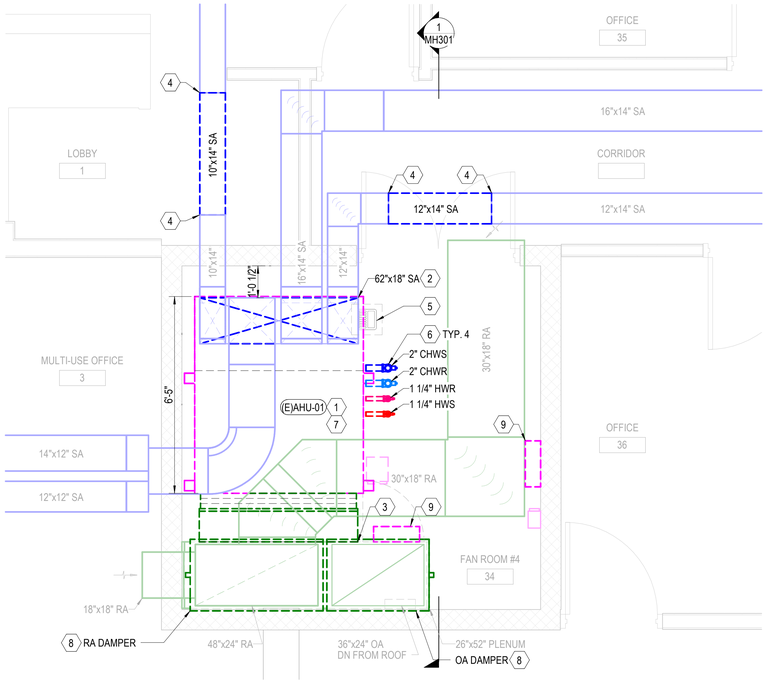
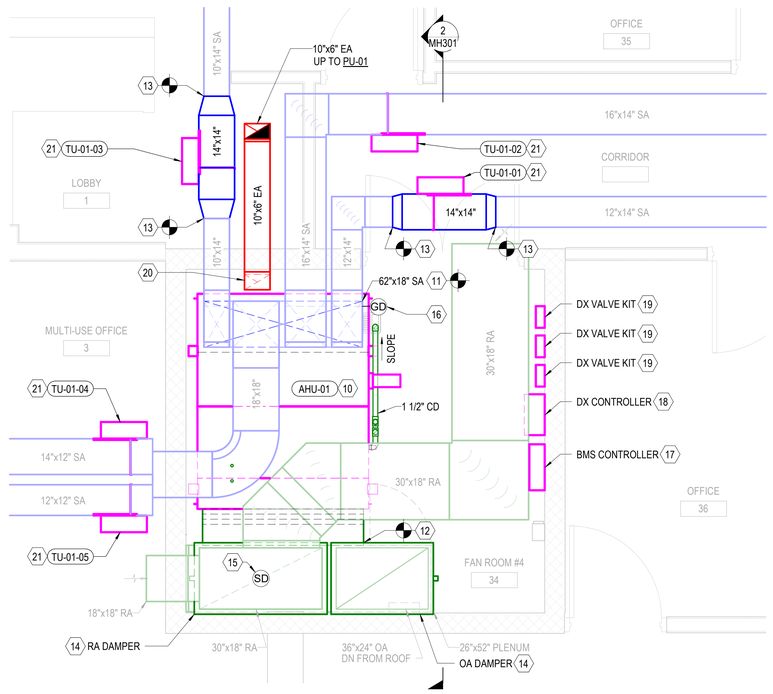


FIRST FLOOR - AHU-01 - HVAC DEMO PLAN

SCALE: 1/2" = 1'-0"

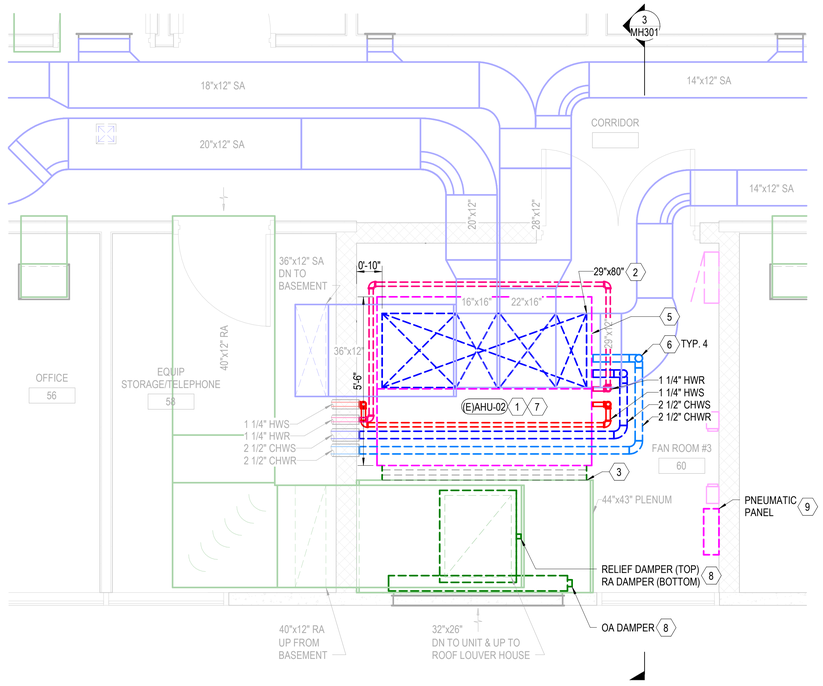
1 MH110



FIRST FLOOR - AHU-01 - HVAC RENO PLAN

SCALE: 1/2" = 1'-0"

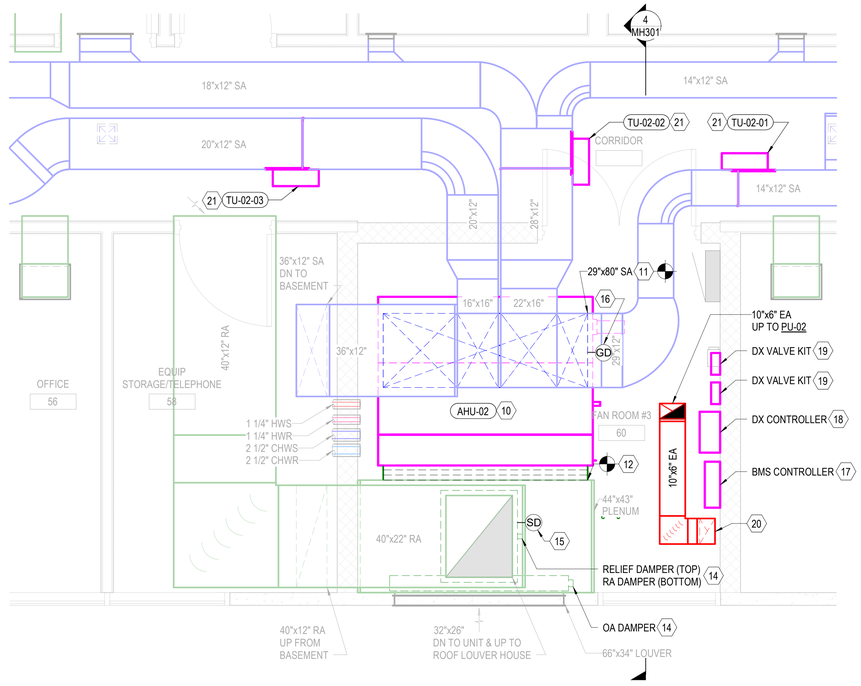
2 MH110



FIRST FLOOR - AHU-02 - HVAC DEMO PLAN

SCALE: 1/2" = 1'-0"

3 MH110



FIRST FLOOR - AHU-02 - HVAC RENO PLAN

SCALE: 1/2" = 1'-0"

4 MH110

2' 1' 0' 2' 4'

1/2" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE AHU AT EXISTING SUPPLY AIR FLEXIBLE CONNECTION, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

3 REMOVE AHU AT FLEXIBLE CONNECTION TO EXISTING MIXING BOX PLENUM TO REMAIN, EXISTING FILTER RACK ATTACHED OR WITHIN PLENUM BOX TO BE REMOVED, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

4 REMOVE EXISTING SUPPLY AIR DUCTWORK BACK TO INDICATED POINT, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

5 REMOVE CONDENSATE DRAIN PIPING FROM AHU IN ITS ENTIRETY.

6 REMOVE CHW / HW PIPING FROM AHU BACK THRU FLOOR, FILL-IN CONCRETE AT FLOOR PENETRATIONS.

7 EXISTING DUCT MOUNTED SMOKE DETECTOR TO BE REPLACED ON AHU RETURN AIR DUCTWORK, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

8 REMOVE EXISTING PNEUMATIC ACTUATOR & CONTROL DAMPER, INCLUDING ALL ASSOCIATED PNEUMATIC LINES AND CONTROLS, REFER TO RENO PLAN ON THIS SHEET FOR NEW REQUIREMENTS.

9 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

10 INSTALL NEW AIR HANDLING UNIT ON STEEL SUPPORTS TO AVOID EXISTING FLOOR SINK UNDERNEATH, MAINTAIN ALL SERVICE CLEARANCES PER AHU MANUFACTURER'S DIRECTION.

11 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT DISCHARGE TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK.

12 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT TO EXISTING AIR MIXING BOX PLENUM.

13 PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK.

14 PROVIDE NEW CONTROL DAMPER IN DUCTWORK, RUSKIN MODEL CD50 WITH ELECTRIC ACTUATOR, BELIMO MODEL LF24-SR OR EQUAL, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

15 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

16 PROVIDE DUCT MOUNTED REFRIGERANT GAS DETECTOR IN MAIN SUPPLY AIR DISCHARGE DUCT, INTERLOCK TO SHUTDOWN ASSOCIATED AHU & CONDENSING UNIT, ROOM PURGE EXHAUST FAN SHALL START UPON GAS DETECTION, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

17 MOUNT BMS CONTROLLER ON WALL AT 48" AFF, PROVIDE 120/1/60 CIRCUIT, ROUTE 24 VOLT POWER FROM CONTROLLER TO DAMPER ELECTRIC ACTUATORS, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

18 MOUNT DX CONTROLLER ON WALL AT 48" AFF, PROVIDE 208-230/1/60 CIRCUIT, ROUTE CONTROL WIRING TO ASSOCIATED DX VALVE KIT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

19 MOUNT DX VALVE KIT ON WALL AT 48" AFF, ROUTE REFRIGERANT PIPING FROM ASSOCIATED CONDENSING UNIT THRU VALVE KIT TO DX COILS ON AIR HANDLING UNIT.

20 TERMINATE REFRIGERANT PURGE EXHAUST DUCT 12" AFF, PROVIDE 1/2" MESH SCREEN ON INLET.

21 MOUNT SLIDE-IN RETROFIT TERMINAL UNIT IN EXISTING DUCTWORK, MAINTAIN 18" CLEARANCE IN FRONT OF UNIT.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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ARCHITECTURE
ENGINEERING
CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: ANN
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Issue Date: 18 JUL 2025

MECHANICAL

MAIN BLDG / EAST WING
FIRST FLOOR AHU-01 & AHU-02 HVAC PLANS

Sheet Number
MH111

M3PN 240097

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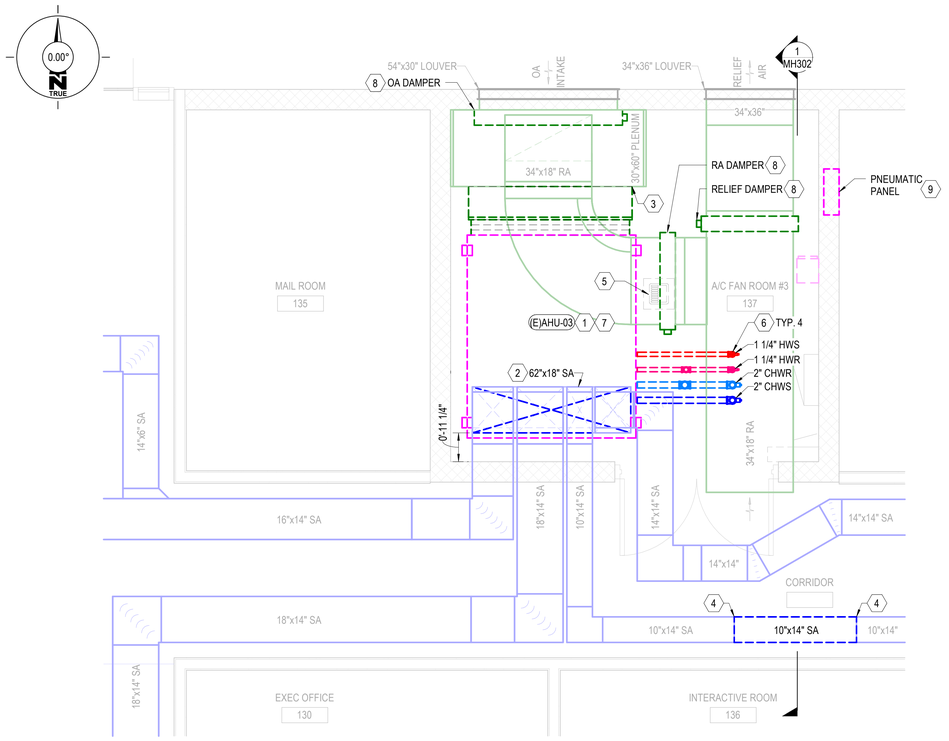
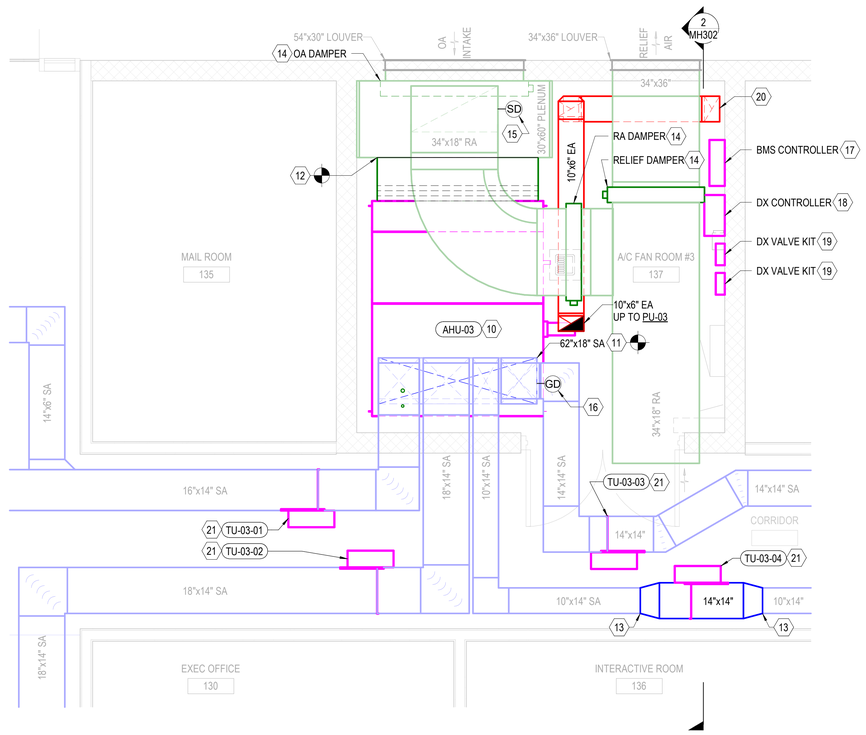


FIRST FLOOR - AHU-03 - HVAC DEMO PLAN

SCALE: 1/2" = 1'-0"

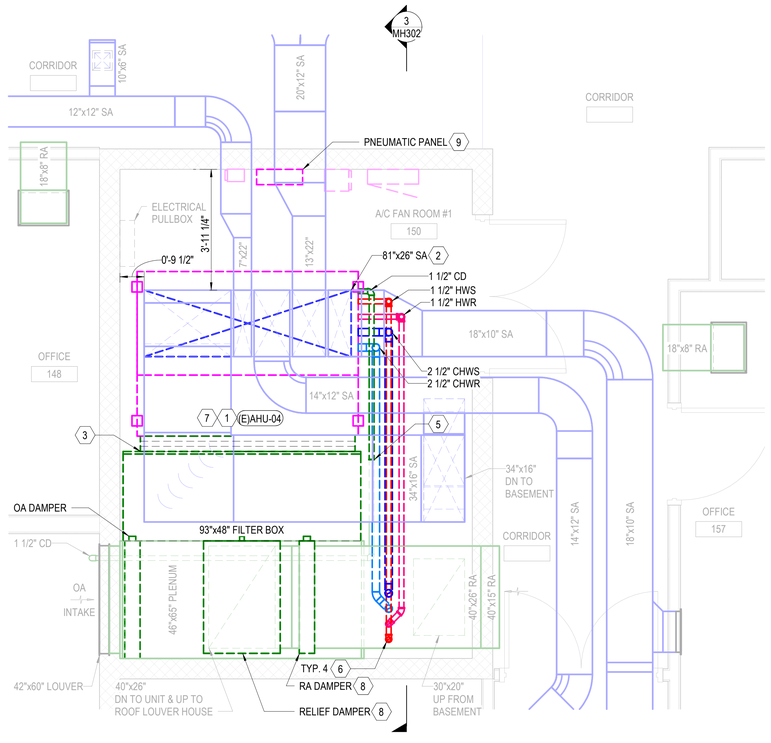
1 MH110



FIRST FLOOR - AHU-03 - HVAC RENO PLAN

SCALE: 1/2" = 1'-0"

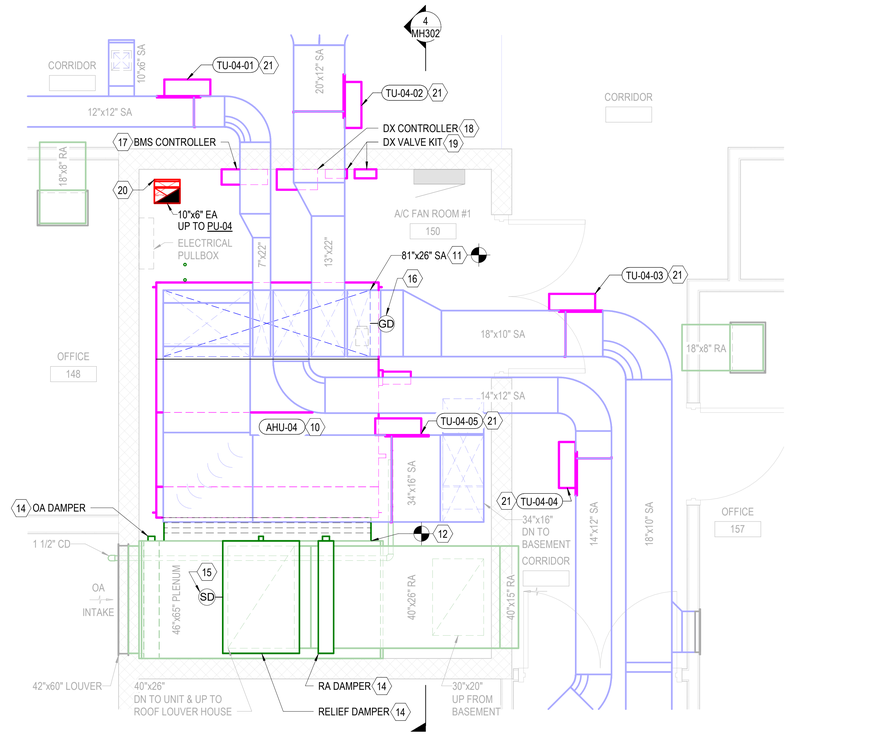
2 MH110



FIRST FLOOR - AHU-04 - HVAC DEMO PLAN

SCALE: 1/2" = 1'-0"

3 MH110



FIRST FLOOR - AHU-04 - HVAC RENO PLAN

SCALE: 1/2" = 1'-0"

4 MH110

2' 1' 0' 2' 4'
1/2" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE AHU AT EXISTING SUPPLY AIR FLEXIBLE CONNECTION, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

3 REMOVE AHU AT FLEXIBLE CONNECTION TO EXISTING MIXING BOX PLENUM TO REMAIN, EXISTING FILTER RACK ATTACHED OR WITHIN PLENUM BOX TO BE REMOVED, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

4 REMOVE EXISTING SUPPLY AIR DUCTWORK BACK TO INDICATED POINT, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

5 REMOVE CONDENSATE DRAIN PIPING FROM AHU IN ITS ENTIRETY.

6 REMOVE CHW / HW PIPING FROM AHU BACK THRU FLOOR, FILL-IN CONCRETE AT FLOOR PENETRATIONS.

7 EXISTING DUCT MOUNTED SMOKE DETECTOR TO BE REPLACED ON AHU RETURN AIR DUCTWORK, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

8 REMOVE EXISTING PNEUMATIC ACTUATOR & CONTROL DAMPER, INCLUDING ALL ASSOCIATED PNEUMATIC LINES AND CONTROLS, REFER TO RENO PLAN ON THIS SHEET FOR NEW REQUIREMENTS.

9 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

10 INSTALL NEW AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD OR FINISHED FLOOR, MAINTAIN ALL SERVICE CLEARANCES PER AHU MANUFACTURER'S DIRECTION.

11 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT DISCHARGE TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK.

12 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT TO EXISTING AIR MIXING BOX PLENUM.

13 PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK.

14 PROVIDE NEW CONTROL DAMPER IN DUCTWORK, RUSKIN MODEL CD50 WITH ELECTRIC ACTUATOR, BELIMO MODEL LF24-SR OR EQUAL, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

15 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

16 PROVIDE DUCT MOUNTED REFRIGERANT GAS DETECTOR IN MAIN SUPPLY AIR DISCHARGE DUCT, INTERLOCK TO SHUTDOWN ASSOCIATED AHU & CONDENSING UNIT, ROOM PURGE EXHAUST FAN SHALL START UPON GAS DETECTION, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

17 MOUNT BMS CONTROLLER ON WALL AT 48" AFF, PROVIDE 120/1/60 CIRCUIT, ROUTE 24 VOLT POWER FROM CONTROLLER TO DAMPER ELECTRIC ACTUATORS, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

18 MOUNT DX CONTROLLER ON WALL AT 48" AFF, PROVIDE 208-230/1/60 CIRCUIT, ROUTE CONTROL WIRING TO ASSOCIATED DX VALVE KIT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

19 MOUNT DX VALVE KIT ON WALL AT 48" AFF, ROUTE REFRIGERANT PIPING FROM ASSOCIATED CONDENSING UNIT THRU VALVE KIT TO DX COILS ON AIR HANDLING UNIT.

20 TERMINATE REFRIGERANT PURGE EXHAUST DUCT 12" AFF, PROVIDE 1/2" MESH SCREEN ON INLET.

21 MOUNT SLIDE-IN RETROFIT TERMINAL UNIT IN EXISTING DUCTWORK, MAINTAIN 18" CLEARANCE IN FRONT OF UNIT.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

NOIRLAB HVAC PROJECT
TUCSON MAIN FACILITY

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ARCHITECTURE
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Revisions

#	Description	Date

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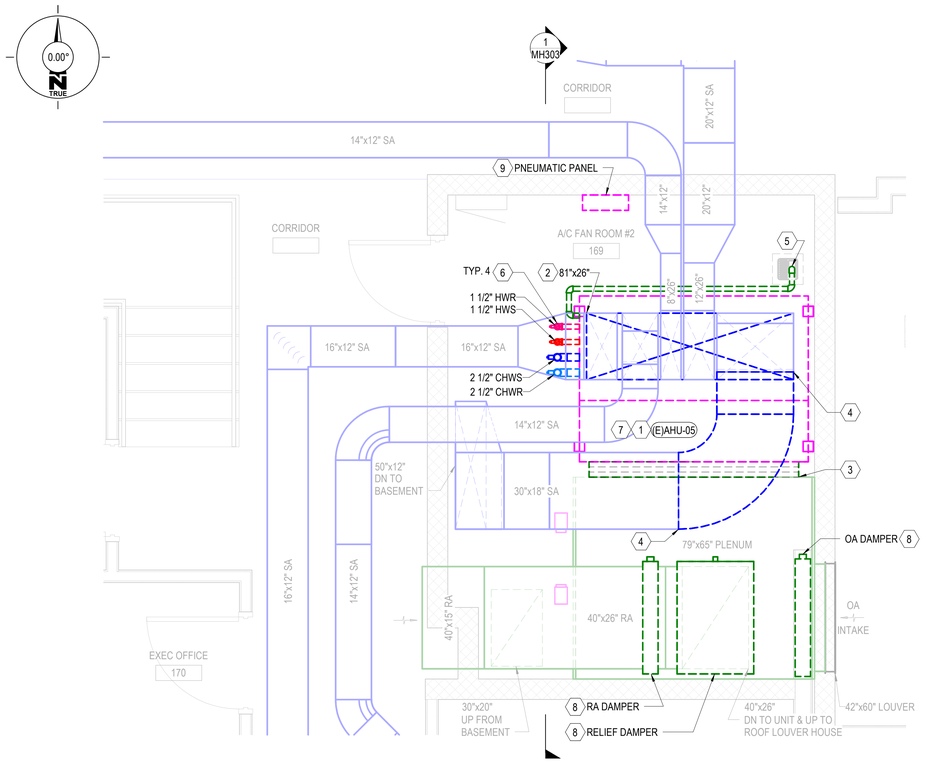
MECHANICAL

MAIN BLDG / EAST WING
FIRST FLOOR AHU-03 & AHU-04 HVAC PLANS

Sheet Number
MH112

M3PN 240097

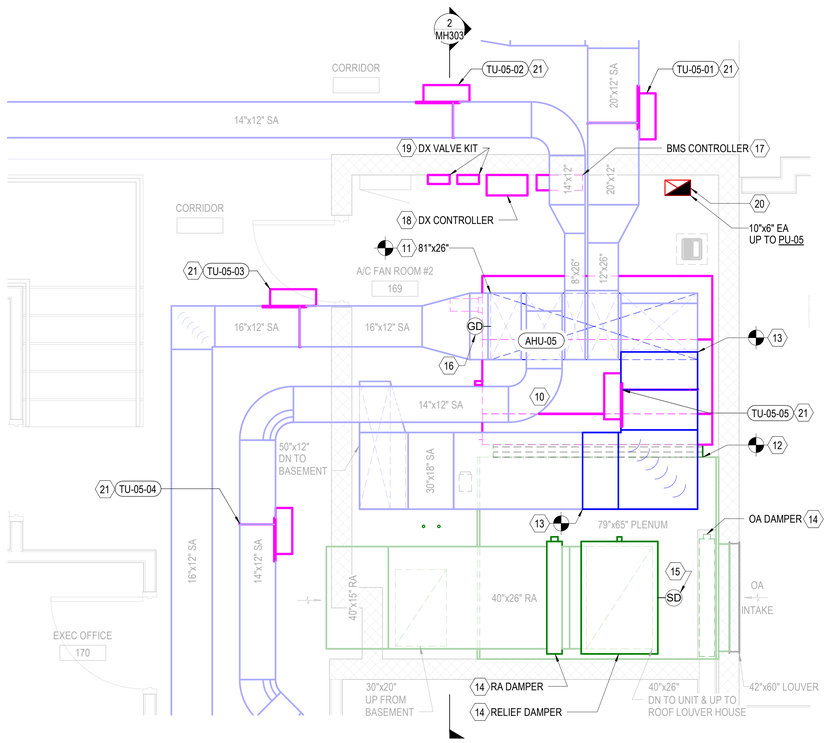
DATE: 7/17/2025 2:39:47 PM PATH: C:\Revit\M3 Projects\240097 NOIRLab HVAC Replacement_ann@m3eworld.ad



FIRST FLOOR - AHU-05 - DEMO HVAC PLAN

SCALE: 1/2" = 1'-0"

1 MH110



FIRST FLOOR - AHU-05 - RENO HVAC PLAN

SCALE: 1/2" = 1'-0"

2 MH110

2' 1' 0' 2' 4'

1/2" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE AHU AT EXISTING SUPPLY AIR FLEXIBLE CONNECTION, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

3 REMOVE AHU AT FLEXIBLE CONNECTION TO EXISTING MIXING BOX PLENUM TO REMAIN, EXISTING FILTER RACK ATTACHED OR WITHIN PLENUM BOX TO BE REMOVED, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

4 REMOVE EXISTING SUPPLY AIR DUCTWORK BACK TO INDICATED POINT, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

5 REMOVE CONDENSATE DRAIN PIPING FROM AHU IN ITS ENTIRETY.

6 REMOVE CHW / HW PIPING FROM AHU BACK THRU FLOOR, FILL-IN CONCRETE AT FLOOR PENETRATIONS.

7 EXISTING DUCT MOUNTED SMOKE DETECTOR TO BE REPLACED ON AHU RETURN AIR DUCTWORK, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

8 REMOVE EXISTING PNEUMATIC ACTUATOR & CONTROL DAMPER, INCLUDING ALL ASSOCIATED PNEUMATIC LINES AND CONTROLS, REFER TO RENO PLAN ON THIS SHEET FOR NEW REQUIREMENTS.

9 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

10 INSTALL NEW AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD OR FINISHED FLOOR, MAINTAIN ALL SERVICE CLEARANCES PER AHU MANUFACTURER'S DIRECTION.

11 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT DISCHARGE TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK.

12 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT TO EXISTING AIR MIXING BOX PLENUM.

13 PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK.

14 PROVIDE NEW CONTROL DAMPER IN DUCTWORK, RUSKIN MODEL CD50 WITH ELECTRIC ACTUATOR, BELIMO MODEL LF24-SR OR EQUAL, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

15 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

16 PROVIDE DUCT MOUNTED REFRIGERANT GAS DETECTOR IN MAIN SUPPLY AIR DISCHARGE DUCT, INTERLOCK TO SHUTDOWN ASSOCIATED AHU & CONDENSING UNIT, ROOM PURGE EXHAUST FAN SHALL START UPON GAS DETECTION, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

17 MOUNT BMS CONTROLLER ON WALL AT 48" AFF, PROVIDE 120/1/60 CIRCUIT, ROUTE 24 VOLT POWER FROM CONTROLLER TO DAMPER ELECTRIC ACTUATORS, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

18 MOUNT DX CONTROLLER ON WALL AT 48" AFF, PROVIDE 208-230/1/60 CIRCUIT, ROUTE CONTROL WIRING TO ASSOCIATED DX VALVE KIT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

19 MOUNT DX VALVE KIT ON WALL AT 48" AFF, ROUTE REFRIGERANT PIPING FROM ASSOCIATED CONDENSING UNIT THRU VALVE KIT TO DX COILS ON AIR HANDLING UNIT.

20 TERMINATE REFRIGERANT PURGE EXHAUST DUCT 12" AFF, PROVIDE 1/2" MESH SCREEN ON INLET.

21 MOUNT SLIDE-IN RETROFIT TERMINAL UNIT IN EXISTING DUCTWORK, MAINTAIN 18" CLEARANCE IN FRONT OF UNIT.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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TUCSON MAIN FACILITY

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ARCHITECTURE
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Revisions

#	Description	Date

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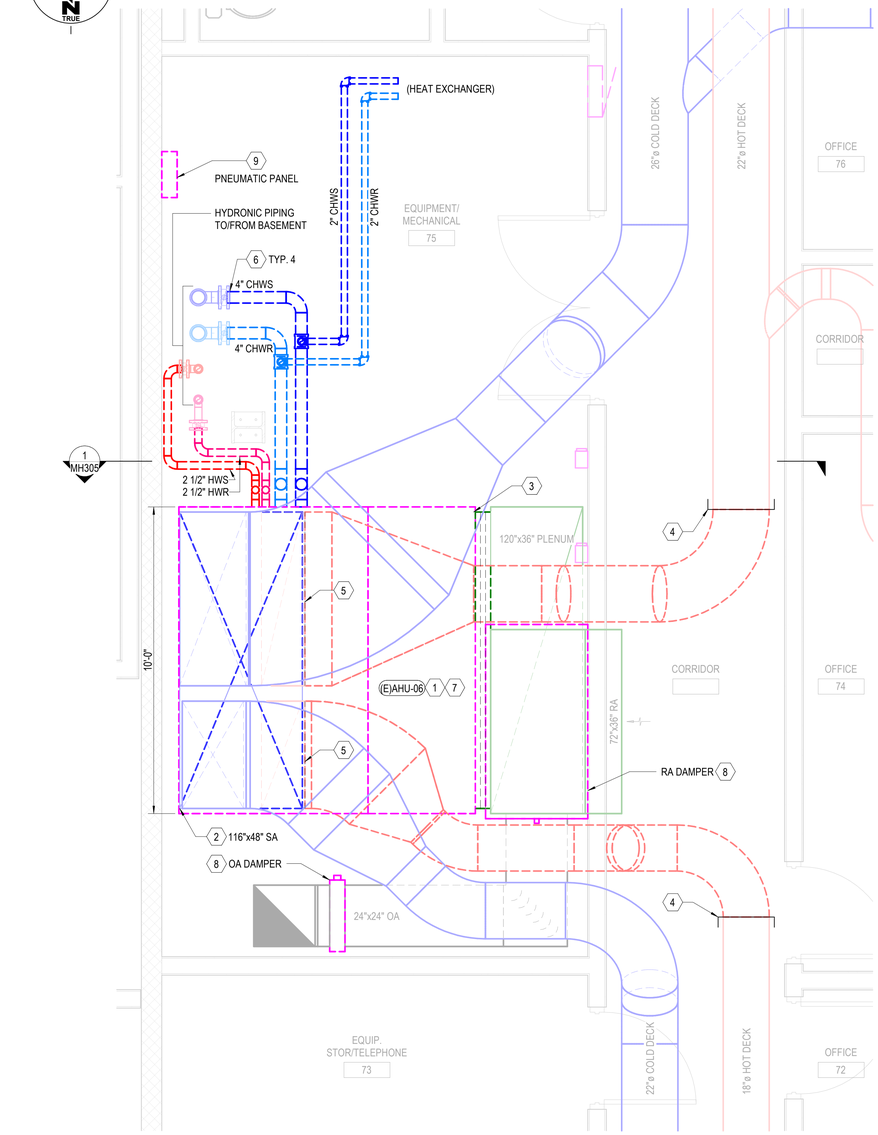
MECHANICAL

MAIN BLDG / EASTWING
FIRST FLOOR AHU-05
HVAC PLANS

Sheet Number
MH113

M3PN 240097

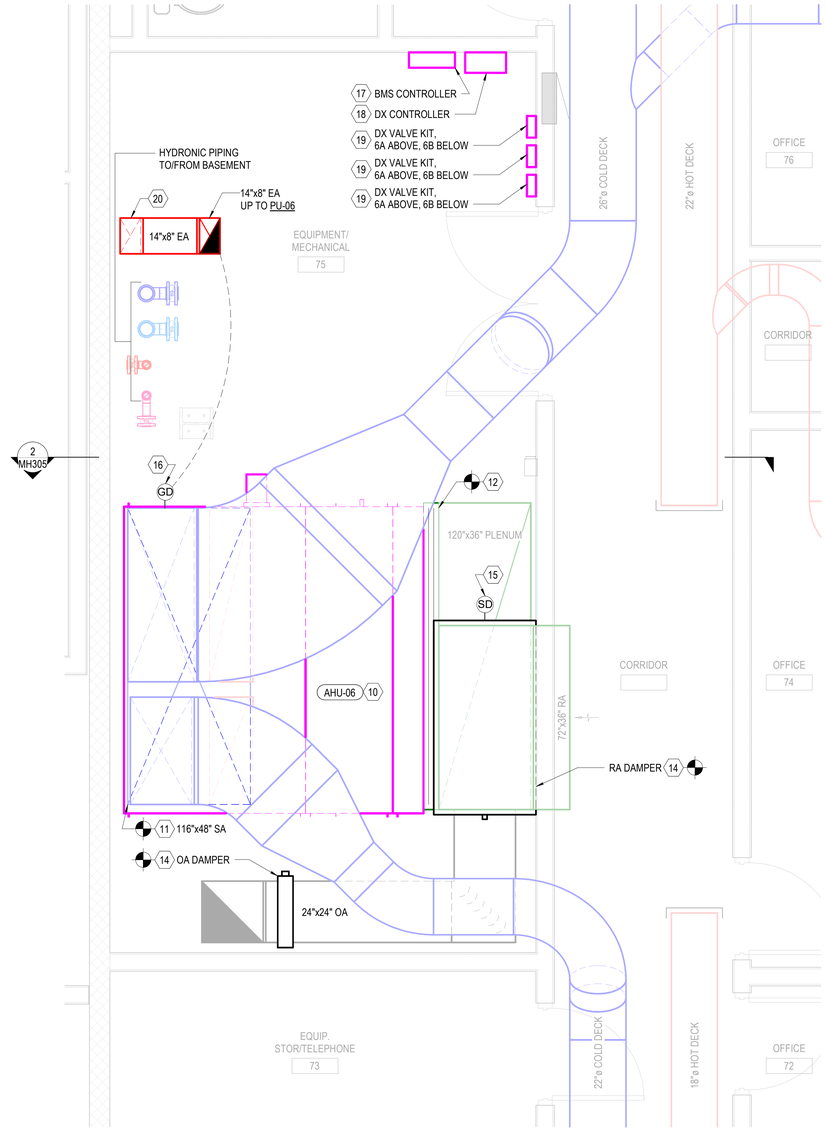
DATE: 7/17/2025 2:51:24 PM PATH: C:\Revit\M3 Projects\M3PN 240097 NOIRLab HVAC Replacement_annann.ann@m3eng.rvt



FIRST FLOOR - AHU-06 - DEMO HVAC PLAN

1 MH110

SCALE: 1/2" = 1'-0"



FIRST FLOOR - AHU-06 - RENO HVAC PLAN

2 MH110

SCALE: 1/2" = 1'-0"

2' 1' 0' 2' 4'

1/2" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE AHU AT EXISTING SUPPLY AIR FLEXIBLE CONNECTION, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

3 REMOVE AHU AT FLEXIBLE CONNECTION TO EXISTING MIXING BOX PLENUM TO REMAIN, EXISTING FILTER RACK ATTACHED OR WITHIN PLENUM BOX TO BE REMOVED, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

4 REMOVE EXISTING HOT DECK DUCTWORK FROM AHU BACK TO INDICATED POINT, PROVIDE ENDCAP.

5 REMOVE EXISTING HOT DECK DUCTWORK FROM AHU AT ELBOW, PROVIDE ENDCAP.

6 REMOVE CHW / HW PIPING FROM AHU BACK TO ISOLATION VALVE, PROVIDE ENDCAP.

7 EXISTING DUCT MOUNTED SMOKE DETECTOR TO BE REPLACED ON AHU RETURN AIR DUCTWORK, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

8 REMOVE EXISTING PNEUMATIC ACTUATOR & CONTROL DAMPER, INCLUDING ALL ASSOCIATED PNEUMATIC LINES AND CONTROLS, REFER TO RENO PLAN ON THIS SHEET FOR NEW REQUIREMENTS.

9 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

10 INSTALL NEW AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD OR FINISHED FLOOR, MAINTAIN ALL SERVICE CLEARANCES PER AHU MANUFACTURER'S DIRECTION.

11 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT DISCHARGE TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK.

12 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT TO EXISTING AIR MIXING BOX PLENUM.

13 NOT USED.

14 PROVIDE NEW CONTROL DAMPER IN DUCTWORK, RUSKIN MODEL CD50 WITH ELECTRIC ACTUATOR, BELIMO MODEL LF24-SR OR EQUAL, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

15 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

16 PROVIDE DUCT MOUNTED REFRIGERANT GAS DETECTOR IN MAIN SUPPLY AIR DISCHARGE DUCT, INTERLOCK TO SHUTDOWN ASSOCIATED AHU & CONDENSING UNIT, ROOM PURGE EXHAUST FAN SHALL START UPON GAS DETECTION, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

17 MOUNT BMS CONTROLLER ON WALL AT 48" AFF, PROVIDE 120/1/60 CIRCUIT, ROUTE 24 VOLT POWER FROM CONTROLLER TO DAMPER ELECTRIC ACTUATORS, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

18 MOUNT DX CONTROLLER ON WALL AT 48" AFF, PROVIDE 208-230/1/60 CIRCUIT, ROUTE CONTROL WIRING TO ASSOCIATED DX VALVE KIT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

19 MOUNT DX VALVE KIT ON WALL AT 48" AFF, ROUTE REFRIGERANT PIPING FROM ASSOCIATED CONDENSING UNIT THRU VALVE KIT TO DX COILS ON AIR HANDLING UNIT.

20 TERMINATE REFRIGERANT PURGE EXHAUST DUCT 12" AFF, PROVIDE 1/2" MESH SCREEN ON INLET.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: ANN
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Issue Date: 18 JUL 2025

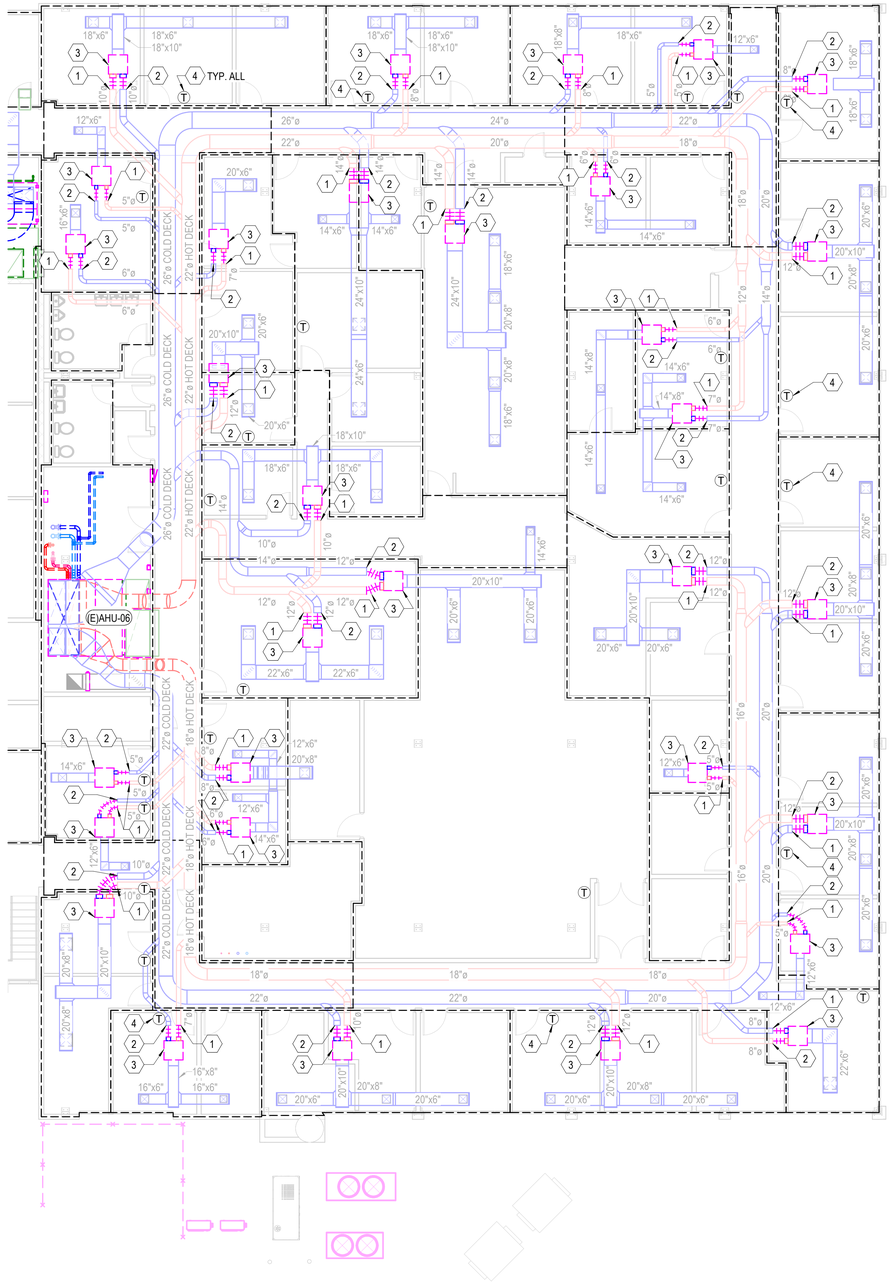
MECHANICAL

MAIN BLDG / EASTWING
FIRST FLOOR AHU-06
HVAC PLANS

Sheet Number
MH114

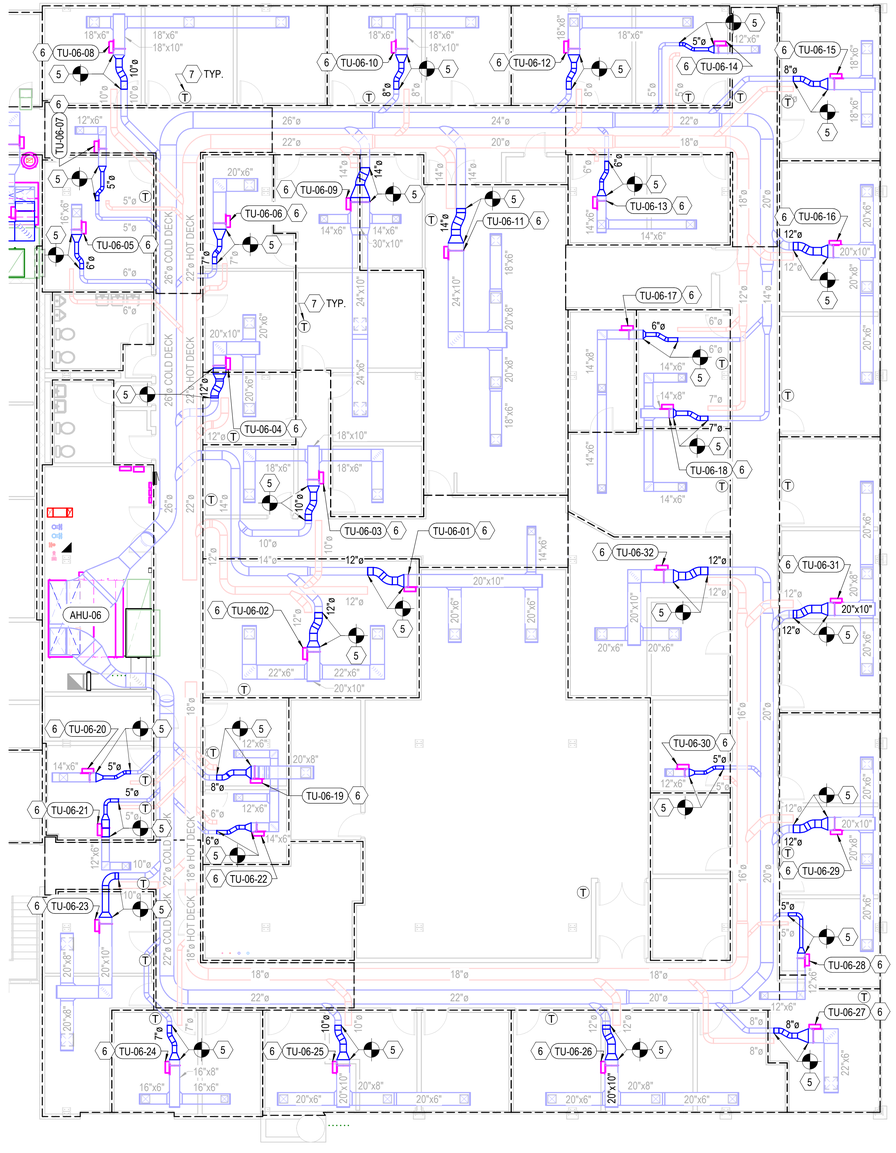
M3PN 240097

DATE: 7/17/2025 2:21:24 PM By: J:\Drawings\19 Documents\20 Design\M-ARCH\MH7 Replacement_eastwing_scope.dwg



FIRST FLOOR - EAST WING HVAC DEMO PLAN

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



FIRST FLOOR - EAST WING HVAC RENO PLAN

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

8' 4' 0' 8' 16'

1/8" = 1'-0"

KEYNOTES

1. REMOVE EXISTING HOT DECK DUCTWORK FROM MIXING BOX BACK TO INDICATED POINT, PROVIDE ENDCAP.
2. REMOVE EXISTING COLD DECK DUCTWORK FROM MIXING BOX BACK TO INDICATED POINT, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.
3. REMOVE EXISTING MIXING BOX, INCLUDING ALL ASSOCIATED CONTROLS AND SUPPORT HANGERS, REFER TO RENO PLAN ON THIS SHEET FOR NEW EQUIPMENT AND CONNECTION.
4. REMOVE EXISTING PNEUMATIC THERMOSTAT, INCLUDING ALL ASSOCIATED CONTROL LINES, REFER TO RENO PLAN ON THIS SHEET FOR REPLACEMENT, TYPICAL ALL.
5. PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK
6. PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK FOR SLIDE-IN RETROFIT TERMINAL UNIT, SEAL DUCTWORK ACCORDING TO MANUFACTURER REQUIREMENTS.
7. PROVIDE & INSTALL TERMINAL UNIT TEMPERATURE SENSOR / TRANSMITTER ON WALL AT 44" AFF. COORDINATE WITH WALL MOUNTED DEVICES AND FURNITURE, TYPICAL ALL.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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ARCHITECTURE
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Revisions

#	Description	Date

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Issue Date: 18 JUL 2025

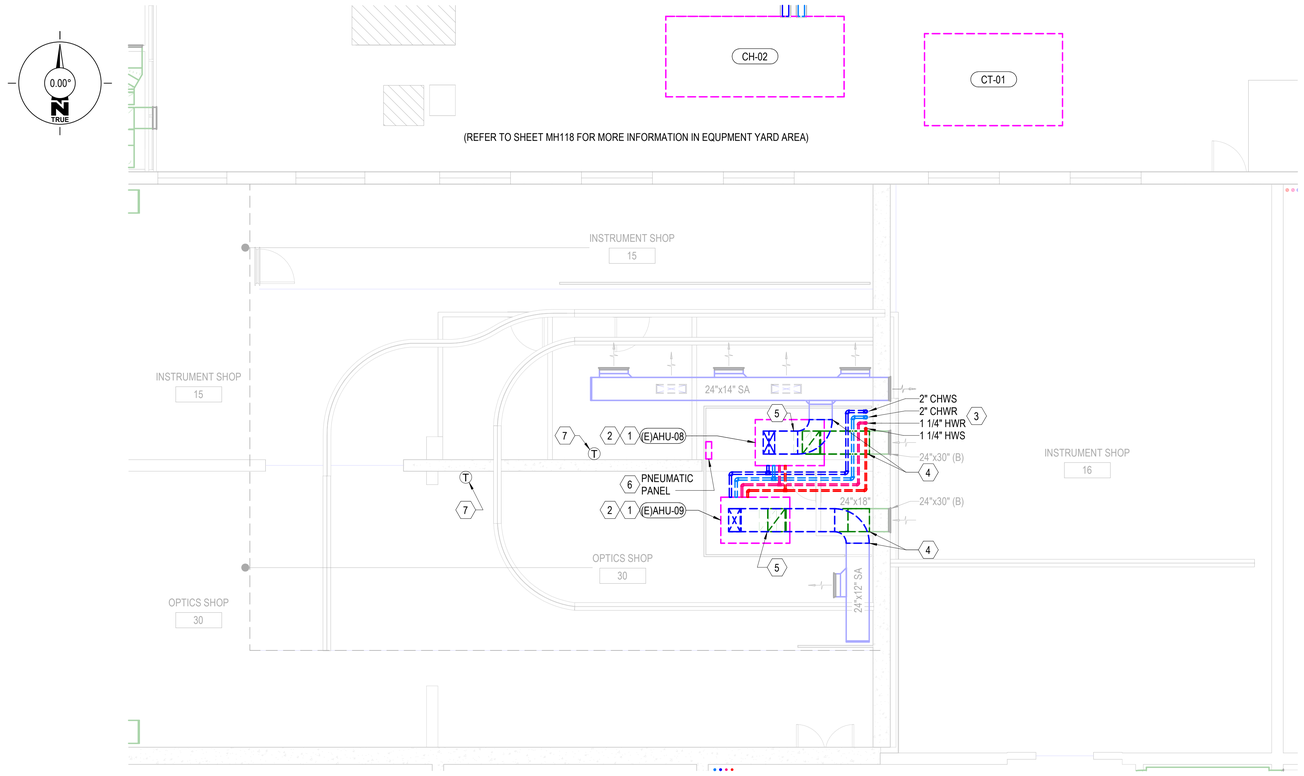
MECHANICAL

MAIN BLDG / EAST WING
FIRST FLOOR HVAC
PLANS

Sheet Number
MH115

M3PN 240097

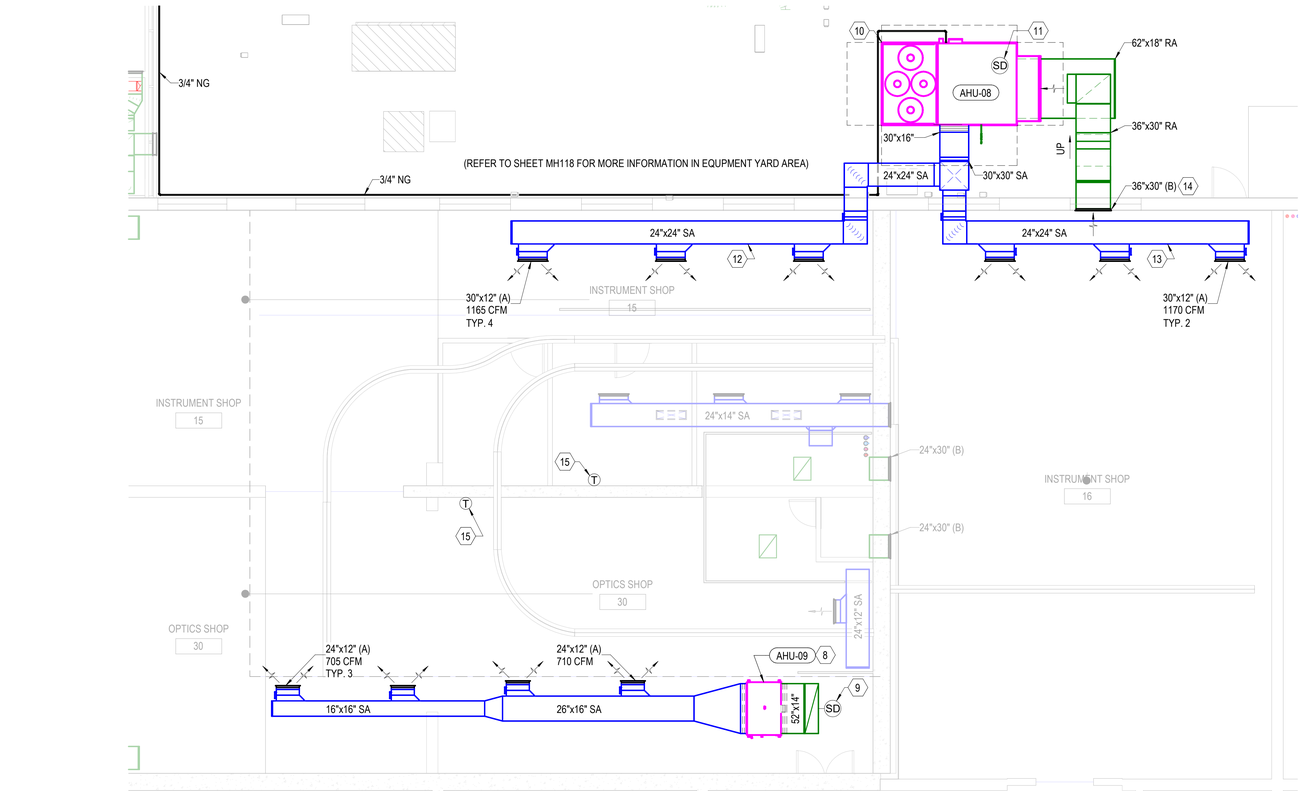
DATE: 7/17/2025 4:43:43 PM PATH: C:\Documents\25 projects\M3PN 240097 NOIRLab HVAC Replacement_annette.ivanovic@m3.ai



FIRST FLOOR - AHU-08 & AHU-9 - HVAC DEMO PLAN

SCALE: 3/16" = 1'-0"

1 MH110



FIRST FLOOR - AHU-08 & AHU-9 - HVAC RENO PLAN

SCALE: 3/16" = 1'-0"

2 MH110

6' 3' 0' 6' 12'

3/16" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE CONDENSATE DRAIN PIPING FROM AHU IN ITS ENTIRETY.

3 REMOVE CHW / HW PIPING FROM AHU BACK THRU FLOOR, FILL-IN CONCRETE AT FLOOR PENETRATIONS.

4 REMOVE EXISTING RETURN AIR DUCTWORK BACK TO FLOOR PENETRATION, PROVIDE ENDCAP.

5 REMOVE EXISTING RETURN AIR DUCTWORK BACK TO FLOOR PENETRATION, PROVIDE ENDCAP.

6 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

7 REMOVE EXISTING PNEUMATIC THERMOSTAT, INCLUDING ALL ASSOCIATED CONTROL LINES, REFER TO RENO PLAN ON THIS SHEET FOR REPLACEMENT, TYPICAL ALL.

8 LOCATE FANCOIL UNDER EXISTING WALKWAY, SUSPEND FROM WALKWAY STRUCTURE, PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO UNIT, ROUTE REFRIGERANT PIPING TO/FROM ASSOCIATED CONDENSING UNIT(S) ON ROOF, REFER TO DETAIL #12/MH501.

9 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

10 MOUNT PACKAGED UNIT ON CONCRETE HOUSEKEEPING PAD, MAINTAIN ALL SERVICE CLEARANCES PER EQUIPMENT MANUFACTURER'S DIRECTION.

11 PROVIDE SMOKE DETECTOR INSIDE PACKAGED UNIT, MOUNT WITH "FIELD INSTALL KIT" BY UNIT MANUFACTURER AT RETURN AIR INLET UPSTREAM OF OUTDOOR AIR CONNECTION AND FILTERS, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

12 ROUTE DUCTWORK TIGHT TO THE BOTTOM OF EXISTING WALKWAY STRUCTURE.

13 ROUTE DUCTWORK ABOVE EXISTING WALL MOUNTED LIGHTING FIXTURES.

14 SET BOTTOM OF RETURN GRILLE AT 12" AFF, COORDINATE WITH INTERIOR EQUIPMENT.

15 PROVIDE 7-DAY PROGRAMMABLE NETWORK THERMOSTAT ON WALL AT 44" AFF.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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TUCSON MAIN FACILITY

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Revisions

#	Description	Date

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Issue Date: 18 JUL 2025

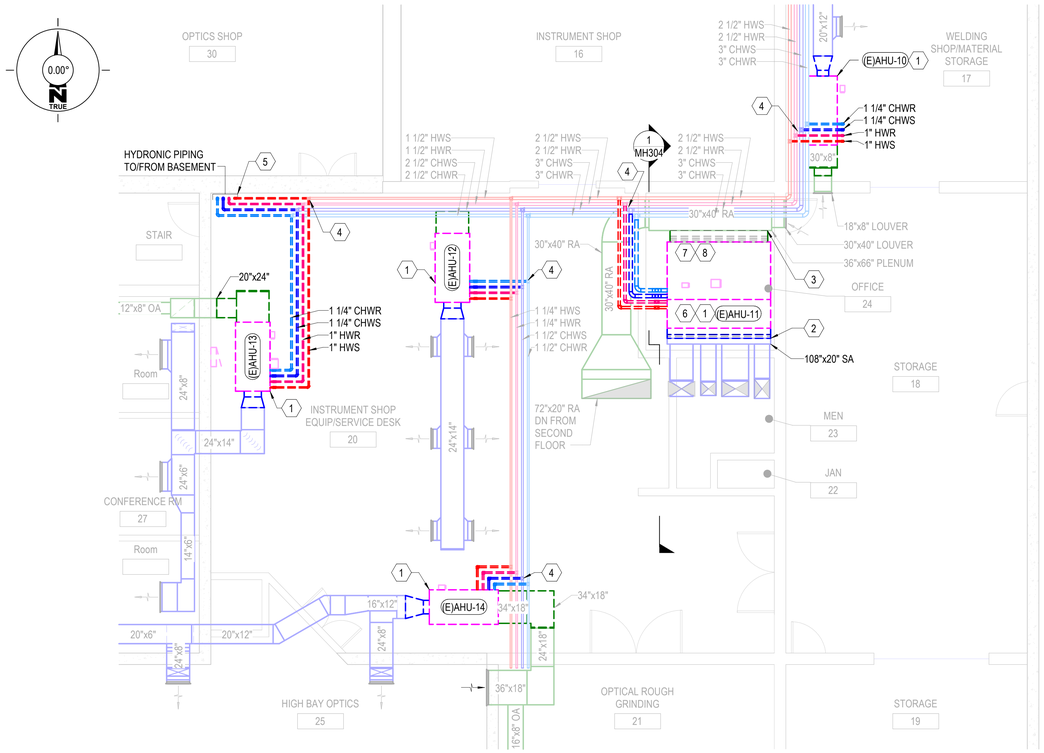
MECHANICAL

SHOP / ENG BLDG FIRST FLOOR AHU-08 & AHU-09 HVAC PLANS

Sheet Number
MH116

M3PN 240097

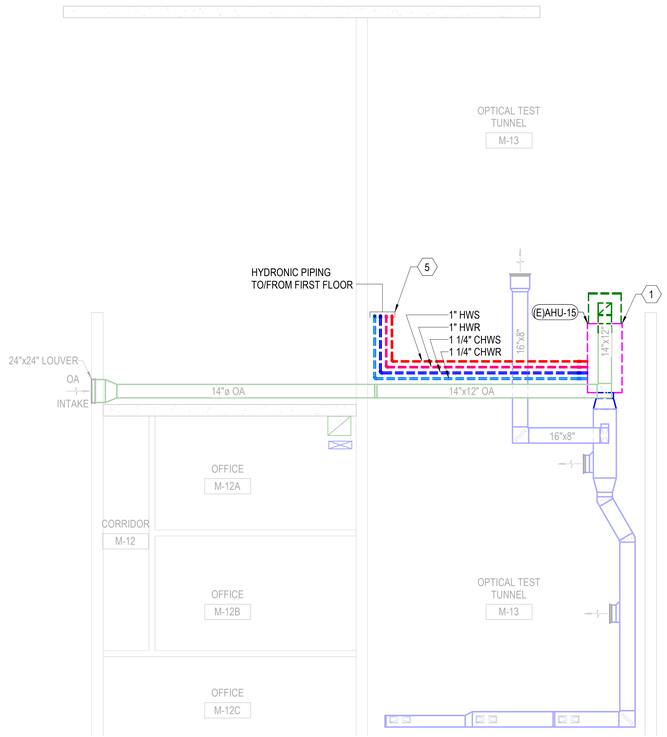
DATE: 7/17/2025 3:43:53 PM PATH: C:\Users\WDB\Documents\M3\240097-NOIRLAB-HVAC\Replacement_wdb.rvt Layout:MH116



FIRST FLOOR - AHU-10, 11, 12, 13, 14 - HVAC DEMO PLAN

SCALE: 3/16" = 1'-0"

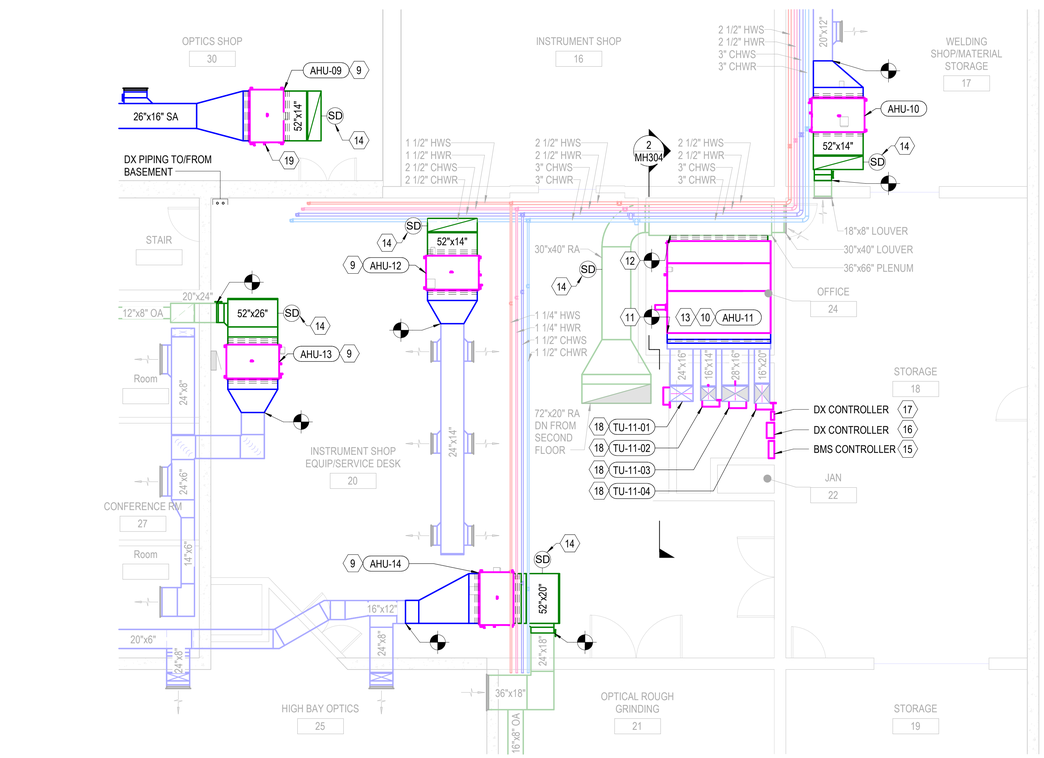
1 MH110



BASEMENT - AHU-15 - HVAC DEMO PLAN

SCALE: 3/16" = 1'-0"

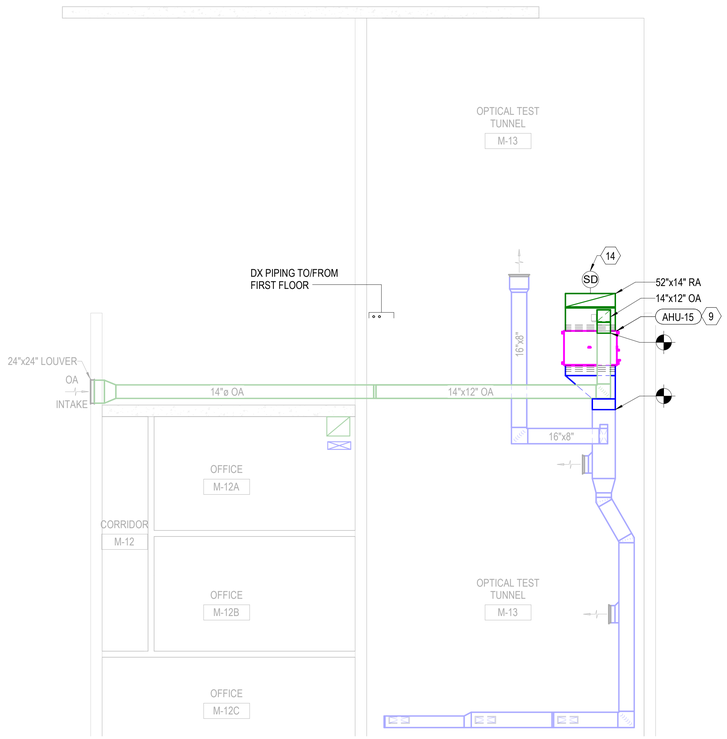
3 MH100



FIRST FLOOR - AHU-10, 11, 12, 13, 14 - HVAC RENO PLAN

SCALE: 3/16" = 1'-0"

2 MH110



6' 3' 0' 6' 12'

3/16" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE AHU AT EXISTING SUPPLY AIR FLEXIBLE CONNECTION, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

3 REMOVE AHU AT FLEXIBLE CONNECTION TO EXISTING MIXING BOX PLENUM TO REMAIN, EXISTING FILTER RACK ATTACHED OR WITHIN PLENUM BOX TO BE REMOVED, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

4 REMOVE CHW / HW PIPING FROM AHU BACK TO INDICATED POINT, PROVIDE ENDCAP.

5 REMOVE CHW / HW PIPING FROM AHU BACK THRU FLOOR, SALVAGE (2) PIPE FLOOR PENETRATIONS FOR ROUTING OF NEW DX PIPING, FILL-IN REMAINING CONCRETE AT FLOOR PENETRATIONS.

6 EXISTING DUCT MOUNTED SMOKE DETECTOR TO BE REPLACED ON AHU RETURN AIR DUCTWORK, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

7 REMOVE EXISTING PNEUMATIC ACTUATOR & CONTROL DAMPERS, INCLUDING ALL ASSOCIATED PNEUMATIC LINES AND CONTROLS, REFER TO RENO PLAN ON THIS SHEET FOR NEW REQUIREMENTS.

8 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

9 SUSPEND FANCOIL FROM STRUCTURE ABOVE, PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO UNIT, ROUTE REFRIGERANT PIPING TO/FROM ASSOCIATED CONDENSING UNIT(S) ON ROOF, REFER TO DETAIL #12/MH501.

10 INSTALL NEW AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD OR FINISHED FLOOR, MAINTAIN ALL SERVICE CLEARANCES PER AHU MANUFACTURER'S DIRECTION.

11 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT DISCHARGE TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK.

12 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT TO EXISTING AIR MIXING BOX PLENUM.

13 PROVIDE NEW CONTROL DAMPER IN DUCTWORK, RUSKIN MODEL CD50 WITH ELECTRIC ACTUATOR, BELIMO MODEL LF24-SR OR EQUAL, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

14 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

15 MOUNT BMS CONTROLLER ON WALL AT 48" AFF, PROVIDE 120/1/60 CIRCUIT, ROUTE 24 VOLT POWER FROM CONTROLLER TO DAMPER ELECTRIC ACTUATORS, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

16 MOUNT DX CONTROLLER ON WALL AT 48" AFF, PROVIDE 208-230/1/60 CIRCUIT, ROUTE CONTROL WIRING TO ASSOCIATED DX VALVE KIT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

17 MOUNT DX VALVE KIT ON WALL AT 48" AFF, ROUTE REFRIGERANT PIPING FROM ASSOCIATED CONDENSING UNIT THRU VALVE KIT TO DX COILS ON AIR HANDLING UNIT.

18 MOUNT SLIDE-IN RETROFIT TERMINAL UNIT IN EXISTING DUCTWORK, MAINTAIN 18" CLEARANCE IN FRONT OF UNIT.

19 ROUTE AND CONNECT 3/4" CONDENSATE PIPING FROM FANCOIL TO CONDENSATE PIPING FROM FANCOIL AHU-12, PROVIDE 1% SLOPE TOWARD TERMINATION POINT.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

SHOP / ENG BLDG
AHU-10,11,12,13,14, 15
HVAC PLANS

Sheet Number
MH117

M3PN 240097

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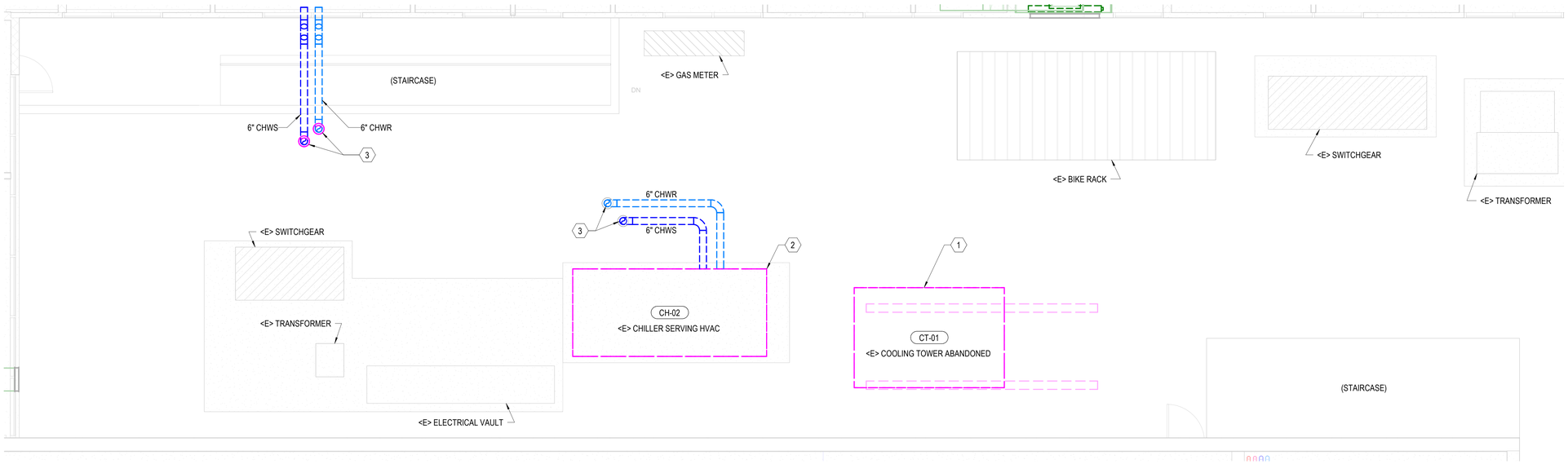
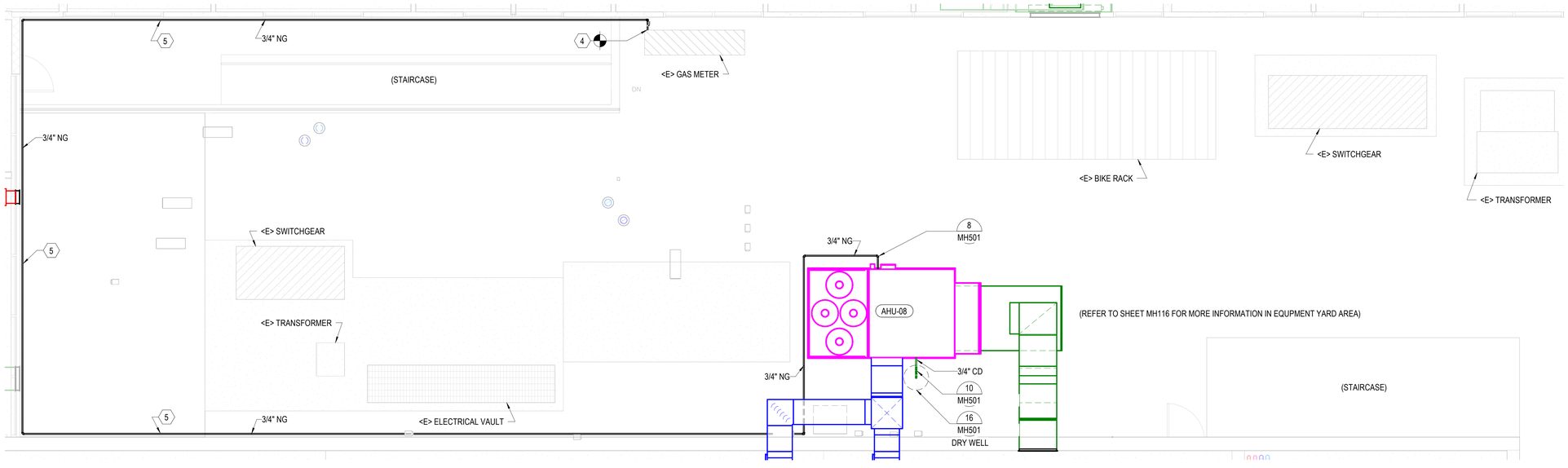


FIRST FLOOR - EQUIPMENT YARD WEST - DEMO HVAC PLAN

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

1 MH301



FIRST FLOOR - EQUIPMENT YARD WEST - RENO HVAC PLAN

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

2 MH301

KEYNOTES

1 EXISTING COOLING TOWER (NOT IN SERVICE) TO BE REMOVED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE ALL ASSOCIATED PIPING ABOVE GROUND AND PROVIDE ENDCAP, ALL ASSOCITED PIPE & CONCRETE EQUIPMENT SUPPORTS TO BE DEMOLISHED.

2 EXISTING CHILLER TO REMAIN IN SERVICE UNTIL ALL EXISTING HYDRONIC AIR HANDLING UNITS HAVE BEEN REPLACED, CHILLER TO BE REMOVED ONLY AFTER ENTIRE AHU REPLACEMENT HAS BEEN ACHIEVED.

3 EXISTING CHILLER PIPING TO REMAIN IN SERVICE UNTIL ALL EXISTING HYDRONIC AIR HANDLING UNITS HAVE BEEN REPLACED, PIPING TO BE REMOVED & CAPPED ONLY AFTER ENTIRE AHU REPLACEMENT HAS BEEN ACHIEVED.

4 PROVIDE CONNECTION TO EXISTING NATURAL GAS MAIN DOWNSTREAM OF METER, PROVIDE ISOLATION VALVE.

5 SECURE NATURAL GAS PIPING TO WALL BELOW EXISTING WINDOWS, COORDINATE WITH EXISTING UTILITIES.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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Revisions

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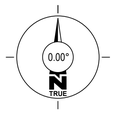
MECHANICAL

FIRST FLOOR
EQUIPMENT YARD - WEST

Sheet Number
MH118

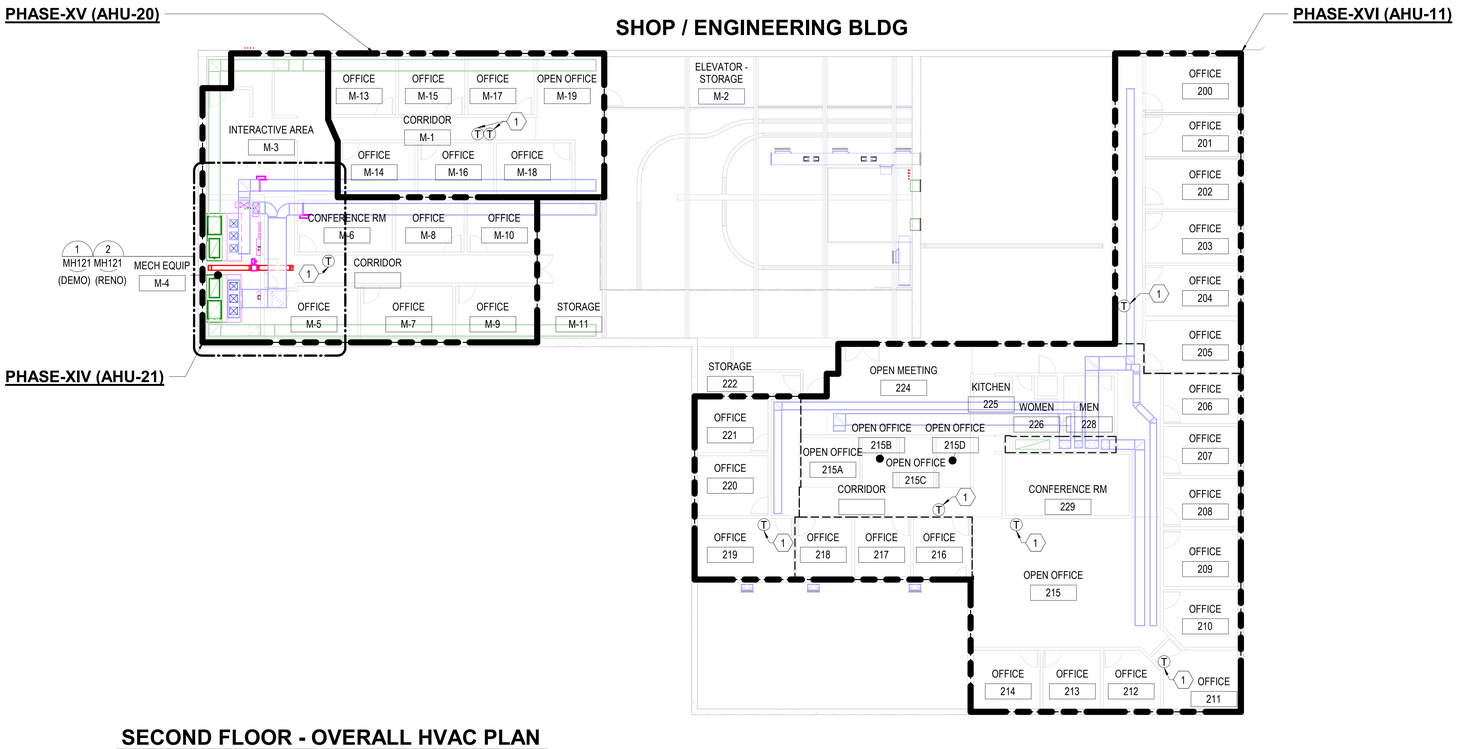
M3PN 240097

DATE: 7/17/2025 3:51:26 PM PATH: C:\Revit\M3 Projects\M3 240097 NOIRLab HVAC Replacement_arnoldj.sweet@nlf.u



KEYNOTES

1 REPLACE EXISTING PNEUMATIC THERMOSTAT, PROVIDE TERMINAL UNIT TEMPERATURE SENSOR / TRANSMITTER ON WALL AT 44" AFF.



SECOND FLOOR - OVERALL HVAC PLAN

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

10' 5' 0' 10' 20'
3/32" = 1'-0"

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

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Revisions

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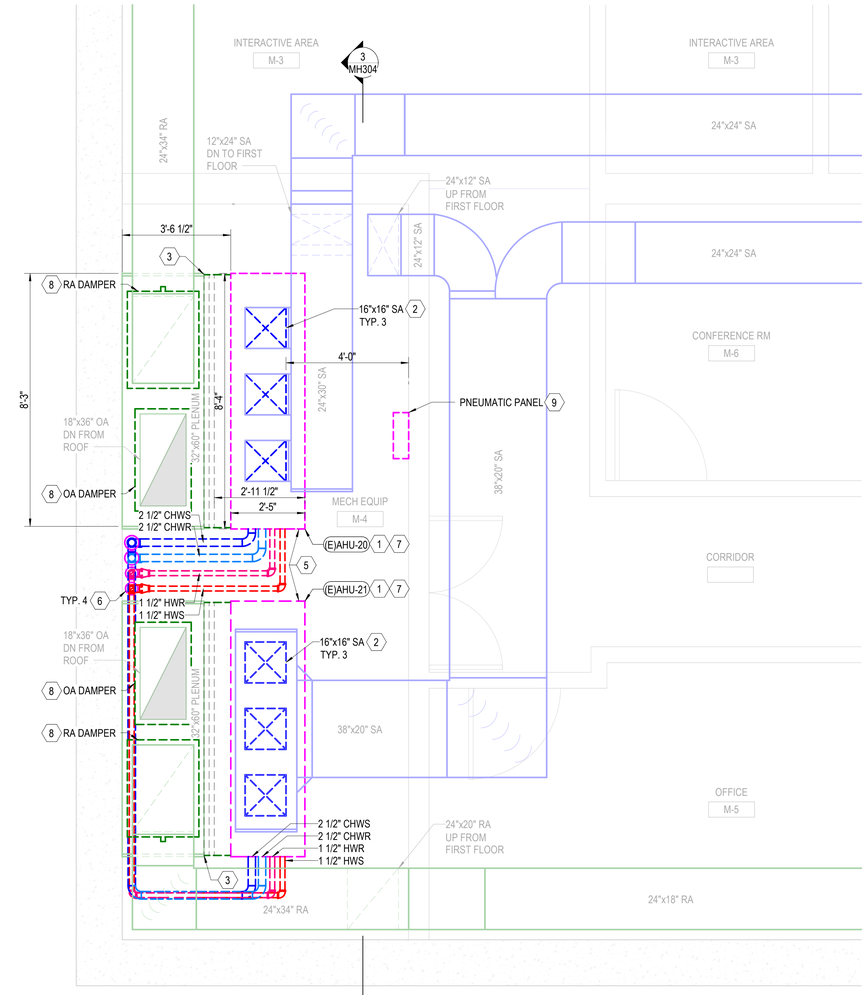
MECHANICAL

SECOND FLOOR
OVERALL HVAC PLAN

Sheet Number
MH120

M3PN 240097

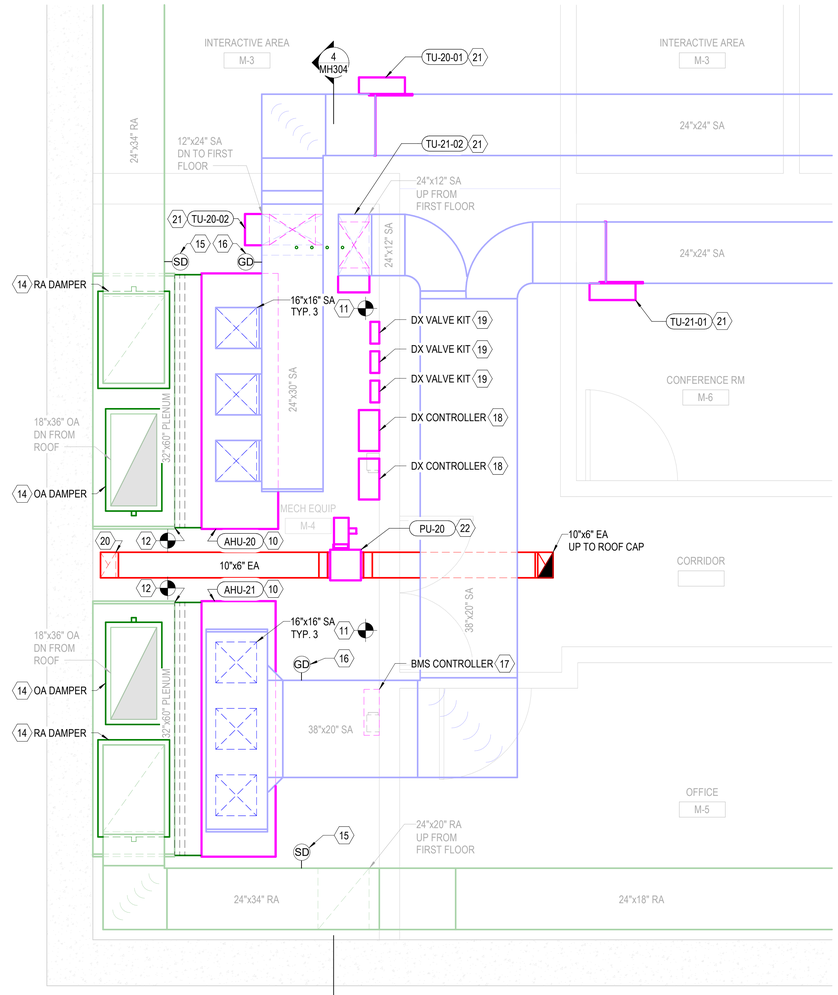
DATE: 7/17/2025 3:54:5 PM PATH: C:\Revit\M3 PROJECTS\M3PN 240097 HP NOIRLab HVAC Replacement_amanda.kuwertz@m3.a



SECOND FLOOR - AHU-20 & AHU-21 - DEMO HVAC PLAN

SCALE: 1/2" = 1'-0"

1 MH120



SECOND FLOOR - AHU-20 & AHU-21 - RENO HVAC PLAN

SCALE: 1/2" = 1'-0"

2 MH120

4' 2' 0' 4' 8'

1/4" = 1'-0"

KEYNOTES

1 EXISTING AIR HANDLING UNIT TO BE REPLACED, DISCONNECT FROM ALL SERVING UTILITIES AND REMOVE AHU INCLUDING ALL ASSOCIATED HYDRONIC & CONDENSATE PIPING, SUPPORTS AND VIBRATION ISOLATORS, REFER TO RENO PLAN ON THIS SHEET FOR NEW UNIT.

2 REMOVE AHU AT EXISTING SUPPLY AIR FLEXIBLE CONNECTION, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

3 REMOVE AHU AT FLEXIBLE CONNECTION TO EXISTING MIXING BOX PLENUM TO REMAIN, EXISTING FILTER RACK ATTACHED OR WITHIN PLENUM BOX TO BE REMOVED, REFER TO RENO PLAN ON THIS SHEET FOR NEW CONNECTION.

4 NOT USED.

5 REMOVE CONDENSATE DRAIN PIPING FROM AHU IN ITS ENTIRETY.

6 REMOVE CHW / HW PIPING FROM AHU BACK THRU FLOOR, FILL-IN CONCRETE AT FLOOR PENETRATIONS.

7 EXISTING DUCT MOUNTED SMOKE DETECTOR TO BE REPLACED ON AHU RETURN AIR DUCTWORK, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

8 REMOVE EXISTING PNEUMATIC ACTUATOR & CONTROL DAMPER, INCLUDING ALL ASSOCIATED PNEUMATIC LINES AND CONTROLS, REFER TO RENO PLAN ON THIS SHEET FOR NEW REQUIREMENTS.

9 REMOVE EXISTING PNEUMATIC CONTROL PANEL INCLUDING ALL ASSOCIATED ACCESSORIES, PNEUMATIC LINES AND CONTROLS, COORDINATE WITH CONTROLS CONTRACTOR.

10 INSTALL NEW AIR HANDLING UNIT ON EXISTING HOUSEKEEPING PAD OR FINISHED FLOOR, MAINTAIN ALL SERVICE CLEARANCES PER AHU MANUFACTURER'S DIRECTION.

11 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT DISCHARGE TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK.

12 PROVIDE FLEXIBLE CONNECTION FROM AIR HANDLING UNIT TO EXISTING AIR MIXING BOX PLENUM.

13 PROVIDE CONNECTION TO EXISTING SUPPLY AIR DUCTWORK.

14 PROVIDE NEW CONTROL DAMPER IN DUCTWORK, RUSKIN MODEL CD50 WITH ELECTRIC ACTUATOR, BELIMO MODEL LF24-SR OR EQUAL, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

15 PROVIDE DUCT MOUNTED SMOKE DETECTOR IN RETURN AIR DUCT UPSTREAM OF OUTSIDE AIR CONNECTION, INTERLOCK WITH ASSOCIATED AIR HANDLING UNIT, UNIT TO BE SHUTDOWN UPON SMOKE DETECTION, INTERLOCK THRU BMS & FIRE ALARM PANEL FOR MONITORING, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

16 PROVIDE DUCT MOUNTED REFRIGERANT GAS DETECTOR IN MAIN SUPPLY AIR DISCHARGE DUCT, INTERLOCK TO SHUTDOWN ASSOCIATED AHU & CONDENSING UNIT, ROOM PURGE EXHAUST FAN SHALL START UPON GAS DETECTION, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

17 MOUNT BMS CONTROLLER ON WALL AT 48" AFF, PROVIDE 120/1/60 CIRCUIT, ROUTE 24 VOLT POWER FROM CONTROLLER TO DAMPER ELECTRIC ACTUATORS, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

18 MOUNT DX CONTROLLER ON WALL AT 48" AFF, PROVIDE 208-230/1/60 CIRCUIT, ROUTE CONTROL WIRING TO ASSOCIATED DX VALVE KIT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.

19 MOUNT DX VALVE KIT ON WALL AT 48" AFF, ROUTE REFRIGERANT PIPING FROM ASSOCIATED CONDENSING UNIT THRU VALVE KIT TO DX COILS ON AIR HANDLING UNIT.

20 TERMINATE REFRIGERANT PURGE EXHAUST DUCT 12" AFF, PROVIDE 1/2" MESH SCREEN ON INLET.

21 MOUNT SLIDE-IN RETROFIT TERMINAL UNIT IN EXISTING DUCTWORK, MAINTAIN 18" CLEARANCE IN FRONT OF UNIT.

22 SUSPEND FAN FROM STRUCTURE ABOVE, PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO UNIT.

GENERAL NOTES

A. ALL EXISTING AIR SCRUBBER DEVICES MOUNTED TO EXISTING SUPPLY AIR DISTRIBUTION DUCTWORK SHALL REMAIN IN PLACE & OPERATIONAL.

B. COORDINATE WITH OWNER PRIOR TO THE TIE-IN OR SHUTDOWN OF ANY SERVICE UTILITIES.

C. SALVAGE ALL DEMOLISHED EQUIPMENT, VALVES, DAMPERS, CONTROL PANELS AND MONITORING DEVICES BACK TO OWNER.

D. CONTRACTOR SHALL FIELD VERIFY EXISTING DUCTWORK & PIPING DIMENSIONS PRIOR TO DEVICE PROCUREMENT OR PIPING & DUCTWORK FABRICATION.

E. PROVIDE TRANSITION AND FLEXIBLE CONNECTION TO EQUIPMENT.

F. PROVIDE MANUAL BALANCING DAMPER AT ALL BRANCH TAKE-OFFS.

G. COORDINATE INSTALLATION WITH OTHER TRADES.

H. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

I. REFER TO 'MH7 SERIES' DRAWINGS FOR HVAC CONTROLS AND FLOW DIAGRAMS.

NOIRLAB HVAC PROJECT
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Revisions

#	Description	Date

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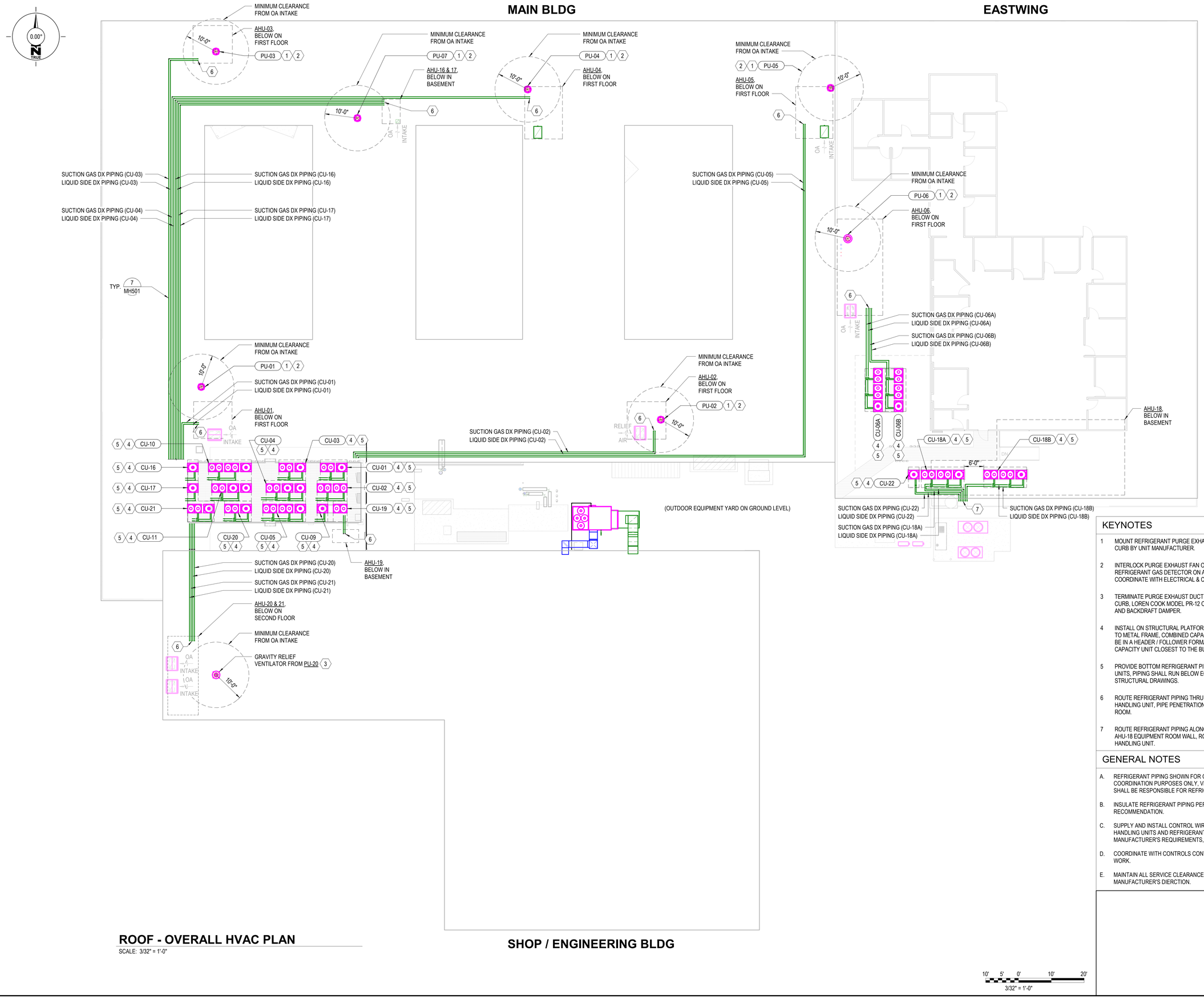
MECHANICAL

SHOP / ENG BLDG
SECOND FLOOR AHU-20 & AHU-21 HVAC PLANS

Sheet Number
MH121

M3PN 240097

DATE: 7/17/2025 3:49:03 PM XREFs: C:\Users\WDB\Documents\M3\2025\M3PN 240097 NOIRLab HVAC Replacement_wdbMEmaster.rvt



ROOF - OVERALL HVAC PLAN

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

10' 5' 0' 10' 20'

3/32" = 1'-0"

KEYNOTES

1. MOUNT REFRIGERANT PURGE EXHAUST FAN ON PRE-FABRICATED ROOF CURB BY UNIT MANUFACTURER.
2. INTERLOCK PURGE EXHAUST FAN OPERATION WITH ASSOCIATED REFRIGERANT GAS DETECTOR ON AHU SUPPLY AIR DISCHARGE DUCT, COORDINATE WITH ELECTRICAL & CONTROLS CONTRACTOR.
3. TERMINATE PURGE EXHAUST DUCT WITH ROOF CAP ON PRE-FABRICATED CURB, LOREN COOK MODEL PR-12 OR EQUAL, PROVIDE WITH BIRDSCREEN AND BACKDRAFT DAMPER.
4. INSTALL ON STRUCTURAL PLATFORM WITH RUBBER SNUBBERS, SECURE TO METAL FRAME, COMBINED CAPACITY VRF CONDENSING UNITS SHALL BE IN A HEADER / FOLLOWER FORMATION, BEGINNING WITH THE LARGEST CAPACITY UNIT CLOSEST TO THE BUILDING BRANCH PIPING.
5. PROVIDE BOTTOM REFRIGERANT PIPING CONNECTION TO CONDENSING UNITS, PIPING SHALL RUN BELOW EQUIPMENT PLATFORM, REFER TO STRUCTURAL DRAWINGS.
6. ROUTE REFRIGERANT PIPING THRU ROOF TO/FROM ASSOCIATED AIR HANDLING UNIT, PIPE PENETRATIONS SHALL BE WITHIN EQUIPMENT ROOM.
7. ROUTE REFRIGERANT PIPING ALONG EXTERIOR, PENETRATE BUILDING AT AHU-18 EQUIPMENT ROOM WALL, ROUTE TO/FROM ASSOCIATED AIR HANDLING UNIT.

GENERAL NOTES

A. REFRIGERANT PIPING SHOWN FOR GENERAL ARRANGEMENT AND COORDINATION PURPOSES ONLY. VRF EQUIPMENT MANUFACTURER SHALL BE RESPONSIBLE FOR REFRIGERANT PIPE SIZES.

B. INSULATE REFRIGERANT PIPING PER MANUFACTURER'S RECOMMENDATION.

C. SUPPLY AND INSTALL CONTROL WIRING TO CONDENSING UNITS, AIR HANDLING UNITS AND REFRIGERANT FLOW SELECTOR UNITS PER MANUFACTURER'S REQUIREMENTS, WIRING SHALL BE PLENUM RATED.

D. COORDINATE WITH CONTROLS CONTRACTOR FOR ALL HVAC CONTROLS WORK.

E. MAINTAIN ALL SERVICE CLEARANCES PER CONDENSER UNIT MANUFACTURER'S DIERCTION.

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

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MECHANICAL

ROOF OVERALL HVAC PLAN

Sheet Number
MH130

M3PN 240097

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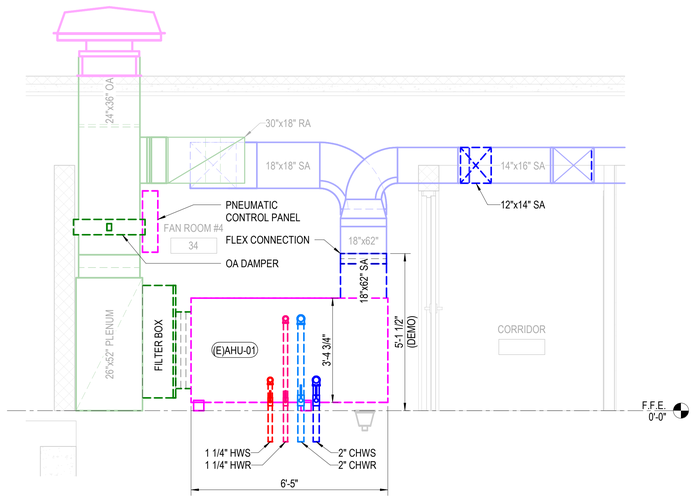
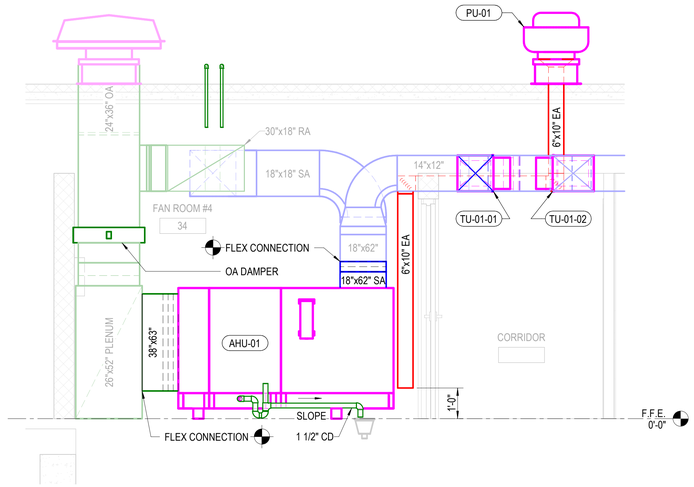


SECTION - AHU-01 LOOKING WEST - DEMO

SCALE: 1/2" = 1'-0"

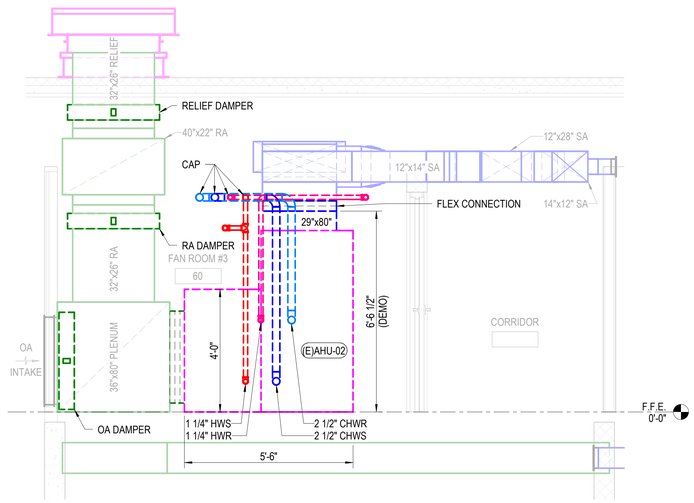
1 MH111



SECTION - AHU-01 LOOKING WEST - RENO

SCALE: 1/2" = 1'-0"

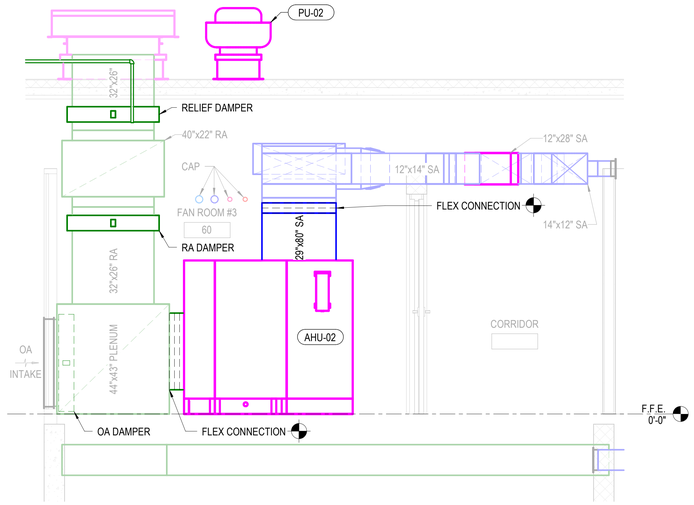
2 MH111



SECTION - AHU-02 LOOKING WEST - DEMO

SCALE: 1/2" = 1'-0"

3 MH111



SECTION - AHU-02 LOOKING WEST - RENO

SCALE: 1/2" = 1'-0"

4 MH111

NOIRLAB HVAC PROJECT
TUCSON MAIN FACILITY

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Revisions

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MECHANICAL

SECTIONS

Sheet Number
MH301

M3PN 240097

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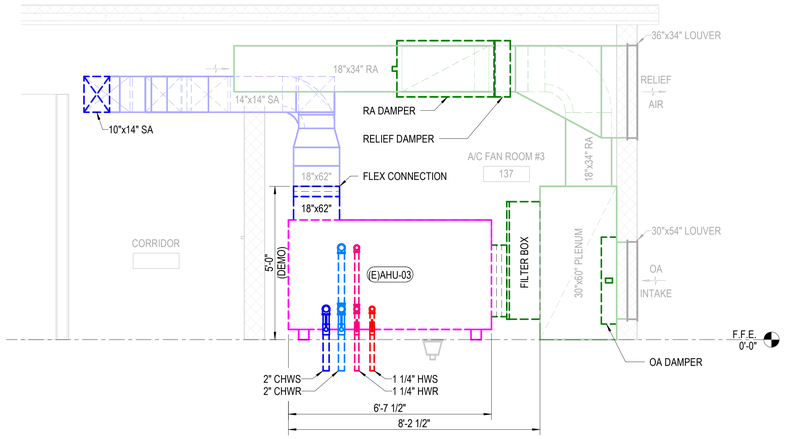
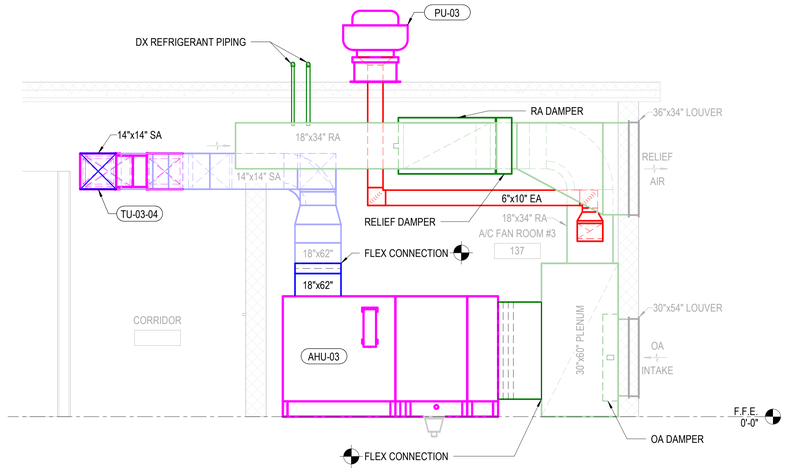


SECTION - AHU-03 LOOKING WEST - DEMO

SCALE: 1/2" = 1'-0"

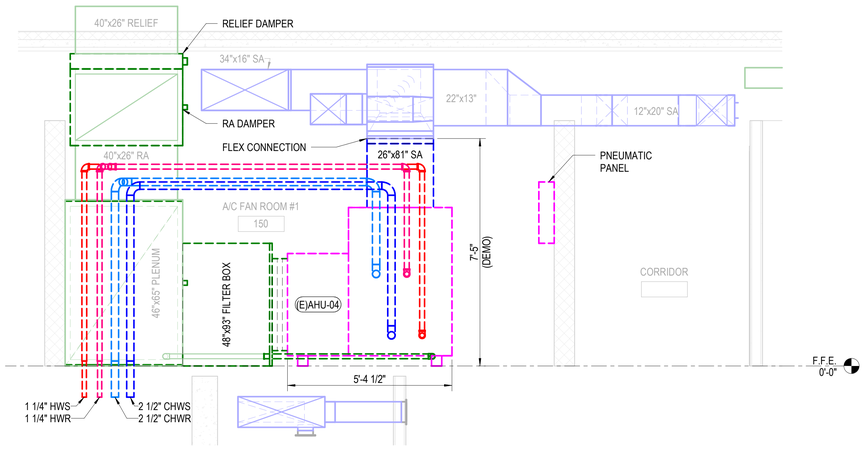
1 MH112



SECTION - AHU-03 LOOKING WEST - RENO

SCALE: 1/2" = 1'-0"

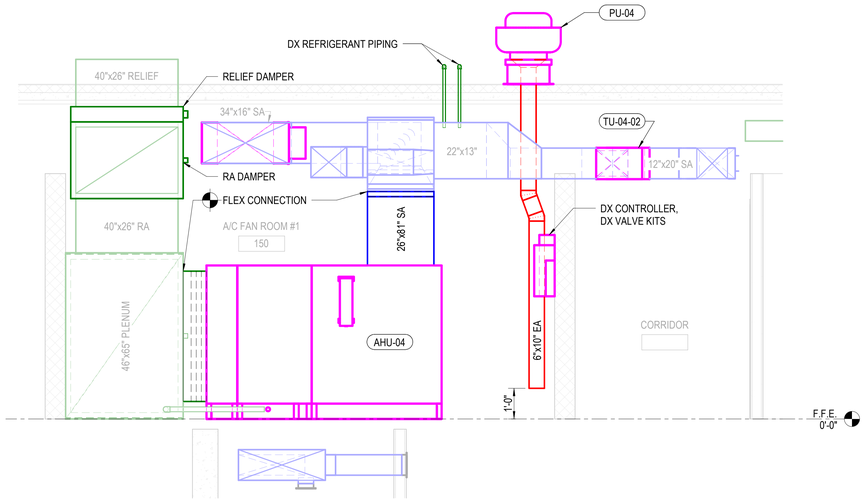
2 MH112



SECTION - AHU-04 LOOKING WEST - DEMO

SCALE: 1/2" = 1'-0"

3 MH112



SECTION - AHU-04 LOOKING WEST - RENO

SCALE: 1/2" = 1'-0"

4 MH112

NOIRLAB HVAC PROJECT
TUCSON MAIN FACILITY

BID DOCUMENTS

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ENGINEERING
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Revisions

#	Description	Date

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MECHANICAL

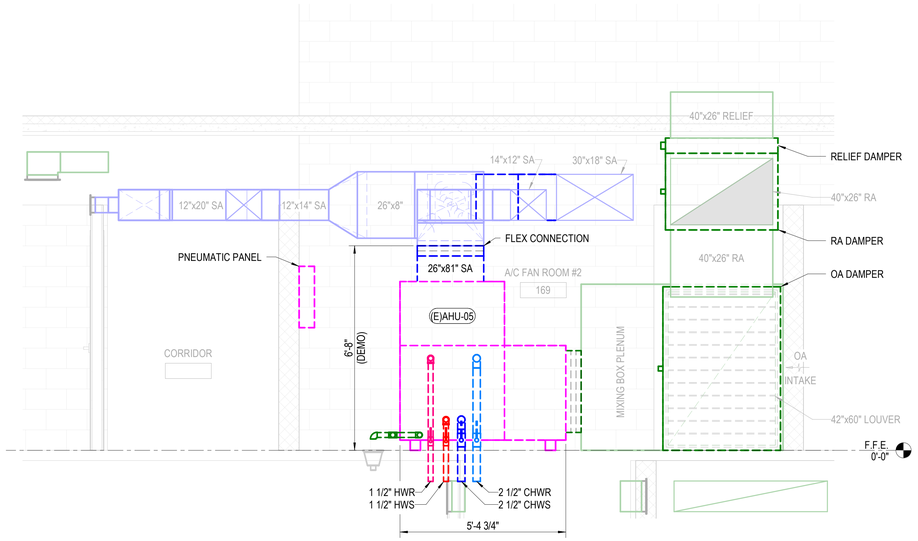
SECTIONS

Sheet Number

MH302

M3PN 240097

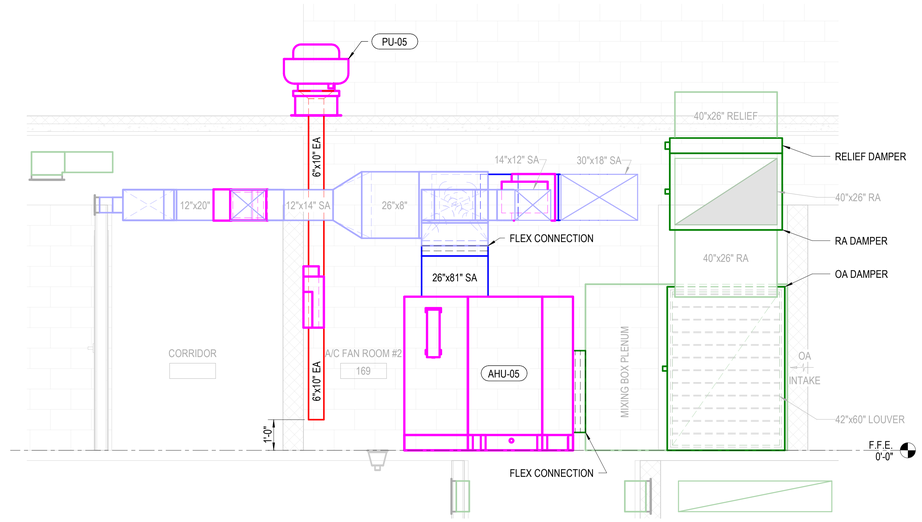
DATE: 7/17/2025 3:23:23 PM PATH: C:\Users\WTB\Documents\M3\240097-NOIRLab HVAC Replacement_wwarbs.cooper@M3.rvt



SECTION - AHU-05 LOOKING EAST - DEMO

SCALE: 1/2" = 1'-0"

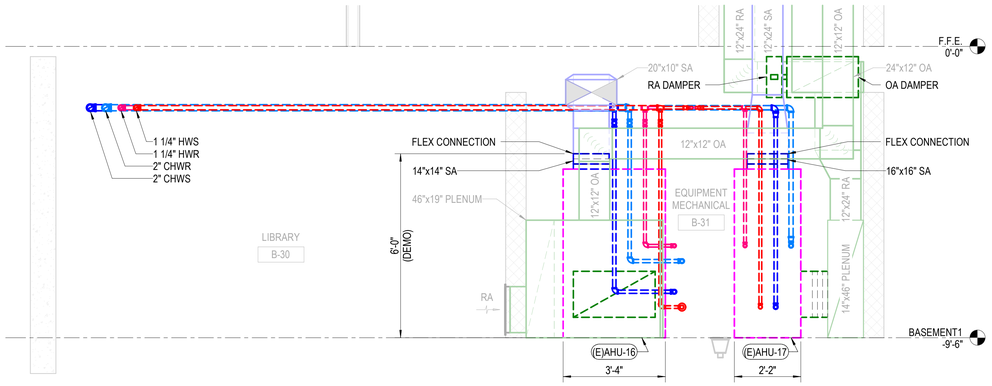
1 MH113



SECTION - AHU-05 LOOKING EAST - RENO

SCALE: 1/2" = 1'-0"

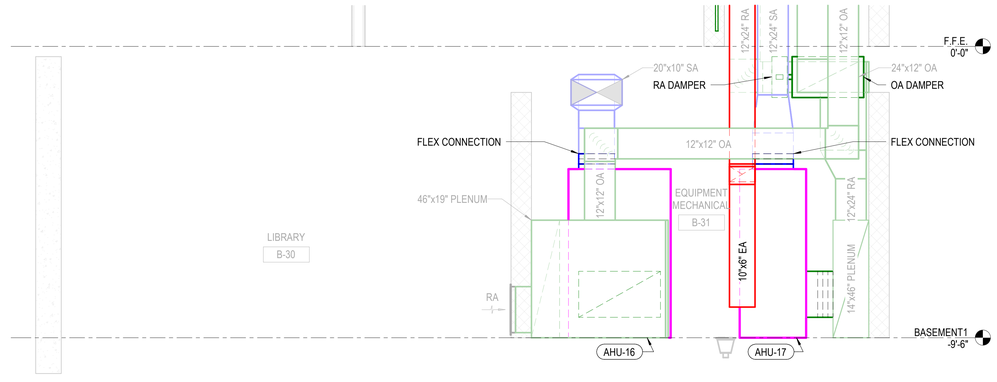
2 MH113



SECTION - AHU-16 & AHU-17 LOOKING NORTH - DEMO

SCALE: 1/2" = 1'-0"

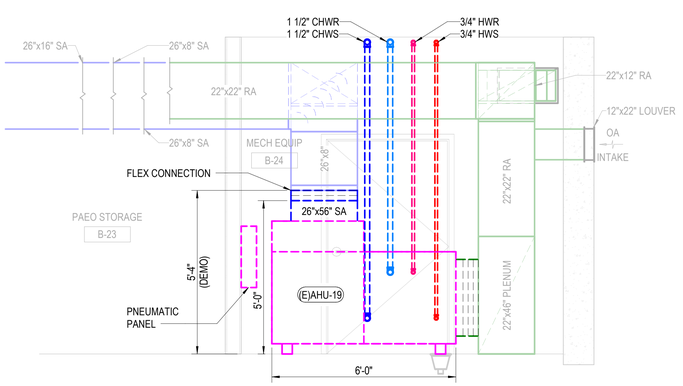
3 MH101



SECTION - AHU-16 & AHU-17 LOOKING NORTH - RENO

SCALE: 1/2" = 1'-0"

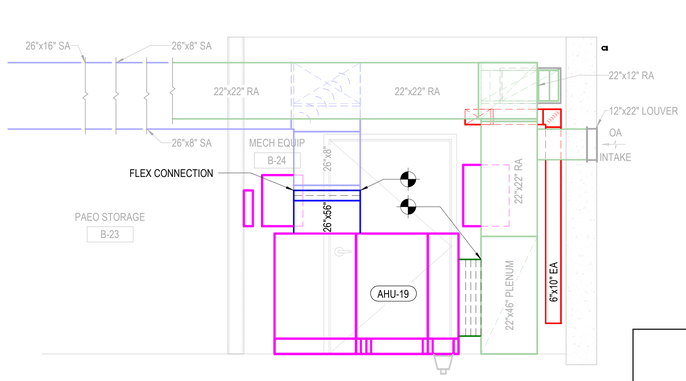
4 MH101



SECTION - AHU-19 LOOKING NORTH - DEMO

SCALE: 1/2" = 1'-0"

5 MH101



SECTION - AHU-19 LOOKING NORTH - RENO

SCALE: 1/2" = 1'-0"

6 MH101

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Revisions

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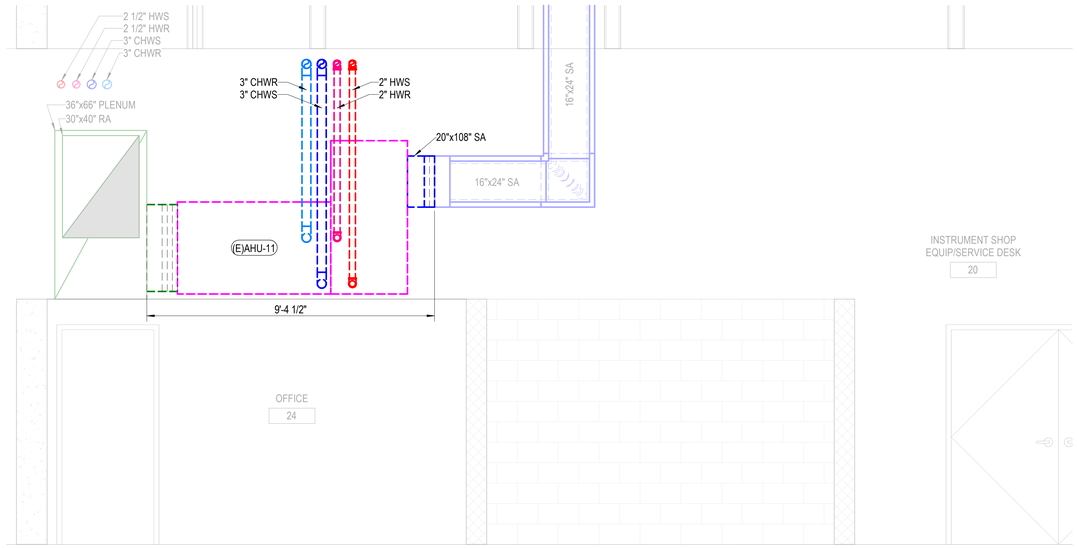
MECHANICAL

SECTIONS

Sheet Number
MH303

M3PN 240097

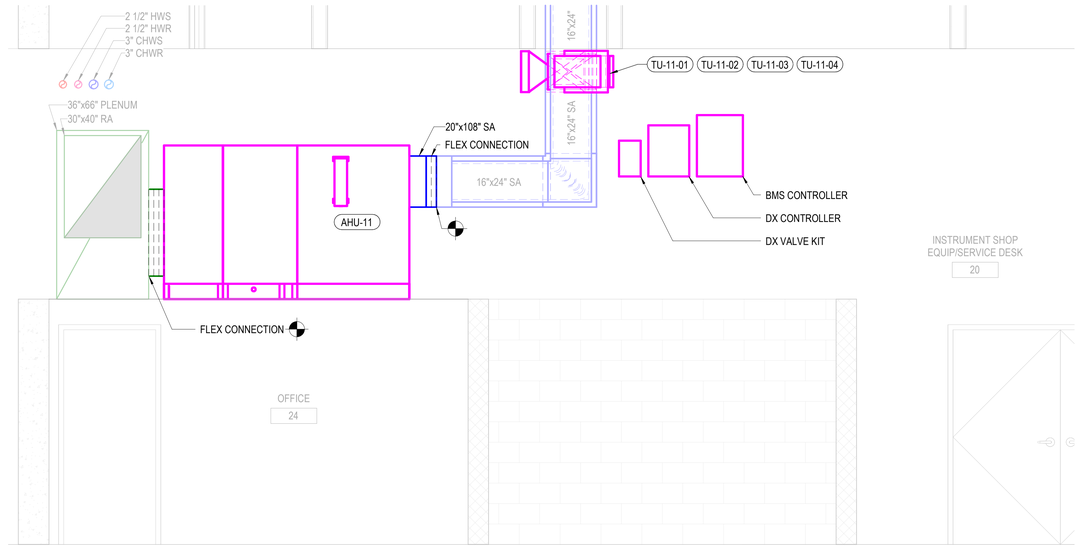
DATE: 7/17/2025 3:33:53 PM PATH: C:\Users\WDB\Documents\20250707-NOIRLab-HVAC-Replacement_wmaida.rvt



SECTION - AHU-11 LOOKING EAST - DEMO

SCALE: 1/2" = 1'-0"

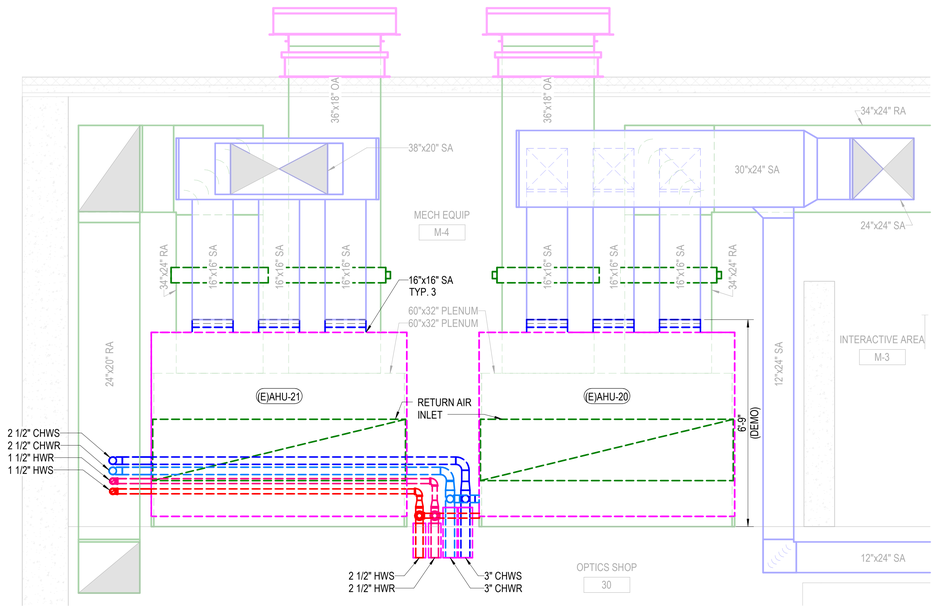
1 MH117



SECTION - AHU-11 LOOKING EAST - RENO

SCALE: 1/2" = 1'-0"

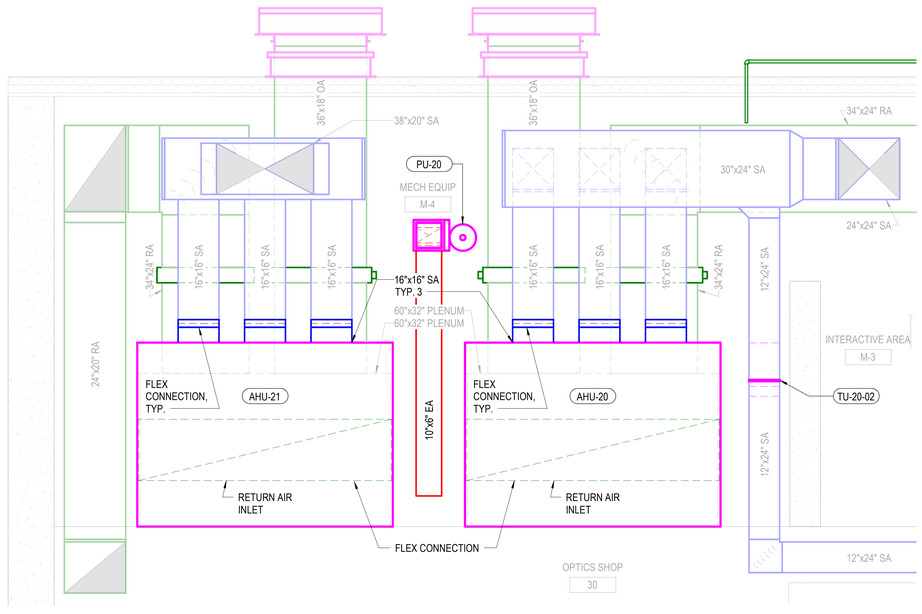
2 MH117



SECTION - AHU-20 & AHU-21 LOOKING WEST - DEMO

SCALE: 1/2" = 1'-0"

3 MH121



SECTION - AHU-20 & AHU-21 LOOKING WEST - RENO

SCALE: 1/2" = 1'-0"

4 MH121

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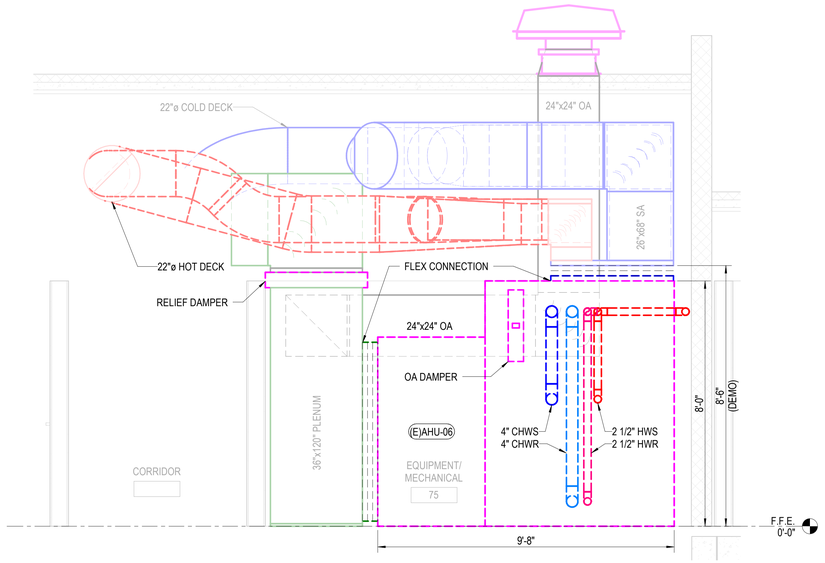
MECHANICAL

SECTIONS

Sheet Number
MH304

M3PN 240097

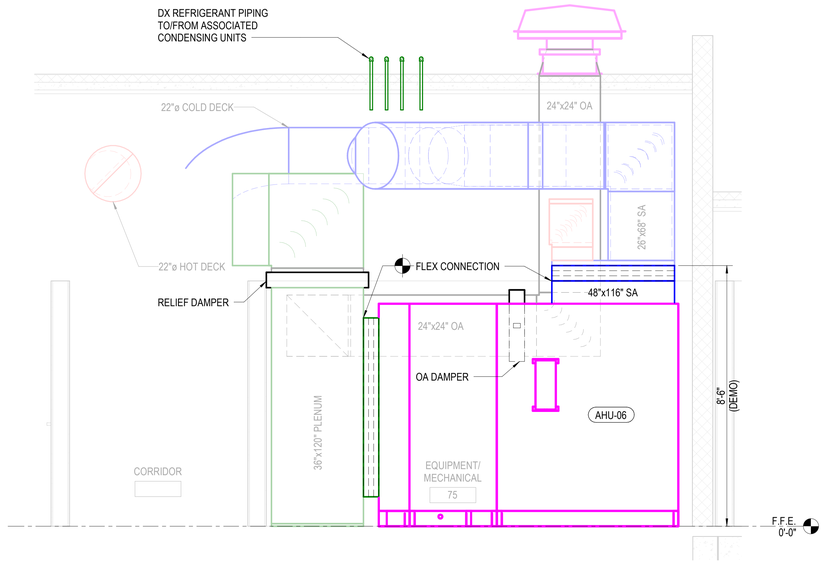
DATE: 7/17/2025 3:59:53 PM PATH: C:\Documents\19 Documents\20 Updates and Addenda\Addendum #1\MH\Addendum #1 MH304.rvt



SECTION - AHU-06 LOOKING SOUTH - DEMO

SCALE: 1/2" = 1'-0"

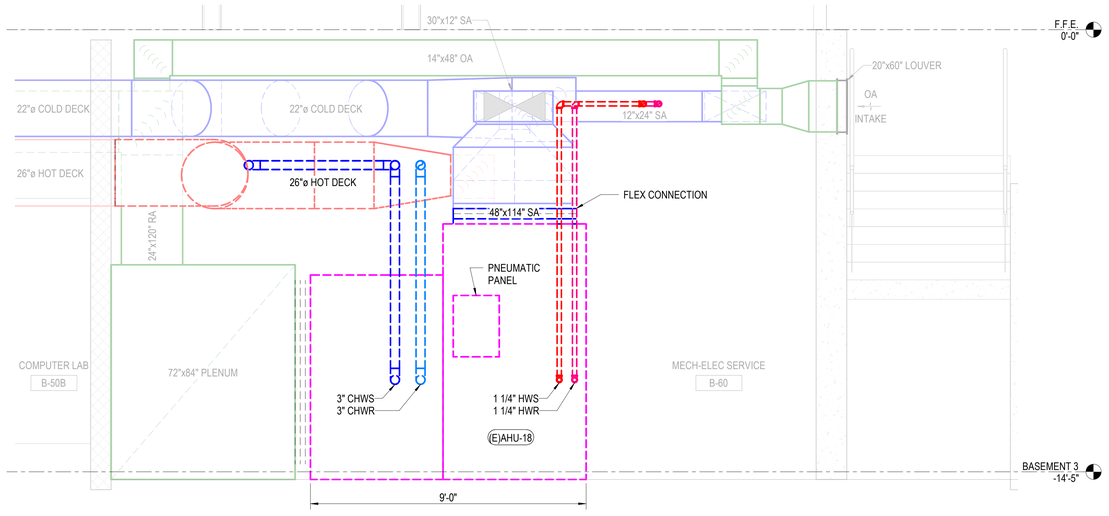
1 MH114



SECTION - AHU-06 LOOKING SOUTH - RENO

SCALE: 1/2" = 1'-0"

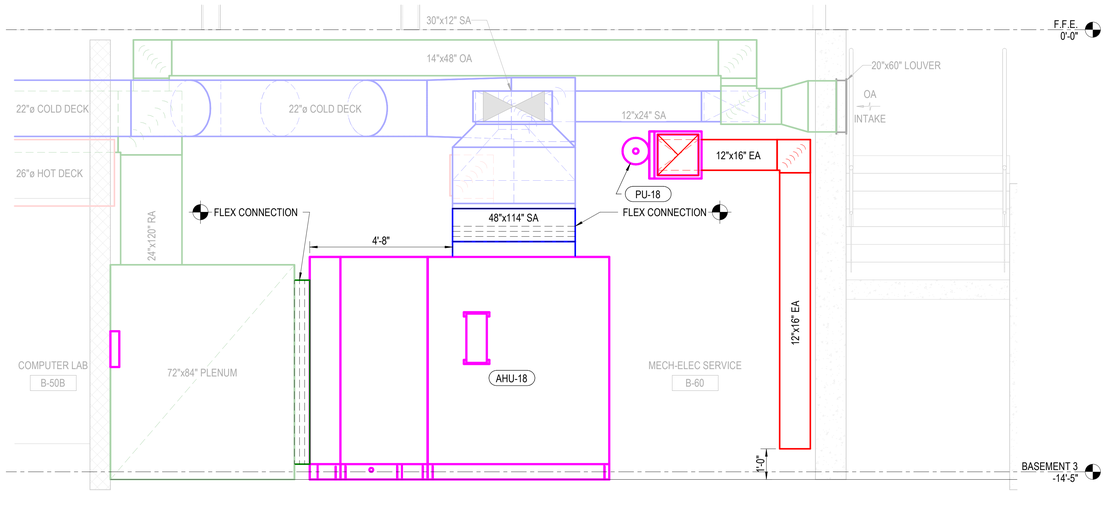
2 MH114



SECTION - AHU-18 LOOKING EAST - DEMO

SCALE: 1/2" = 1'-0"

3 MH102



SECTION - AHU-18 LOOKING EAST - RENO

SCALE: 1/2" = 1'-0"

4 MH102

NOIRLAB HVAC PROJECT
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Revisions

#	Description	Date

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MECHANICAL

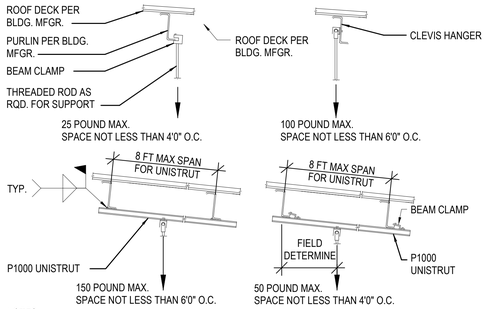
SECTIONS

Sheet Number

MH305

M3PN 240097

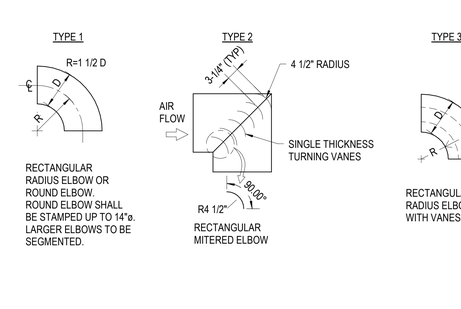
DATE: 7/17/2025 2:59:24 PM PATH: C:\Revit\M3PN 240097 AHU06 and AHU18 Replacement_amanda.ouweneel@m3.a



NOTES:
1. HANGERS AND SUPPORTS SHALL BE FACTORY FABRICATED ACCORDING TO MSS SP-58.
2. INSTALL HANGER, SUPPORTS, CLAMPS AND ATTACHMENTS PER MSS SP-69 & SP-89 AS REQUIRED TO PROPERLY SUPPORT FROM BUILDING STRUCTURE.
3. CONTRACTOR SHALL ENSURE THAT WEIGHT LIMITS ARE NOT EXCEEDED.

STRUCTURAL ATTACHMENT 1

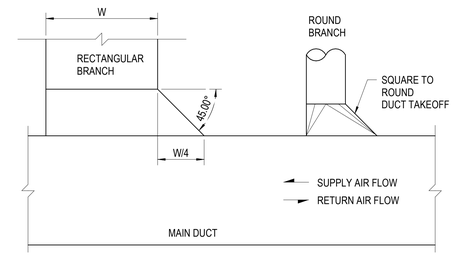
SCALE: NTS



NOTES:
1. ALL ELBOWS SHALL HAVE AN R/D=1.5 UNLESS NOTED OTHERWISE ON PLAN.

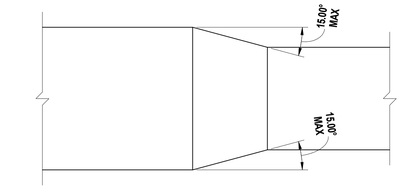
DUCT ELBOWS 2

SCALE: NTS



DUCT BRANCH TAKE OFF 3

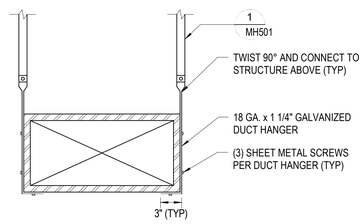
SCALE: NTS



NOTES:
1. IF 15° ANGLE IS NOT POSSIBLE, CONTACT ENGINEER FOR OTHER POSSIBLE SOLUTIONS.

DUCT TRANSITION 4

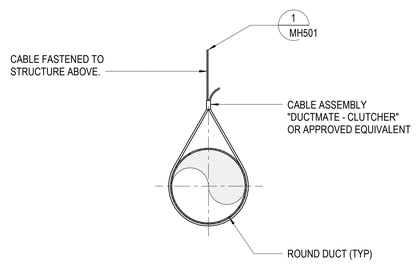
SCALE: NTS



NOTE:
1. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR ALL MATERIALS FOR ATTACHMENT TO BUILDING STRUCTURE.

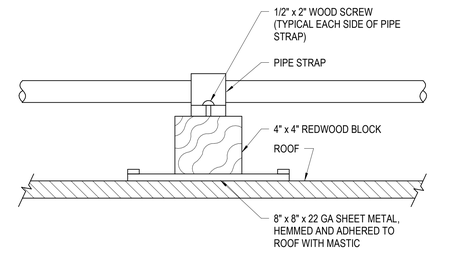
DUCT HANGER - RECTANGULAR 5

SCALE: NTS



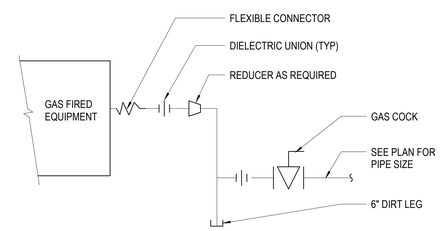
DUCT HANGER - ROUND 6

SCALE: NTS



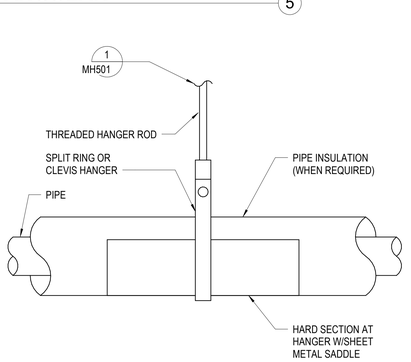
PIPE SUPPORT - ROOF 7

SCALE: NTS



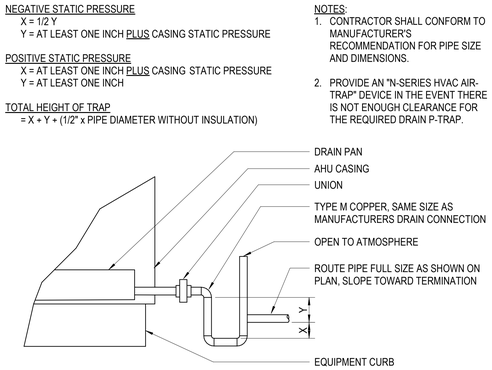
GAS CONNECTION 8

SCALE: NTS



PIPE HANGER 9

SCALE: NTS



NOTES:
1. CONTRACTOR SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR PIPE SIZE AND DIMENSIONS.
2. PROVIDE AN "N-SERIES HVAC AIR-TRAP" DEVICE IN THE EVENT THERE IS NOT ENOUGH CLEARANCE FOR THE REQUIRED DRAIN P-TRAP.

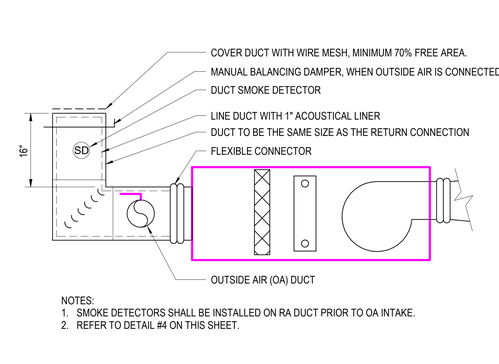
NEGATIVE STATIC PRESSURE
X = 1/2 Y
Y = AT LEAST ONE INCH PLUS CASING STATIC PRESSURE

POSITIVE STATIC PRESSURE
X = AT LEAST ONE INCH PLUS CASING STATIC PRESSURE
Y = AT LEAST ONE INCH

TOTAL HEIGHT OF TRAP
= X + Y + (1/2" x PIPE DIAMETER WITHOUT INSULATION)

CONDENSATE TRAP 10

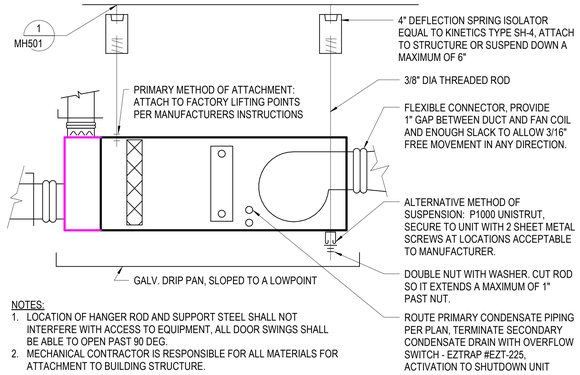
SCALE: NTS



NOTES:
1. SMOKE DETECTORS SHALL BE INSTALLED ON RA DUCT PRIOR TO OA INTAKE.
2. REFER TO DETAIL #4 ON THIS SHEET.

FAN COIL SOUND BOOT 11

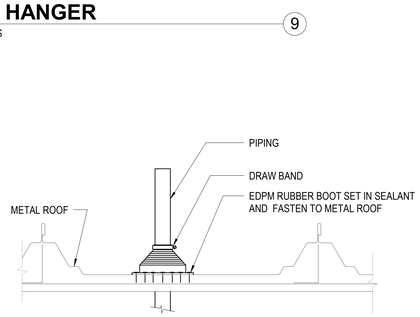
SCALE: NTS



NOTES:
1. LOCATION OF HANGER ROD AND SUPPORT STEEL SHALL NOT INTERFERE WITH ACCESS TO EQUIPMENT, ALL DOOR SWINGS SHALL BE ABLE TO OPEN PAST 90 DEG.
2. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR ALL MATERIALS FOR ATTACHMENT TO BUILDING STRUCTURE.

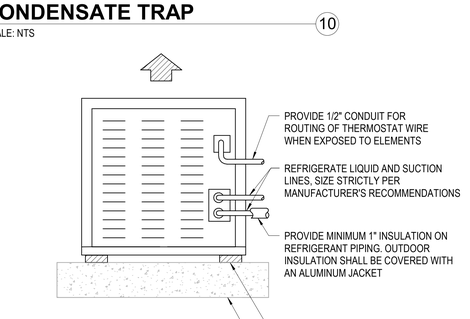
GAS CONNECTION 8

SCALE: NTS



PIPE PENETRATION THROUGH ROOF 13

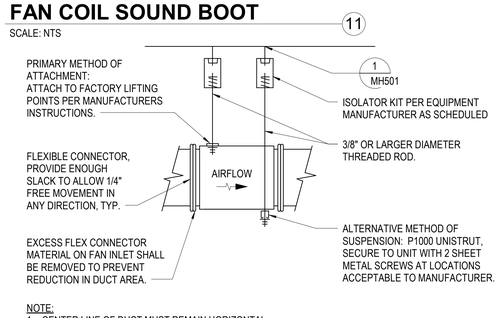
SCALE: NTS



NOTE:
1. INSTALL CONDENSING UNIT IN ACCORDANCE WITH MANUFACTURER'S MINIMUM MAINTENANCE AND AIRFLOW SPACE CLEARANCES.

CONDENSING UNIT 14

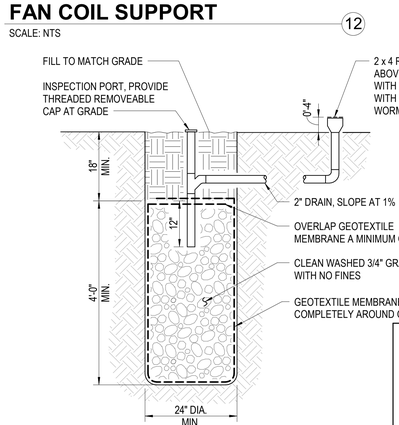
SCALE: NTS



NOTE:
1. CENTER LINE OF DUCT MUST REMAIN HORIZONTAL.
2. LOCATION OF HANGER ROD AND SUPPORT STEEL SHALL NOT INTERFERE WITH DEVICES AND ACCESS DOORS ON EQUIPMENT. ALL DOOR SWINGS SHALL BE ABLE TO OPEN PAST 90 DEGREE.
3. MECHANICAL CONTRACTOR IS RESPONSIBLE FOR ALL MATERIALS FOR ATTACHMENT TO BUILDING STRUCTURE.
4. MAINTAIN SERVICE CLEARANCES AROUND UNIT FOR FILTER PULL, COIL PULL, MOTOR MAINTENANCE, AND NEC CLEARANCES.

INLINE FAN MOUNTING 15

SCALE: NTS



NOTES:
1. DRYWELL TO BE A MINIMUM OF 5 FEET FROM ANY FOUNDATION.
2. USE DWV FITTING FOR ALL CHANGES OF DIRECTION.
3. PAINT EXPOSED PLASTIC PIPE WITH WHITE LATEX PAINT.

DRY WELL 16

SCALE: NTS

NOIRLAB HVAC PROJECT
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Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

DETAILS

Sheet Number
MH501

M3PN 240097

DATE: 7/17/2025 2:05:25 PM FILE: C:\Users\WDB\Documents\2025\M3P\WORK\MECHANICAL\M3PN_mechanical_wdb.rvt

VRF (VARIABLE REFRIGERANT FLOW) AHU SCHEDULE

AHU EQUIP #	ASSOCIATED CONDENSER	AHU LOCATION	SERVICE	# OF ZONES SERVED	CONFIGURATION	NOMINAL TONAGE	SUPPLY AIR (ACFM)	OUTSIDE AIR (ACFM)	FAN						FILTER				COOLING						HEATING			UNIT WEIGHT (LBS)	MANUFACTURER	MODEL	NOTES
									ESP (IN WG)	TOTAL MOTOR (HP)	ELECTRICAL (V/PH/HZ)	FLA	MCA	MOCP	FAN TYPE	PRE-FILTER THICKNESS (IN)	PRE-FILTER MERV RATING	FINAL FILTER THICKNESS (IN)	FINAL FILTER MERV RATING	CAPACITY TOTAL (BTUH)	CAPACITY SENSIBLE (BTUH)	ENTERING AIR DB (DEG F)	ENTERING AIR WB (DEG F)	LEAVING AIR DB (DEG F)	LEAVING AIR WB (DEG F)	CAPACITY (BTUH)	ENTERING AIR DB (DEG F)	LEAVING AIR DB (DEG F)				
AHU-01	CU-01	MAIN BLDG - LEVEL-1 RM-34 - A/C FAN ROOM #4	HVAC ZONES: 1, 2, 3, 20, 21(A)	5	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	22	6,500	SEE OA SCHED	1.0	5	208/3/60	15.4	19.3		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	193,400	193,100	82.1	61.3	51.9	49.9	67,400	65.0	75.5	1,198	CARRIER	AERO 39MN SIZE 12W	1, 5 THRU 10
AHU-02	CU-02	MAIN BLDG - LEVEL-1 RM-60 - A/C FAN ROOM #3	HVAC ZONES: 17, 18, 19, 73	4	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	24	9,500	SEE OA SCHED	1.2	5	208/3/60	16.7	20.9		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	219,200	219,200	80.4	59.3	56.9	50.3	84,400	65.0	74.0	2,173	CARRIER	AERO 39MN SIZE 21W	1, 5 THRU 10
AHU-03	CU-03	MAIN BLDG - LEVEL-1 RM-137 - A/C FAN ROOM #5	HVAC ZONES: 4, 5, 6, 7	4	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	22	6,500	SEE OA SCHED	1.0	5	208/3/60	15.4	19.3		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	195,600	195,600	82.5	61.1	51.9	49.6	89,700	64.7	78.7	1,489	CARRIER	AERO 39MN SIZE 12W	1, 5 THRU 10
AHU-04	CU-04	MAIN BLDG - LEVEL-1 RM-150 - A/C FAN ROOM #1	HVAC ZONES: 9A, 9B, 9C, 9D, 10, 70, 72	5	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	30	10,500	SEE OA SCHED	1.6	10	208/3/60	33.0	41.3		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	268,100	268,100	81.1	59.8	55.2	49.9	87,800	64.1	72.6	2,217	CARRIER	AERO 39MN SIZE 21W	1, 5 THRU 10
AHU-05	CU-05	MAIN BLDG - LEVEL-1 RM-169 - A/C FAN ROOM #2	HVAC ZONES: 9E, 14, 15, 16, 71	5	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	32	10,500	SEE OA SCHED	1.6	10	208/3/60	33.0	41.3		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	289,400	289,400	81.7	59.8	53.7	49.0	87,100	64.3	72.8	2,217	CARRIER	AERO 39MN SIZE 21W	1, 5 THRU 10
AHU-06	CU-06A, CU-06B	EAST WING - LEVEL-1 RM-75 - MECH EQPT ROOM	FIRST FLOOR - TERMINAL UNITS	32	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	66	24,000	SEE OA SCHED	2.5	25	460/3/60	37.4	46.8		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	630,600	629,800	81.6	60.6	53.7	50.0	217,100	64.9	72.8	4,629	CARRIER	AERO 39MN SIZE 50W	1, 5 THRU 10
AHU-09	CU-09	SHOP/ENG BLDG - LEVEL-1 RM-30 - OPTICS SHOP	HVAC ZONE: 28A	1	FAN COIL - HIGH STATIC PRESSURE DUCT TYPE	8	2,825	SEE OA SCHED	0.6	--	208-230/1/60	5.9	7.4	15	DC INVERTER DRIVEN	--	--	WASHABLE	5	75,800	74,700	79.7	58.4	46.7	44.8	27,100	46.3	58.3	218	TOSHIBA / CARRIER	MMD-UP0961HP-UL	1 THRU 4
AHU-10	CU-10	SHOP/ENG BLDG - LEVEL-1 RM-17 - MATERIAL STORAGE	HVAC ZONE: 29	1	FAN COIL - HIGH STATIC PRESSURE DUCT TYPE	6	2,235	SEE OA SCHED	0.6	--	208-230/1/60	4.6	5.7	15	DC INVERTER DRIVEN	--	--	WASHABLE	5	52,200	52,200	78.1	58.2	53.6	48.6	24,500	65.4	76.9	218	TOSHIBA / CARRIER	MMD-UP0721HP-UL	1 THRU 4
AHU-12	CU-10	SHOP/ENG BLDG - LEVEL-1 RM-20 - INSTRUMENT SHOP	HVAC ZONE: 31	1	FAN COIL - HIGH STATIC PRESSURE DUCT TYPE	8	2,825	SEE OA SCHED	0.6	--	208-230/1/60	5.9	7.4	15	DC INVERTER DRIVEN	--	--	WASHABLE	5	75,400	73,100	78.2	60.5	51.9	50.2	31,200	49.2	60.4	218	TOSHIBA / CARRIER	MMD-UP0961HP-UL	1 THRU 4
AHU-13	CU-10	SHOP/ENG BLDG - LEVEL-1 RM-20 - INSTRUMENT SHOP	HVAC ZONES: 32, 107	1	FAN COIL - HIGH STATIC PRESSURE DUCT TYPE	6	2,235	SEE OA SCHED	0.6	--	208-230/1/60	4.6	5.7	15	DC INVERTER DRIVEN	--	--	WASHABLE	5	53,200	53,100	78.3	61.4	54.2	52.6	10,200	67.6	72.2	218	TOSHIBA / CARRIER	MMD-UP0721HP-UL	1 THRU 4
AHU-14	CU-10	SHOP/ENG BLDG - LEVEL-1 RM-20 - INSTRUMENT SHOP	HVAC ZONE: 33	1	FAN COIL - HIGH STATIC PRESSURE DUCT TYPE	6	2,235	SEE OA SCHED	0.6	--	208-230/1/60	4.6	5.7	15	DC INVERTER DRIVEN	--	--	WASHABLE	5	59,600	58,500	78.5	60.4	51.9	50.2	31,000	69.1	83.2	218	TOSHIBA / CARRIER	MMD-UP0721HP-UL	1 THRU 4
AHU-15	CU-10	SHOP/ENG BLDG - BASEMENT RM-B-25 - OPTICAL TEST TUNNEL	B-25 - OPTICAL TEST TUNNEL	1	FAN COIL - HIGH STATIC PRESSURE DUCT TYPE	8	2,825	SEE OA SCHED	0.6	--	208-230/1/60	5.9	7.4	15	DC INVERTER DRIVEN	--	--	WASHABLE	5	67,200	67,200	76.9	57.0	52.7	47.3	4,300	67.3	68.9	218	TOSHIBA / CARRIER	MMD-UP0961HP-UL	1 THRU 4
AHU-11	CU-11	SHOP/ENG BLDG - LEVEL-1 RM-20 - INSTRUMENT SHOP	HVAC ZONES: 30, 77, 77A, 78, 79	5	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	30	11,000	SEE OA SCHED	0.75	7.5	208/3/60	24.2	30.3		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	284,100	283,400	79.8	61.5	53.6	51.9	77,600	66.1	73.3	2,383	CARRIER	AERO 39MN SIZE 21W	1, 5 THRU 10
AHU-16	CU-16	MAIN BLDG - BASEMENT RM-B-31 - MECH ROOM	HVAC ZONE: 68	1	AIR HANDLING UNIT - VERTICAL MOUNT - SINGLE ZONE	6	2,000	SEE OA SCHED	0.75	1	208/3/60	4.0	5.0		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	44,100	44,100	78.6	58.5	56.2	49.9	9,000	64.3	68.9		CARRIER	AERO 39MN	1, 5 THRU 10
AHU-17	CU-17	MAIN BLDG - BASEMENT RM-B-31 - MECH ROOM	HVAC ZONE: 8	1	AIR HANDLING UNIT - VERTICAL MOUNT - SINGLE ZONE	8	2,400	SEE OA SCHED	0.75	1	208/3/60	4.0	5.0		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	61,300	61,300	78.7	58.6	52.8	48.5	28,800	64.6	76.8		CARRIER	AERO 39MN	1, 5 THRU 10
AHU-18	CU-18A, CU-18B	EAST WING - BASEMENT B-60 - MECH / ELEC EQPT	BASEMENT - TERMINAL UNITS	26	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	64	24,000	SEE OA SCHED	2.5	25	460/3/60	37.4	46.8		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	505,400	505,400	79.7	60.2	58.3	52.3	85,500	65.3	68.9	4,629	CARRIER	AERO 39MN SIZE 50W	1, 5 THRU 10
AHU-19	CU-19	MAIN BLDG - BASEMENT RM-B-24 - MECH ROOM	HVAC ZONES: 22, 23, 24, 74, 74A	4	AIR HANDLING UNIT - HORIZONTAL MOUNT - MULTIZONE	12	5,000	SEE OA SCHED	0.75	2	208/3/60	6.4	8.0		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	105,600	105,600	81.0	61.8	54.2	52.0	26,000	65.3	71.9	1,232	CARRIER	AERO 39MN SIZE 08W	1, 5 THRU 10
AHU-20	CU-20	SHOP/ENG BLDG - LEVEL-2 RM-M-4 - MECH EQPT ROOM	HVAC ZONES: 25, 75	2	AIR HANDLING UNIT - VERTICAL MOUNT - MULTIZONE	20	6,000	SEE OA SCHED	1.0	3	208/3/60	9.4	11.8		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	176,000	176,000	81.7	60.7	51.9	49.4	56,400	64.7	74.3	1,461	CARRIER	AERO 39MN SIZE 12W	1, 5 THRU 10
AHU-21	CU-21	SHOP/ENG BLDG - LEVEL-2 RM-M-4 - MECH EQPT ROOM	HVAC ZONES: 26, 28, 76	3	AIR HANDLING UNIT - VERTICAL MOUNT - MULTIZONE	18	6,000	SEE OA SCHED	1.0	3	208/3/60	9.4	11.8		DIRECT DRIVE PLENUM / PLUG FAN ARRAY	2	8	2	13	168,200	168,200	80.4	60.0	51.9	49.1	64,100	65.0	75.9	1,461	CARRIER	AERO 39MN SIZE 12W	1, 5 THRU 10
AHU-22	CU-22	MAIN BLDG - BASEMENT RM-B-46B - CLEAN ROOM	HVAC ZONE: 92A	1	FAN COIL - HIGH STATIC PRESSURE DUCT TYPE	6	2,235	SEE OA SCHED	0.6	--	208-230/1/60	4.6	5.7	15	DC INVERTER DRIVEN	--	--	WASHABLE	5	53,200	48,200	78.1	62.5	54.5	53.1	18,500	57.7	66.5	218	TOSHIBA / CARRIER	MMD-UP0721HP-UL	1 THRU 4

NOTES:
1. FAN STATIC PRESSURE HAS BEEN CALCULATED FOR SYSTEM LOSSES AT AN ELEVATION OF 2,500 FT.
2. PROVIDE UNITS WITH R-410A REFRIGERANT.
3. PROVIDE WITH 7-DAY PROGRAMMABLE NETWORK THERMOSTAT WITH AUTOMATIC CHANGEOVER, BACNET COMPATIBLE.
4. PROVIDE UNIT WITH CONDENSATE DRAIN PUMP KIT ACCESSORY - TCB-DP40DPE (POWERED FROM UNIT), BY FANCOIL MANUFACTURER.
5. FOR MORE INFORMATION, REFER TO 'AIR HANDLING UNIT CONFIGURATIONS' FOR MAXIMUM UNIT DIMENSIONS, SHEETS MH604 THRU MH607.
6. PROVIDE UNIT WITH VFD COMPATIBLE MOTORS, NON-ECM.
7. PROVIDE UNIT WITH ONE COMMON VFD FOR UNITS WITH MULTIPLE MOTORS.
8. SCHEDULED AHU MOTOR HORSEPOWER MUST NOT BE EXCEEDED.
9. PROVIDE RACK WITH COMMON FILTER DIMENSIONS, AVOID ODDBALL SIZES.
10. PROVIDE EQUAL OF SEMCO, HUNTAIR, TRANE, JCI/PACE OR CLIMATECRAFT, AHU SUBSTITUTIONS ARE TO BE APPROVED IN WRITING BY THE OWNER.

VRF (VARIABLE REFRIGERANT FLOW) CONDENSER SCHEDULE

EQUIP #	SERVICE	EQUIP TYPE	NOMINAL COMBINED TONNAGE	MINIMUM ENERGY EFFICIENCY RATIO (EER / IEER)	CONDENSING AIR TEMPERATURE COOLING (DEG F)	CONDENSING AIR TEMPERATURE HEATING (DEG F)	HEATING MINIMUM @ 47 DEG F OA (COP)	POWER (V/PH/HZ)	FLA	MCA	MOCP	MANUFACTURER	MODULE CAPACITY CODES	MODEL	WEIGHT (LBS)	NOTES
CU-01	AHU-01	COMBINED MODEL HEAT PUMP	22	10.4 / 11.6	105.7	32.0	3.2	460/3/60	21.9 + 14	27.4 + 17.5	40 + 20	TOSHIBA / CARRIER	168 + 96	MMY-UP2641HT6P-UL	774 + 533	1 THRU 4
CU-02	AHU-02	COMBINED MODEL HEAT PUMP	24	10.4 / 11.6	105.7	32.0	3.2	460/3/60	19.7 + 19.7	24.6 + 24.6	35 + 35	TOSHIBA / CARRIER	144 + 144	MMY-UP2881HT6P-UL	721 + 721	1 THRU 4
CU-03	AHU-03	COMBINED MODEL HEAT PUMP	22	10.4 / 11.6	105.7	32.0	3.2	460/3/60	21.9 + 14	27.4 + 17.5	40 + 20	TOSHIBA / CARRIER	168 + 96	MMY-UP2641HT6P-UL	774 + 533	1 THRU 4
CU-04	AHU-04	COMBINED MODEL HEAT PUMP	30	10.4 / 11.6	105.7	32.0	3.2	460/3/60	21.9 + 14 + 14	27.4 + 17.5 + 17.5	40 + 20 + 20	TOSHIBA / CARRIER	168 + 96 + 96	MMY-UP3601HT6P-UL	774 + 533 + 533	1 THRU 4
CU-05	AHU-05	COMBINED MODEL HEAT PUMP	32	10.4 / 11.6	105.7	32.0	3.2	460/3/60	19.7 + 19.7 + 14	24.6 + 24.6 + 17.5	35 + 35 + 20	TOSHIBA / CARRIER	144 + 144 + 96	MMY-UP3841HT6P-UL	721 + 721 + 533	1 THRU 4
CU-06A	AHU-06	COMBINED MODEL HEAT PUMP	34	10.4 / 11.6	105.7	32.0	3.2	460/3/60	21.9 + 19.7 + 14	27.4 + 24.6 + 17.5	40 + 35 + 20	TOSHIBA / CARRIER	168 + 144 + 96	MMY-UP4081HT6P-UL	744 + 721 + 533	1 THRU 4
CU-06B	AHU-06	COMBINED MODEL HEAT PUMP	32	10.4 / 11.6	105.7	32.0	3.2	460/3/60	19.7 + 19.7 + 14	24.6 + 24.6 + 17.5	35 + 35 + 20	TOSHIBA / CARRIER	144 + 144 + 96	MMY-UP3841HT6P-UL	721 + 721 + 533	1 THRU 4
CU-09	AHU-09	SINGLE MODEL HEAT PUMP	8	12.1 / 13.2	105.7	32.0	3.3	460/3/60	14	17.5	20	TOSHIBA / CARRIER	96	MMY-MUP0961HT6P-UL	533	1, 2
CU-10	AHU-10	COMBINED MODEL HEAT PUMP	36	10.4 / 11.6	105.7	32.0	3.2	460/3/60	21.9 + 21.9 + 14	27.4 + 27.4 + 17.5	40 + 40 + 20	TOSHIBA / CARRIER	168 + 168 + 96	MMY-UP4321HT6P-UL	774 + 774 + 533	1, 2
CU-11	AHU-11	COMBINED MODEL HEAT PUMP	30	10.4 / 11.6	105.7	32.0	3.2	460/3/60	21.9 + 14 + 14	27.4 + 17.5 + 17.5	40 + 20 + 20	TOSHIBA / CARRIER	168 + 96 + 96	MMY-UP3601HT6P-UL	774 + 533 + 533	1 THRU 4
CU-16	AHU-16	SINGLE MODEL HEAT PUMP	6	12.1 / 13.2	105.7	32.0	3.3	460/3/60	13.9	17.4	20	TOSHIBA / CARRIER	72	MMY-MUP0721HT6P-UL	533	1 THRU 4
CU-17	AHU-17	SINGLE MODEL HEAT PUMP	8	12.1 / 13.2	105.7	32.0	3.3	460/3/60	14	17.5	20	TOSHIBA / CARRIER	96	MMY-MUP0961HT6P-UL	533	1 THRU 4
CU-18A	AHU-18	COMBINED MODEL HEAT PUMP	32	10.4 / 11.6	105.7	32.0	3.2	460/3/60	19.7 + 19.7 + 14	24.6 + 24.6 + 17.5	35 + 35 + 20	TOSHIBA / CARRIER	144 + 144 + 96	MMY-UP3841HT6P-UL	721 + 721 + 533	1 THRU 4
CU-18B	AHU-18	COMBINED MODEL HEAT PUMP	32	10.4 / 11.6	105.7	32.0	3.2	460/3/60	19.7 + 19.7 + 14	24.6 + 24.6 + 17.5	35 + 35 + 20	TOSHIBA / CARRIER	144 + 144 + 96	MMY-UP3841HT6P-UL	721 + 721 + 533	1 THRU 4
CU-19	AHU-19	SINGLE MODEL HEAT PUMP	12	12.1 / 13.2	105.7	32.0	3.2	460/3/60	19.7	24.6	35	TOSHIBA / CARRIER	144	MMY-MUP1441HT6P-UL	721	1 THRU 4
CU-20	AHU-20	COMBINED MODEL HEAT PUMP	20	10.4 / 11.6	105.7	32.0	3.2	460/3/60	19.7 + 14	24.6 + 17.5	35 + 20	TOSHIBA / CARRIER	144 + 96	MMY-UP2401HT6P-UL	721 + 533	1 THRU 4
CU-21	AHU-21	COMBINED MODEL HEAT PUMP	18	11.6 / 12.7	105.7	32.0	3.2	460/3/60	19.7 + 13.9	24.6 + 17.4	35 + 20	TOSHIBA / CARRIER	144 + 72	MMY-UP2161HT6P-UL	721 + 533	1 THRU 4
CU-22	AHU-22	SINGLE MODEL HEAT PUMP	6	12.1 / 13.2	105.7	32.0	3.3	460/3/60	13.9	17.4	20	TOSHIBA / CARRIER	72	MMY-MUP0721HT6P-UL	533	1, 2

NOTES:
1. FAN STATIC PRESSURE HAS BEEN CALCULATED FOR SYSTEM LOSSES AT AN ELEVATION OF 2,500 FT.
2. PROVIDE UNITS WITH R-410A REFRIGERANT.
3. PROVIDE WITH DX VALVE KIT AND DX CONTROLLER FOR AHU DX COIL CONNECTIVITY.
4. PROVIDE TA-TYPE RETURN AIR TEMPERATURE CONTROL FOR DX COIL INTERFACE.

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NOIRLAB HVAC PROJECT
TUCSON MAIN FACILITY
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Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL
SCHEDULES

Sheet Number
MH601

M3PN 240097

TERMINAL UNIT SCHEDULE

EQUIP #	SOURCE	AREA	SERVICE	TYPE	CONFIGURATION	SELECTED UNIT DAMPER SIZE	SELECTED UNIT DUCT SIZE	MAXIMUM AIR FLOW (ACFM)	MINIMUM AIR FLOW (ACFM)	ELECTRIC HEATING ELEMENT	ELECTRICAL (V/PH/HZ)	MANUFACTURER	MODEL	NOTES
TU-01-01	AHU-01	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 20	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 14	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-01-02	AHU-01	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 21, 21A	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	16 x 14	1,700	595	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-01-03	AHU-01	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 1	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 14	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-01-04	AHU-01	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 3	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 12	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-01-05	AHU-01	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 2	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	12 x 12	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-02-01	AHU-02	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 18	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 12	1,200	455	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-02-02	AHU-02	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 17	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	28 x 12	2,800	945	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-02-03	AHU-02	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 19	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	J - 18 x 12 Damper	20 x 12	2,000	700	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-02-04	AHU-02	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 73	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	L - 30 x 12 Damper	36 x 12	3,500	1,225	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-03-01	AHU-03	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 4	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	16 x 14	1,800	630	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-03-02	AHU-03	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 5	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	J - 18 x 12 Damper	18 x 14	2,100	735	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-03-03	AHU-03	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 6	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 14	1,500	525	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-03-04	AHU-03	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 7	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 14	1,100	385	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-04-01	AHU-04	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 9A	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	12 x 12	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-04-02	AHU-04	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 10	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	J - 18 x 12 Damper	20 x 12	2,000	700	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-04-03	AHU-04	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 9D	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	18 x 10	1,400	490	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-04-04	AHU-04	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 9B, 9C	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 12	1,400	490	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-04-05	AHU-04	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 70, 72	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	M - 22 x 16 Damper	34 x 16	4,500	1,575	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-05-01	AHU-05	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 14	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	J - 18 x 12 Damper	20 x 12	1,800	630	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-05-02	AHU-05	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 9E	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 12	1,400	490	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-05-03	AHU-05	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 15	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	16 x 12	1,400	490	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-05-04	AHU-05	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 16	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	14 x 12	1,400	490	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-05-05	AHU-05	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 71	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	N - 24 x 18 Damper	30 x 18	4,500	1,575	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-01	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 60	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,000	350	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-02	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 59	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-03	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 60	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	18 x 10	800	280	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-04	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 62	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,000	350	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-05	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 66	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	16 x 6	350	125	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-06	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 66	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	20 x 6	450	160	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-07	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 65	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	12 x 6	200	70	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-08	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 34	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	18 x 10	1,000	350	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-09	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 63	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	30 x 10	2,000	700	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-10	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 35	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	18 x 10	900	315	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-11	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 64	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	24 x 10	1,600	560	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-12	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 36	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	18 x 8	700	245	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-13	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 61	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	14 x 6	350	125	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-14	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 37	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	12 x 6	200	70	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-15	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 38	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	18 x 8	750	265	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-16	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 40	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-17	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 42, 43	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	E - 14 x 8 Damper	14 x 8	350	125	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-18	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 41	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	E - 14 x 8 Damper	14 x 8	400	140	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-19	AHU-06	EAST WING - FIRST FLOOR	RM-101A	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	20 x 8	700	245	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-20	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 56	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	14 x 6	250	90	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-21	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 55	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	12 x 6	200	70	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-22	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 57	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	14 x 6	350	125	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-23	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 54	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,000	350	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-24	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 53	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	E - 14 x 8 Damper	16 x 8	500	175	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-25	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 52A	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	900	315	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-26	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 52	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-27	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 49	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	22 x 6	650	230	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-28	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 55	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	12 x 6	200	70	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-29	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 46	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-30	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 50	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	12 x 6	200	70	N/A	120/1/60	KRUEGER	SVE	1 THRU 8

TERMINAL UNIT SCHEDULE

EQUIP #	SOURCE	AREA	SERVICE	TYPE	CONFIGURATION	SELECTED UNIT DAMPER SIZE	SELECTED UNIT DUCT SIZE	MAXIMUM AIR FLOW (ACFM)	MINIMUM AIR FLOW (ACFM)	ELECTRIC HEATING ELEMENT	ELECTRICAL (V/PH/HZ)	MANUFACTURER	MODEL	NOTES
TU-06-31	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 44	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-06-32	AHU-06	EAST WING - FIRST FLOOR	HVAC ZONE: 58	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,000	350	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-11-01	AHU-11	SHOP/ENG BLDG - SECOND FLOOR	HVAC ZONE: 78	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	K - 20 x 14 Damper	24 x 16	3,000	1,050	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-11-02	AHU-11	SHOP/ENG BLDG - SECOND FLOOR	HVAC ZONE: 77, 77A	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	G - 12 x 10 Damper	16 x 14	2,000	700	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-11-03	AHU-11	SHOP/ENG BLDG - SECOND FLOOR	HVAC ZONE: 78, 79	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	M - 22 x 16 Damper	28 x 16	3,500	1,225	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-11-04	AHU-11	SHOP/ENG BLDG - SECOND FLOOR	HVAC ZONE: 78	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	K - 20 x 14 Damper	20 x 16	2,500	875	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-01	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 90	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	20 x 6	600	210	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-02	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 90, 94	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	825	290	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-03	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 94, 100	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	825	290	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-04	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 95	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	20 x 6	500	175	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-05	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 97	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	28 x 10	1,800	630	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-06	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 98	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	14 x 6	300	105	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-07	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 83	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	12 x 6	250	90	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-08	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 104	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	12 x 6	150	55	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-09	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 101	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	18 x 6	500	175	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-10	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 102	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	24 x 10	1,650	580	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-11	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 101A	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	16 x 6	400	140	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-12	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 101A	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	22 x 6	600	210	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-13	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 92	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	14 x 6	300	105	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-14	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 86, 92	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,000	350	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-15	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 89	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	14 x 6	300	105	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-16	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 87	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	14 x 6	350	125	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-17	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 86	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	18 x 6	500	175	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-18	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 86	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	16 x 6	400	140	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-19	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 84	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	20 x 8	800	280	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-20	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 83	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	C - 8 x 6 Damper	12 x 6	250	90	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-21	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 82	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	20 x 10	1,200	420	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-22	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 103	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	E - 14 x 8 Damper	16 x 8	900	315	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-23	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 103	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	E - 14 x 8 Damper	16 x 8	900	315	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-24	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 81	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	20 x 8	800	280	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-25	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 80	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	22 x 10	1,250	440	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-26	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 80	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	H - 18 x 10 Damper	22 x 10	1,250	440	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-27	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 93	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	L - 30 x 12 Damper	30 x 12	3,000	1,050	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-18-28	AHU-18	EAST WING - BASEMENT	HVAC ZONE: 92B	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	J - 18 x 12 Damper	24 x 12	2,400	840	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-19-01	AHU-19	MAIN BUILDING - BASEMENT	HVAC ZONE: 74, 74A	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	M - 22 x 16 Damper	26 x 16	2,000	700	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-19-02	AHU-19	MAIN BUILDING - BASEMENT	HVAC ZONE: 24	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	M - 22 x 16 Damper	26 x 16	2,000	700	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-19-03	AHU-19	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 23	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	26 x 8	1,000	350	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-19-04	AHU-19	MAIN BLDG - FIRST FLOOR	HVAC ZONE: 22	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	F - 18 x 6 Damper	26 x 8	1,000	350	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-20-01	AHU-20	SHOP/ENG BLDG - FIRST FLOOR	HVAC ZONE: 75	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	N - 24 x 18 Damper	24 x 24	3,500	1,225	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-20-02	AHU-20	SHOP/ENG BLDG - FIRST FLOOR	HVAC ZONE: 25	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	J - 18 x 12 Damper	24 x 12	2,500	875	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-21-01	AHU-21	SHOP/ENG BLDG - FIRST FLOOR	HVAC ZONE: 76	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	N - 24 x 18 Damper	24 x 24	4,000	1,400	N/A	120/1/60	KRUEGER	SVE	1 THRU 8
TU-21-02	AHU-21	SHOP/ENG BLDG - FIRST FLOOR	HVAC ZONE: 26, 28	VARIABLE AIR VOLUME	SLIDE-IN RETROFIT TERMINAL UNIT	J - 18 x 12 Damper	24 x 12	2,000	700	N/A	120/1/60	KRUEGER	SVE	1 THRU 8

NOTES:
1. PROVIDE SINGLE POINT POWER CONNECTION TO TERMINAL UNITS.
2. PROVIDE 120-24 VAC STEP-DOWN TRANSFORMER FOR ACTUATOR, MOUNTED AND WIRED IN CONTROL ENCLOSURE, BY UNIT MANUFACTURER.
3. PROVIDE WITH TOGGLE DISCONNECT SWITCH, BY UNIT MANUFACTURER.
4. PROVIDE UNIT WITH BACNET COMPATIBLE DIRECT DIGITAL CONTROLS.
5. PROVIDE UNIT WITH BACNET COMPATIBLE TEMPERATURE / TRANSMITTER WALL SENSOR.
6. REFER TO DRAWINGS FOR RIGHT-HAND / LEFT-HAND UNIT ORIENTATION.
7. VERIFY SITE CONDITIONS FOR TERMINAL UNIT INSTALLATION LOCATION PRIOR TO PROCUREMENT.
8. COORDINATE WITH ELECTRICAL AND CONTROLS CONTRACTOR FOR UNIT LOCATION.

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ARCHITECTURE
ENGINEERING
CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: ANN
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Issue Date: 18 JUL 2025

MECHANICAL
SCHEDULES

Sheet Number
MH602

M3PN 240097

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PACKAGED UNIT SCHEDULE

EQUIP #	AREA SERVED	NOMINAL TONS	SUPPLY AIR TOTAL (ACFM)	OUTSIDE AIR TOTAL (ACFM)	SUPPLY FAN		FILTER		COOLING					HEATING				ELECTRICAL			MINIMUM EFFICIENCY			MANUFACTURER	MODEL	UNIT WEIGHT (LBS)	NOTES
					ESP (IN WG)	FAN DRIVE	DEPTH (IN)	MERV RATING	CAPACITY		ENTERING AIR TEMP.		CONDENSING AIR TEMP (DEG F)	FUEL TYPE	INPUT / OUTPUT STAGE 1 (MBH)	INPUT / OUTPUT STAGE 2 (MBH)	INLET PRESSURE (IN. WG)	ELECTRICAL (V/PH/HZ)	MCA (AMPS)	MOCP (AMPS)	EER	IEER	AFUE (%)				
									TOTAL (BTUH)	SENSIBLE (BTUH)	DB (DEG F)	WB (DEG F)															
AHU-08	SHOP/ENG BLDG - LEVEL-1 RM-16 INSTRUMENT SHOP	17.5	7,000	SEE OA SCHED	0.6	BELT	2	13	175,600	172,200	76.6	57.3	105.7	NATURAL GAS	176 / 142	220 / 178	5 - 13	460/3/60	46.6	50.0	10.8	12.2	80	CARRIER	48HC-DE20	2,935	1 THRU 7

NOTES:
1. FAN STATIC PRESSURE HAS BEEN CALCULATED FOR SYSTEM LOSSES AT AN ELEVATION OF 2,500 FT.
2. PROVIDE UNIT WITH R-410A REFRIGERANT.
3. PROVIDE WITH 2-SPEED INDOOR MOTOR FAN.
4. PROVIDE 2-STAGE COOLING WITH FACTORY INSTALLED HUMIDI-MIZER SYSTEM.
5. PROVIDE UNIT WITH 100% OA ECONOMIZER & POWER EXHAUST.
6. PROVIDE UNIT WITH FACTORY INSTALLED RETURN AIR CHAMBER SMOKE DETECTOR.
7. PROVIDE WITH 7-DAY PROGRAMMABLE NETWORK THERMOSTAT WITH AUTOMATIC CHANGEOVER, BACNET COMPATIBLE.

FAN SCHEDULE

EQUIP #	FUNCTION	AREA SERVED	AIRFLOW (ACFM)	MAX ESP (IN WG)	CONFIGURATION	FAN BLADE	FAN DRIVE	MOTOR (HP)	ELECTRICAL (V/PH/HZ)	MANUFACTURER	MODEL	WEIGHT (LBS)	NOTES
PU-01	PURGE EXHAUST - REFRIGERANT	MAIN BLDG - LEVEL-1 RM-34 - AHU-01	200	0.5	UPBLAST	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	ACRU-B-100	60	1 THRU 6
PU-02	PURGE EXHAUST - REFRIGERANT	MAIN BLDG - LEVEL-1 RM-60 - AHU-02	200	0.5	UPBLAST	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	ACRU-B-100	60	1 THRU 6
PU-03	PURGE EXHAUST - REFRIGERANT	MAIN BLDG - LEVEL-1 RM-137 - AHU-03	200	0.5	UPBLAST	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	ACRU-B-100	60	1 THRU 6
PU-04	PURGE EXHAUST - REFRIGERANT	MAIN BLDG - LEVEL-1 RM-150 - AHU-04	200	0.5	UPBLAST	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	ACRU-B-100	60	1 THRU 6
PU-05	PURGE EXHAUST - REFRIGERANT	MAIN BLDG - LEVEL-1 RM-169 - AHU-05	200	0.5	UPBLAST	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	ACRU-B-100	60	1 THRU 6
PU-06	PURGE EXHAUST - REFRIGERANT	EAST WING - LEVEL-1 RM-34 - AHU-01	500	0.5	UPBLAST	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	ACRU-B-120	80	1 THRU 6
PU-07	PURGE EXHAUST - REFRIGERANT	MAIN BLDG - BASEMENT RM-B-31 - AHU-16/17	200	0.5	UPBLAST	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	ACRU-B-100	60	1 THRU 6
PU-18	PURGE EXHAUST - REFRIGERANT	EAST WING - BASEMENT RM-B-60 - AHU-18	1,100	0.5	SQUARE INLINE	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	SQN-B-120	48	1 THRU 4, 7, 8
PU-19	PURGE EXHAUST - REFRIGERANT	MAIN BLDG - BASEMENT RM-B-24 - AHU-19	200	0.5	SQUARE INLINE	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	SQN-B-70	36	1 THRU 4, 7, 8
PU-20	PURGE EXHAUST - REFRIGERANT	SHOP/ENG BLDG - LEVEL-2 M-4 MECH EQPT ROOM - AHU-20/21	200	0.5	SQUARE INLINE	CENTRIFUGAL	BELT	1/4	115/1/60	LOREN COOK	SQN-B-70	36	1 THRU 4, 7, 8

NOTES:
1. FAN STATIC PRESSURE HAS BEEN CALCULATED FOR SYSTEM LOSSES AT AN ELEVATION OF 2,500 FT.
2. MOTOR SHALL DELIVER THE ABOVE STATED PERFORMANCE WITHOUT USING THE MOTOR SERVICE FACTOR.
3. FAN SHALL BE INTERLOCKED WITH RESPECTIVE REFRIGERANT GAS DETECTOR WITHIN EQUIPMENT ROOM.
4. COORDINATE UNIT REQUIREMENTS AND INSTALLATION WITH ELECTRICAL AND CONTROLS CONTRACTOR.
5. PROVIDE WITH BAROMETRIC BACKDRAFT DAMPER AND DAMPER TRAY.
6. PROVIDE WITH PRE-FABRICATED 9-1/2" ROOF CURB, MATCH ROOF SLOPE.
7. PROVIDE WITH SPRING ISOLATORS WITH 1" MIN. DEFLECTION, BY FAN MANUFACTURER, FOR UNIT HANGING INSTALLATION.
8. PROVIDE WITH MOTOR SIDE GUARD, BY FAN MANUFACTURER.

AIR DEVICE SCHEDULE

MARK	TYPE	INLET SIZE (IN)	PANELSIZE (IN)	PATTERN	MOUNTING SURFACE	OBD REQUIRED	MAX NC AT DESIGN CFM	MATERIALS	COLOR	MANUFACTURER	MODEL	NOTES
A	SUPPLY	SEE PLANS	SEE PLANS	NOTE 3	DUCT / SIDEWALL	YES	25	STEEL	WHITE	KRUEGER	880H	1, 2
B	RETURN	36"x30"	36x30	35 DEG DEFLECTION	DUCT / SIDEWALL	YES	25	STEEL	WHITE	KRUEGER	S80	1, 2

NOTES:
1. MANUFACTURER GIVEN IS BASIS OF DESIGN, SUBSTITUTION IS PERMISSIBLE PROVIDED DESIGN CRITERIA IS MET.
2. PROVIDE SQUARE TO ROUND ADAPTERS OR INLET COLLARS WHEN REQUIRED. SEAL AIR TIGHT.
3. DIFFUSER TO HAVE 4-WAY AIR PATTERN UNLESS NOTED DIFFERENTLY ON PLANS.

LOUVER SCHEDULE

MARK	FUCTION	SERVICE	FLOW RATE (ACFM)	MAXIMUM PRESSURE DROP (IN WG)	MATERIAL	MAXIMUM FREE AREA VELOCITY	MINIMUM FREE AREA (SQ. FT.)	DIMENSIONS (WxH (IN)	MANUFACTURER	MODEL	NOTES
LU-18	PURGE EXHAUST	PU-18 - PURGE FAN DISCHARGE	1,100	0.14	EXTRUDED ALUM	800	1.4	24x18	RUSKIN	EME520DD	1 THRU 4
LU-19	PURGE EXHAUST	PU-19 - PURGE FAN DISCHARGE	200	0.05	EXTRUDED ALUM	425	0.5	12x12	RUSKIN	EME520DD	1 THRU 4

NOTES:
1. LOUVER SHALL MEET AIRFLOW REQUIREMENTS AT 2500 FT ELEVATION.
2. PROVIDE WIND-DRIVEN, SIGHT PROOF LOUVER.
3. PROVIDE WITH BIRDSCREEN.
4. CONTRACTOR SHALL COORDINATE LOUVER SIZES AND LOCATIONS PRIOR TO PROCUREMENT.

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ARCHITECTURE
ENGINEERING
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Revisions

#	Description	Date

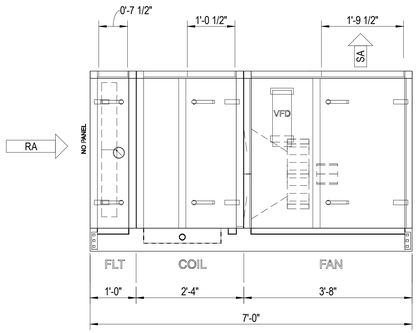
Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

SCHEDULES

Sheet Number
MH603

M3PN 240097



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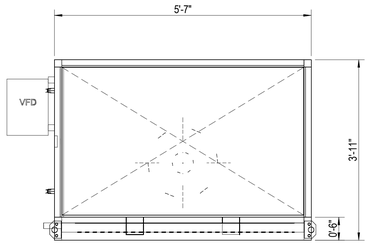

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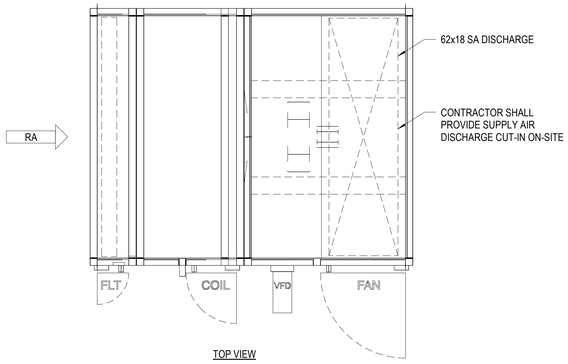
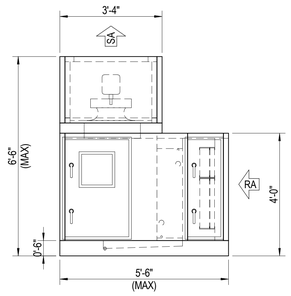


TOP VIEW

AIR HANDLING UNIT CONFIGURATION - AHU-01

SCALE: 3/4" = 1'-0"

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



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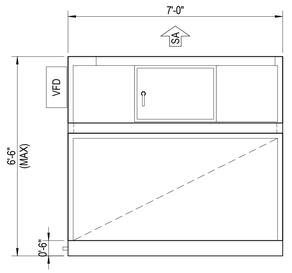

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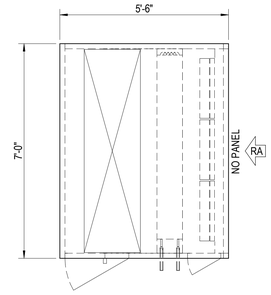

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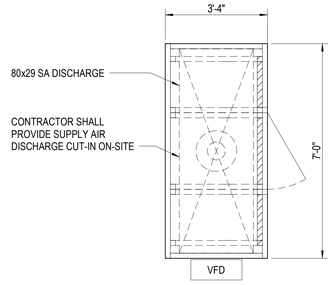
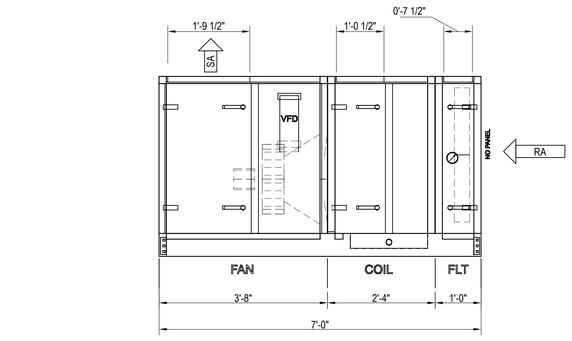


PLAN - UPPER SECTION

AIR HANDLING UNIT CONFIGURATION - AHU-02

SCALE: 1/2" = 1'-0"

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



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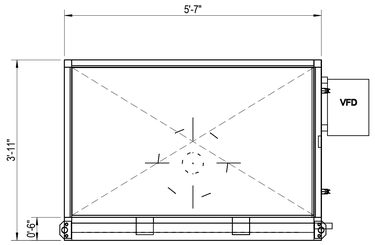

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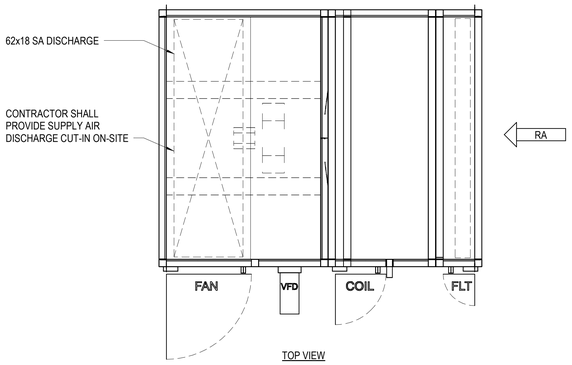
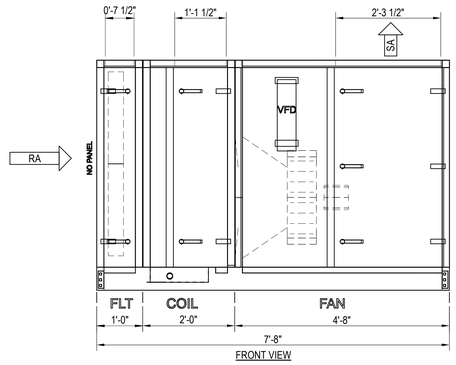


TOP VIEW

AIR HANDLING UNIT CONFIGURATION - AHU-03

SCALE: 3/4" = 1'-0"

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



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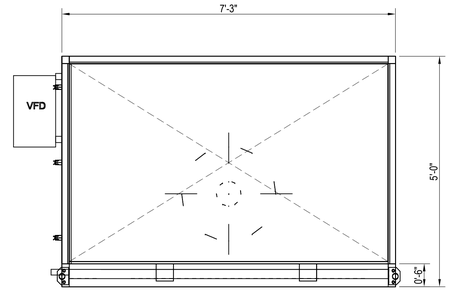

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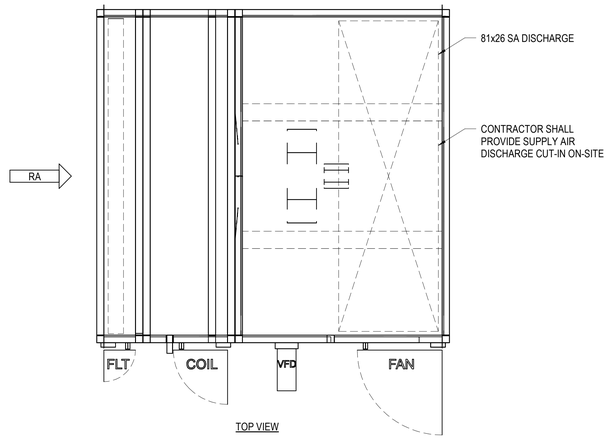

TOP VIEW

AIR HANDLING UNIT CONFIGURATION - AHU-04

SCALE: 3/4" = 1'-0"

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.

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Revisions

#	Description	Date

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Issue Date: 18 JUL 2025

MECHANICAL

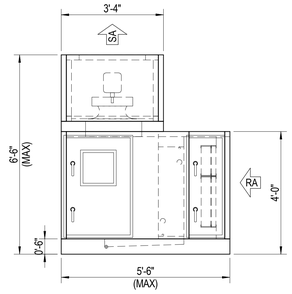
AIR HANDLING UNIT CONFIGURATIONS

Sheet Number

MH604

M3PN 240097

DATE: 7/17/2025 2:57:53 PM PATH: C:\Revit\M3 Projects\M3 240097 NOIRLab HVAC Replacement_annwdb.rvt



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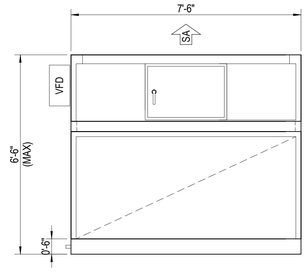

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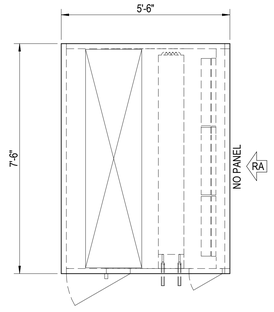
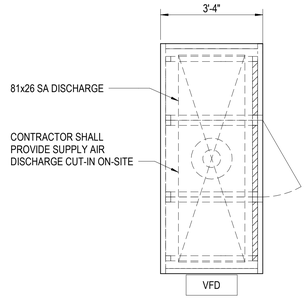


PLAN - LOWER SECTION

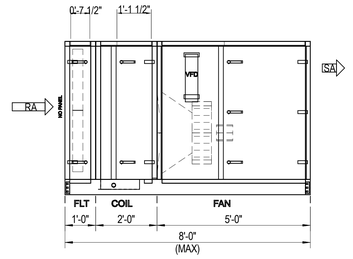


PLAN - UPPER SECTION

AIR HANDLING UNIT CONFIGURATION - AHU-05

SCALE: 1/2" = 1'-0"

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



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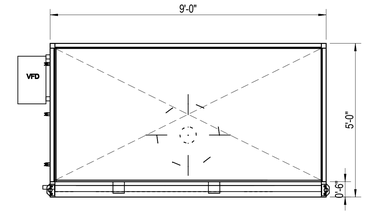
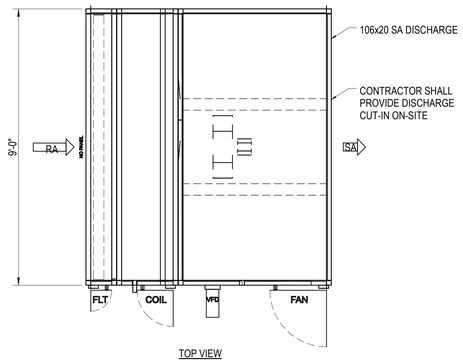


RIGHT VIEW

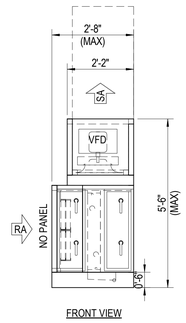


TOP VIEW

AIR HANDLING UNIT CONFIGURATION - AHU-11

SCALE: 1/2" = 1'-0"

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



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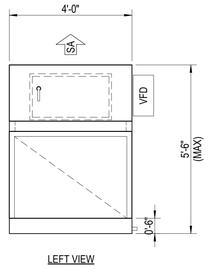
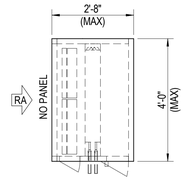


LEFT VIEW



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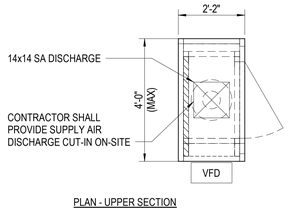
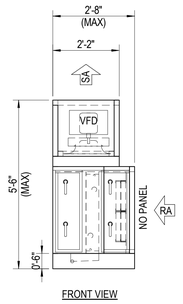


PLAN - UPPER SECTION

AIR HANDLING UNIT CONFIGURATION - AHU-16

SCALE: 1/2" = 1'-0"

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



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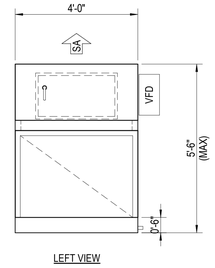

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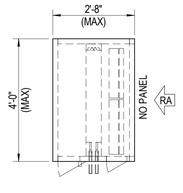

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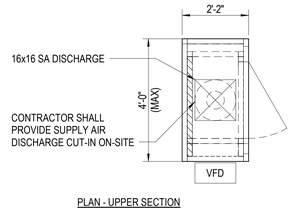

PLAN - UPPER SECTION

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.

AIR HANDLING UNIT CONFIGURATION - AHU-17

SCALE: 1/2" = 1'-0"

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Revisions

#	Description	Date

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Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

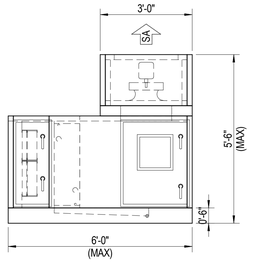
AIR HANDLING UNIT CONFIGURATIONS

Sheet Number

MH605

M3PN 240097

DATE: 7/17/2025 4:51:51 PM PATH: C:\Revit\M3 Projects\240097 NOIRLab HVAC Replacement_arsenis.lyssenko@nl.ed



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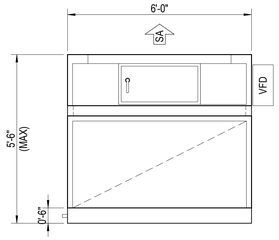

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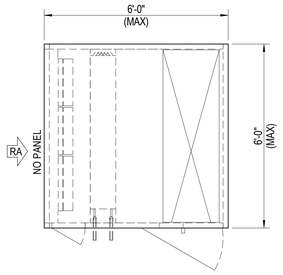

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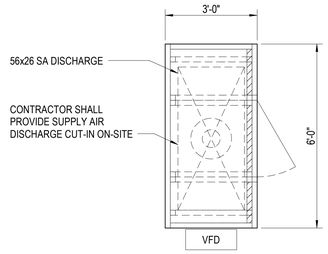
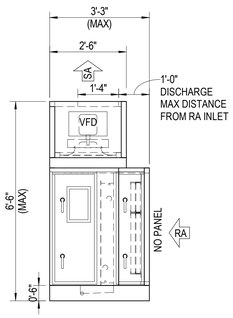


PLAN - UPPER SECTION

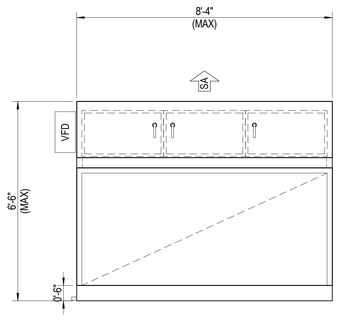
AIR HANDLING UNIT CONFIGURATION - AHU-19

SCALE: 1/2" = 1'-0"

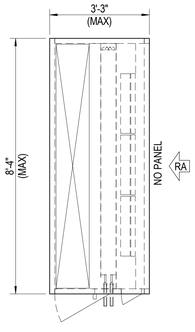
NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



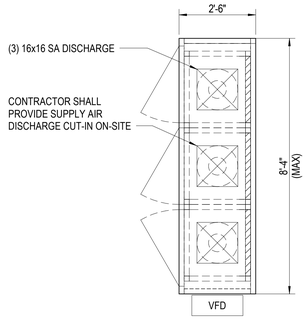
FRONT VIEW



RIGHT VIEW



PLAN - LOWER SECTION

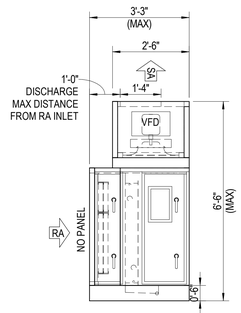


PLAN - UPPER SECTION

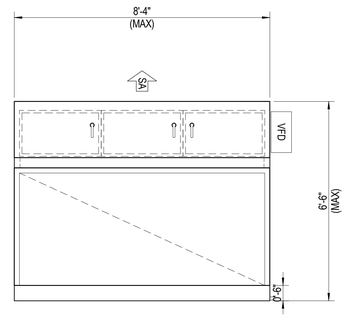
AIR HANDLING UNIT CONFIGURATION - AHU-20

SCALE: 1/2" = 1'-0"

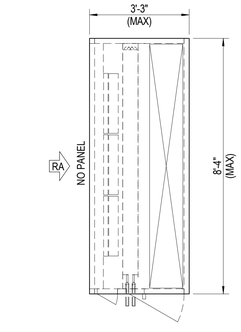
NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



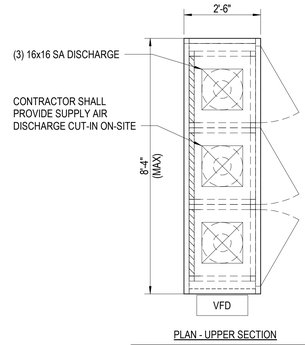
FRONT VIEW



LEFT VIEW



PLAN - LOWER SECTION



PLAN - UPPER SECTION

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.

AIR HANDLING UNIT CONFIGURATION - AHU-21

SCALE: 1/2" = 1'-0"

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ARCHITECTURE
ENGINEERING
CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

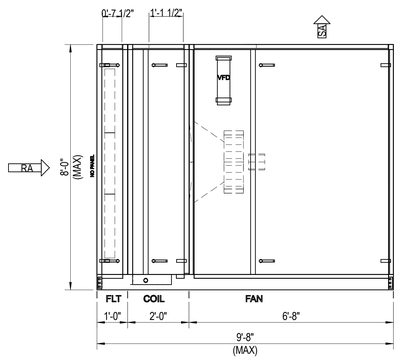
MECHANICAL

AIR HANDLING UNIT CONFIGURATIONS

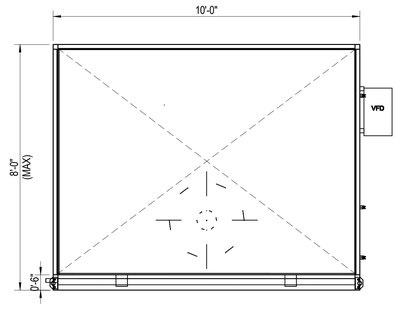
Sheet Number
MH606

M3PN 240097

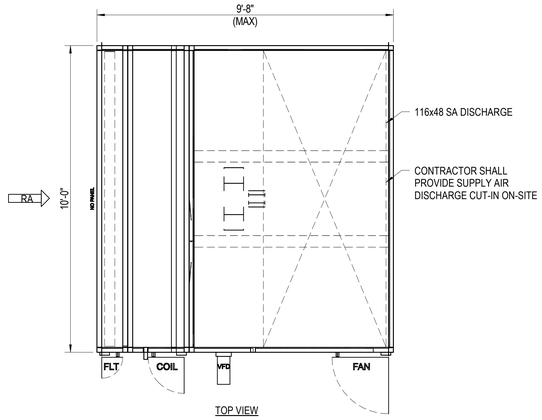
DATE: 7/17/2025 2:54:43 PM PATH: C:\Drawings\19 Documents\25 240097 AP MCHS.rvt FACILITY\Approved_arrows&Layouts\MH.rvt



FRONT VIEW



LEFT VIEW

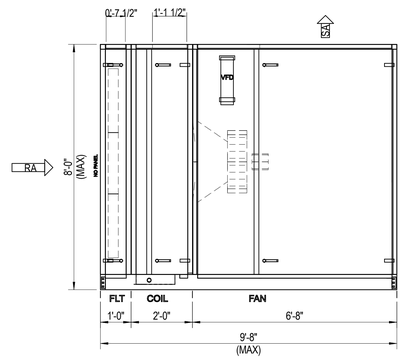


TOP VIEW

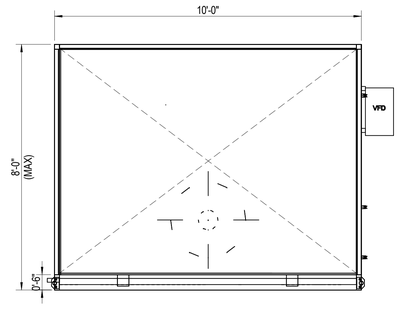
AIR HANDLING UNIT CONFIGURATION - AHU-06

SCALE: 1/2" = 1'-0"

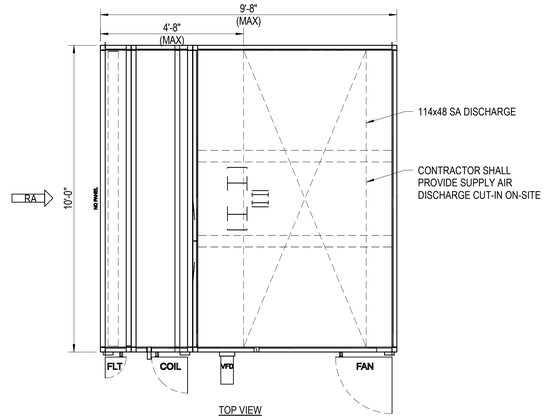
NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.



FRONT VIEW



LEFT VIEW



TOP VIEW

AIR HANDLING UNIT CONFIGURATION - AHU-18

SCALE: 1/2" = 1'-0"

NOTE TO CONTRACTOR:
1. ALL AIR HANDLING UNITS SHALL BE PROVIDED IN SECTIONS TO ALLOW ENTRY INTO BUILDING AND ASSOCIATED EQUIPMENT ROOM DOORWAYS.

NOIRLAB HVAC PROJECT
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BID DOCUMENTS

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ARCHITECTURE
ENGINEERING
CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

AIR HANDLING UNIT CONFIGURATIONS

Sheet Number
MH607

M3PN 240097

DATE: 7/17/2025 2:53:43 PM PATH: C:\Drawings\19 Documents\20 240097 AP MDB.rvt FACILITY\Replacement_all models to current v2023.rvt

OUTDOOR AIR CALCULATION (INTERNATIONAL MECHANICAL CODE - 2018)

Az: ZONE FLOOR AREA (SQFT) OR # OF TOILETS
EA: REQUIRED EXHAUST AIR, PER TABLE 403.3.1.1 (CFM)
Evz: ZONE VENTILATION EFFICIENCY. App A Eq A-1 = 1 + Vout / Vps - Voz / Vdz
Ev: =min(Evz)

Ez: ZONE AIR DISTRIBUTION EFFECTIVENESS Per Table 403.3.1.1.2.3.2
Pz: Zone population
Ra: AREA OUTDOOR AIR RATE (CFM/SQFT)
Rp: PEOPLE OUTDOOR AIR RATE (CFM/PERSON)
Vbz: BREATHING ZONE OUTDOOR AIR FLOW (CFM) (Eq. 4-1) =Rp Pz+Ra Az.

Vot: OUTDOOR AIR INTAKE FLOW (CFM) Eq. 4-8 = Vou/Ev
Vpz: Zone primary airflow (CFM)
Vou: Uncorrected outdoor air intake Eq 4-6 Vou=D*Sum(Rp*Pz)+Sum(Ra*Az)
Voz: Zone outdoor airflow = Vbz/Ez
Vps: System primary airflow

		Units	sqft		cfm				/1000 ft²		cfm/ft²x2	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION (REF. TABLE 403)	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-01																					
HVAC-1	1	LOBBY	719		1,200	0.8		LOBBIES MAIN ENTRY	10	7.19	0.06	43.1	7.19	5.0	36.0	102.82	128.5		0.95	178.50	
HVAC-2	3	MULTI-PURPOSE OFFICE AREA	440		800	0.8		OFFICE SPACES	5	2.2	0.06	26.4	2.20	5.0	11.0	48.62	60.8		0.98	84.41	
HVAC-2	3A	MULTI-PURPOSE OFFICE AREA	110		200	0.8		OFFICE SPACES	5	0.55	0.06	6.6	0.55	5.0	2.8	12.16	15.2		0.98	21.10	
HVAC-2	11	OFFICE AREA	146		200	0.8		OFFICE SPACES	5	0.73	0.06	8.8	0.73	5.0	3.7	16.13	20.2		0.96	28.01	
HVAC-3	2	MENS RESTROOM	95	2	125	0.8		TOILET ROOMS - PUBLIC (PER WC)										140	1.06		
HVAC-3	2A	JANITOR	16		50	0.8		JANITOR CLOSETS, TRASH ROOMS, RECYCLING										16	1.06		
HVAC-3	4	WOMENS RESTROOM	116	2	125	0.8		TOILET ROOMS - PUBLIC (PER WC)										140	1.06		
HVAC-3	6	OFFICE	128		300	0.8		OFFICE SPACES	5	0.64	0.06	7.7	0.64	5.0	3.2	14.14	17.7		1.00	24.56	
HVAC-3	8	OFFICE	175		300	0.8		OFFICE SPACES	5	0.88	0.06	10.5	0.88	5.0	4.4	19.37	24.2		0.98	33.63	
HVAC-3	10	OFFICE	102		300	0.8		OFFICE SPACES	5	0.51	0.06	6.1	0.51	5.0	2.6	11.27	14.1		1.01	19.57	
HVAC-20	36	OFFICE	126		300	0.8		OFFICE SPACES	5	0.63	0.06	7.6	0.63	5.0	3.2	13.92	17.4		1.00	24.17	
HVAC-20	38	OFFICE	182		300	0.8		OFFICE SPACES	5	0.91	0.06	10.9	0.91	5.0	4.6	20.11	25.1		0.97	34.92	
HVAC-20	44	COPY ROOM	91		250	0.8		COPY, PRINTING ROOMS	4	0.36	0.06	5.5	0.36	5.0	1.8	9.44	11.8	46	1.01	16.39	
HVAC-20	46	STORAGE	79		50	0.8		STORAGE ROOMS			0.12	9.5				12.32	15.4		0.75	21.40	
HVAC-20	48	OFFICE	136		350	0.8		OFFICE SPACES	5	0.68	0.06	8.2	0.68	5.0	3.4	15.03	18.8		1.00	26.09	
HVAC-21	37	OFFICE	134		350	0.8		OFFICE SPACES	5	0.67	0.06	8.0	0.67	5.0	3.4	14.81	18.5		1.00	25.71	
HVAC-21	39	OFFICE	138		350	0.8		OFFICE SPACES	5	0.69	0.06	8.3	0.69	5.0	3.5	15.25	19.1		1.00	26.47	
HVAC-21	41	OFFICE	222		600	0.8		OFFICE SPACES	5	1.11	0.06	13.3	1.11	5.0	5.6	24.53	30.7		1.01	42.59	
HVAC-21A	35	OFFICE	180		350	0.8		OFFICE SPACES	5	0.9	0.06	10.8	0.90	5.0	4.5	19.89	24.9		0.99	34.53	
Totals			3,335		6,500								18.65			369.81		342	0.75		
					<Vps>											< V_{ou} >			O.A.(Vot)+30%	493.88	eq 6-8
	Y	<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 191.3								Vbz has been increased by 30%					
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	500	
		Outdoor air per person 26.8 cfm/person						*Outdoor air as % of design primary supply air 8% (cfm)*								*O.A per unit floor area 0.15 cfm/sf*					

		Units	sqft		cfm				/1000 ft²		cfm/ft²x2	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION (REF. TABLE 403)	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-02																					
HVAC-17	43	OFFICE	120		500	0.8		OFFICE SPACES	5	0.6	0.06	7.2	0.60	5.0	3.0	13.26	16.6		1.03	19.84	
HVAC-17	45	OFFICE	132		320	0.8		OFFICE SPACES	5	0.66	0.06	7.9	0.66	5.0	3.3	14.59	18.2		1.01	21.82	
HVAC-17	47	OFFICE	88		180	0.8		OFFICE SPACES	5	0.44	0.06	5.3	0.44	5.0	2.2	9.72	12.2		1.00	14.55	
HVAC-17	49	OFFICE	148		330	0.8		OFFICE SPACES	5	0.74	0.06	8.9	0.74	5.0	3.7	16.35	20.4		1.00	24.47	
HVAC-17	57	OFFICE	115		330	0.8		OFFICE SPACES	5	0.58	0.06	6.9	0.58	5.0	2.9	12.74	15.9		1.02	19.06	
HVAC-17	59	WOMENS RESTROOM	87	2	75	0.8		TOILET ROOMS - PUBLIC (PER WC)										140	1.06		
HVAC-17	61	MENS RESTROOM	126	3	75	0.8		TOILET ROOMS - PUBLIC (PER WC)										210	1.06		
HVAC-17	63	OFFICE	138		330	0.8		OFFICE SPACES	5	0.69	0.06	8.3	0.69	5.0	3.5	15.25	19.1		1.01	22.81	
HVAC-17	65	OFFICE	147		330	0.8		OFFICE SPACES	5	0.74	0.06	8.8	0.74	5.0	3.7	16.28	20.3		1.00	24.35	
HVAC-17	67	OFFICE	145		330	0.8		OFFICE SPACES	5	0.73	0.06	8.7	0.73	5.0	3.7	16.06	20.1		1.00	24.02	
HVAC-18	62	OFFICE	130		400	0.8		OFFICE SPACES	5	0.65	0.06	7.8	0.65	5.0	3.3	14.37	18.0		1.02	21.49	
HVAC-18	64	OFFICE	135		400	0.8		OFFICE SPACES	5	0.68	0.06	8.1	0.68	5.0	3.4	14.95	18.7		1.02	22.36	
HVAC-18	66	OFFICE	138		400	0.8		OFFICE SPACES	5	0.69	0.06	8.3	0.69	5.0	3.5	15.25	19.1		1.02	22.81	
HVAC-19	50	OFFICE	184		400	0.8		OFFICE SPACES	5	0.92	0.06	11.0	0.92	5.0	4.6	20.33	25.4		1.00	30.42	
HVAC-19	52A	OFFICE	91		325	0.8		OFFICE SPACES	5	0.46	0.06	5.5	0.46	5.0	2.3	10.09	12.6		1.02	15.09	
HVAC-19	52	OFFICE	91		325	0.8		OFFICE SPACES	5	0.46	0.06	5.5	0.46	5.0	2.3	10.09	12.6		1.02	15.09	
HVAC-19	54	OFFICE	141		375	0.8		OFFICE SPACES	5	0.71	0.06	8.5	0.71	5.0	3.6	15.61	19.5		1.01	23.36	
HVAC-19	56	OFFICE	134		375	0.8		OFFICE SPACES	5	0.67	0.06	8.0	0.67	5.0	3.4	14.81	18.5		1.01	22.15	
HVAC-19	58	STORAGE	86		200	0.8		STORAGE ROOMS			0.12	10.3				13.42	16.8		0.98	20.07	
HVAC-73	B-1	OFFICE	490		1,200	0.8		OFFICE SPACES	5	2.45	0.06	29.4	2.45	5.0	12.3	54.15	67.7		1.01	81.00	
HVAC-73	B-12	LAB R&D	719		1,500	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	5.03	0.18	129.4	5.03	10.0	50.3	233.64	292.0		0.87	349.51	
HVAC-73	B-13	LAB R&D	140		500	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	0.98	0.18	25.2	0.98	10.0	9.8	45.50	56.9		0.95	68.07	
HVAC-73	B-13A	DARK ROOM / IR LAB	88		300	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	0.62	0.18	15.8	0.62	10.0	6.2	28.65	35.8		0.94	42.86	
Totals			3,813		9,500								19.50			605.09		350	0.87		
					<Vps>											< V_{ou} >			O.A.(Vot)+30%	696.30	eq 6-8
	Y	<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 334.8								Vbz has been increased by 30%					
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	700	
		Outdoor air per person 35.9 cfm/person						*Outdoor air as % of design primary supply air 7% (cfm)*								*O.A per unit floor area 0.18 cfm/sf*					

		Units	sqft		cfm				/1000 ft²		cfm/ft²x2	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION (REF. TABLE 403)	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-03																					
HVAC-4	121	OFFICE	132		200	0.8		OFFICE SPACES	5	0.66	0.06	7.9	0.66	5.0	3.3	14.59	18.2		0.97	19.71	
HVAC-4	123	OFFICE	208		300	0.8		OFFICE SPACES	5	1.04	0.06	12.5	1.04	5.0	5.2	22.98	28.7		0.96	31.06	
HVAC-4	125	OFFICE	148		300	0.8		OFFICE SPACES	5	0.74	0.06	8.9	0.74	5.0	3.7	16.35	20.4		0.99	22.10	
HVAC-4	127	EXECUTIVE OFFICE	125		200	0.8		OFFICE SPACES	5	0.63	0.06	7.5	0.63	5.0	3.2	13.85	17.3		0.97	18.71	
HVAC-4	129	EXECUTIVE OFFICE	184		300	0.8		OFFICE SPACES	5	0.92	0.06	11.0	0.92	5.0	4.6	20.33	25.4		0.97	27.48	
HVAC-4	131	OFFICE	114		200	0.8		OFFICE SPACES	5	0.57	0.06	6.8	0.57	5.0	2.9	12.60	15.7		0.98	17.02	
HVAC-4	133	EXECUTIVE OFFICE	175		300	0.8		OFFICE SPACES	5	0.88	0.06	10.5	0.88	5.0	4.4	19.37	24.2		0.98	26.18	
HVAC-5	122	OFFICE	192		525	0.8		OFFICE SPACES	5	0.96	0.06	11.5	0.96	5.0	4.8	21.22	26.5		1.01	28.67	
HVAC-5	124	EXECUTIVE OFFICE	320		525	0.8		OFFICE SPACES	5	1.6	0.06	19.2	1.60	5.0	8.0	35.36	44.2		0.97	47.79	
HVAC-5	128	OFFICE	183		525	0.8		OFFICE SPACES	5	0.92	0.06	11.0	0.92	5.0	4.6	20.25	25.3		1.01	27.37	
HVAC-5	130	EXECUTIVE OFFICE	195		525	0.8		OFFICE SPACES	5	0.98	0.06	11.7	0.98	5.0	4.9	21.58	27.0		1.01	29.17	
HVAC-6	135	MAILROOM	91		250	0.8		COPY, PRINTING ROOMS	4	0.36	0.06	5.5	0.36	5.0	1.8	9.44	11.8	46	1.01	12.76	
HVAC-6	139	OFFICE	136		300	0.8		OFFICE SPACES	5	0.68	0.06	8.2	0.68	5.0	3.4	15.03	18.8		1.00	20.31	
HVAC-6	141	OFFICE	185		325	0.8		OFFICE SPACES	5	0.93	0.06	11.1	0.93	5.0	4.7	20.48	25.6		0.98	27.67	
HVAC-6	143	OFFICE	137		300	0.8		OFFICE SPACES	5	0.69	0.06	8.2	0.69	5.0	3.5	15.17	19.0		0.99	20.50	
HVAC-6	145	OFFICE	185		325	0.8		OFFICE SPACES	5	0.93	0.06	11.1	0.93	5.0	4.7	20.48	25.6		0.98	27.67	
HVAC-7	136	INTERATION ROOM	387		600	0.8		OFFICE SPACES	5	1.94	0.06	23.2	1.94	5.0	9.7	42.80	53.5		0.97	57.84	
HVAC-7	142	LIBRARY OFFICE	298		500	0.8		OFFICE SPACES	5	1.49	0.06	17.9	1.49	5.0	7.5	32.93	41.2		0.98	44.50	
Totals			3,395		6,500								16.92			374.79		46	0.96		
					<Vps>											< V_{ou} >			O.A.(Vot)+30%	389.64	eq 6-8
	Y	<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 203.7								Vbz has been increased by 30%					
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	400	
		Outdoor air per person 23.6 cfm/person						*Outdoor air as % of design primary supply air 6% (cfm)*								*O.A per unit floor area 0.12 cfm/sf*					

NOTES:
1. OUTSIDE AIR SHALL MODULATE BETWEEN UNOCCUPIED BASE MINIMUM VALUES AND SCHEDULED VALUES SHOWN AIR HANDLING UNITS.
2. ALL SPACES ARE EXISTING, SUPPLY AIR QUANTITY SHOWN IS FOR REFERENCE ONLY.

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Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

OUTSIDE AIR SCHEDULES

Sheet Number
MH608

M3PN 240097

DATE: 7/17/2025 4:05:29 PM PATH: C:\Revit\M3 PROJECTS\2025\M3PN 240097 NOIRLAB HVAC Replacement_ANNWDB_revit2025.rvt

OUTDOOR AIR CALCULATION (INTERNATIONAL MECHANICAL CODE - 2018)

Az: ZONE FLOOR AREA (SQFT) OR # OF TOILETS
EA: REQUIRED EXHAUST AIR, PER TABLE 403.3.1.1 (CFM)
Evz: ZONE VENTILATION EFFICIENCY. App A Eq A-1 = 1 + Vout / Vps - Voz / Vdz
Ev: =min(Evz)

Ez: ZONE AIR DISTRIBUTION EFFECTIVENESS Per Table 403.3.1.1.2.3.2
Pz: Zone population
Ra: AREA OUTDOOR AIR RATE (CFM/SQFT)
Rp: PEOPLE OUTDOOR AIR RATE (CFM/PERSON)
Vbz: BREATHING ZONE OUTDOOR AIR FLOW (CFM) (Eq. 4-1) =Rp Pz+Ra Az.

Vot: OUTDOOR AIR INTAKE FLOW (CFM) Eq: 4-8 = Vou/Ev
Vpz: Zone primary airflow (CFM)
Vou: Uncorrected outdoor air intake Eq 4-6 Vou=D*Sum(Rp*Pz)+Sum(Ra*Az)
Voz: Zone outdoor airflow = Vbz/Ez
Vps: System primary airflow

		Units	sqft		cfm				/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION (REF. TABLE 403)	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-04																					
HVAC-9A	144	WOMENS RESTROOM	87	1	100	0.8		TOILET ROOMS - PUBLIC (PER WC)										70	1.09		
HVAC-9A	146	MENS RESTROOM	87	2	100	0.8		TOILET ROOMS - PUBLIC (PER WC)										140	1.09		
HVAC-9A	148	OFFICE	190		400	0.8		OFFICE SPACES	5	0.95	0.06	11.4	0.95	5.0	4.8	21.00	26.2		1.02	47.34	
HVAC-9A	MID	COORIDOR	250		400	0.8		CORRIDORS			0.06	15.0				19.50	24.4		1.03	43.97	
HVAC-9B	152	OFFICE	120		350	0.8		OFFICE SPACES	5	0.6	0.06	7.2	0.60	5.0	3.0	13.26	16.6		1.04	29.90	
HVAC-9B	154	OFFICE	120		350	0.8		OFFICE SPACES	5	0.6	0.06	7.2	0.60	5.0	3.0	13.26	16.6		1.04	29.90	
HVAC-9C	156	OFFICE	121		350	0.8		OFFICE SPACES	5	0.61	0.06	7.3	0.61	5.0	3.1	13.40	16.8		1.04	30.22	
HVAC-9C	158	OFFICE	148		350	0.8		OFFICE SPACES	5	0.74	0.06	8.9	0.74	5.0	3.7	16.35	20.4		1.03	36.88	
HVAC-9D	153	OFFICE	136		400	0.8		OFFICE SPACES	5	0.68	0.06	8.2	0.68	5.0	3.4	15.03	18.8		1.04	33.89	
HVAC-9D	155	CONFERENCE RM / OFFICE	242		1,100	0.8		CONFERENCE/MEETING	50	12.1	0.06	14.5	12.10	5.0	60.5	97.53	121.9		0.98	219.90	
HVAC-10	147	OFFICE	139		400	0.8		OFFICE SPACES	5	0.7	0.06	8.3	0.70	5.0	3.5	15.39	19.2		1.04	34.71	
HVAC-10	149	OFFICE	187		400	0.8		OFFICE SPACES	5	0.94	0.06	11.2	0.94	5.0	4.7	20.70	25.9		1.02	46.67	
HVAC-10	149A	OFFICE	160		400	0.8		OFFICE SPACES	5	0.8	0.06	9.6	0.80	5.0	4.0	17.68	22.1		1.03	39.87	
HVAC-10	151	OFFICE	150		400	0.8		OFFICE SPACES	5	0.75	0.06	9.0	0.75	5.0	3.8	16.58	20.7		1.03	37.37	
HVAC-10	159	OFFICE	140		400	0.8		OFFICE SPACES	5	0.7	0.06	8.4	0.70	5.0	3.5	15.47	19.3		1.04	34.88	
HVAC-70	B-32	LIBRARY STACK ROOM	460		550	0.8		STORAGE ROOMS			0.12	55.2				71.76	89.7		0.92	161.81	
HVAC-70	B-32A	MEAS	70		150	0.8		STORAGE ROOMS			0.12	8.4				10.92	13.7		1.00	24.62	
HVAC-70	B-33	STORAGE	120		200	0.8		STORAGE ROOMS			0.12	14.4				18.72	23.4		0.97	42.21	
HVAC-70	B-34	LAB	273		400	0.8		MEDIA CENTER	25	6.83	0.12	32.8	6.83	10.0	68.3	131.38	164.2		0.68	296.23	
HVAC-70	B-35	LAB/OFFICE	357		550	0.8		OFFICE SPACES	5	1.79	0.06	21.4	1.79	5.0	9.0	39.48	49.4		1.00	89.02	
HVAC-70	B-36	DARK RM / MEASURING LAB	180		300	0.8		MEDIA CENTER	25	4.5	0.12	21.6	4.50	10.0	45.0	86.58	108.2		0.73	195.22	
HVAC-70	B-37	OFFICE	156		300	0.8		OFFICE SPACES	5	0.78	0.06	9.4	0.78	5.0	3.9	17.24	21.5		1.01	38.87	
HVAC-72	B-14	LAB CUSTODIAL SUPPLIES	392		150	0.8		STORAGE ROOMS			0.12	47.0				61.15	76.4		0.58	137.89	
HVAC-72	B-15	LSST STORAGE	243		200	0.8		STORAGE ROOMS			0.12	29.2				37.91	47.4		0.85	85.48	
HVAC-72	B-16	OFFICE / LAB	409		550	0.8		OFFICE SPACES	5	2.05	0.06	24.5	2.05	5.0	10.3	45.23	56.5		0.98	101.98	
HVAC-72	B-16A	OFFICE	126		250	0.8		OFFICE SPACES	5	0.63	0.06	7.6	0.63	5.0	3.2	13.92	17.4		1.02	31.39	
HVAC-72	B-16B	OFFICE	132		250	0.8		OFFICE SPACES	5	0.66	0.06	7.9	0.66	5.0	3.3	14.59	18.2		1.01	32.89	
HVAC-72	B-18	OFFICE	282		250	0.8		OFFICE SPACES	5	1.41	0.06	16.9	1.41	5.0	7.1	31.16	39.0		0.93	70.26	
HVAC-72	B-18A	OFFICE	140		250	0.8		OFFICE SPACES	5	0.7	0.06	8.4	0.70	5.0	3.5	15.47	19.3		1.01	34.88	
HVAC-72	B-18B	OFFICE	125		250	0.8		OFFICE SPACES	5	0.63	0.06	7.5	0.63	5.0	3.2	13.85	17.3		1.02	31.22	
Totals			5,742		10,500								40.15			904.49		210	0.58		
					<Vps>											< V_{oz} >			O.A.(Vot)+30%	1,568.82	eq 6-8
																			SCHED	1,570	

Y <--Y to Include ASHRAE + 30% airflow
P Total Zone Occupants (to determine occupant Diversity)
Outdoor air per person 39.1 cfm/person

Minimum O.A. for Un-Occupied bldg --> 438.4
Occupant Diversity = P / SumPz = 100%
Outdoor air as % of design primary supply air 15% (cfm)
O.A per unit floor area 0.27 cfm/sf

Vbz has been increased by 30%

		Units	sqft		cfm				/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION (REF. TABLE 403)	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-05																					
HVAC-9E	157	OFFICE	205		400	0.8		OFFICE SPACES	5	1.03	0.06	12.3	1.03	5.0	5.2	22.69	28.4		1.03	39.32	
HVAC-9E	160	PRINTER ROOM	46		100	0.8		COPY, PRINTING ROOMS	4	0.18	0.06	2.8	0.18	5.0	0.9	4.76	5.9	23	1.05	8.25	
HVAC-9E	162	OFFICE	194		400	0.8		OFFICE SPACES	5	0.97	0.06	11.6	0.97	5.0	4.9	21.44	26.8		1.04	37.16	
HVAC-9E	164	OFFICE	186		400	0.8		OFFICE SPACES	5	0.93	0.06	11.2	0.93	5.0	4.7	20.55	25.7		1.04	35.63	
HVAC-9E	168	STORAGE	69		100	0.8		STORAGE ROOMS			0.12	8.3				10.76	13.5		0.97	18.66	
HVAC-14	161	OFFICE	139		360	0.8		OFFICE SPACES	5	0.7	0.06	8.3	0.70	5.0	3.5	15.39	19.2		1.05	26.68	
HVAC-14	163	OFFICE	139		360	0.8		OFFICE SPACES	5	0.7	0.06	8.3	0.70	5.0	3.5	15.39	19.2		1.05	26.68	
HVAC-14	165	OFFICE	139		360	0.8		OFFICE SPACES	5	0.7	0.06	8.3	0.70	5.0	3.5	15.39	19.2		1.05	26.68	
HVAC-14	166	OFFICE	160		360	0.8		OFFICE SPACES	5	0.8	0.06	9.6	0.80	5.0	4.0	17.68	22.1		1.04	30.65	
HVAC-14	167	OFFICE	160		360	0.8		OFFICE SPACES	5	0.8	0.06	9.6	0.80	5.0	4.0	17.68	22.1		1.04	30.65	
HVAC-15	170	EXECUTIVE OFFICE	184		280	0.8		OFFICE SPACES	5	0.92	0.06	11.0	0.92	5.0	4.6	20.33	25.4		1.01	35.25	
HVAC-15	172	OFFICE	120		280	0.8		OFFICE SPACES	5	0.6	0.06	7.2	0.60	5.0	3.0	13.26	16.6		1.05	22.99	
HVAC-15	174	OFFICE	121		280	0.8		OFFICE SPACES	5	0.61	0.06	7.3	0.61	5.0	3.1	13.40	16.8		1.04	23.23	
HVAC-15	176	OFFICE	121		280	0.8		OFFICE SPACES	5	0.61	0.06	7.3	0.61	5.0	3.1	13.40	16.8		1.04	23.23	
HVAC-15	178	OFFICE	123		280	0.8		OFFICE SPACES	5	0.62	0.06	7.4	0.62	5.0	3.1	13.62	17.0		1.04	23.62	
HVAC-16	171	OFFICE	181		280	0.8		OFFICE SPACES	5	0.91	0.06	10.9	0.91	5.0	4.6	20.03	25.0		1.02	34.73	
HVAC-16	173	OFFICE	138		280	0.8		OFFICE SPACES	5	0.69	0.06	8.3	0.69	5.0	3.5	15.25	19.1		1.04	26.43	
HVAC-16	175	OFFICE	179		280	0.8		OFFICE SPACES	5	0.9	0.06	10.7	0.90	5.0	4.5	19.81	24.8		1.02	34.34	
HVAC-16	177	OFFICE	124		280	0.8		OFFICE SPACES	5	0.62	0.06	7.4	0.62	5.0	3.1	13.70	17.1		1.04	23.75	
HVAC-16	179	OFFICE	70		280	0.8		OFFICE SPACES	5	0.35	0.06	4.2	0.35	5.0	1.8	7.74	9.7		1.07	13.41	
HVAC-71	B-38	CCD / DEWAR LAB	313		500	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	2.19	0.18	56.3	2.19	10.0	21.9	101.71	127.1		0.85	176.32	
HVAC-71	B-38A	TV LAB	295		500	0.8		MEDIA CENTER	25	7.38	0.12	35.4	7.38	10.0	73.8	141.96	177.5		0.75	246.09	
HVAC-71	B-39	LAB	395		500	0.8		OFFICE SPACES	5	1.98	0.06	23.7	1.98	5.0	9.9	43.68	54.6		1.00	75.72	
HVAC-71	B-39A	OFFICE GSMT	232		300	0.8		OFFICE SPACES	5	1.16	0.06	13.9	1.16	5.0	5.8	25.64	32.0		1.00	44.44	
HVAC-71	B-39B	STORAGE	76		100	0.8		STORAGE ROOMS			0.12	9.1				11.86	14.8		0.96	20.55	
HVAC-71	B-2	LR&D LAB	539		700	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	3.77	0.18	97.0	3.77	10.0	37.7	175.14	218.9		0.79	303.60	
HVAC-71	B-3	LAB	157		300	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	1.1	0.18	28.3	1.10	10.0	11.0	51.04	63.8		0.89	88.48	
HVAC-71	B-4	IR LAB	95		300	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	0.67	0.18	17.1	0.67	10.0	6.7	30.94	38.7		0.98	53.64	
HVAC-71	B-5	CLEANROOM	120		400	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	0.84	0.18	21.6	0.84	10.0	8.4	39.00	48.8		0.98	67.61	
HVAC-71	B-6	OFFICE / STORAGE	186		200	0.8		OFFICE SPACES	5	0.93	0.06	11.2	0.93	5.0	4.7	20.55	25.7		0.98	35.63	
HVAC-71	B-7	LR&D LAB / OFFICE	176		200	0.8		OFFICE SPACES	5	0.88	0.06	10.6	0.88	5.0	4.4	19.45	24.3		0.98	33.71	
HVAC-71	B-8	LAB	163		200	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	1.14	0.18	29.3	1.14	10.0	11.4	52.96	66.2		0.77	91.81	
HVAC-71	B-8A	LAB	229		300	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	1.6	0.18	41.2	1.60	10.0	16.0	74.39	93.0		0.79	128.95	
Totals			5,774		10,500								37.28			1,100.59		23	0.75		
					<Vps>											< V_{oz} >			O.A.(Vot)+30%	1,467.62	eq 6-8
																			SCHED	1,470	

Y <--Y to Include ASHRAE + 30% airflow
P Total Zone Occupants (to determine occupant Diversity)
Outdoor air per person 39.4 cfm/person

Minimum O.A. for Un-Occupied bldg --> 566.7
Occupant Diversity = P / SumPz = 100%
Outdoor air as % of design primary supply air 14% (cfm)
O.A per unit floor area 0.25 cfm/sf

Vbz has been increased by 30%

NOTES:
1. OUTSIDE AIR SHALL MODULATE BETWEEN UNOCCUPIED BASE MINIMUM VALUES AND SCHEDULED VALUES SHOWN AIR HANDLING UNITS.
2. ALL SPACES ARE EXISTING, SUPPLY AIR QUANTITY SHOWN IS FOR REFERENCE ONLY.

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

OUTSIDE AIR SCHEDULES

Sheet Number
MH609

M3PN 240097

DATE: 7/17/2025 4:01:21 PM XREFs: C:\Dropbox (M3 Engineering)\M3 Projects\240097 NOIRLab HVAC Replacement_Tucson\Revit\MH.rvt

OUTDOOR AIR CALCULATION (INTERNATIONAL MECHANICAL CODE - 2018)

Az: ZONE FLOOR AREA (SQFT) OR # OF TOILETS
EA: REQUIRED EXHAUST AIR, PER TABLE 403.3.1.1 (CFM)
Evz: ZONE VENTILATION EFFICIENCY. App A Eq A-1 = 1 + Vout / Vps - Voz / Vdz
Ev: =min(Evz)

Ez: ZONE AIR DISTRIBUTION EFFECTIVENESS Per Table 403.3.1.1.2.3.2
Pz: Zone population
Ra: AREA OUTDOOR AIR RATE (CFM/SQFT)
Rp: PEOPLE OUTDOOR AIR RATE (CFM/PERSON)
Vbz: BREATHING ZONE OUTDOOR AIR FLOW (CFM) (Eq. 4-1) =Rp Pz+Ra Az.

Vot: OUTDOOR AIR INTAKE FLOW (CFM) Eq. 4-8 = Vou/Ev
Vpz: Zone primary airflow (CFM)
Vou: Uncorrected outdoor air intake Eq 4-6 Vou=D*Sum(Rp*Pz)+Sum(Ra*Az)
Voz: Zone outdoor airflow = Vbz/Ez
Vps: System primary airflow

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-06																					
HVAC-34	181	OFFICE	155		335	0.8		OFFICE SPACES	5	0.78	0.06	9.3	0.78	5.0	3.9	13.20	16.5		1.00	23.31	
HVAC-34	183	OFFICE	146		335	0.8		OFFICE SPACES	5	0.73	0.06	8.8	0.73	5.0	3.7	12.41	15.5		1.01	21.91	
HVAC-34	185	OFFICE	146		330	0.8		OFFICE SPACES	5	0.73	0.06	8.8	0.73	5.0	3.7	12.41	15.5		1.01	21.91	
HVAC-35	187	OFFICE	153		450	0.8		OFFICE SPACES	5	0.77	0.06	9.2	0.77	5.0	3.9	13.03	16.3		1.02	23.01	
HVAC-35	189	OFFICE	139		450	0.8		OFFICE SPACES	5	0.7	0.06	8.3	0.70	5.0	3.5	11.84	14.8		1.02	20.91	
HVAC-36	191	OFFICE	196		350	0.8		OFFICE SPACES	5	0.98	0.06	11.8	0.98	5.0	4.9	16.66	20.8		0.99	29.42	
HVAC-36	193	OFFICE	152		350	0.8		OFFICE SPACES	5	0.76	0.06	9.1	0.76	5.0	3.8	12.92	16.2		1.01	22.81	
HVAC-37	EW1-NE	CORRIDOR	600		200	0.8		STORAGE ROOMS			0.12	72.0				72.00	90.0		0.60	127.13	
HVAC-38	120	OFFICE	254		750	0.8		OFFICE SPACES	5	1.27	0.06	15.2	1.27	5.0	6.4	21.59	27.0		1.02	38.12	
HVAC-40	116	OFFICE	197		500	0.8		OFFICE SPACES	5	0.99	0.06	11.8	0.99	5.0	5.0	16.77	21.0		1.01	29.61	
HVAC-40	118	OFFICE	248		700	0.8		OFFICE SPACES	5	1.24	0.06	14.9	1.24	5.0	6.2	21.08	26.4		1.01	37.22	
HVAC-41	119	OFFICE	179		400	0.8		OFFICE SPACES	5	0.9	0.06	10.7	0.90	5.0	4.5	15.24	19.1		1.00	26.91	
HVAC-42	117A	POSTDOC CONFERENCE ROOM	128		175	0.8		CONFERENCE/MEETING	50	6.4	0.06	7.7	6.40	5.0	32.0	39.68	49.6		0.77	70.06	
HVAC-43	117	OFFICE	265		175	0.8		OFFICE SPACES	5	1.33	0.06	15.9	1.33	5.0	6.7	22.55	28.2		0.89	39.82	
HVAC-44	110	OFFICE	147		400	0.8		OFFICE SPACES	5	0.74	0.06	8.8	0.74	5.0	3.7	12.52	15.7		1.01	22.11	
HVAC-44	112	OFFICE	147		400	0.8		OFFICE SPACES	5	0.74	0.06	8.8	0.74	5.0	3.7	12.52	15.7		1.01	22.11	
HVAC-44	114	OFFICE	147		400	0.8		OFFICE SPACES	5	0.74	0.06	8.8	0.74	5.0	3.7	12.52	15.7		1.01	22.11	
HVAC-46	104	OFFICE	140		400	0.8		OFFICE SPACES	5	0.7	0.06	8.4	0.70	5.0	3.5	11.90	14.9		1.02	21.01	
HVAC-46	106	OFFICE	147		400	0.8		OFFICE SPACES	5	0.74	0.06	8.8	0.74	5.0	3.7	12.52	15.7		1.01	22.11	
HVAC-46	108	OFFICE	147		400	0.8		OFFICE SPACES	5	0.74	0.06	8.8	0.74	5.0	3.7	12.52	15.7		1.01	22.11	
HVAC-49	102	OFFICE	211		650	0.8		OFFICE SPACES	5	1.06	0.06	12.7	1.06	5.0	5.3	17.96	22.5		1.02	31.71	
HVAC-50	103	OFFICE	102		100	0.8		OFFICE SPACES	5	0.51	0.06	6.1	0.51	5.0	2.6	8.67	10.8		0.94	15.31	
HVAC-50	105	OFFICE	102		100	0.8		OFFICE SPACES	5	0.51	0.06	6.1	0.51	5.0	2.6	8.67	10.8		0.94	15.31	
HVAC-52	96	OFFICE	148		400	0.8		OFFICE SPACES	5	0.74	0.06	8.9	0.74	5.0	3.7	12.58	15.7		1.01	22.21	
HVAC-52	98	OFFICE	148		400	0.8		OFFICE SPACES	5	0.74	0.06	8.9	0.74	5.0	3.7	12.58	15.7		1.01	22.21	
HVAC-52	100	OFFICE	132		400	0.8		OFFICE SPACES	5	0.66	0.06	7.9	0.66	5.0	3.3	11.22	14.0		1.02	19.81	
HVAC-52A	90	OFFICE	126		300	0.8		OFFICE SPACES	5	0.63	0.06	7.6	0.63	5.0	3.2	10.71	13.4		1.01	18.91	
HVAC-52A	92	OFFICE	121		300	0.8		OFFICE SPACES	5	0.61	0.06	7.3	0.61	5.0	3.1	10.31	12.9		1.01	18.20	
HVAC-52A	94	OFFICE	149		300	0.8		OFFICE SPACES	5	0.75	0.06	8.9	0.75	5.0	3.8	12.69	15.9		1.00	22.41	
HVAC-53	84B	OFFICE	142		400	0.8		OFFICE SPACES	5	0.71	0.06	8.5	0.71	5.0	3.6	12.07	15.1		1.01	21.31	
HVAC-53	88	COPY ROOM	98		100	0.8		COPY, PRINTING ROOMS	4	0.39	0.06	5.9	0.39	5.0	2.0	7.83	9.8	49	0.95	13.83	
HVAC-54	84	OFFICE	142		500	0.8		OFFICE SPACES	5	0.71	0.06	8.5	0.71	5.0	3.6	12.07	15.1		1.02	21.31	
HVAC-54	84A	OFFICE	172		500	0.8		OFFICE SPACES	5	0.86	0.06	10.3	0.86	5.0	4.3	14.62	18.3		1.02	25.81	
HVAC-55	EW1-SW	CORRIDOR	920		200	0.8		CORRIDORS			0.06	55.2				55.20	69.0		0.71	97.47	
HVAC-56	71	OFFICE	162		150	0.8		OFFICE SPACES	5	0.81	0.06	9.7	0.81	5.0	4.1	13.77	17.2		0.94	24.31	
HVAC-56	73	EQUIP. STORAGE / TELEPHONE	81		25	0.8		STORAGE ROOMS			0.12	9.7				9.72	12.2		0.57	17.16	
HVAC-56	77	JANITOR	30		25	0.8		JANITOR CLOSETS, TRASH ROOMS, RECYCLING										30	1.05		
HVAC-56	79	WOMEN	79	2	25	0.8		TOILET ROOMS - PUBLIC (PER WC)										140	1.05		
HVAC-56	81	MEN	110	4	25	0.8		TOILET ROOMS - PUBLIC (PER WC)										280	1.05		
HVAC-57	70	OFFICE	101		175	0.8		OFFICE SPACES	5	0.51	0.06	6.1	0.51	5.0	2.6	8.61	10.8		0.99	15.20	
HVAC-57	72	OFFICE	119		175	0.8		OFFICE SPACES	5	0.6	0.06	7.1	0.60	5.0	3.0	10.14	12.7		0.98	17.90	
HVAC-58	109	OFFICE	117		250	0.8		OFFICE SPACES	5	0.59	0.06	7.0	0.59	5.0	3.0	9.97	12.5		1.00	17.60	
HVAC-58	111	OFFICE	122		250	0.8		OFFICE SPACES	5	0.61	0.06	7.3	0.61	5.0	3.1	10.37	13.0		1.00	18.31	
HVAC-58	113	INTERACTIVE ROOM	295		500	0.8		CONFERENCE/MEETING	50	14.75	0.06	17.7	14.75	5.0	73.8	91.45	114.3		0.82	161.48	
HVAC-59	74	OFFICE	484		1,200	0.8		OFFICE SPACES	5	2.42	0.06	29.0	2.42	5.0	12.1	41.14	51.4		1.01	72.64	
HVAC-60	76	OFFICE	102		500	0.8		OFFICE SPACES	5	0.51	0.06	6.1	0.51	5.0	2.6	8.67	10.8		1.03	15.31	
HVAC-60	EW1-MID	CORRIDOR	380		500	0.8		CORRIDORS			0.06	22.8				22.80	28.5		1.00	40.26	
HVAC-61	190	OFFICE	112		500	0.8		OFFICE SPACES	5	0.56	0.06	6.7	0.56	5.0	2.8	9.52	11.9		1.03	16.81	
HVAC-61	192	OFFICE	112		500	0.8		OFFICE SPACES	5	0.56	0.06	6.7	0.56	5.0	2.8	9.52	11.9		1.03	16.81	
HVAC-62	76A	OFFICE	102		500	0.8		OFFICE SPACES	5	0.51	0.06	6.1	0.51	5.0	2.6	8.67	10.8		1.03	15.31	
HVAC-63	78	OFFICE	103		500	0.8		OFFICE SPACES	5	0.52	0.06	6.2	0.52	5.0	2.6	8.78	11.0		1.03	15.50	
HVAC-63	78A	OFFICE	104		500	0.8		OFFICE SPACES	5	0.52	0.06	6.2	0.52	5.0	2.6	8.84	11.1		1.03	15.61	
HVAC-63	78B	OFFICE	200		500	0.8		OFFICE SPACES	5	1	0.06	12.0	1.00	5.0	5.0	17.00	21.3		1.01	30.02	
HVAC-63	82	OFFICE	142		500	0.8		OFFICE SPACES	5	0.71	0.06	8.5	0.71	5.0	3.6	12.07	15.1		1.02	21.31	
HVAC-64	180	CONFERENCE ROOM	728		1,600	0.8		CONFERENCE/MEETING	50	36.4	0.06	43.7	36.40	5.0	182.0	225.68	282.1		0.88	398.49	
HVAC-64	180A	FOOD SERVICE	113		200	0.8		BREAK ROOMS	25	2.83	0.06	6.8	2.83	5.0	14.2	20.93	26.2		0.92	36.96	
HVAC-65	EW1-NW	CORRIDOR	563		200	0.8		CORRIDORS			0.06	33.8				33.78	42.2		0.84	59.65	
HVAC-66	80	OFFICE	148		225	0.8		OFFICE SPACES	5	0.74	0.06	8.9	0.74	5.0	3.7	12.58	15.7		0.98	22.21	
HVAC-66	82A	OFFICE	139		225	0.8		OFFICE SPACES	5	0.7	0.06	8.3	0.70	5.0	3.5	11.84	14.8		0.99	20.91	
HVAC-66	83	OFFICE	240		350	0.8		OFFICE SPACES	5	1.2	0.06	14.4	1.20	5.0	6.0	20.40	25.5		0.98	36.02	
HVAC-66	--	OFFICE	275		650	0.8		OFFICE SPACES	5	1.38	0.06	16.5	1.38	5.0	6.9	23.40	29.3		1.01	41.32	
HVAC-66	--	OFFICE	275		700	0.8		OFFICE SPACES	5	1.38	0.06	16.5	1.38	5.0	6.9	23.40	29.3		1.01	41.32	
Totals			12,084		24,000								100.67			1,256.11		499	0.57		
					<Vps>											< V_{ou} >			O.A.(Vot)	2,217.95	eq 6-8
		<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 752.5													
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	3,000	
		Outdoor air per person 29.8 cfm/person						*Outdoor air as % of design primary supply air 13% (cfm)*								*O.A per unit floor area 0.25 cfm/sf*					

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-08																					
HVAC-27	15A	OFFICE	115		150	0.8		OFFICE SPACES	5	0.58	0.06	6.9	0.58	5.0	2.9	12.74	15.9		1.00	18.10	
HVAC-27	15B	LAB TOOL RM	150		150	0.8		STORAGE ROOMS			0.12	18.0				23.40	29.3		0.92	33.24	
HVAC-27	15	INSTRUMENT SHOP	653		2,500	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	4.57	0.18	117.5	4.57	10.0	45.7	212.21	265.3		1.00	301.46	
HVAC-27	16	INSTRUMENT SHOP	1,608		4,200	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	11.26	0.18	289.4	11.26	10.0	112.6	522.65	653.3		0.95	742.45	
Totals			2,526		7,000								16.41			771.00			0.92		
					<Vps>											< V_{ou} >			O.A.(Vot)+30%	842.50	eq 6-8
	Y	<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 431.8								Vbz has been increased by 30%					
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	850	
		Outdoor air per person 51.8 cfm/person						*Outdoor air as % of design primary supply air 12% (cfm)*								*O.A per unit floor area 0.34 cfm/sf*					

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-09																					
HVAC-28A	30	OPTICS SHOP	1,250		2,825	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	8.75	0.18	225.0	8.75	10.0	87.5	312.50	390.6		0.97	321.39	
Totals			1,250		2,825								8.75			312.50			0.97		
					<Vps>											< V_{ou} >			O.A.(Vot)	321.39	eq 6-8
		<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 225.0													
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	325	
		Outdoor air per person 37.1 cfm/person						*Outdoor air as % of design primary supply air 12% (cfm)*								*O.A per unit floor area 0.26 cfm/sf*					

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-10																					
HVAC-29	17	WELDING SHOP / STORAGE	1,042		2,235	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	7.29	0.18	187.6	7.29	10.0	72.9	260.46	325.6		0.97	268.28	
Totals			1,042		2,235								7.29			260.46			0.97		
					<Vps>											< V_{ou} >			O.A.(Vot)	268.28	eq 6-8
		<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 187.6													
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	270	
		Outdoor air per person 37 cfm/person						*Outdoor air as % of design primary supply air 12% (cfm)*								*O.A per unit floor area 0.26 cfm/sf*					

NOTES:
1. OUTSIDE AIR SHALL MODULATE BETWEEN UNOCCUPIED BASE MINIMUM VALUES AND SCHEDULED VALUES SHOWN AIR HANDLING UNITS.
2. ALL SPACES ARE EXISTING, SUPPLY AIR QUANTITY SHOWN IS FOR REFERENCE ONLY.

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

OUTSIDE AIR SCHEDULES

Sheet Number
MH610

M3PN 240097

OUTDOOR AIR CALCULATION (INTERNATIONAL MECHANICAL CODE - 2018)

Az: ZONE FLOOR AREA (SQFT) OR # OF TOILETS
EA: REQUIRED EXHAUST AIR, PER TABLE 403.3.1.1 (CFM)
Evz: ZONE VENTILATION EFFICIENCY, App A Eq A-1 = 1 + Vout / Vps - Voz / Vdz
Ev: =min(Evz)

Ez: ZONE AIR DISTRIBUTION EFFECTIVENESS Per Table 403.3.1.1.2.3.2
Pz: Zone population
Ra: AREA OUTDOOR AIR RATE (CFM/SQFT)
Rp: PEOPLE OUTDOOR AIR RATE (CFM/PERSON)
Vbz: BREATHING ZONE OUTDOOR AIR FLOW (CFM) (Eq. 4-1) =Rp Pz+Ra Az

Vot: OUTDOOR AIR INTAKE FLOW (CFM) Eq. 4-8 = Vou/Ev
Vpz: Zone primary airflow (CFM)
Vou: Uncorrected outdoor air intake Eq 4-6 Vou=D*Sum(Rp*Pz)+Sum(Ra*Az)
Voz: Zone outdoor airflow = Vbz/Ez
Vps: System primary airflow

			Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-11																					
HVAC-77	216	OFFICE	100		330	0.8		OFFICE SPACES	5	0.5	0.06	6.0	0.50	5.0	2.5	11.05	13.8		1.02	19.13	
HVAC-77	217	OFFICE	98		330	0.8		OFFICE SPACES	5	0.49	0.06	5.9	0.49	5.0	2.5	10.83	13.5		1.02	18.75	
HVAC-77	218	OFFICE	98		330	0.8		OFFICE SPACES	5	0.49	0.06	5.9	0.49	5.0	2.5	10.83	13.5		1.02	18.75	
HVAC-77A	219	OPEN OFFICE	169		350	0.8		OFFICE SPACES	5	0.85	0.06	10.1	0.85	5.0	4.3	18.71	23.4		1.00	32.38	
HVAC-77A	220	OFFICE	128		330	0.8		OFFICE SPACES	5	0.64	0.06	7.7	0.64	5.0	3.2	14.14	17.7		1.01	24.48	
HVAC-77A	221	OFFICE	115		330	0.8		OFFICE SPACES	5	0.58	0.06	6.9	0.58	5.0	2.9	12.74	15.9		1.01	22.05	
HVAC-78	206	OFFICE	111		300	0.8		OFFICE SPACES	5	0.56	0.06	6.7	0.56	5.0	2.8	12.30	15.4		1.01	21.29	
HVAC-78	207	OFFICE	111		300	0.8		OFFICE SPACES	5	0.56	0.06	6.7	0.56	5.0	2.8	12.30	15.4		1.01	21.29	
HVAC-78	208	OFFICE	109		300	0.8		OFFICE SPACES	5	0.55	0.06	6.5	0.55	5.0	2.8	12.08	15.1		1.01	20.91	
HVAC-78	209	OFFICE	128		300	0.8		OFFICE SPACES	5	0.64	0.06	7.7	0.64	5.0	3.2	14.14	17.7		1.00	24.48	
HVAC-78	210	OFFICE	124		300	0.8		OFFICE SPACES	5	0.62	0.06	7.4	0.62	5.0	3.1	13.70	17.1		1.01	23.72	
HVAC-78	211	OFFICE	141		300	0.8		OFFICE SPACES	5	0.71	0.06	8.5	0.71	5.0	3.6	15.61	19.5		1.00	27.03	
HVAC-78	212	OFFICE	95		300	0.8		OFFICE SPACES	5	0.48	0.06	5.7	0.48	5.0	2.4	10.53	13.2		1.02	18.23	
HVAC-78	213	OFFICE	101		300	0.8		OFFICE SPACES	5	0.51	0.06	6.1	0.51	5.0	2.6	11.19	14.0		1.02	19.38	
HVAC-78	214	OFFICE	118		300	0.8		OFFICE SPACES	5	0.59	0.06	7.1	0.59	5.0	3.0	13.04	16.3		1.01	22.57	
HVAC-78	215	OPEN OFFICE	367		675	0.8		OFFICE SPACES	5	1.84	0.06	22.0	1.84	5.0	9.2	40.59	50.7		0.99	70.26	
HVAC-78	215	OPEN OFFICE	367		600	0.8		OFFICE SPACES	5	1.84	0.06	22.0	1.84	5.0	9.2	40.59	50.7		0.98	70.26	
HVAC-78	215A	OFFICE	86		200	0.8		OFFICE SPACES	5	0.43	0.06	5.2	0.43	5.0	2.2	9.50	11.9		1.00	16.45	
HVAC-78	215B	OFFICE	52		200	0.8		OFFICE SPACES	5	0.26	0.06	3.1	0.26	5.0	1.3	5.75	7.2		1.03	9.95	
HVAC-78	215C	OFFICE	52		200	0.8		OFFICE SPACES	5	0.26	0.06	3.1	0.26	5.0	1.3	5.75	7.2		1.03	9.95	
HVAC-78	215D	OFFICE	52		200	0.8		OFFICE SPACES	5	0.26	0.06	3.1	0.26	5.0	1.3	5.75	7.2		1.03	9.95	
HVAC-78	224	OPEN MEETING	371		600	0.8		CONFERENCE/MEETING	50	18.55	0.06	22.3	18.55	5.0	92.8	149.51	186.9		0.75	258.81	
HVAC-78	225	KITCHEN	65		200	0.8		BREAK ROOMS	25	1.63	0.06	3.9	1.63	5.0	8.2	15.67	19.6		0.96	27.12	
HVAC-78	226	WOMEN	65	1	50	0.8		TOILET ROOMS - PUBLIC (PER WC)										70	1.06		
HVAC-78	228	MEN	90	2	550	0.8		TOILET ROOMS - PUBLIC (PER WC)										140	1.06		
HVAC-78	229	CONFERENCE ROOM	231		675	0.8		CONFERENCE/MEETING	50	11.55	0.06	13.9	11.55	5.0	57.8	93.09	116.4		0.89	161.15	
HVAC-78	215-COR	CORRIDOR	220		150	0.8		CORRIDORS			0.06	13.2				17.16	21.5		0.92	29.70	
HVAC-79	200	OFFICE	157		300	0.8		OFFICE SPACES	5	0.79	0.06	9.4	0.79	5.0	4.0	17.38	21.7		0.99	30.09	
HVAC-79	201	OFFICE	117		300	0.8		OFFICE SPACES	5	0.59	0.06	7.0	0.59	5.0	3.0	12.96	16.2		1.01	22.44	
HVAC-79	202	OFFICE	142		300	0.8		OFFICE SPACES	5	0.71	0.06	8.5	0.71	5.0	3.6	15.69	19.6		1.00	27.16	
HVAC-79	203	OFFICE	145		300	0.8		OFFICE SPACES	5	0.73	0.06	8.7	0.73	5.0	3.7	16.06	20.1		1.00	27.79	
HVAC-79	204	OFFICE	142		300	0.8		OFFICE SPACES	5	0.71	0.06	8.5	0.71	5.0	3.6	15.69	19.6		1.00	27.16	
HVAC-79	205	OFFICE	145		300	0.8		OFFICE SPACES	5	0.73	0.06	8.7	0.73	5.0	3.7	16.06	20.1		1.00	27.79	
HVAC-79	200-COR	CORRIDOR	216		200	0.8		CORRIDORS			0.06	13.0				16.85	21.1		0.96	29.16	
Totals			4,828		11,000								49.65			687.22		210	0.75		
					<Vps>											< V_{ou} >			O.A.(Vot)+30%	915.09	eq 6-8
	Y	<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 280.5								Vbz has been increased by 30%					
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	920	
		Outdoor air per person 18.5 cfm/person						*Outdoor air as % of design primary supply air 8% (cfm)*								*O.A per unit floor area 0.19 cfm/sf*					

			Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-12																					
HVAC-31	20	INSTRUMENT SHOP	1,626		2,825	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	11.38	0.18	292.7	11.38	10.0	113.8	406.48	508.1		0.96	421.65	
Totals			1,626		2,825								11.38			406.48			0.96		
					<Vps>											< V_{ou} >			O.A.(Vot)	421.65	eq 6-8
		<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 292.7													
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	425	
		Outdoor air per person 37.3 cfm/person						*Outdoor air as % of design primary supply air 15% (cfm)*								*O.A per unit floor area 0.26 cfm/sf*					

			Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-13																					
HVAC-32	27	CONFERENCE RM	672		1,000	0.8		CONFERENCE/MEETING	50	33.6	0.06	40.3	33.60	5.0	168.0	208.32	260.4		0.85	244.18	
HVAC-107	M-12A	OFFICE	188		350	0.8		OFFICE SPACES	5	0.94	0.06	11.3	0.94	5.0	4.7	15.98	20.0		1.06	18.73	
HVAC-107	M-12B	OFFICE	175		350	0.8		OFFICE SPACES	5	0.88	0.06	10.5	0.88	5.0	4.4	14.90	18.6		1.06	17.47	
HVAC-107	M-12C	OFFICE	113		350	0.8		OFFICE SPACES	5	0.57	0.06	6.8	0.57	5.0	2.9	9.63	12.0		1.08	11.29	
HVAC-107	M-12-COR	CORRIDOR	82		185	0.8		CORRIDORS			0.06	4.9				4.92	6.2		1.08	5.77	
Totals			1,230		2,235								35.99			253.75			0.85		
					<Vps>											< V_{ou} >			O.A.(Vot)	297.43	eq 6-8
		<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 73.8													
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	300	
		Outdoor air per person 8.3 cfm/person						*Outdoor air as % of design primary supply air 13% (cfm)*								*O.A per unit floor area 0.24 cfm/sf*					

			Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-14																					
HVAC-33	25	HIGH BAY OPTICS	1,070		2,235	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	7.49	0.18	192.6	7.49	10.0	74.9	267.50	334.4		0.97	275.75	
Totals			1,070		2,235								7.49			267.50			0.97		
					<Vps>											< V_{ou} >			O.A.(Vot)	275.75	eq 6-8
		<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 192.6													
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	275	
		Outdoor air per person 36.7 cfm/person						*Outdoor air as % of design primary supply air 12% (cfm)*								*O.A per unit floor area 0.26 cfm/sf*					

			Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-15																					
HVAC-108	EB-TUN	OPTICS TUNNEL	1,200		2,825	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	8.4	0.18	216.0	8.40	10.0	84.0	300.00	375.0		0.97	308.18	
Totals			1,200		2,825								8.40			300.00			0.97		
					<Vps>											< V_{ou} >			O.A.(Vot)	308.18	eq 6-8
		<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 216.0													
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	310	
		Outdoor air per person 36.9 cfm/person						*Outdoor air as % of design primary supply air 11% (cfm)*								*O.A per unit floor area 0.26 cfm/sf*					

			Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-16																					
HVAC-68	B-30	LIBRARY	1,400		2,000	0.8		LIBRARIES	10	14	0.12	168.0	14.00	5.0	70.0	309.40	386.8		0.96	418.40	
Totals			1,400		2,000								14.00			309.40			0.96		
					<Vps>											< V_{ou} >			O.A.(Vot)+30%	321.85	eq 6-8
	Y	<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 168.0								Vbz has been increased by 30%					
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	325	
		Outdoor air per person 23.2 cfm/person						*Outdoor air as % of design primary supply air 16% (cfm)*								*O.A per unit floor area 0.23 cfm/sf*					

			Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-17																					
HVAC-8	140	LIBRARY	1,236		2,400	0.8		LIBRARIES	10	12.36	0.12	148.3	12.36	5.0	61.8	273.16	341.4		0.97	365.50	
Totals			1,236		2,400								12.36			273.16			0.97		
					<Vps>											< V_{ou} >			O.A.(Vot)+30%	281.16	eq 6-8
	Y	<--Y to Include ASHRAE + 30% airflow						Minimum O.A. for Un-Occupied bldg --> 148.3								Vbz has been increased by 30%					
		P Total Zone Occupants (to determine occupant Diversity)						Occupant Diversity = P / SumPz = 100%											SCHED	300	
		Outdoor air per person 24.3 cfm/person						*Outdoor air as % of design primary supply air 13% (cfm)*								*O.A per unit floor area 0.24 cfm/sf*					

NOTES:
1. OUTSIDE AIR SHALL MODULATE BETWEEN UNOCCUPIED BASE MINIMUM VALUES AND SCHEDULED VALUES SHOWN AIR HANDLING UNITS.
2. ALL SPACES ARE EXISTING, SUPPLY AIR QUANTITY SHOWN IS FOR REFERENCE ONLY.

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Revisions

#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

MECHANICAL

OUTSIDE AIR SCHEDULES

Sheet Number
MH611

M3PN 240097

DATE: 7/17/2025 4:05:19 PM N:\Projects\19 Documents\M3PN 240097 NOIRLab HVAC Replacement_Ammann\mech\MH611.rvt

OUTDOOR AIR CALCULATION (INTERNATIONAL MECHANICAL CODE - 2018)

Az: ZONE FLOOR AREA (SQFT) OR # OF TOILETS
EA: REQUIRED EXHAUST AIR, PER TABLE 403.3.1.1 (CFM)
Evz: ZONE VENTILATION EFFICIENCY. App A Eq A-1 = 1 + Vout / Vps - Voz / Vdz
Ev: =min(Evz)

Ez: ZONE AIR DISTRIBUTION EFFECTIVENESS Per Table 403.3.1.1.2.3.2
Pz: Zone population
Ra: AREA OUTDOOR AIR RATE (CFM/SQFT)
Rp: PEOPLE OUTDOOR AIR RATE (CFM/PERSON)
Vbz: BREATHING ZONE OUTDOOR AIR FLOW (CFM) (Eq. 4-1) =Rp Pz+Ra Az

Vot: OUTDOOR AIR INTAKE FLOW (CFM) Eq. 4-8 = Vou/Ev
Vpz: Zone primary airflow (CFM)
Vou: Uncorrected outdoor air intake Eq 4-6 Vou=D*Sum(Rp*Pz)+Sum(Ra*Az)
Voz: Zone outdoor airflow = Vbz/Ez
Vps: System primary airflow

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-18																					
HVAC-80	B-40	LSST LASER LAB	972		2,500	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	6.8	0.18	175.0	6.80	10.0	68.0	242.96	303.7		0.96	324.43	
HVAC-81	B-41	STORAGE	480		800	0.8		STORAGE ROOMS			0.12	57.6				57.60	72.0		0.99	76.91	
HVAC-82	B-42	STORAGE	325		400	0.8		STORAGE ROOMS			0.12	39.0				39.00	48.8		0.96	52.08	
HVAC-82	B-43B	OFFICE	177		400	0.8		OFFICE SPACES	5	0.89	0.06	10.6	0.89	5.0	4.5	15.07	18.8		1.04	20.12	
HVAC-82	B-43C	OFFICE	123		400	0.8		OFFICE SPACES	5	0.62	0.06	7.4	0.62	5.0	3.1	10.48	13.1		1.05	13.99	
HVAC-83	EWB-NE	CORRIDOR	1,000		250	0.8		CORRIDORS			0.06	60.0				60.00	75.0		0.78	80.12	
HVAC-84	B-43	OFFICE / LAB	625		800	0.8		OFFICE SPACES	5	3.13	0.06	37.5	3.13	5.0	15.7	53.15	66.4		1.00	70.97	
HVAC-86	B-43A	LAB EEL	135		200	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	0.95	0.18	24.3	0.95	10.0	9.5	33.80	42.3		0.87	45.13	
HVAC-86	B-44	OFFICE	152		200	0.8		OFFICE SPACES	5	0.76	0.06	9.1	0.76	5.0	3.8	12.92	16.2		1.00	17.25	
HVAC-86	B-45	OFFICE / LAB	207		250	0.8		OFFICE SPACES	5	1.04	0.06	12.4	1.04	5.0	5.2	17.62	22.0		1.00	23.53	
HVAC-86	B-46	WORKROOM	272		750	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	1.9	0.18	49.0	1.90	10.0	19.0	67.96	85.0		0.97	90.75	
HVAC-87	B-52	OFFICE	215		350	0.8		OFFICE SPACES	5	1.08	0.06	12.9	1.08	5.0	5.4	18.30	22.9		1.02	24.44	
HVAC-89	B-47	OFFICE	115		300	0.8		OFFICE SPACES	5	0.58	0.06	6.9	0.58	5.0	2.9	9.80	12.3		1.04	13.09	
HVAC-90	B-51A	OFFICE	428		600	0.8		OFFICE SPACES	5	2.14	0.06	25.7	2.14	5.0	10.7	36.38	45.5		1.01	48.58	
HVAC-92	B-46A	WORKROOM	446		800	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	3.12	0.18	80.3	3.12	10.0	31.2	111.48	139.4		0.91	148.86	
HVAC-92B	B-49	CLEANROOM SOFT WALL	485		2,400	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	3.4	0.18	87.3	3.40	10.0	34.0	121.30	151.6		1.02	161.98	
HVAC-92B	B-49A	CLEANROOM	135		350	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	0.95	0.18	24.3	0.95	10.0	9.5	33.80	42.3		0.96	45.13	
HVAC-93	B-50	OFFICE	125		300	0.8		OFFICE SPACES	5	0.63	0.06	7.5	0.63	5.0	3.2	10.65	13.3		1.04	14.22	
HVAC-93	B-50A	CONFERENCE ROOM	288		500	0.8		CONFERENCE/MEETING	50	14.4	0.06	17.3	14.40	5.0	72.0	89.28	111.6		0.86	119.22	
HVAC-93	B-50B	COMPUTER LAB	402		1,800	0.8		COMPUTER LAB	25	10.05	0.12	48.2	10.05	10.0	100.5	148.74	185.9		0.98	198.62	
HVAC-93	B-50C	OFFICE	129		300	0.8		OFFICE SPACES	5	0.65	0.06	7.7	0.65	5.0	3.3	10.99	13.7		1.04	14.68	
HVAC-94	B-51B	OFFICE	100		275	0.8		OFFICE SPACES	5	0.5	0.06	6.0	0.50	5.0	2.5	8.50	10.6		1.05	11.35	
HVAC-94	B-51C	OFFICE	100		200	0.8		OFFICE SPACES	5	0.5	0.06	6.0	0.50	5.0	2.5	8.50	10.6		1.03	11.35	
HVAC-94	B-51J	WORKSPACE	375		350	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	2.63	0.18	67.5	2.63	10.0	26.3	93.80	117.3		0.75	125.25	
HVAC-95	B-55	STORAGE	240		500	0.8		STORAGE ROOMS			0.12	28.8				28.80	36.0		1.01	38.46	
HVAC-97	B-54	CONFERENCE ROOM	587		1,700	0.8		CONFERENCE/MEETING	50	29.35	0.06	35.2	29.35	5.0	146.8	181.97	227.5		0.95	242.99	
HVAC-97	B-56	STORAGE	80		100	0.8		STORAGE ROOMS			0.12	9.6				9.60	12.0		0.96	12.82	
HVAC-98	B-53	CONFERENCE ROOM	202		300	0.8		CONFERENCE/MEETING	50	10.1	0.06	12.1	10.10	5.0	50.5	62.62	78.3		0.82	83.62	
HVAC-100	B-51D	OFFICE	105		400	0.8		OFFICE SPACES	5	0.53	0.06	6.3	0.53	5.0	2.7	8.95	11.2		1.06	11.95	
HVAC-100	B-51J	COFFEE SITTING AREA	127		425	0.8		BREAK ROOMS	25	3.18	0.06	7.6	3.18	5.0	15.9	23.52	29.4		1.01	31.41	
HVAC-101	B-62	OFFICE / LAB AAS	375		500	0.8		OFFICE SPACES	5	1.88	0.06	22.5	1.88	5.0	9.4	31.90	39.9		1.00	42.60	
HVAC-101A	B-65	LAB	477		1,000	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	3.34	0.18	85.9	3.34	10.0	33.4	119.26	149.1		0.93	159.25	
HVAC-102	B-51E	OFFICE	103		330	0.8		OFFICE SPACES	5	0.52	0.06	6.2	0.52	5.0	2.6	8.78	11.0		1.05	11.72	
HVAC-102	B-51F	OFFICE	143		330	0.8		OFFICE SPACES	5	0.72	0.06	8.6	0.72	5.0	3.6	12.18	15.2		1.04	16.26	
HVAC-102	B-51G	OFFICE	102		330	0.8		OFFICE SPACES	5	0.51	0.06	6.1	0.51	5.0	2.6	8.67	10.8		1.05	11.58	
HVAC-102	B-51H	OFFICE	96		330	0.8		OFFICE SPACES	5	0.48	0.06	5.8	0.48	5.0	2.4	8.16	10.2		1.05	10.90	
HVAC-102	B-51J	WORKSPACE	333		330	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	2.33	0.18	59.9	2.33	10.0	23.3	83.24	104.1		0.77	111.15	
HVAC-103	B-51	PLAN FILE AREA	850		1,800	0.8		STORAGE ROOMS			0.12	102.0				102.00	127.5		1.01	136.20	
HVAC-104	B-64	OFFICE / LAB	134		150	0.8		OFFICE SPACES	5	0.67	0.06	8.0	0.67	5.0	3.4	11.39	14.2		0.99	15.21	
Totals			**11,765**		**24,000**								**110.33**			**2,013.12**			**0.75**		
					<Vps>											**< V_{oz} >**			**O.A.(Vot)**	**2,688.17**	eq 6-8
																			SCHED	**3,000**	

<--Y to Include ASHRAE + 30% airflow
P Total Zone Occupants (to determine occupant Diversity)
Outdoor air per person 27.2 cfm/person

Minimum O.A. for Un-Occupied bldg --> 1,284.1
Occupant Diversity = P / SumPz = 100%
Outdoor air as % of design primary supply air 13% (cfm)
O.A per unit floor area 0.25 cfm/sf

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-19																					
HVAC-22	5	CONFERENCE ROOM	656		1,000	0.8	15	CONFERENCE/MEETING	50	32.8	0.06	39.4	15.00	5.0	75.0	148.67	185.8		0.94	212.46	
HVAC-23	MB	KITCHEN	304		1,000	0.8		BREAK ROOMS	25	7.6	0.06	18.2	7.60	5.0	38.0	73.11	91.4		1.03	104.48	
HVAC-24	42	LOUNGE	355		800	0.8		BREAK ROOMS	25	8.88	0.06	21.3	8.88	5.0	44.4	85.41	106.8		0.99	122.06	
HVAC-24	42A	OFFICE	140		200	0.8		OFFICE SPACES	5	0.7	0.06	8.4	0.70	5.0	3.5	15.47	19.3		1.03	22.11	
HVAC-74	B-23	PAEO STORAGE	757		1,000	0.8		STORAGE ROOMS			0.12	90.8				118.09	147.6		0.97	168.76	
HVAC-74A	B-23A	IR LAB	523		1,000	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	3.66	0.18	94.1	3.66	10.0	36.6	169.96	212.5		0.91	242.89	
Totals			**2,735**		**5,000**								**35.84**			**610.71**			**0.91**		
					<Vps>											**< V_{oz} >**			**O.A.(Vot)+30%**	**671.34**	eq 6-8
																			SCHED	**675**	

Y <--Y to Include ASHRAE + 30% airflow
P Total Zone Occupants (to determine occupant Diversity)
Outdoor air per person 18.8 cfm/person

Minimum O.A. for Un-Occupied bldg --> 272.2
Occupant Diversity = P / SumPz = 100%
Outdoor air as % of design primary supply air 14% (cfm)
O.A per unit floor area 0.25 cfm/sf

Vbz has been increased by 30%

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-20																					
HVAC-25	13	CORRIDOR	171		150	0.8		CORRIDORS			0.06	10.3				10.26	12.8		1.00	12.08	
HVAC-25	14	MENS RESTROOM	49	1	50	0.8		TOILET ROOMS - PUBLIC (PER WC)										70	1.09		
HVAC-25	15	INSTRUMENT SHOP	1,773		2,300	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	12.41	0.18	319.1	12.41	10.0	124.1	443.24	554.1		0.85	522.06	
HVAC-75	M-1	CORRIDOR	138		400	0.8		CORRIDORS			0.06	8.3				8.28	10.4		1.06	9.75	
HVAC-75	M-13	OFFICE	116		425	0.8		OFFICE SPACES	5	0.58	0.06	7.0	0.58	5.0	2.9	9.86	12.3		1.06	11.61	
HVAC-75	M-14	OFFICE	118		425	0.8		OFFICE SPACES	5	0.59	0.06	7.1	0.59	5.0	3.0	10.03	12.5		1.06	11.81	
HVAC-75	M-15	OFFICE	116		425	0.8		OFFICE SPACES	5	0.58	0.06	7.0	0.58	5.0	2.9	9.86	12.3		1.06	11.61	
HVAC-75	M-16	OFFICE	118		425	0.8		OFFICE SPACES	5	0.59	0.06	7.1	0.59	5.0	3.0	10.03	12.5		1.06	11.81	
HVAC-75	M-17	OFFICE	116		425	0.8		OFFICE SPACES	5	0.58	0.06	7.0	0.58	5.0	2.9	9.86	12.3		1.06	11.61	
HVAC-75	M-18	OFFICE	118		425	0.8		OFFICE SPACES	5	0.59	0.06	7.1	0.59	5.0	3.0	10.03	12.5		1.06	11.81	
HVAC-75	M-19	OFFICE	212		550	0.8		OFFICE SPACES	5	1.06	0.06	12.7	1.06	5.0	5.3	18.02	22.5		1.05	21.22	
Totals			**3,045**		**6,000**								**16.98**			**539.47**		**70**	**0.85**		
					<Vps>											**< V_{oz} >**			**O.A.(Vot)**	**635.40**	eq 6-8
																			SCHED	**750**	

<--Y to Include ASHRAE + 30% airflow
P Total Zone Occupants (to determine occupant Diversity)
Outdoor air per person 44.2 cfm/person

Minimum O.A. for Un-Occupied bldg --> 392.7
Occupant Diversity = P / SumPz = 100%
Outdoor air as % of design primary supply air 13% (cfm)
O.A per unit floor area 0.25 cfm/sf

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-21																					
HVAC-26	30A	OPTICS LAB	370		400	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	2.59	0.18	66.6	2.59	10.0	25.9	92.50	115.6		0.80	115.06	
HVAC-28	30	OPTICS SHOP	1,080		2,100	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	7.56	0.18	194.4	7.56	10.0	75.6	270.00	337.5		0.93	335.84	
HVAC-76	M-3	INTERACTIVE AREA	481		550	0.8	10	RECEPTION AREAS	30	14.43	0.06	28.9	10.00	5.0	50.0	78.86	98.6		0.91	98.09	
HVAC-76	M-5	OFFICE	142		425	0.8		OFFICE SPACES	5	0.71	0.06	8.5	0.71	5.0	3.6	12.07	15.1		1.06	15.01	
HVAC-76	M-6	CONFERENCE ROOM	149		550	0.8		CONFERENCE/MEETING	50	7.45	0.06	8.9	7.45	5.0	37.3	46.19	57.7		0.99	57.45	
HVAC-76	M-7	OFFICE	144		425	0.8		OFFICE SPACES	5	0.72	0.06	8.6	0.72	5.0	3.6	12.24	15.3		1.06	15.22	
HVAC-76	M-8	OFFICE	108		425	0.8		OFFICE SPACES	5	0.54	0.06	6.5	0.54	5.0	2.7	9.18	11.5		1.07	11.42	
HVAC-76	M-9	OFFICE	126		425	0.8		OFFICE SPACES	5	0.63	0.06	7.6	0.63	5.0	3.2	10.71	13.4		1.06	13.32	
HVAC-76	M-10	OFFICE	107		425	0.8		OFFICE SPACES	5	0.54	0.06	6.4	0.54	5.0	2.7	9.12	11.4		1.07	11.34	
HVAC-76	M-3-COR	CORRIDOR	288		275	0.8		CORRIDORS			0.06	17.3				17.28	21.6		1.01	21.49	
Totals			**2,995**		**6,000**								**30.74**			**558.15**			**0.80**		
					<Vps>											**< V_{oz} >**			**O.A.(Vot)**	**694.25**	eq 6-8
																			SCHED	**750**	

<--Y to Include ASHRAE + 30% airflow
P Total Zone Occupants (to determine occupant Diversity)
Outdoor air per person 24.4 cfm/person

Minimum O.A. for Un-Occupied bldg --> 353.7
Occupant Diversity = P / SumPz = 100%
Outdoor air as % of design primary supply air 13% (cfm)
O.A per unit floor area 0.25 cfm/sf

		Units	sqft		cfm			(REF. TABLE 403)	/1000 ft²		cfm/ft²	cfm	# people	cfm	cfm	cfm		cfm			
TAG NO.	ROOM NUM.	ROOM NAME	Az	No.	Vpz or Vdz	Ez	Actual People	OCCUPANCY CLASSIFICATION	Default Area	Calc Area	Ra	Acfm	Pz	Rp	Rp*Pz	Vbz eq 6-1	Voz	EA	Evz	Voz Zone Air	NOTES
AHU-22																					
HVAC-92A	B-46B	CLEANROOM	293		2,000	0.8		GENERAL MANUFACTURING (EXCLUDE H &CHEMICALS	7	2.05	0.18	52.7	2.05	10.0	20.5	73.24	91.6		0.99	74.77	
HVAC-92A	B-46B-COR	CORRIDOR	182		235	0.8		CORRIDORS			0.06	10.9				10.92	13.7		0.98	11.15	
Totals			**475**		**2,235**								**2.05**			**84.16**			**0.98**		
					<Vps>											**< V_{oz} >**			**O.A.(Vot)**	**85.92**	eq 6-8
																			SCHED	**100**	

<--Y to Include ASHRAE + 30% airflow
P Total Zone Occupants (to determine occupant Diversity)
Outdoor air per person 48.8 cfm/person

Minimum O.A. for Un-Occupied bldg --> 63.6
Occupant Diversity = P / SumPz = 100%
Outdoor air as % of design primary supply air 4% (cfm)
O.A per unit floor area 0.21 cfm/sf

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Revisions

#	Description	Date

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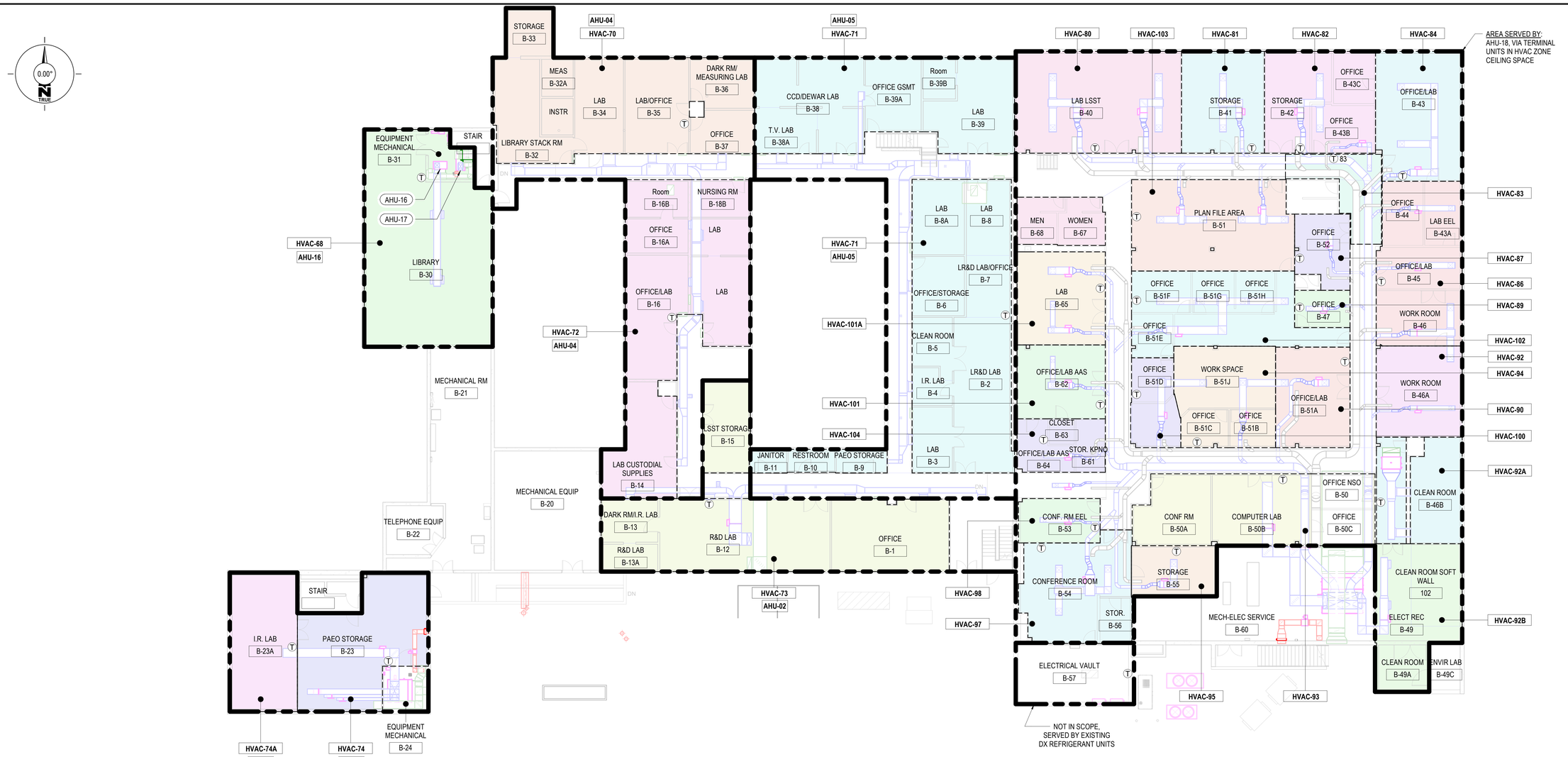
MECHANICAL

OUTSIDE AIR SCHEDULES

Sheet Number
MH612

M3PN 240097

DATE: 7/17/2025 3:53:57 PM FILE: C:\Revit\19 Documents\25 240097 all MEP&LAB HVAC Replacement_ansela.superdd.rvt



BASEMENT - HVAC ZONES

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

HVAC ZONES / CRITERIA

HVAC-68	COOL: 72 DEG F, 35-50% RH HEAT: 68 DEG F	HVAC-81	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-92	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-100	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-70	COOL: 72 DEG F, 35-50% RH HEAT: 68 DEG F	HVAC-82	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-92A	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-101	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-71	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-83	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-92B	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-101A	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-72	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-84	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-93	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-102	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-73	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-86	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-94	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-103	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-74	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-87	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-95	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-104	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-74A	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-89	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-97	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-107	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-80	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-90	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-98	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-108	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F

LEGEND

HVAC ZONE - BOUNDARY

AHU SYSTEM - BOUNDARY

10' 5' 0' 10' 20'

3/32" = 1'-0"

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Revisions

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MECHANICAL

BASEMENT HVAC ZONES AND CRITERIA

Sheet Number
MH701

M3PN 240097

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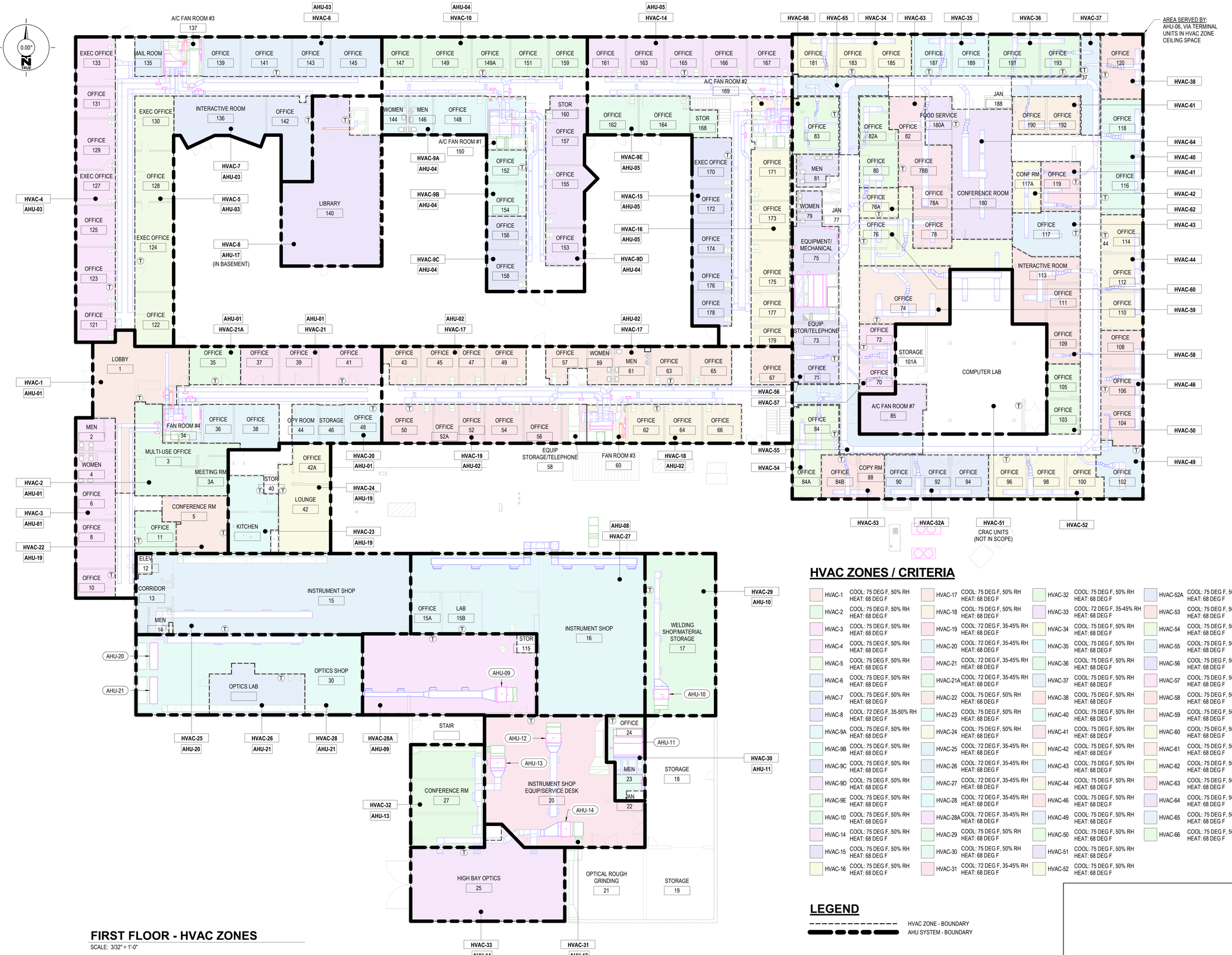

FIRST FLOOR - HVAC ZONES

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

HVAC ZONES / CRITERIA

HVAC-1	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-17	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-32	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-52A	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-2	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-18	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-33	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-53	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-3	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-19	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-34	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-54	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-4	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-20	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-35	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-55	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-5	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-21	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-36	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-56	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-6	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-21A	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-37	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-57	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-7	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-22	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-38	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-58	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-8	COOL: 72 DEG F, 35-50% RH HEAT: 68 DEG F	HVAC-23	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-40	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-59	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-9A	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-24	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-41	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-60	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-9B	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-25	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-42	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-61	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-9C	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-26	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-43	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-62	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-9D	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-27	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-44	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-63	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-9E	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-28	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-46	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-64	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-10	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-28A	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-49	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-65	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-14	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-29	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-50	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-66	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-15	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-30	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-51	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F		
HVAC-16	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F	HVAC-31	COOL: 72 DEG F, 35-45% RH HEAT: 68 DEG F	HVAC-52	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F		

LEGEND

HVAC ZONE - BOUNDARY

AHU SYSTEM - BOUNDARY

10' 5' 0' 10' 20'

3/32" = 1'-0"

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ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

Revisions

#	Description	Date

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MECHANICAL

FIRST FLOOR HVAC ZONES AND CRITERIA

Sheet Number
MH702

M3PN 240097

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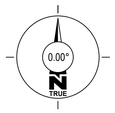

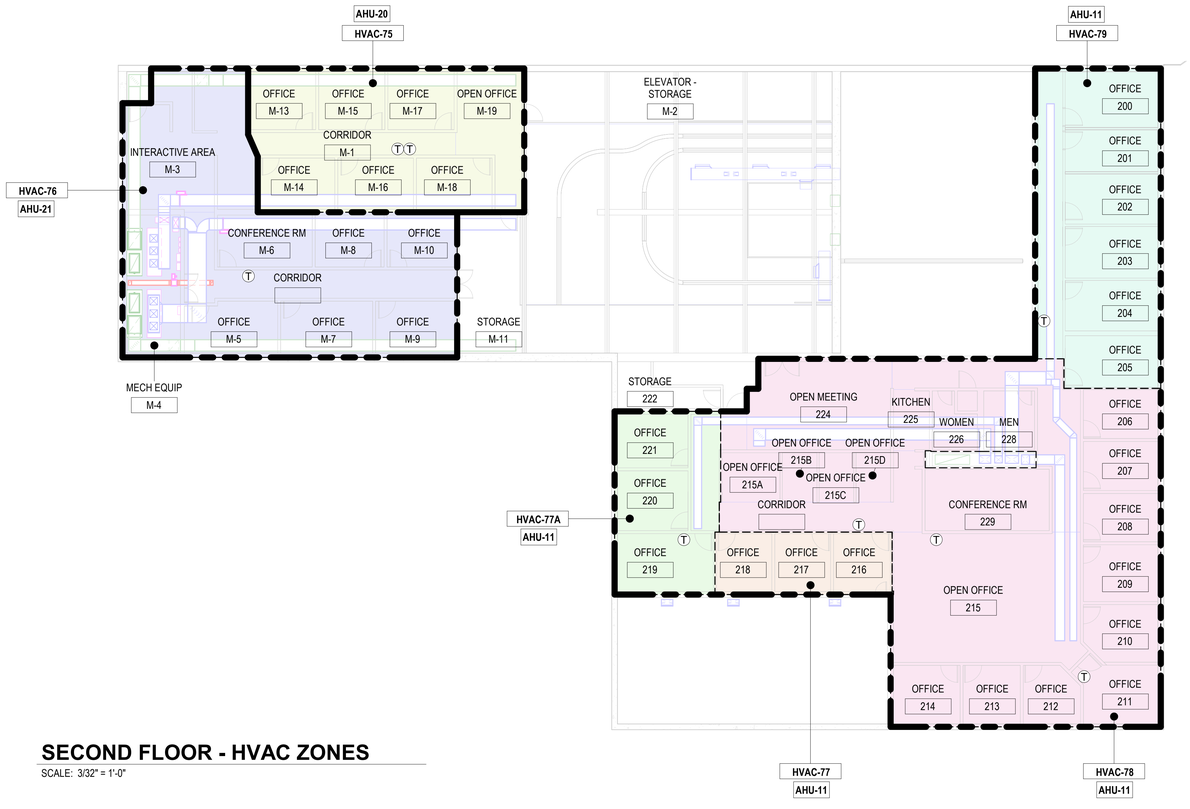

SECOND FLOOR - HVAC ZONES

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

HVAC ZONES / CRITERIA

HVAC-75	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-76	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-77	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-77A	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-78	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F
HVAC-79	COOL: 75 DEG F, 50% RH HEAT: 68 DEG F

LEGEND

HVAC ZONE - BOUNDARY

AHU SYSTEM - BOUNDARY

10' 5' 0' 10' 20'

3/32" = 1'-0"

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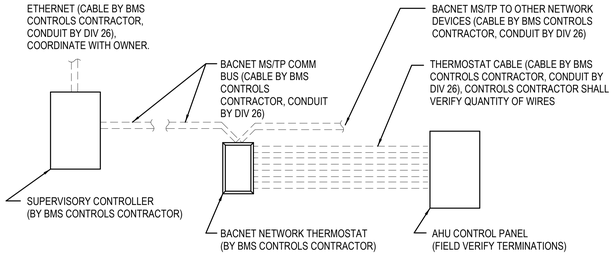
MECHANICAL

SECOND FLOOR HVAC ZONES AND CRITERIA

Sheet Number
MH703

M3PN 240097

DATE: 7/17/2025 4:13:24 PM PATH: C:\Documents\25 Jacobs and NOIRLab HVAC Replacement_amanda.lyvers@m3.a

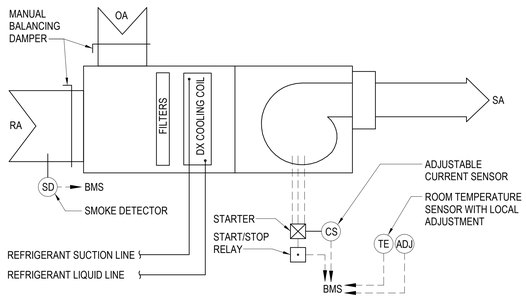


GENERAL NOTES:

1. THE NETWORK THERMOSTAT SHALL PROVIDE BACNET MS/TP COMMUNICATION CAPABILITY THAT ENABLES REMOTE MONITORING AND PROGRAMMABILITY (ROOM TEMPERATURE, SYSTEM MODE, SETPOINT ADJUSTMENT, NIGHT SETBACK, SCHEDULE STATUS, MINIMUM DEADBAND & OCCUPANCY OVERRIDE).
2. THE NETWORK THERMOSTAT SHALL PROVIDE A KEYPAD LOCKOUT FEATURE.
3. THE SUPERVISORY CONTROLLER SHALL PROVIDE ALARM, TRENDING, SCHEDULING AND PASSWORD PROTECTION.
4. REFER TO MECHANICAL EQUIPMENT SCHEDULES FOR THERMOSTAT MAKE & MODEL.

TYPICAL NETWORK THERMOSTAT

SCALE: NONE 1

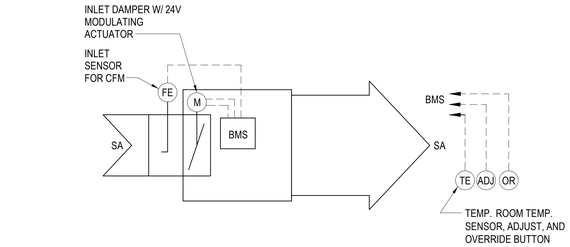


SEQUENCE OF OPERATION:

1. THE FAN COIL UNIT SHALL OPERATE DURING SCHEDULED OCCUPIED TIMES, NIGHT SET-BACK/SET-UP, MORNING WARM-UP/COOL DOWN SEQUENCES AND TIMED OVERRIDE PERIODS SET FORTH BY CLIENT.
2. THE VRF COMPRESSOR SHALL MODULATE AS REQUIRED TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT.
3. IF THE ROOM TEMPERATURE IS GREATER THAN 5 DEG F FROM SETPOINT, AN ALARM MESSAGE SHALL BE PROVIDED.
4. THE FAN STATUS SHALL BE MONITORED AND AN ALARM MESSAGE SHALL BE PROVIDED IF THE FAN FAILS.
5. SHUT-DOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND OR SYSTEM SAFETY, THE SUPPLY FAN SHALL TURN OFF.
6. SMOKE DETECTION: SMOKE DETECTORS (WHERE INDICATED ON THE CONSTRUCTION DRAWINGS) SHALL BE HARD WIRED THROUGH THE STARTER AND STOP THE FAN AND GENERATE AN ALARM UPON SMOKE DETECTION.

FAN COIL DIAGRAM

SCALE: NONE 3

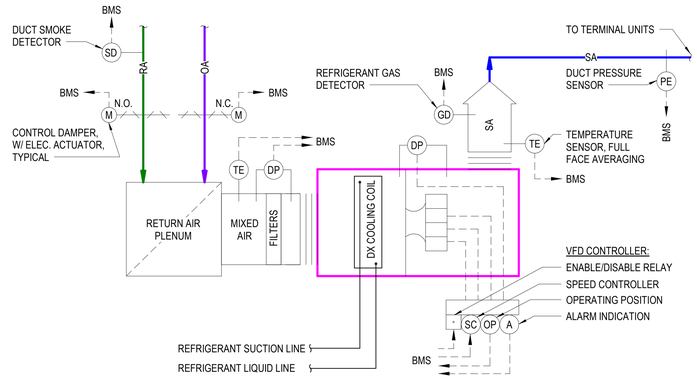


SEQUENCE OF OPERATION:

1. THE TERMINAL UNITS SHALL OPERATE DURING SCHEDULED OCCUPIED TIMES, NIGHT SET-BACK/SET-UP, MORNING WARM-UP/COOL DOWN SEQUENCES AND TIMED OVERRIDE PERIODS SET FORTH BY CLIENT.
2. THE TERMINAL UNIT SHALL MODULATE ITS CONTROL DAMPER BETWEEN SCHEDULED MAXIMUM AND MINIMUM POSITIONS TO MAINTAIN SPACE TEMPERATURE. ON A RISE IN SPACE TEMPERATURE, THE VAV DAMPER SHALL OPEN TO MAXIMUM POSITION. ON A FALL IN SPACE TEMPERATURE, THE VAV DAMPER SHALL CLOSE TO MINIMUM POSITION.
3. IF THE DAMPER IS IN ITS FULLY OPEN POSITION AND IS UNABLE TO OBTAIN THE MAXIMUM SCHEDULED AIR FLOW, A REQUEST SHALL BE MADE TO RESET THE SERVING AIR HANDLER DUCT PRESSURE SETTING. IF THE LOW AIR FLOW CONDITION CONTINUES FOR 5 MINUTES AN ALARM MESSAGE SHALL BE PROVIDED.
4. IF THE ROOM TEMPERATURE IS GREATER THAN 5 DEG F FROM SETPOINT, AN ALARM MESSAGE SHALL BE PROVIDED.
5. THE SCHEDULED OCCUPIED TIMES PROGRAM, WILL CAUSE THE TERMINAL UNITS TO GO INTO UNOCCUPIED MODE SETTINGS WHEN CALLED UPON.

TERMINAL UNIT W/O REHEAT DIAGRAM

SCALE: NONE 2



SEQUENCE OF OPERATION:

1. THE FAN COIL UNIT SHALL OPERATE DURING SCHEDULED OCCUPIED TIMES, NIGHT SET-BACK/SET-UP, MORNING WARM-UP/COOL DOWN SEQUENCES AND TIMED OVERRIDE PERIODS SET FORTH BY CLIENT.
2. THE VRF COMPRESSOR SHALL MODULATE AS REQUIRED TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT.
3. IF THE ROOM TEMPERATURE IS GREATER THAN 5 DEG F FROM SETPOINT, AN ALARM MESSAGE SHALL BE PROVIDED.
4. THE FAN STATUS SHALL BE MONITORED AND AN ALARM MESSAGE SHALL BE PROVIDED IF THE FAN FAILS.
5. SHUT-DOWN: WHEN THE UNIT IS SHUTDOWN BY A STOP COMMAND OR SYSTEM SAFETY, THE SUPPLY FAN SHALL TURN OFF.
6. SMOKE DETECTION: SMOKE DETECTORS (WHERE INDICATED ON THE CONSTRUCTION DRAWINGS) SHALL BE HARD WIRED THROUGH THE STARTER AND STOP THE FAN AND GENERATE AN ALARM UPON SMOKE DETECTION.
7. REFRIGERANT GAS DETECTION: GAS DETECTORS (WHERE INDICATED ON THE CONSTRUCTION DRAWINGS) SHALL BE HARD WIRED THROUGH THE STARTER AND STOP THE AHU FAN AND ASSOCIATED CONDENSER, AN ALARM SHALL BE GENERATED UPON REFRIGERANT GAS DETECTION AND THE ROOM PURGE EXHAUST FAN SHALL BE ENABLED.

AIR HANDLING UNIT DIAGRAM

SCALE: NONE 4

CONTROL SYSMBOLS

ADJ	ADJUSTMENT CONTROL
CS	CURRENT SENSOR
FE	FLOW ELEMENT
GD	REFRIGERANT GAS DETECTOR
SD	DUCT MOUNTED SMOKE DETECTOR
TE	TEMPERATURE ELEMENT
OR	OVERRIDE CONTROL
OS	ROOM OCCUPANCY SENSOR
BMS	BUILDING MANAGEMENT SYSTEM
DEG	DEGREES
F	FAHRENHEIT
I/O	INPUT / OUTPUT
IP	INTERNET PROTOCOL
MS/TP	MASTER SLAVE / TOKEN PASSING
OA	OUTDOOR AIR
RA	RETURN AIR
SA	SUPPLY AIR
WAN	WIDE AREA NETWORK

GENERAL CONTROL NOTES

1. PROVIDE ALL CONTROL DEVICES AND PROGRAMMING REQUIRED TO PERFORM THE FUNCTIONS DESCRIBED IN THE SEQUENCE OF OPERATIONS AND ON THE CONTROL DIAGRAMS.
2. PROVIDE PLENUM RATED CONTROL WIRING TO DEVICES, ALL EXPOSED CONTROL WIRING SHALL BE IN CONDUIT AND ROUTED PARALLEL AND PERPENDICULAR TO BUILDING LINES, COORDINATE WITH ELECTRICAL TRADE.
3. COORDINATE ALL CONTROL DEVICES & OCCUPANCY SENSORS WITH ELECTRICAL TRADE.
4. DUCT MOUNTED SMOKE DETECTORS ARE PROVIDED BY THE ELECTRICAL TRADE AND INSTALLED BY THE MECHANICAL CONTRACTOR.
5. ALL SET POINTS SHALL BE DISPLAYED AND BE ADJUSTABLE, ALL SET POINTS THAT ARE BEING RESET SHALL HAVE THE MOST CURRENT SET POINT DISPLAYED.
6. ALL OPERATING SCHEDULES, ALARMS AND OVERRIDE TIME PERIODS SHALL BE DISPLAYED AND BE ADJUSTABLE.
7. ENERGY MANAGEMENT CONTROLLER SHALL BE ABLE TO TREND LOGS.
8. ALL ALARMS SHALL BE LOGGED WITH THE DATE AND TIME OF THE ALARM ALONG WITH A DESCRIPTION.
9. ALL THERMOSTATS SHALL HAVE LOCAL ADJUSTMENT, THE BMS SHALL HAVE THE ABILITY TO CHANGE THIS RANGE OR LOCK OUT ANY LOCAL ADJUSTMENT.
10. CONTROL DEVICES SHALL BE POWERED BY MECHANICAL EQUIPMENT WHERE AVAILABLE, WHEN CONTROL DEVICES CAN NOT BE POWERED BY MECHANICAL EQUIPMENT, A DEDICATED 120/1/60 CIRCUIT HAS BEEN ALLOCATED IN EACH SECURED SPACE FOR CONTROL POWER, BMS CONTRACTOR IS RESPONSIBLE FOR STEPDOWN TRANSFORMERS, COORDINATE WITH ELECTRICAL TRADE FOR LOCATION.

BMS NETWORK

1. THE METASYS SYSTEM EXTENDED ARCHITECTURE IS THE PRIMARY USER INTERFACE (PUI) UTILIZED BY CLIENT.
2. BMS CONTROLS CONTRACTOR SHALL INSTALL THE CONTROL SYSTEM UTILIZING BACNET COMMUNICATION PROTOCOL.
3. BACNET EQUIPMENT, DEVICES AND NETWORKS SHALL COMPLY WITH CLIENT'S BACNET AND NETWORK ID REQUIREMENTS TO ENSURE EACH DEVICE HAS A UNIQUE ID. LOCAL CONTROL NETWORKS SHALL BE BACNET MS/TP WITH PRIMARY/SUPERVISORY CONTROLLER UTILIZING BACNET /IP FOR INTEGRATION THROUGH THE EXISTING WAN INFRASTRUCTURE.
4. BMS CONTROLS CONTRACTOR SHALL PROVIDE A COMPILED POINTS LIST IDENTIFYING EACH SENSOR, ACTUATOR AND OPERATING SETPOINTS, INCLUDING ADJUSTMENT PARAMETERS THAT ARE TO BE ACCESSIBLE OVER THE NETWORK. THE POINTS LIST SHALL BE PRESENTED IN A FORMAT THAT IDENTIFIES EACH NETWORK, DEVICE AND POINTS CONNECTED TO THE INPUT/OUTPUT DEVICE & EQUIPMENT ASSOCIATED WITH EACH POINT.
5. THE POINTS LIST SHALL ALSO IDENTIFY & DISPLAY NAMES, DESCRIPTIONS, UNITS AND BACNET OBJECT DESCRIPTION INCLUDING OBJECT ID AND DEVICE ID FOR EACH I/O POINT. ALL I/O POINTS SHALL BE CONFIGURED IN COMPLIANCE WITH THE MOST CURRENT BACNET COMMUNICATION PROTOCOL PER ASHRAE STANDARD-135.
6. ACCEPTABLE BMS CONTROL CONTRACTORS ARE AS FOLLOWS:
   - 6.1. CLIMATEC (ALERTON CONTROL SYSTEM)
   - 6.2. JOHNSON CONTROLS INC. (METASYS PRIMARY USER INTERFACE)
7. CONTRACTORS SHALL COORDINATE ALL BMS MONITORED AND/OR CONTROLLED DEVICES THAT ARE MOVED, REMOVED OR ADDED WITH THE BMS CONTRACTOR (CLIMATEC) FOR UPDATING THE EXISTING ALERTON SYSTEM AND REINTEGRATION INTO THE METASYS SYSTEM BY JOHNSON CONTROLS INC.

NOIRLAB HVAC PROJECT
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#	Description	Date

Drawn: ANN
Checked: WDB
Issue Date: 18 JUL 2025

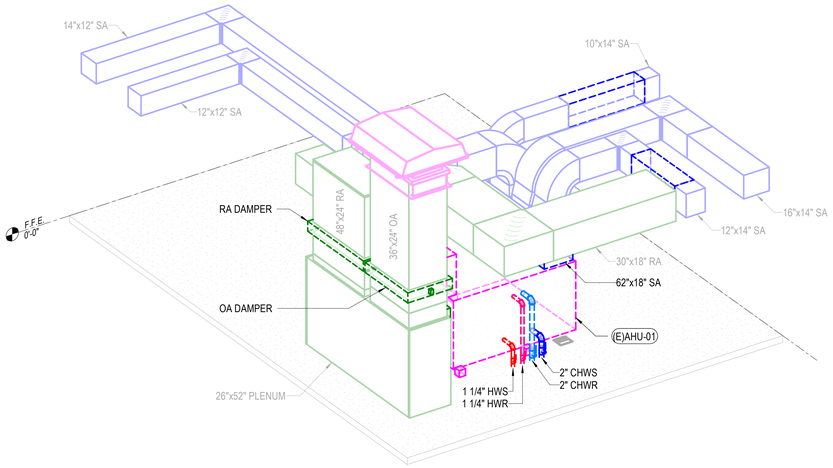
MECHANICAL

CONTROL NOTES AND DIAGRAMS

Sheet Number
MH704

M3PN 240097

DATE: 7/17/2025 2:41:51 PM By: K:\Dropbox (M3)\Documents\25 JOBS\25-24 NOIRLab\Revit\M_arvandi.rvt



3D VIEW - AHU-01 - OVERALL DEMO

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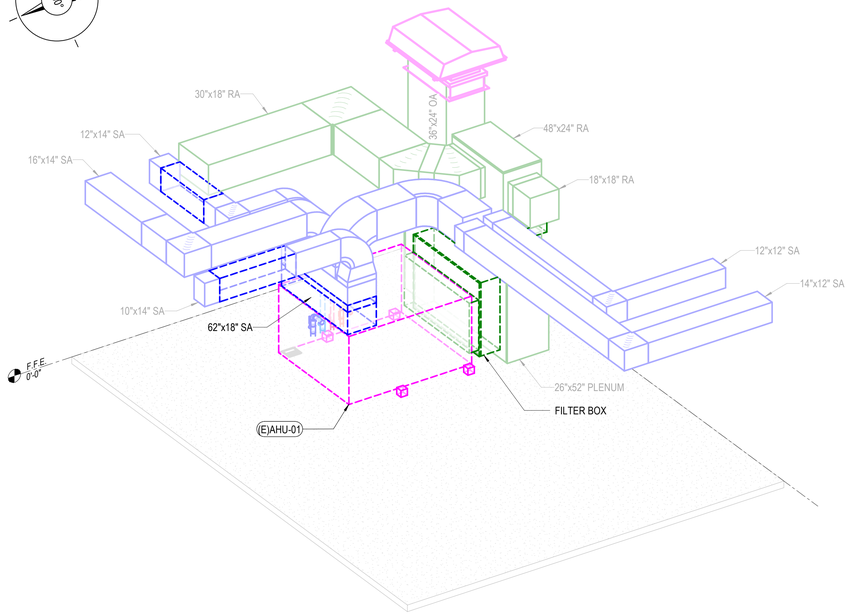

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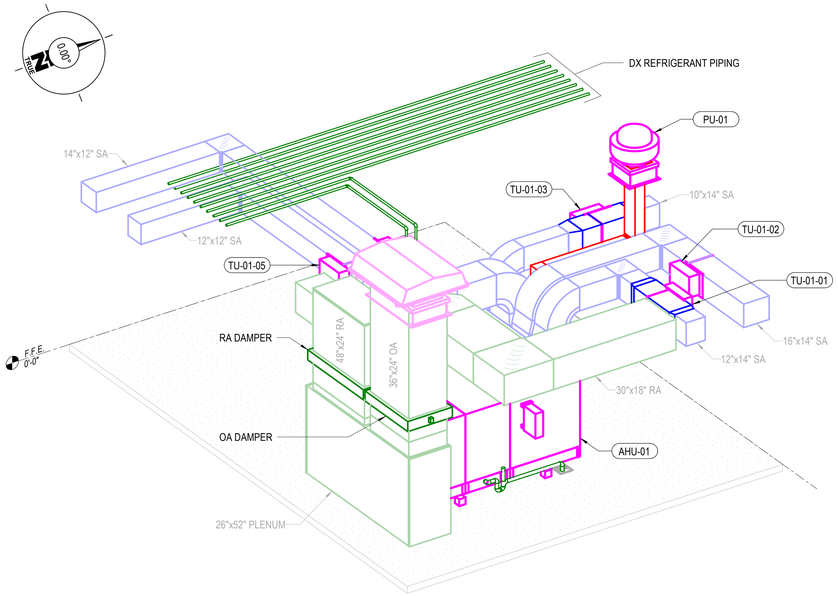

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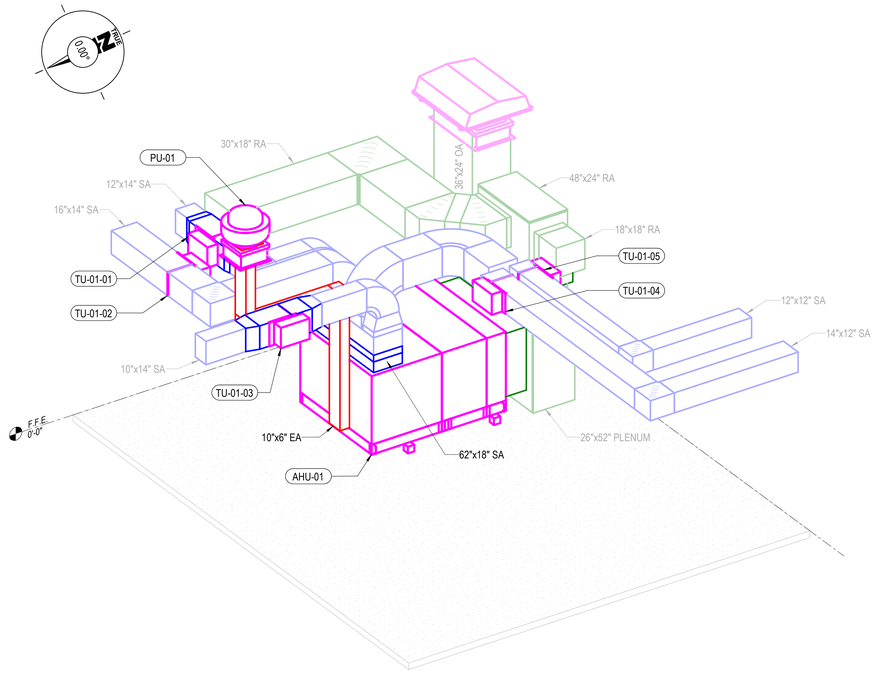

3D VIEW - AHU-01 - OVERALL RENO

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MECHANICAL

3D VIEWS - AHU-01 - MAIN BLDG / EAST WING

Sheet Number
MH901

M3PN 240097

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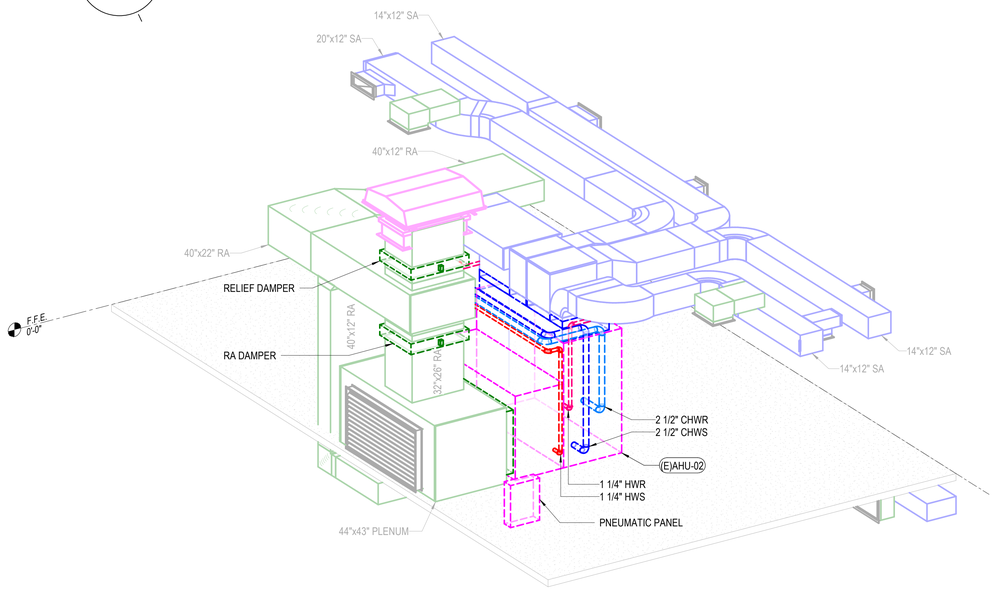

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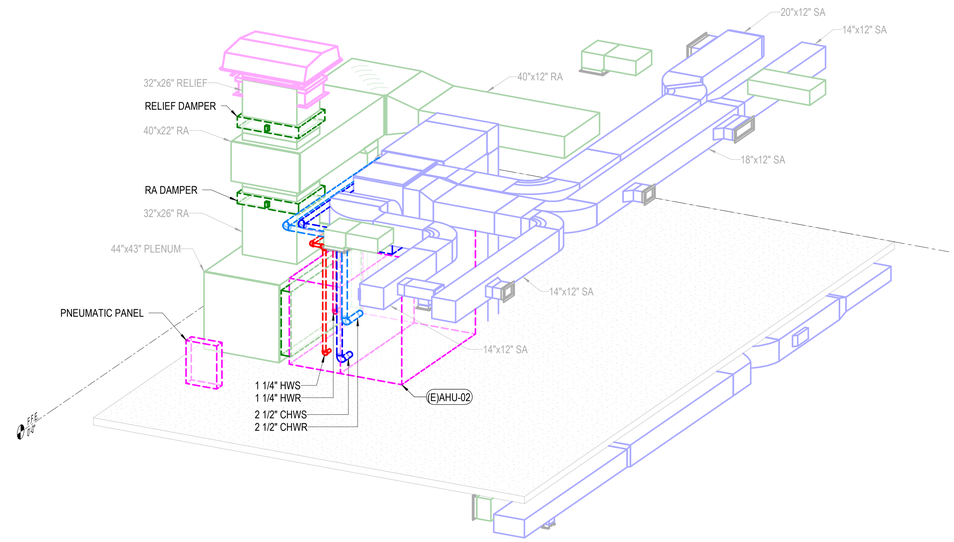

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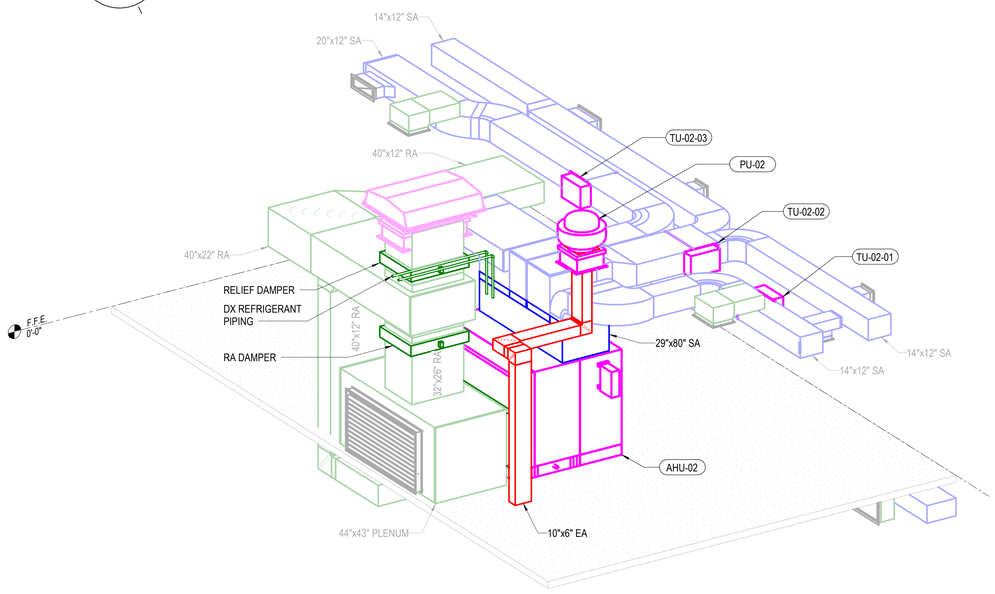

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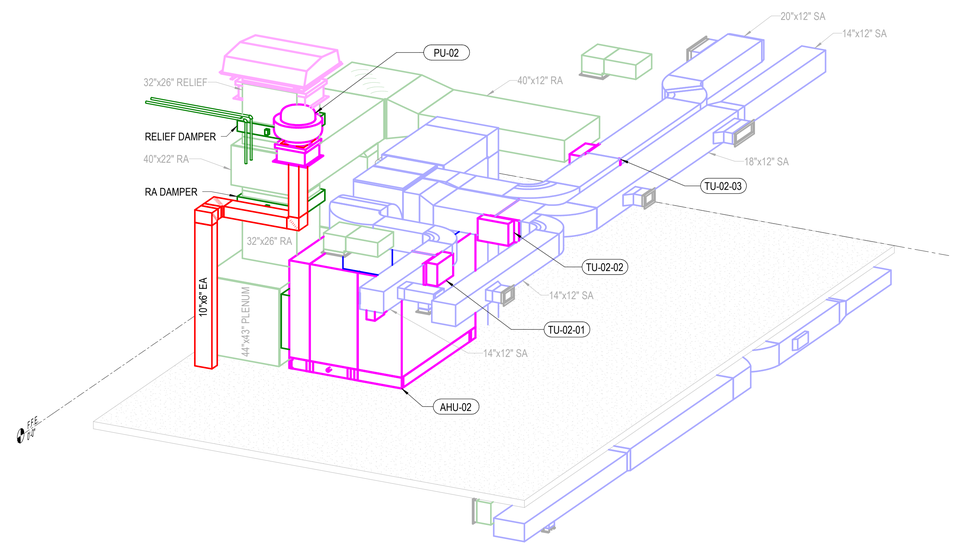

3D VIEW - AHU-02 - OVERALL RENO

SCALE:

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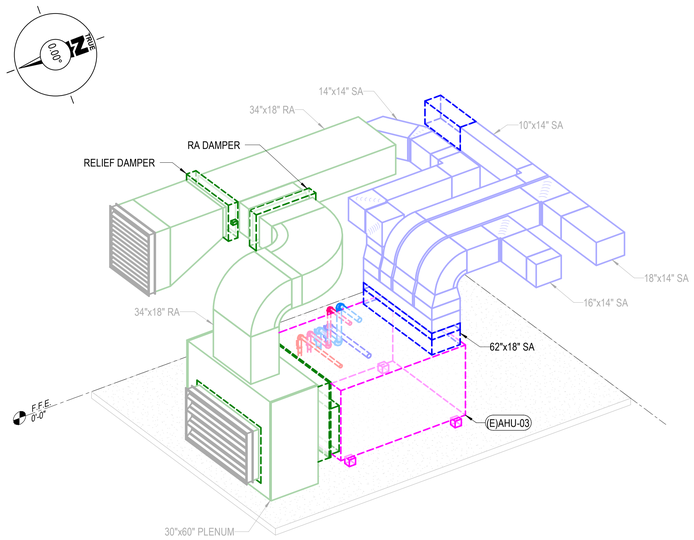
MECHANICAL

3D VIEWS - AHU-02 - MAIN BLDG / EAST WING

Sheet Number
MH902

M3PN 240097

DATE: 7/17/2025 4:17:03 PM PATH: C:\Revit\M3 PROJECTS\M3PN 240097 NOIRLAB HVAC Replacement_anneris.wdb@mh.rvt



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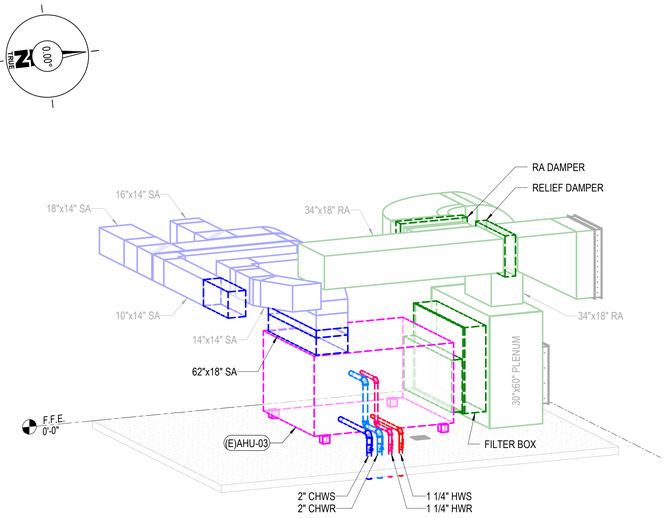

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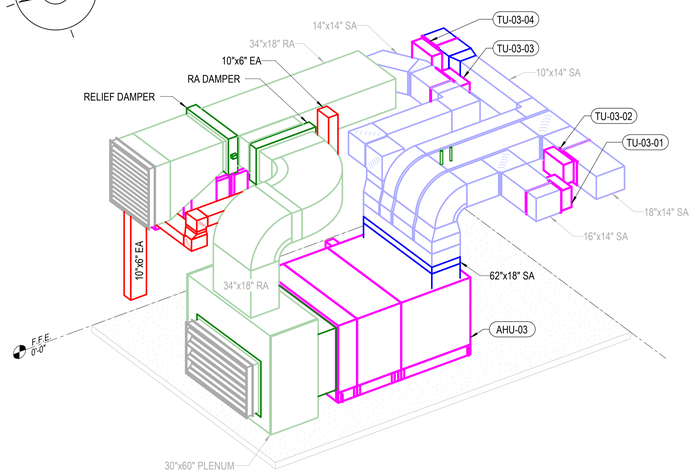

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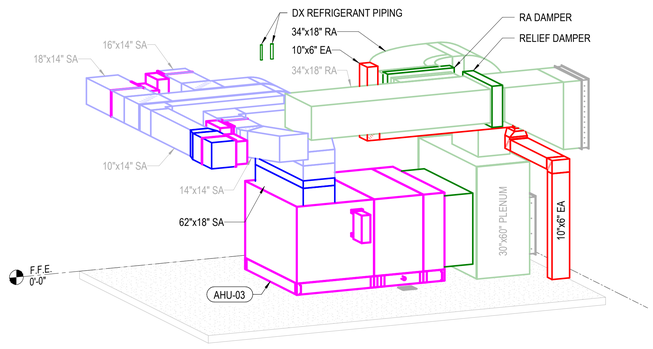

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MECHANICAL

3D VIEWS - AHU-03 - MAIN BLDG / EAST WING

Sheet Number
MH903

M3PN 240097

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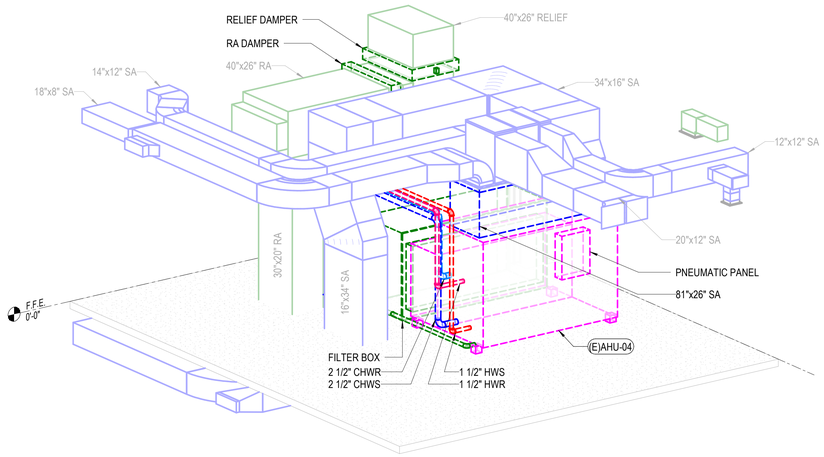

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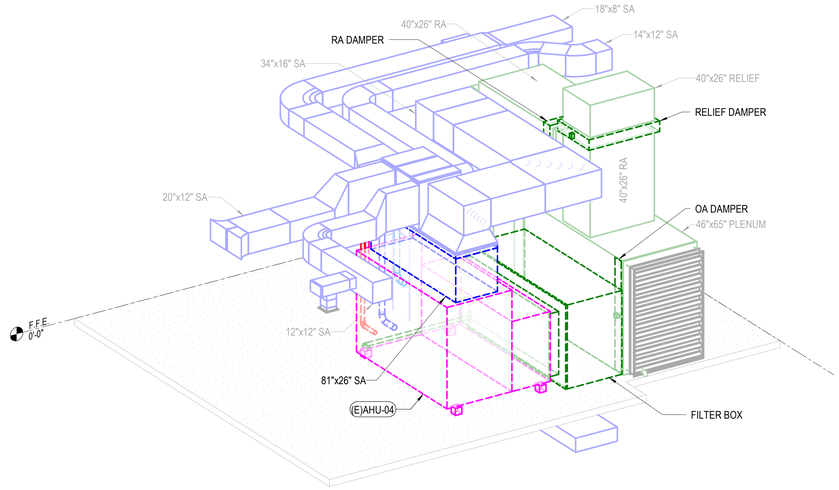

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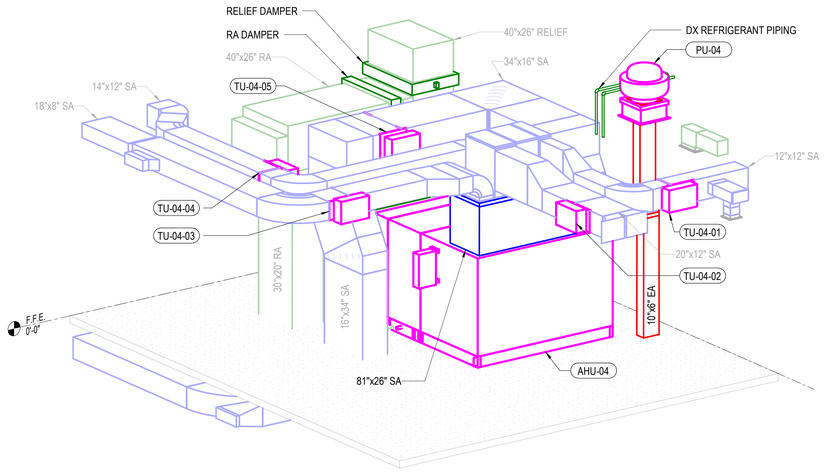

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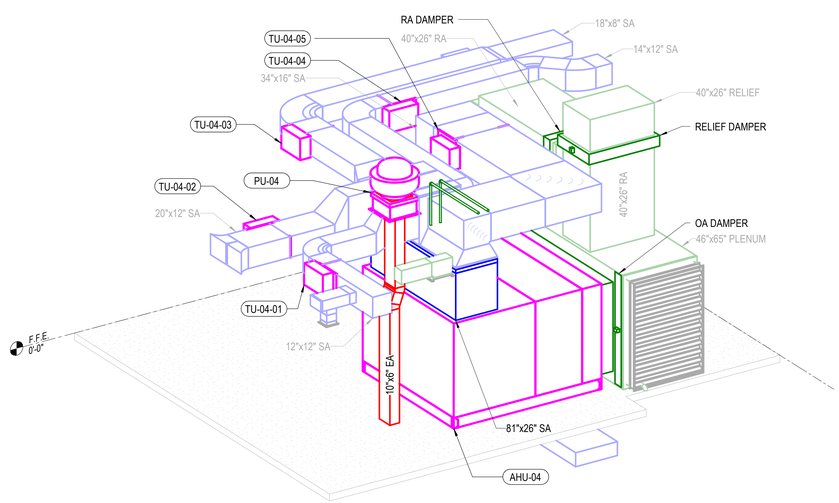

3D VIEW - AHU-04 - OVERALL RENO

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MECHANICAL

3D VIEWS - AHU-04 - MAIN BLDG / EAST WING

Sheet Number

MH904

M3PN 240097

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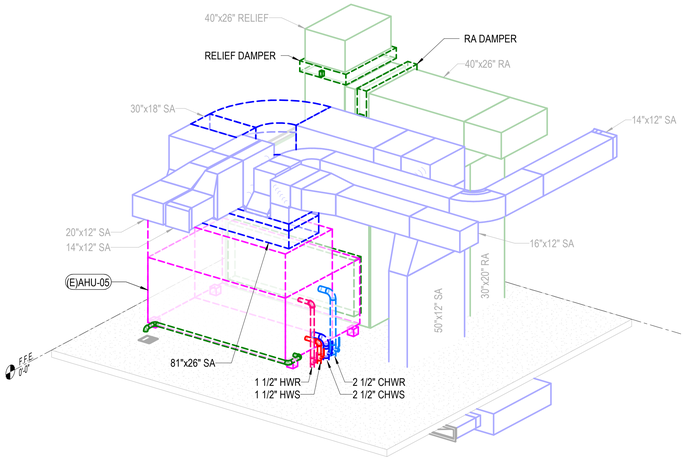

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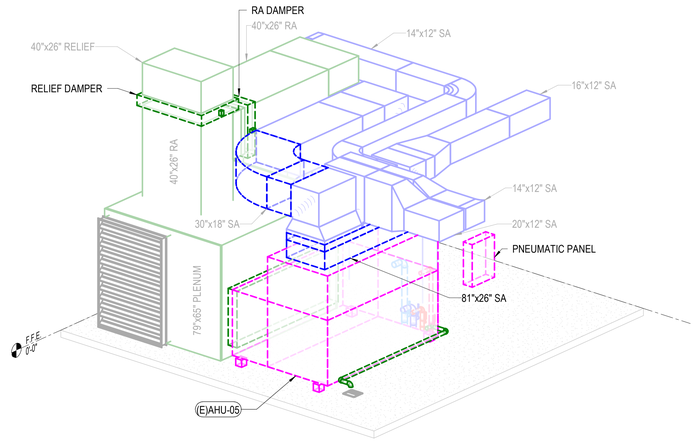

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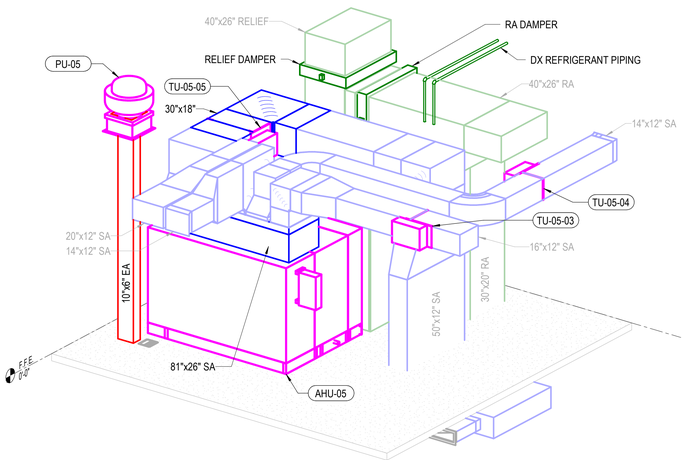

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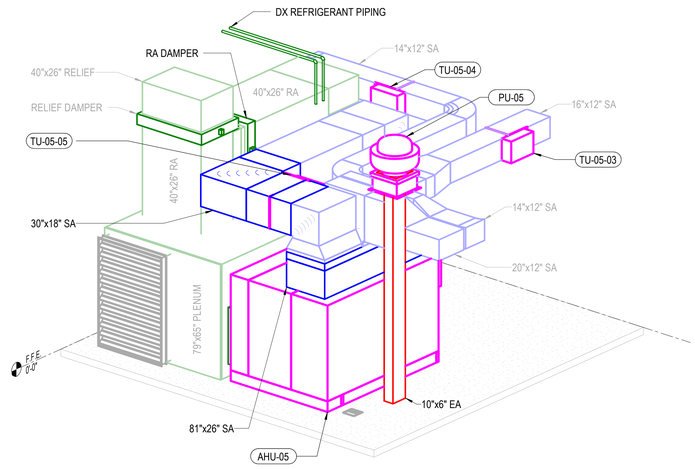

3D VIEW - AHU-05 - OVERALL RENO

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Issue Date: 18 JUL 2025

MECHANICAL

3D VIEWS - AHU-05 - MAIN BLDG / EAST WING

Sheet Number

MH905

M3PN 240097

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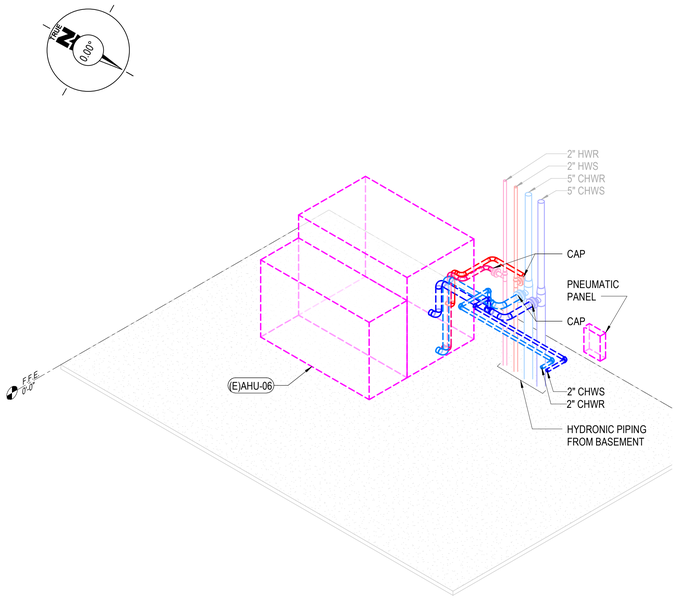

3D VIEW - AHU-06 PIPING DEMO

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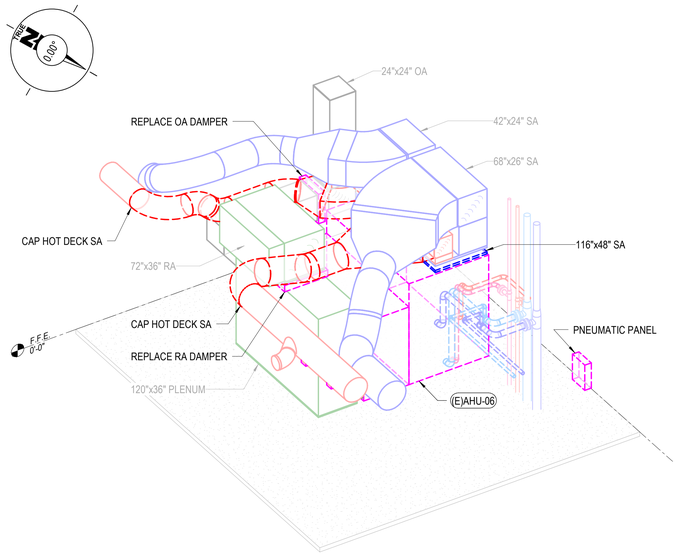

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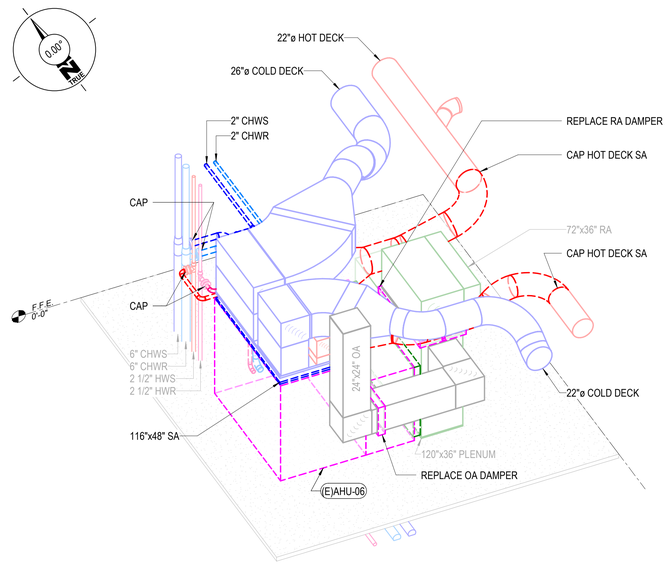

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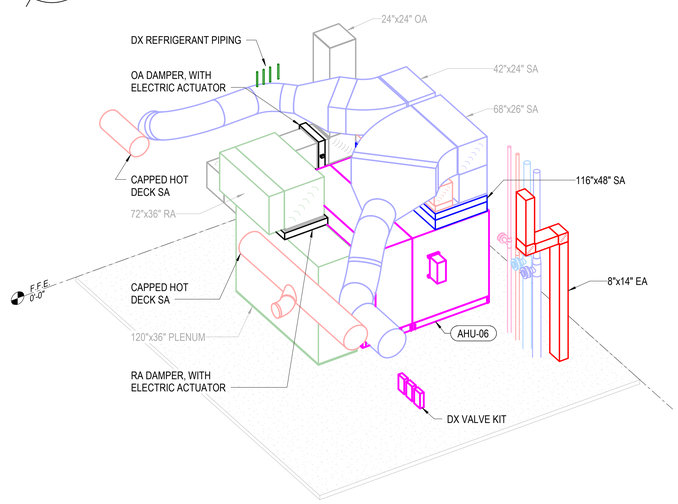

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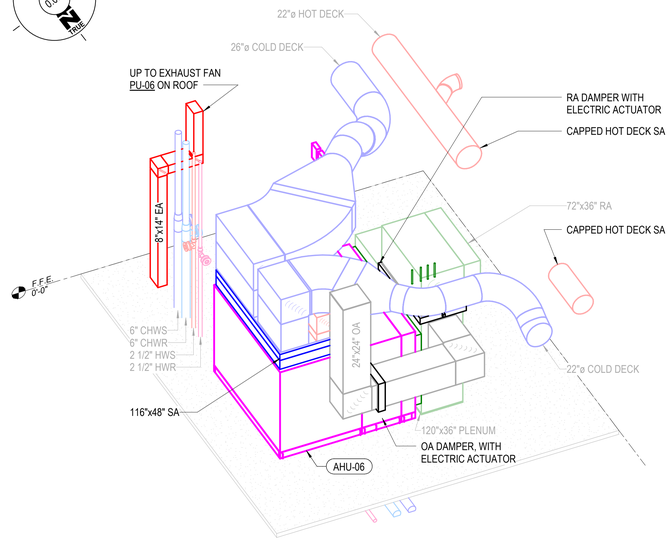

3D VIEW - AHU-06 OVERALL RENO

SCALE:

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MECHANICAL

3D VIEWS - AHU-06 - MAIN BLDG / EAST WING

Sheet Number
MH906

M3PN 240097

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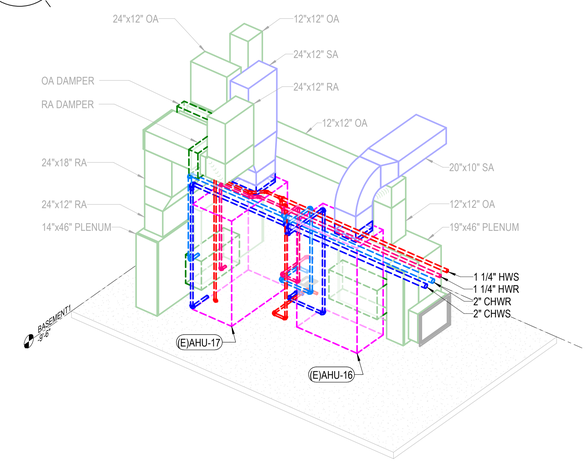

3D VIEW - AHU-16 & 17 - OVERALL DEMO

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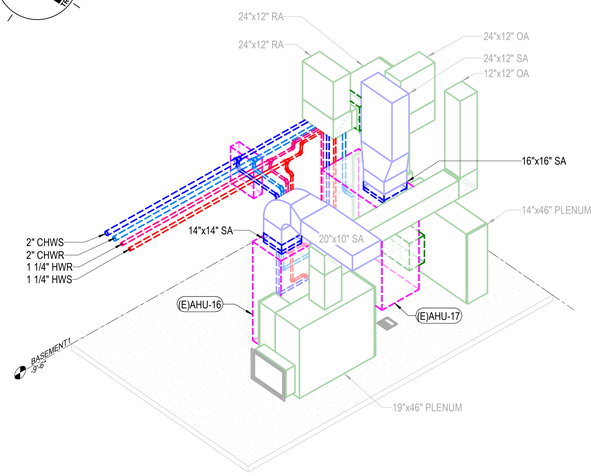

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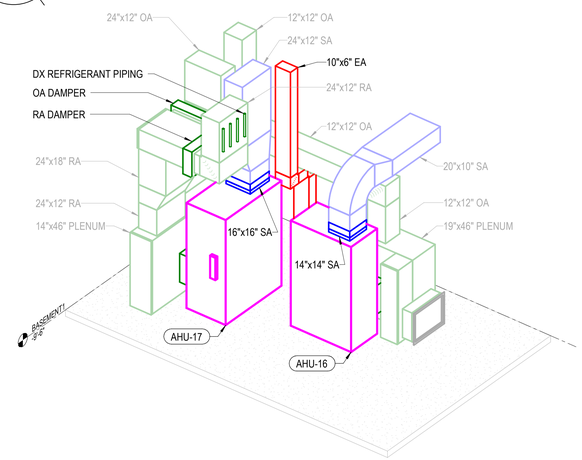

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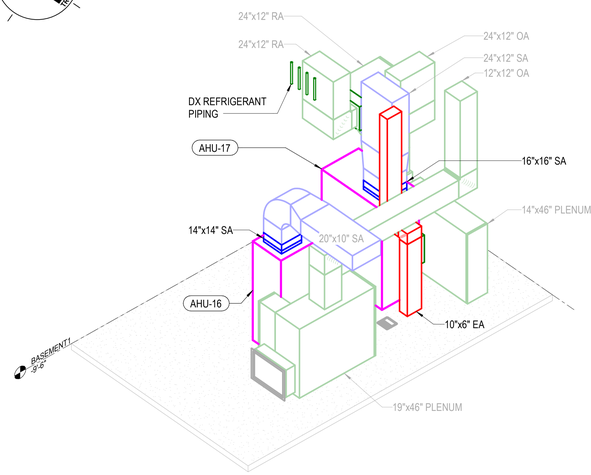

3D VIEW - AHU-16 & 17 - OVERALL RENO

SCALE:

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BID DOCUMENTS

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Revisions

#	Description	Date

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Issue Date: 18 JUL 2025

MECHANICAL

3D VIEWS - AHU-16 & 17 - MAIN BLDG / EAST WING

Sheet Number
MH907

M3PN 240097

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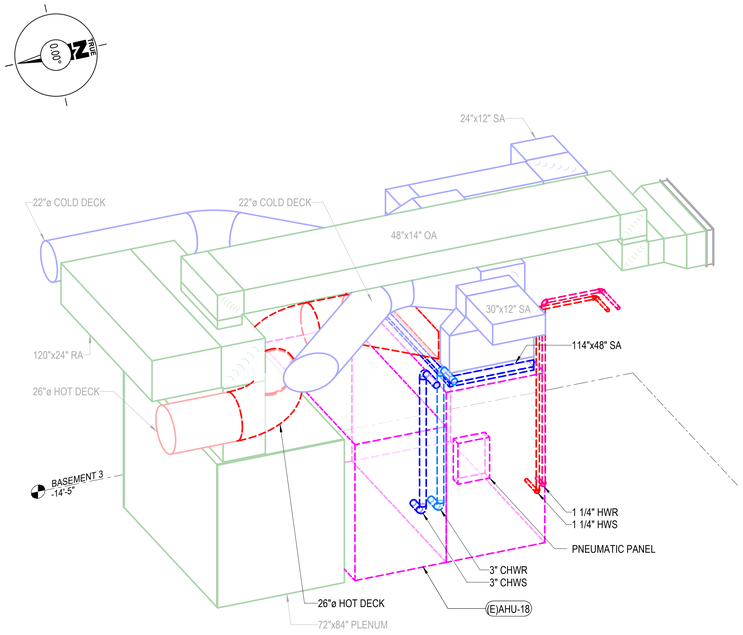

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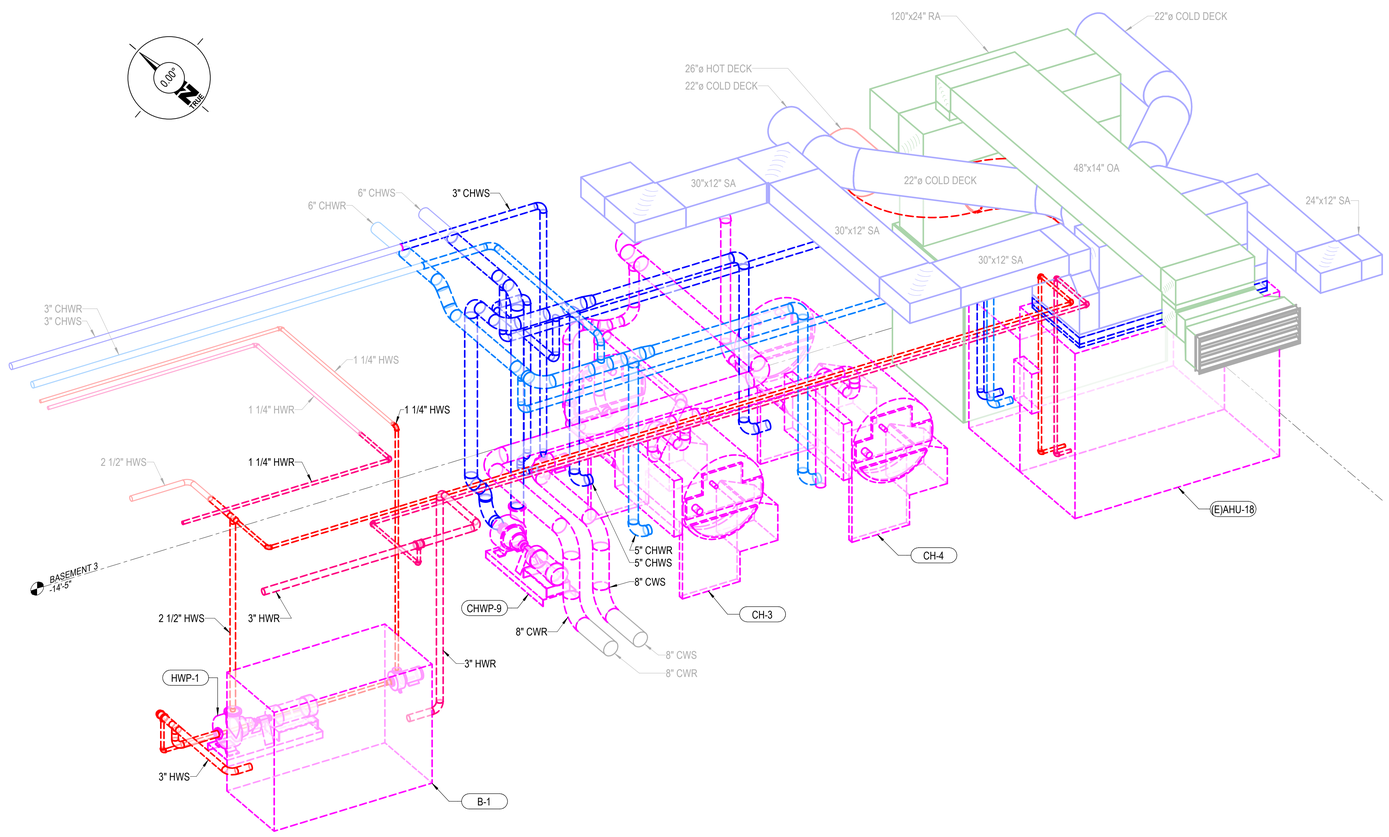

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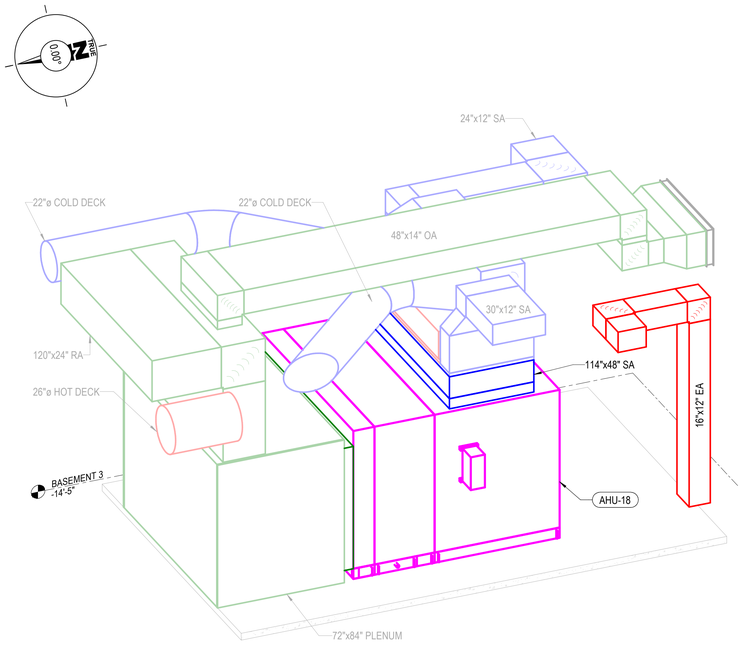

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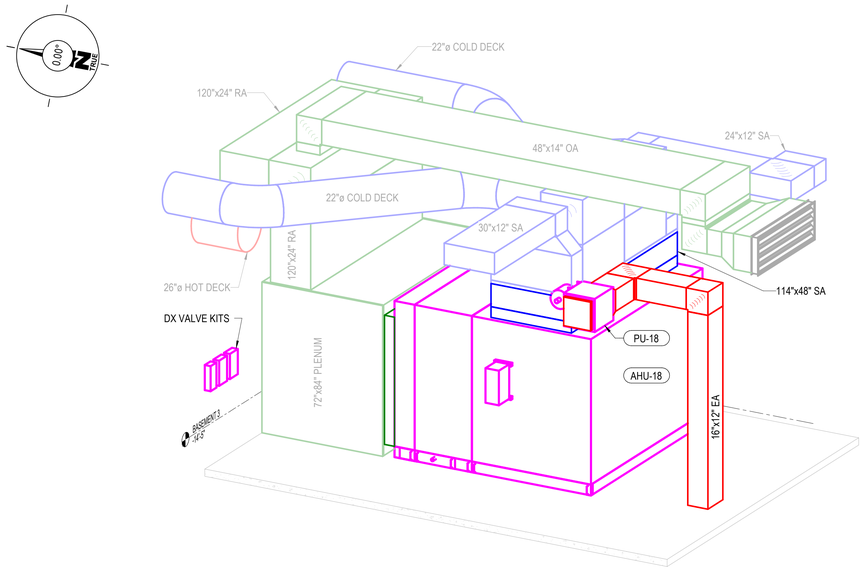

3D VIEW - AHU-18 - OVERALL RENO

SCALE:

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MECHANICAL

3D VIEWS - AHU-18 - MAIN BLDG / EAST WING

Sheet Number
MH908

M3PN 240097

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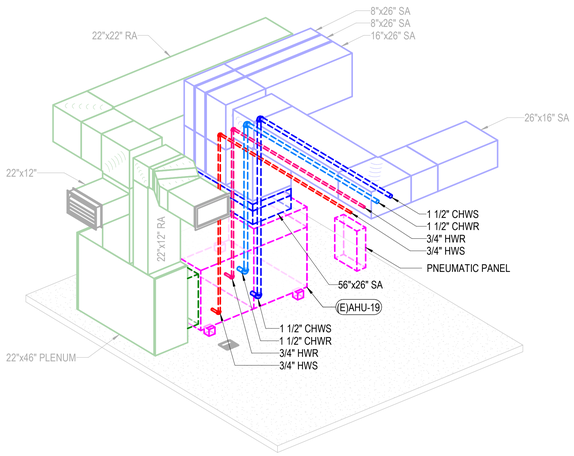

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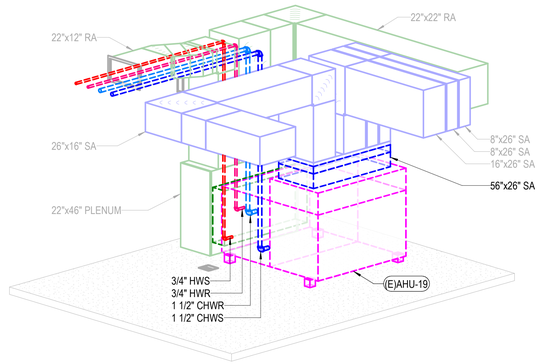

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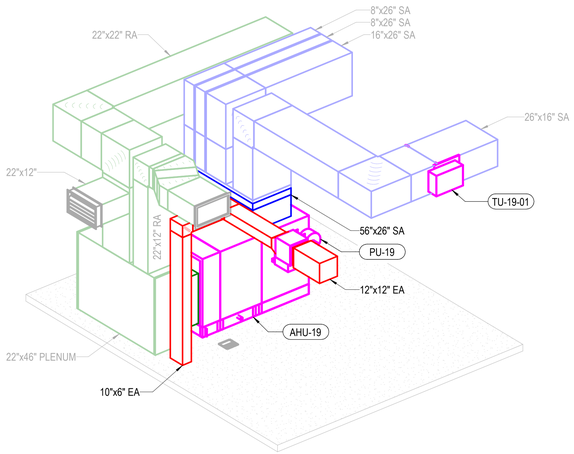

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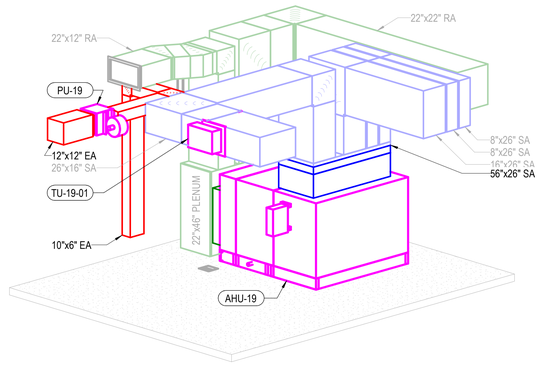

3D VIEW - AHU-19 - OVERALL RENO

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MECHANICAL

3D VIEWS - AHU-19 - MAIN BLDG / EAST WING

Sheet Number
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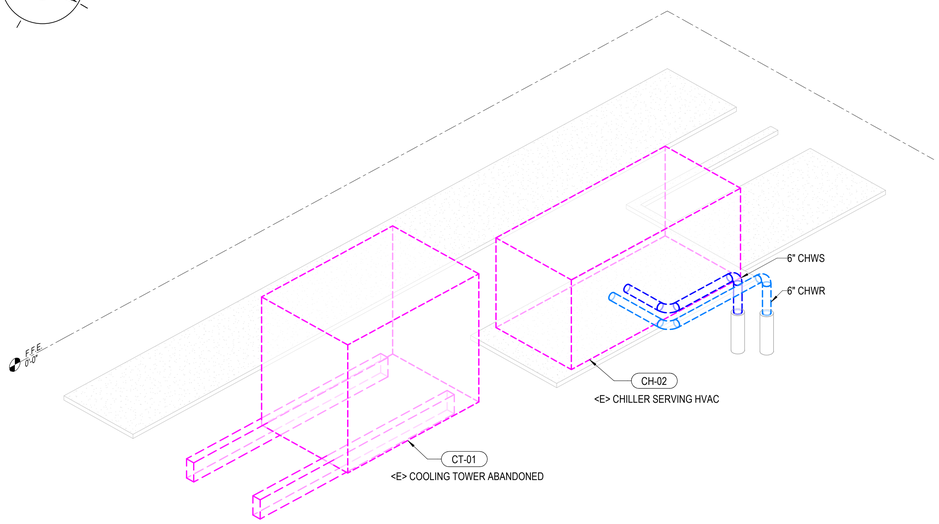

3D VIEW - EQUIPMENT YARD - OVERALL DEMO

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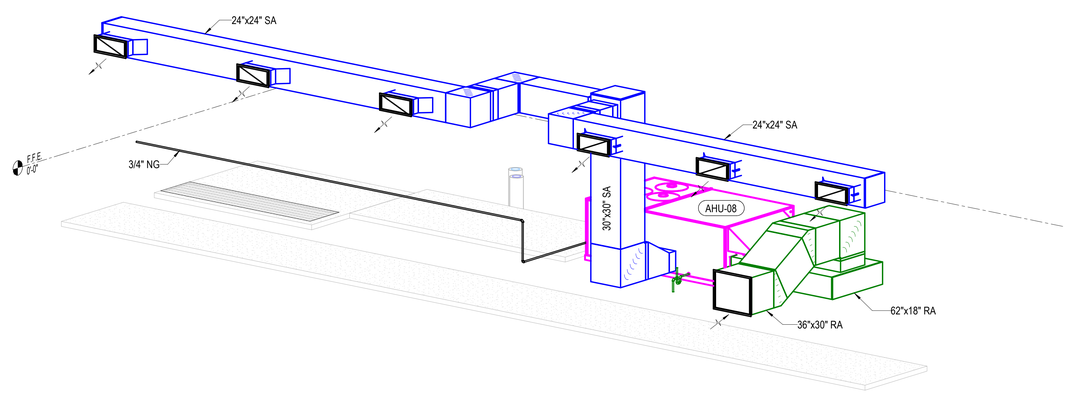

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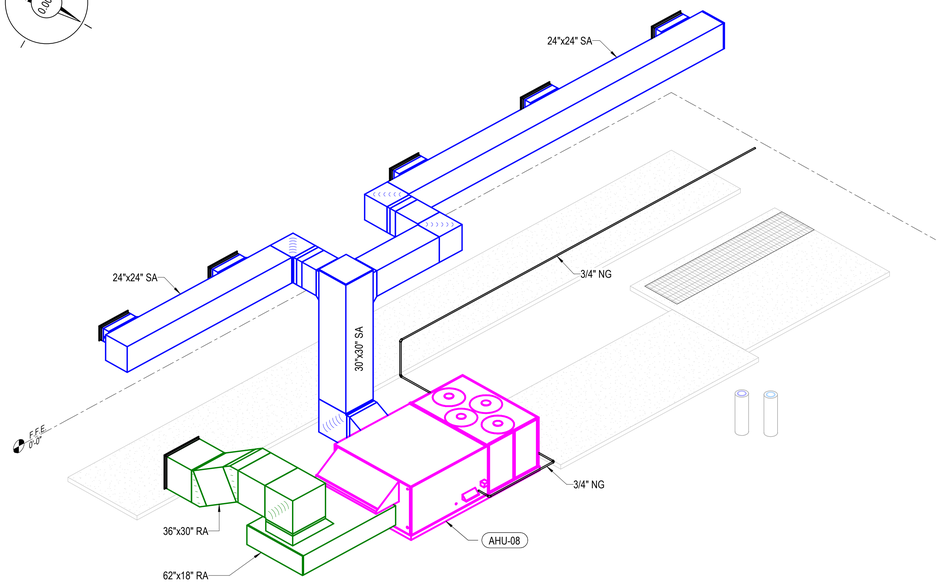

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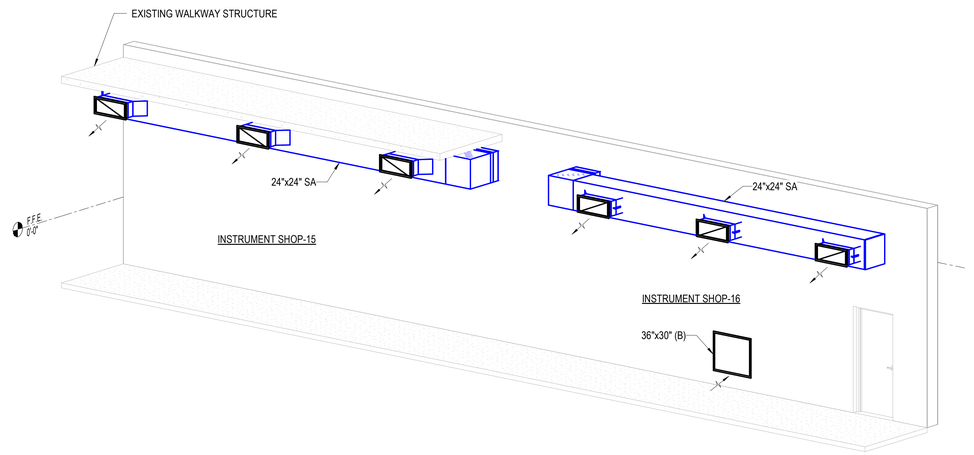

3D VIEW - AHU-08 - OVERALL RENO

SCALE:

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MECHANICAL

3D VIEWS - AHU-08 - SHOP ENG BLDG

Sheet Number
MH910

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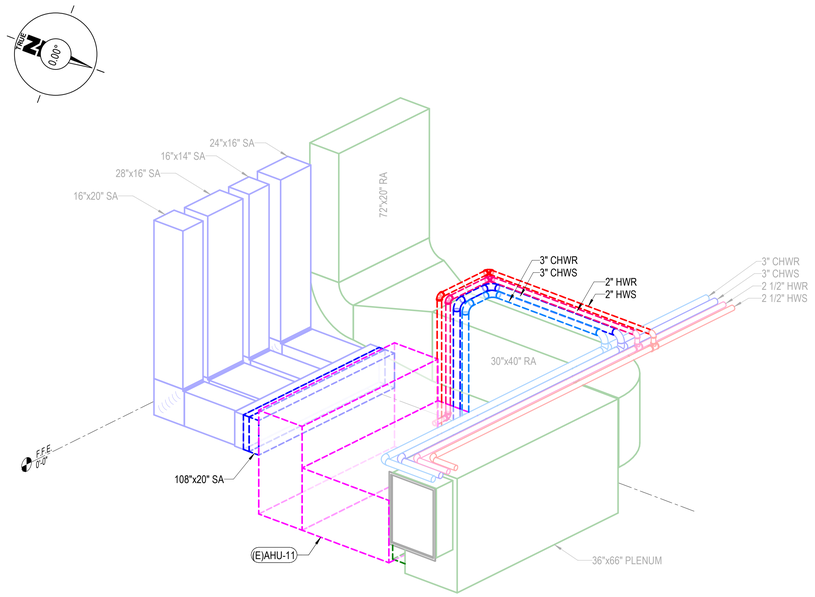

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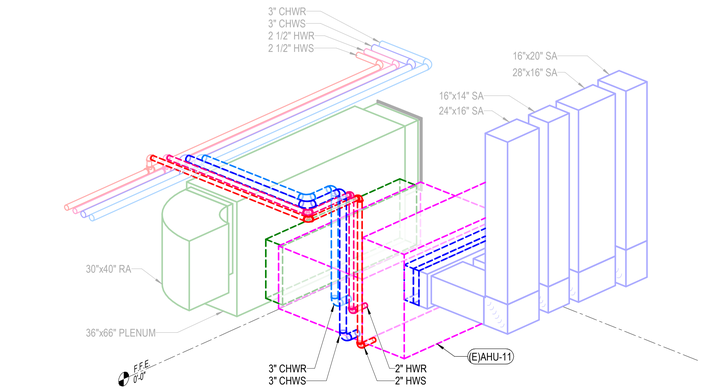

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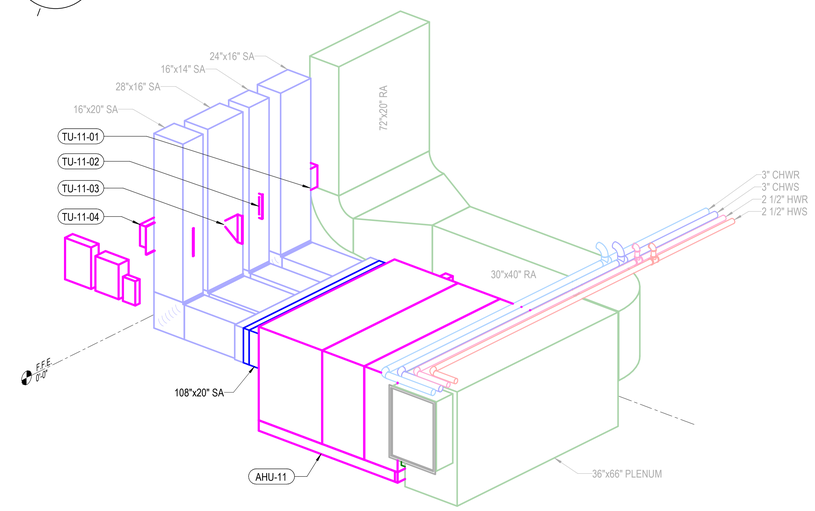

3D VIEW - AHU-11 - OVERALL RENO

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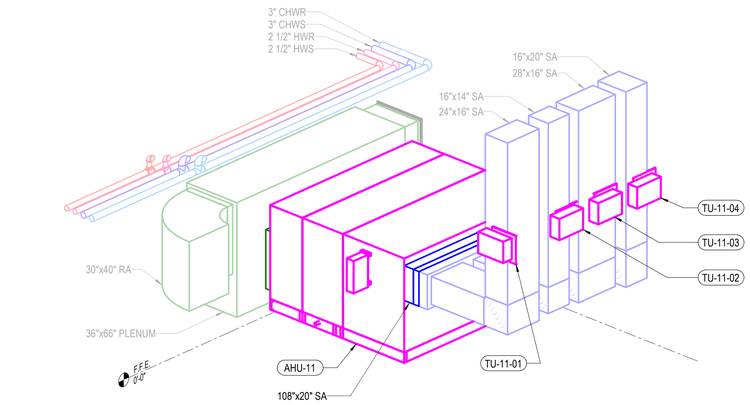

3D VIEW - AHU-11 - OVERALL RENO

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MECHANICAL

3D VIEWS - AHU-11 - SHOP ENG BLDG

Sheet Number
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M3PN 240097

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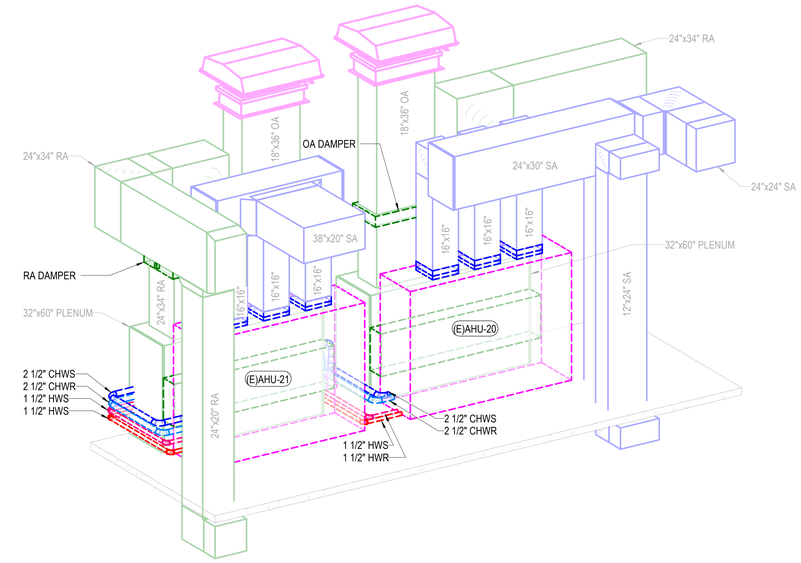

3D VIEW - AHU-20 & 21 - OVERALL DEMO

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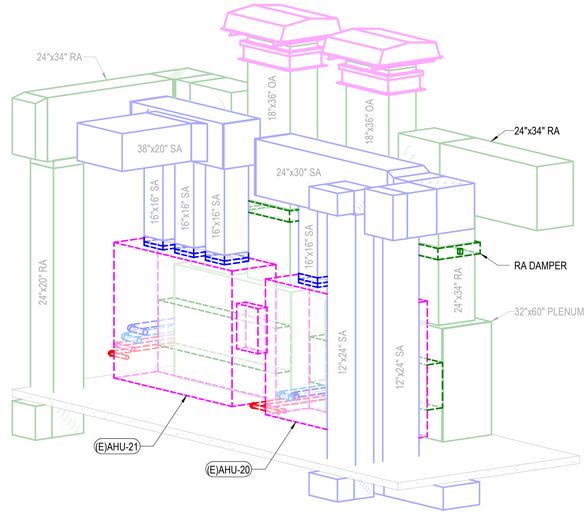

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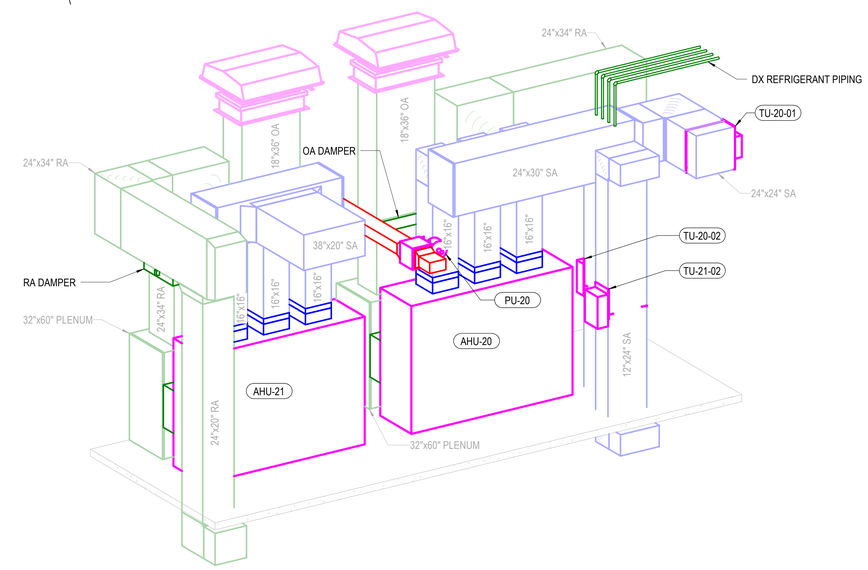

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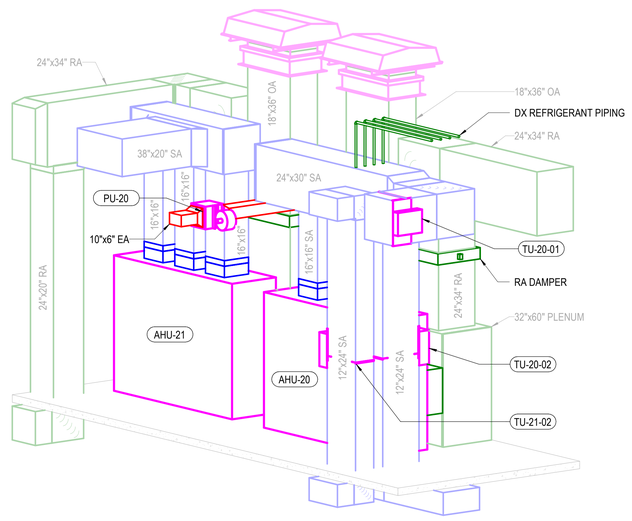

3D VIEW - AHU-20 & 21 - OVERALL RENO

SCALE:

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MECHANICAL

3D VIEWS - AHU-20 & 21 - SHOP ENG BLDG

Sheet Number
MH912

M3PN 240097

DATE: 7/17/2025 4:37:28 PM N:\Drawings\19 Documents\20 Design\M Mechanical\Revit\M3PN 240097 Mechanical_ANN@M3ENG.revit

ELECTRICAL NOTES

GENERAL:

1. THE CONTRACTOR SHALL FURNISH ALL MATERIALS, LABOR, TRANSPORTATION, TOOLS, PERMITS FEES AND INCIDENTALS NECESSARY FOR THE INSTALLATION OF A COMPLETE ELECTRICAL SYSTEM.

2. ALL WORK SHALL BE IN COMPLIANCE WITH THE 2017 EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) AND ALL LOCAL CODES AND ORDINANCES.

3. THE CONTRACTOR SHALL FURNISH SIX COPIES OF MANUFACTURER'S LITERATURE AND DRAWINGS DESCRIBING ALL PROPOSED EQUIPMENT AND MATERIALS INDICATED IN THE DRAWINGS AND SPECIFICATIONS. SUBMITTALS SHALL INCLUDE DETAILED SPECIFICATIONS AND CONSTRUCTION DATA.

4. ALL MATERIALS FURNISHED BY THE CONTRACTOR SHALL BE NEW. THE MANUFACTURER AND CATALOG NUMBERS SPECIFIED HEREIN AND ON THE DRAWINGS ARE TO ESTABLISH DESIGN, STYLE, AND LEVEL OF QUALITY. EQUAL PRODUCTS OF OTHER MANUFACTURERS ARE ACCEPTABLE.

5. THE CONTRACTOR SHALL GUARANTEE ALL LABOR AND MATERIALS FURNISHED BY HIM FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER. ALL WORK FOUND TO BE DEFECTIVE WITHIN THIS PERIOD SHALL BE REPLACED AT NO COST TO THE OWNER.

6. THE CONTRACTOR SHALL FURNISH A CLEAN SET OF DRAWINGS ON WHICH VARIATIONS TO THE ORIGINAL CONSTRUCTION DOCUMENTS ARE LEGIBLY RECORDED AND DESIGNATED "AS-BUILT" UPON COMPLETION AND ACCEPTANCE OF WORK.

7. PANELBOARDS, SWITCHBOARDS, DISCONNECTS, STARTERS, ETC. SHALL BE LABELED WITH ENGRAVED NAMEPLATES CONSTRUCTED OF LAMINATED PHENOLIC. LETTERS SHALL BE CONDENSED GOTHIC, 1/4 INCH HIGH. NAMEPLATES SHALL BE FASTENED WITH RIVETS OR SCREWS.

8. ACCESS AND WORKING SPACE OF ALL NEW ELECTRICAL EQUIPMENT SHALL COMPLY WITH ARTICLE 110.26 OF THE NEC. THERE SHALL NOT BE ANY PIPING, DUCTS, LEAK PROTECTION APPARATUS OR OTHER EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION 6 FEET ABOVE THE ELECTRICAL EQUIPMENT PER ARTICLE 110.26(E)(1).

9. THESE DRAWINGS ARE SCHEMATIC IN NATURE. CONTRACTOR SHALL PROVIDE ALL BOXES, FITTING, ETC. FOR A COMPLETE INSTALLATION, EVEN IF NOT SHOWN ON CONSTRUCTION DOCUMENTS.

BASIC MATERIALS AND METHODS:

1. CONDUIT
   - A. CONDUITS LOCATED INDOORS IN NON-HAZARDOUS AREAS AND NOT SUBJECT TO PHYSICAL DAMAGE SHALL BE ELECTRICAL METALLIC TUBING (EMT) WITH COMPRESSION COUPLINGS AND FITTINGS.
   - B. CONDUITS LOCATED OUTDOORS, OR SUBJECT TO PHYSICAL DAMAGE, SHALL BE RIGID GALVANIZED STEEL (RGS) WITH THREADED COUPLINGS AND FITTINGS.
   - C. FLEXIBLE METALLIC CONDUIT SHALL BE USED IN DRY LOCATIONS AND LIQUID TIGHT FLEXIBLE METAL CONDUIT SHALL BE USED IN WET LOCATIONS TO EXTEND CONDUIT CONNECTIONS TO MOTORS, LIGHTING FIXTURES, TRANSFORMERS, ETC. THE LENGTH OF FLEXIBLE CONDUIT SHALL NOT EXCEED 24 INCHES. THE LENGTH SHALL NOT EXCEED 72 INCHES FOR RECESSED LIGHTING FIXTURES ONLY.
   - D. MINIMUM CONDUIT SIZE SHALL BE 3/4".
   - E. UNDERGROUND CONDUIT SHALL BE SCHEDULE 40 PVC, BURIED A MINIMUM OF 24 INCHES BELOW GRADE. CONDUIT RISERS FROM UNDERGROUND CONDUIT RUNS AND UNDERGROUND CONDUIT BENDS SHALL BE RIGID GALVANIZED STEEL. ALL RGS CONDUIT AND FITTINGS LOCATED BELOW GRADE SHALL BE WRAPPED WITH HALF-LAPPED 3M NO. 51 "SCOTCH RAP", OR APPROVED EQUAL, VINYL TAPE.

2. CONDUCTORS
   - A. ALL CONDUCTORS LOCATED INDOORS SHALL BE COPPER, TYPE THHN/THWN. NUMBER 10 AWG AND BELOW SHALL BE SOLID AND NUMBER 8 AWG AND ABOVE SHALL BE STRANDED.
   - B. ALL CONDUCTORS LOCATED OUTDOORS OR IN WET LOCATIONS SHALL BE COPPER, TYPE XHHW-2.
   - C. MINIMUM CONDUCTOR SIZE FOR POWER AND LIGHTING CIRCUITS SHALL BE NO. 12 AWG, UNLESS SHOWN OTHERWISE ON THE DRAWINGS. MINIMUM CONDUCTOR SIZE FOR CONTROL AND SIGNAL CIRCUITS SHALL BE NO. 14 AWG, UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
   - D. CONDUCTORS FOR 120/208 VOLT SYSTEMS SHALL BE COLOR CODED BLACK, RED, BLUE AND WHITE FOR PHASES A,B,C AND NEUTRAL RESPECTIVELY.
   - E. CONDUCTORS FOR 277/480 VOLT SYSTEMS SHALL BE COLOR CODED BROWN, ORANGE, YELLOW, AND GREY FOR PHASES A,B,C AND NEUTRAL RESPECTIVELY.
   - F. ALL RACEWAYS SHALL CONTAIN AN INSULATED EQUIPMENT GROUNDING CONDUCTOR SIZED PER THE NEC.

3. DISCONNECT SWITCHES
   - A. DISCONNECT SWITCHES SHALL BE HEAVY DUTY TYPE HD.
   - B. FUSIBLE DISCONNECT SWITCHES SHALL HAVE PROVISIONS FOR CLASS R FUSES.
   - C. DISCONNECT SWITCHES SHALL BE SERVICE ENTRANCE RATED WHERE REQUIRED BY THE DRAWINGS OR CODES.
   - D. DISCONNECT SWITCHES AND/OR STARTERS FOR HVAC EQUIPMENT SHALL NOT BE SUPPORTED BY OR MOUNTED TO THE EQUIPMENT. PROVIDE UNISTRUT BRACKETS OR SHEET METAL DISCONNECT STANDS UP FROM ROOF STRUCTURE TO SUPPORT DISCONNECTS.

4. FUSES
   - A. ALL FUSES SHALL BE BUSSMANN"LOW-PEAK" OR APPROVED EQUAL.
   - B. FUSES RATED 1/10 TO 600 AMPERES SHALL BE UL CLASS R DUAL ELEMENT CURRENT LIMITING, EQUAL TO BUSSMANN TYPE LPS-RK (600V) OR LPN-RK (250V).

5. WIRING DEVICES
   - A. RECEPTACLES SHALL BE 20 AMPERES, 125 VOLTS, SPECIFICATION GRADE, HUBBELL NO. 5362, OR APPROVED EQUAL.
   - B. GROUND FAULT RECEPTACLES SHALL BE 20 AMPERES, 125 VOLTS, SPECIFICATION GRADE, HUBBELL NO. GF5362, OR APPROVED EQUAL.
   - C. COLOR OF RECEPTACLES AND DEVICE PLATES SHALL MATCH EXISTING.
   - D. DEVICE PLATES SHALL MATCH EXISTING.
   - E. RECEPTACLES SHALL BE FLUSH MOUNTED 18 INCHES TO BOTTOM OF BOX, ABOVE FINISHED FLOOR, UNLESS OTHERWISE SHOWN, WITH GROUNDING POLE AT TOP.

6. JUNCTION BOXES
   - A. JUNCTION AND PULL BOXES SHALL BE OF CODE GALVANIZED STEEL.
   - B. DEVICE BOXES AND GENERAL PURPOSE JUNCTION BOXES SHALL BE ONE PIECE GALVANIZED PRESSED STEEL KNOCK-OUT TYPE WITH SIMILAR COVER, AND NOT LESS THAN 4" SQUARE.

7. PANELBOARDS
   - A. PANELBOARDS SHALL HAVE THE ELECTRICAL RATINGS AS SHOWN ON THE DRAWINGS.
   - B. PANELBOARDS SHALL CONTAIN BOLT-ON THERMAL MAGNETIC CIRCUIT BREAKERS. CIRCUIT BREAKERS USED TO SWITCH LIGHTING CIRCUITS SHALL BE 'SWD' RATED AND CIRCUIT BREAKERS FEEDING HEATING AND AIR CONDITIONING EQUIPMENT SHALL BE 'HACR' RATED.
   - C. BUS BARS SHALL BE COPPER. NEUTRAL BARS, WHERE SPECIFIED, SHALL BE FULL SIZE.
   - D. A DIRECTORY FRAME AND CARD HAVING A TRANSPARENT COVER SHALL BE FURNISHED ON EACH DOOR, NEATLY TYPED TO INDICATE LOADS.
   - E. SERIES RATED DEVICES SHALL NOT BE ALLOWED.
   - F. PROVIDE (1) 3/4" CONDUIT TO ACCESSIBLE CEILING SPACE FOR EVERY 3 SPARE POLE SPACES IN FLUSH MOUNTED PANELBOARDS

DEMOLITION:

1. ALL ITEMS SCHEDULED FOR RELOCATIONS SHALL BE CAREFULLY REMOVED IN REVERSE OF ORIGINAL ASSEMBLY OR PLACEMENT AND BE PROTECTED UNTIL RELOCATION. THE CONTRACTOR SHALL CLEAN, REPAIR AND PROVIDE NEW MATERIALS AND APPURTENANCES AS REQUIRED TO COMPLETE INSTALLATION AND RESTORE TO GOOD WORKING ORDER. ALL RELOCATIONS SHALL BE PERFORMED BY SKILLED WORKMEN IN ACCORDANCE WITH STANDARD PRACTICE OF THE TRADES INVOLVED.
2. ITEMS SCHEDULED FOR RELOCATION REQUIRED EXTENSION OF CIRCUITRY, SHALL HAVE THEIR WIRE AND CONDUIT EXTENDED TO THE NEW LOCATION.
3. EXTENDED WIRE AND CONDUIT SHALL BE ROUTED IN SUCH A MANNER SO AS NOT TO INTERFERE WITH THE USE OR ESTHETICS OF ANY AREA IN WHICH IT IS ROUTED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RELOCATING OR MODIFYING AND RECONNECTING ANY PANELBOARDS OR OTHER ELECTRICAL EQUIPMENT ASSOCIATED WITH ITEMS BEING RELOCATED.
4. CIRCUITS WITH ONLY A PORTION OF THE LOAD REMOVED SHALL HAVE THE REMOVED LOADS ASSOCIATED CIRCUITRY REMOVED ONLY TO A POINT OR IN SUCH A MANNER THE REMAINING LOAD IS ACTIVE AND IN FIRST CLASS WORKING ORDER.
5. ASSOCIATED CIRCUITRY IS DEFINED AS WALL WIRE, CONDUIT, J-BOXES, WIRING DEVICES, DEVICE BOXES, FUSES, DISCONNECT SWITCHES, ETC. ASSOCIATED WITH THE ITEM SCHEDULED FOR REMOVAL.
6. ITEMS SCHEDULED FOR REMOVAL WITH CONDUIT IN INACCESSIBLE AREAS SHALL ONLY HAVE THIS CONDUIT EMPTIED AND SEALED OR CAPPED IN A SAFE MANNER ACCEPTABLE TO THE OWNER.
7. WHERE ITEMS SCHEDULED FOR REUSE OR RELOCATION ARE FOUND TO BE IN DAMAGED CONDITION, THE CONTRACTOR SHALL CALL THE ATTENTION OF THE OWNER TO SUCH ITEMS AND RECEIVE FURTHER INSTRUCTIONS PRIOR TO REMOVAL. ITEMS DAMAGED DURING RELOCATION SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
8. ALL CUTTING AND PATCHING REQUIRED FOR INSTALLATION OF RACEWAYS OR EQUIPMENT SHALL BE PERFORMED BY A TRADESMAN EXPERIENCED IN THE WORK REQUIRED. ALL FINISHES SHALL MATCH EXISTING ADJACENT SURFACES.
9. ITEMS SALVAGED SHALL BE MOVED AND STORED IN A LOCATION AS DIRECTED BY THE OWNER. REFUSE MATERIALS AND ITEMS NOT TO BE SALVED SHALL BE REMOVED FROM THE SITE FOR DISPOSAL.
10. PROMPTLY REPAIR DAMAGE CAUSED TO ADJACENT FACILITIES BY DEMOLITION OPERATIONS AT NO COST TO THE OWNER.

ABBREVIATIONS

A	AMPERES
ADA	AMERICANS WITH DISABILITES ACT (1990)
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	AMPERES INTERRUPTING CAPACITY
AMP	AMPACITY
AC	ALTERNATING CURRENT
AWG	AMERICAN WIRE GAUGE
#/C	NUMBER OF CONDUCTORS
C	CONDUIT
EWC	ELECTRIC WATER COOLER
EMC	ELECTRICAL METALLIC TUBING
(E)	EXISTING
FU	FUSE
FMC	FLEXIBLE METAL CONDUIT
GFI	GROUND FAULT INTERRUPTER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
G,GND	GROUND
HP	HORSEPOWER
kW	KILOWATTS
kVA	KILOVOLT AMPERES
LFMC	LIQUID TIGHT FLEXIBLE METAL CONDUIT
MCB	MAIN CIRCUIT BREAKER
MCP	MOTOR CIRCUIT PROTECTOR
MLO	MAIN LUGS ONLY
M	MOTOR
MCC	MOTOR CONTROL CENTER
MFG	MANUFACTURER
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL MANUFACTURERS ASSOCIATION
N, NEU	NEUTRAL
(N)	NEW
PH	PHASE
PR	PAIR
PVC	POLYVINYL CHLORIDE
REM	REMARK
RGS	RIGID GALVANIZED STEEL
SDBC	STRANDED BARE COPPER
SHLD,SH	SHIELDED
SN	SOLID NEUTRAL
SP	SPARE
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES
UPS	UNINTERRUPTABLE POWER SOURCE
UON	UNLESS OTHERWISE NOTED
V	VOLTS
W	WATTS
WP	WEATHERPROOF
XFMR	TRANSFORMER

ELECTRICAL SYMBOLS

CONSTRUCTION PHASE LEGEND

- EXISTING TO BE REMOVED/REPLACED
- EXISTING TO REMAIN
- NEW

SINGLE LINE LEGEND

- CIRCUIT BREAKER
- DISCONNECT SWITCH - NON-FUSED
- DISCONNECT SWITCH - FUSED
- TRANSFORMER

WIRING SYMBOLS

- 'LP'-1,3,5 — HOMERUN TO PANEL. 'LP' INDICATES PANEL DESIGNATION. 1,3,5 INDICATES CIRCUIT BREAKER NUMBER
- NEW CONDUIT
- UNDERGROUND CONDUIT
- FLEXIBLE CONDUIT
- NEUT. HOT — NUMBER OF SLASHES INDICATE NUMBER OF WIRES (WHEN MORE THAN TWO). PROVIDE GROUND WIRE IN ALL CONDUITS (SIZE GROUND PER NEC 250.122, U.O.N.); GROUNDS ARE NOT SHOWN BY SLASHES. SLASHES WHERE SHOWN ARE FOR CONVENIENCE OF THE CONTRACTOR ONLY; PROVIDE NUMBER OF CONDUCTORS AS REQUIRED BY CIRCUIT FUNCTION.

POWER DEVICES

- JUNCTION BOX
- DUPLEX RECEPTACLE OUTLET, NEMA 5-20R, MOUNTED 18" AFF
- DUPLEX RECEPTACLE OUTLET, NEMA 5-20R, ABOVE 42" COUNTER
- GFCI — GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE 20 AMPERE FEED THROUGH TYPE
- QUADRAPLEX - TWO DUPLEX RECEPTACLE UNDER A TWO GANG RING, MOUNTED 18" AFF
- SPECIAL PURPOSE RECEPTACLE AS NOTED ON PLANS.
- $_M — TOGGLE SWITCH TYPE MANUAL MOTOR STARTER
- 30A/3P 3R — EXTERNALLY OPERATED NON-FUSED DISCONNECT SWITCH. SIZE AND PHASE AS INDICATED. 3R INDICATES NEMA 3R TYPE ENCLOSURE, NO NUMBER INDICATES NEMA 1 TYPE ENCLOSURE.
- 30A/3P (3) 30A FU 3R — EXTERNALLY OPERATED FUSED DISCONNECT SWITCH. SIZE, POLES, FUSE SIZE & QUANTITY AS INDICATED. 3R INDICATES NEMA 3R TYPE ENCLOSURE, NO NUMBER INDICATES NEMA 1 TYPE ENCLOSURE.
- COMBINATION MOTOR STARTER FUSED DISCONNECT. SIZE, FUSE SIZE, PHASE AND QUANTITY AS INDICATED ON PLANS.
- M = MOTOR OR G = GENERATOR

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ELECTRICAL

SYMBOLS AND ABBREVIATIONS

Sheet Number
E001

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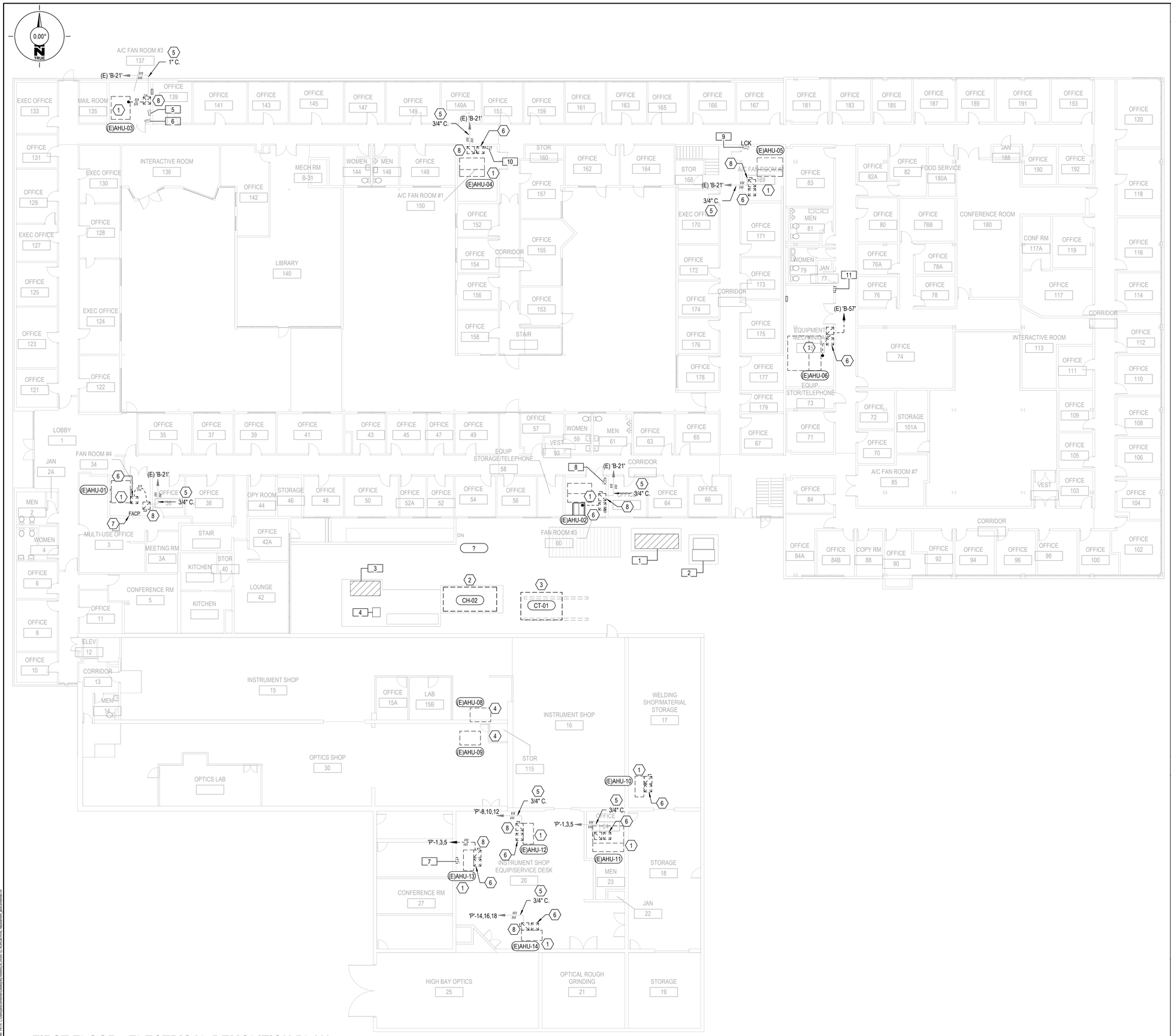

FIRST FLOOR - ELECTRICAL DEMOLITION PLAN

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

10' 5' 0' 10' 20'
3/32" = 1'-0"

KEYNOTES

1. (E) HVAC UNIT TO BE REMOVED AND REPLACED. ASSOCIATED ELECTRICAL (DISCONNECTING MEANS, BRANCH CIRCUIT ETC) TO REMAIN. REFER TO ELECTRICAL PLAN, SHEET EP101, FOR (N) WORK.
2. (E) CHILLER 'CH-02' AND ASSOCIATED ELECTRICAL TO BE REMOVED (U.O.N.).
3. (E) COOLING TOWER 'CT-01' AND ASSOCIATED ELECTRICAL TO BE REMOVED (U.O.N.).
4. (E) HVAC UNIT AND ASSOCIATED ELECTRICAL TO BE REMOVE. REMOVE BRANCH CIRCUIT BACK TO SOURCE.
5. (E) CONDUIT TO REMAIN. (E) CONDUCTORS TO BE REPLACED, SEE (N) ELECTRICAL PLAN, SHEET EP101 FOR (N) WORK.
6. (E) STARTER TO BE REMOVED.
7. (E) FIRE ALARM CONTROL PANEL TO REMAIN.
8. (E) DISCONNECT SWITCH TO BE REPLACED. SEE (N) ELECTRICAL PLAN, SHEET EP101 FOR (N) WORK.

ELECTRICAL EQUIPMENT KEYNOTES 1

1. (E) MAIN 'SES-1' TO REMAIN.
2. (E) UTILITY PAD MOUNT TRANSFORMER TO REMAIN.
3. (E) YARD SWITCHBOARD TO REMAIN.
4. (E) PAD MOUNT DRY-TYPE XFMR 'T3' TO REMAIN.
5. (E) PANEL 'LCA' TO REMAIN.
6. (E) PANEL 'LCA2' TO REMAIN.
7. (E) PANEL 'P' TO BE REPLACED. (E) FEEDER TO PANEL TO BE REMOVED. SEE (N) ELECTRICAL PLAN, SHEET EP101 FOR (N) WORK.
8. (E) PANEL 'LCH' TO BE REPLACED. SEE (N) ELECTRICAL PLAN, SHEET EP101 FOR (N) WORK.
9. (E) PANEL 'LCK' TO REMAIN.
10. (E) PANEL 'LCJ' TO BE REPLACED. SEE (N) ELECTRICAL PLAN, SHEET EP101 FOR (N) WORK.
11. (E) PANEL 'INP' TO BE REPLACED. SEE (N) ELECTRICAL PLAN, SHEET EP101 FOR (N) WORK.

GENERAL NOTES

A. ALL (E) ELECTRICAL DEVICES SHOWN AS DASHED ON THIS PLAN SHALL BE REMOVED (U.O.N.). REMOVAL SHALL INCLUDE BRANCH CIRCUIT(S) SERVING DEVICES BACK TO SOURCE PANEL (TYPICAL ALL INSTANCES).
B. COORDINATE WITH OWNER FOR DEVICES, EQUIPMENT, ETC. TO BE RETURNED TO THE OWNER.
C. COORDINATE DEMOLITION WITH ARCHITECTURAL AND MECHANICAL DEMOLITION PLANS.

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ELECTRICAL

FIRST FLOOR
ELECTRICAL DEMOLITION
PLAN

Sheet Number
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BASEMENT ELECTRICAL DEMOLITION PLAN

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

10' 5' 0' 10' 20'

3/32" = 1'-0"

KEYNOTES

1. (E) HVAC UNIT TO BE REMOVED AND REPLACED. REFER TO ELECTRICAL PLAN, SHEET EP102, FOR (N) WORK.
2. (E) CHILLER-3 AND ASSOCIATED ELECTRICAL TO BE REMOVED.
3. (E) CHILLER 'CH-02' FUSED DISCONNECT TO BE REMOVED.
4. (E) CWP-5 & 6 DISCONNECTS, VFD'S AND ASSOCIATED ELECTRICAL TO BE REMOVED.
6. (E) CHILLER 'CH-02' NON-FUSED DISCONNECT TO BE REMOVED. (E) CONDUIT TO REMAIN. REFER TO BASEMENT POWER PLAN, SHEET EP102, FOR (N) WORK.
7. (E) CHILLER 3 FUSED DISCONNECT TO BE REMOVED.
8. (E) PULL BOX TO REMAIN. REFER TO SINGLE LINE DIAGRAM, SHEET EP701, FOR ADDITIONAL INFORMATION.
9. (E) CONDUIT TO REMAIN. (E) CONDUCTORS TO BE REPLACED. SEE (N) ELECTRICAL PLAN, SHEET EP102 FOR (N) WORK.
10. (E) DISCONNECT SWITCH TO BE REPLACED. (E) HOMERUN CIRCUIT TO REMAIN. SEE (N) ELECTRICAL PLAN, SHEET EP102 FOR (N) WORK.
11. (E) STARTER TO BE REMOVED.
12. (E) CHILLER-4 AND ASSOCIATED ELECTRICAL TO BE REMOVED.
13. (E) CHILLED WATER PUMP AND ASSOCIATED ELECTRICAL TO BE REMOVED.
14. (E) HEATING WATER BOILER, PUMPS AND ASSOCIATED ELECTRICAL TO BE REMOVED.
15. (E) HVAC UNIT TO BE REMOVED AND REPLACED. ASSOCIATED ELECTRICAL TO BE REPLACED. REFER TO ELECTRICAL PLAN, SHEET EP102, FOR (N) WORK.

ELECTRICAL EQUIPMENT KEYNOTES 1

1. (E) SWITCHBOARD 'B-57' TO REMAIN.
2. (E) SWITCHBOARD 'B-21' TO REMAIN.

GENERAL NOTES

A. ALL (E) ELECTRICAL DEVICES SHOWN AS DASHED ON THIS PLAN SHALL BE REMOVED (U.O.N.). REMOVAL SHALL INCLUDE BRANCH CIRCUIT(S) SERVING DEVICES BACK TO SOURCE PANEL (TYPICAL ALL INSTANCES).
B. COORDINATE WITH OWNER FOR DEVICES, EQUIPMENT, ETC. TO BE RETURNED TO THE OWNER.
C. COORDINATE DEMOLITION WITH ARCHITECTURAL AND MECHANICAL DEMOLITION PLANS.

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BASEMENT ELECTRICAL DEMOLITION PLAN

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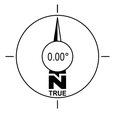

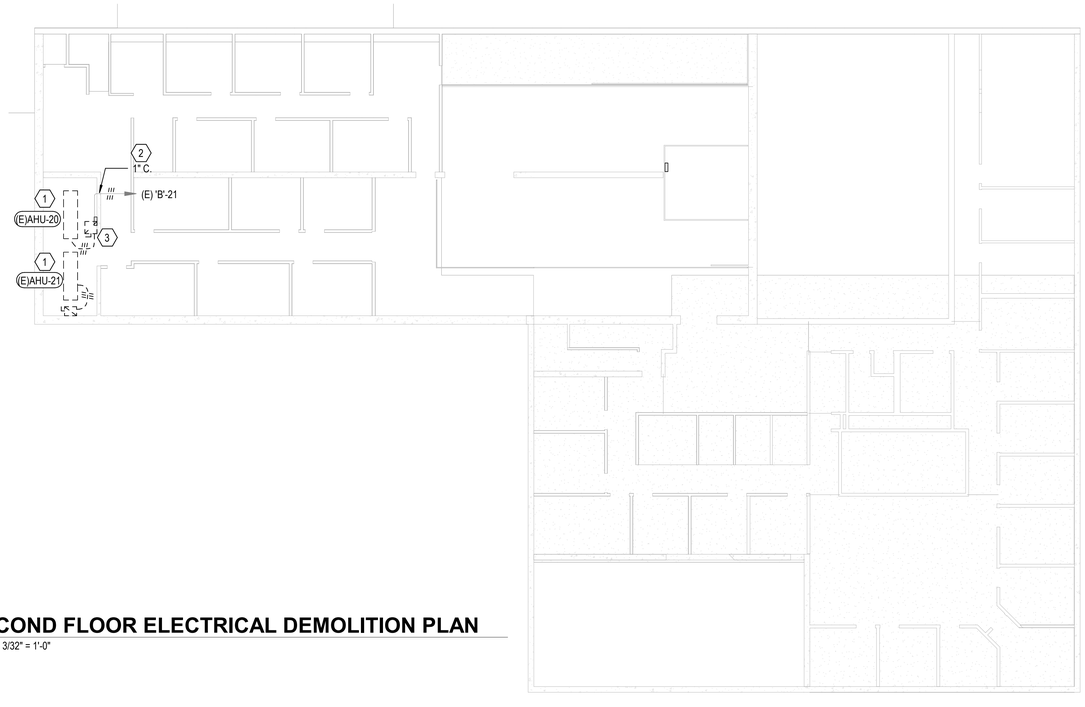

SECOND FLOOR ELECTRICAL DEMOLITION PLAN

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

10' 5' 0' 10' 20'

3/32" = 1'-0"

KEYNOTES

1 (E) HVAC UNIT TO BE REMOVED AND REPLACED. REFER TO ELECTRICAL PLAN, SHEET EP103, FOR (N) WORK.

2 (E) CONDUIT TO REMAIN. (E) CONDUCTORS TO BE REPLACED. SEE (N) ELECTRICAL PLAN, SHEET EP103 FOR (N) WORK.

3 (E) DISCONNECT SWITCH TO BE REPLACED. SEE (N) ELECTRICAL PLAN, SHEET EP103 FOR (N) WORK.

GENERAL NOTES

A. ALL (E) ELECTRICAL DEVICES SHOWN AS DASHED ON THIS PLAN SHALL BE REMOVED (U.O.N.). REMOVAL SHALL INCLUDE BRANCH CIRCUIT(S) SERVING DEVICES BACK TO SOURCE PANEL (TYPICAL ALL INSTANCES).

B. COORDINATE WITH OWNER FOR DEVICES, EQUIPMENT, ETC. TO BE RETURNED TO THE OWNER.

C. COORDINATE DEMOLITION WITH ARCHITECTURAL AND MECHANICAL DEMOLITION PLANS.

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ELECTRICAL

SECOND FLOOR ELECTRICAL DEMOLITION PLAN

Sheet Number
ED103

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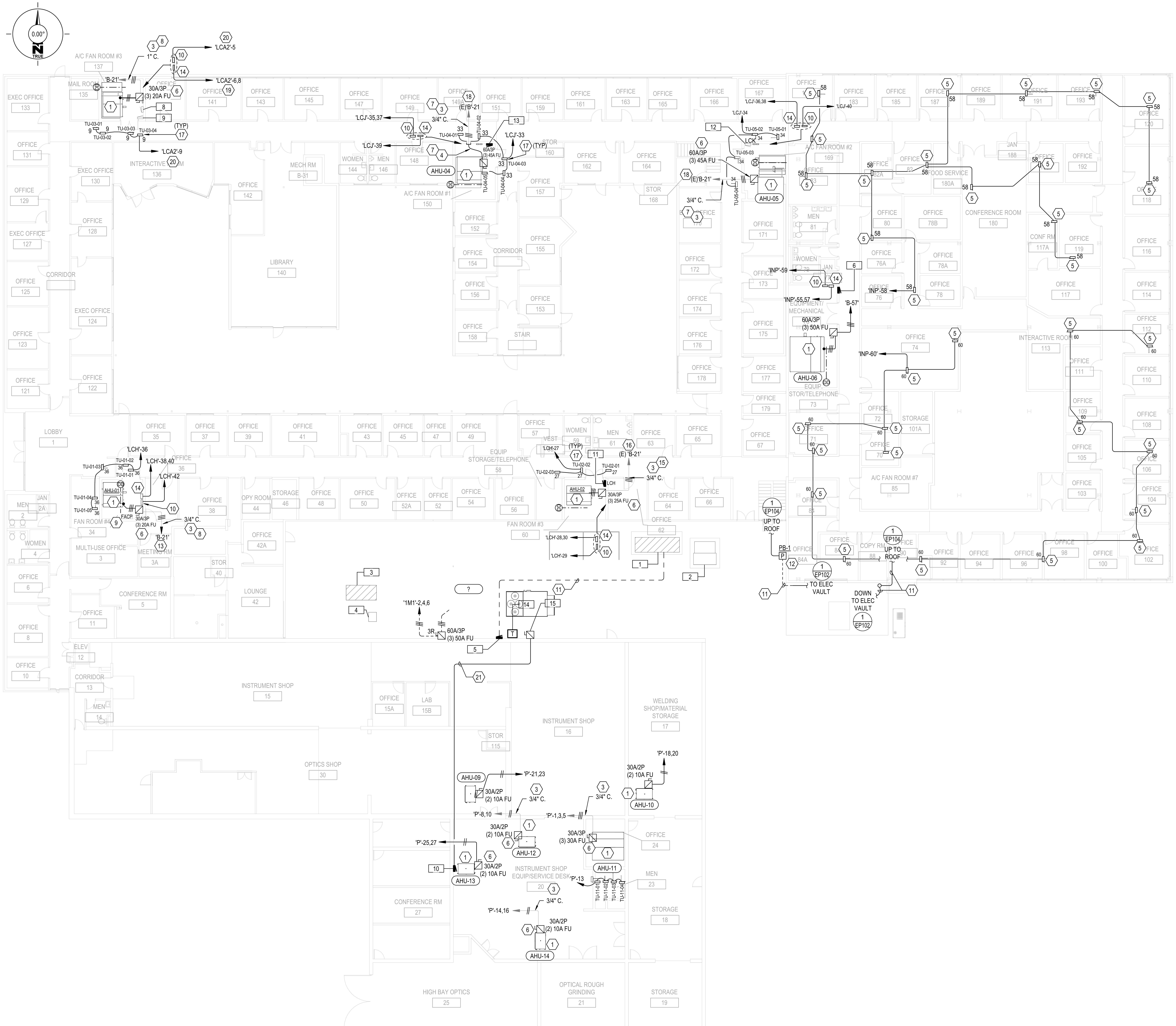

FIRST FLOOR ELECTRICAL PLAN

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

1
EP101

10' 5' 0' 10' 20'
3/32" = 1'-0"

KEYNOTES

1	(N) HVAC UNIT REPLACING (E). INTERCEPT (E) BRANCH CIRCUIT MADE AVAILABLE THROUGH DEMOLITION. COORDINATE EXACT CONNECTION REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN..
3	(E) CONDUIT TO REMAIN.
4	INTERCEPT (E) CONDUIT AND EXTEND AS INDICATED. FIELD VERIFY LOCATION OF (E) CONDUIT.
5	(N) TERMINAL UNIT PROVIDED W/ DISCONNECT.
6	(N) DISCONNECT SWITCH REPLACING (E).
7	(3) #6 AWG, #10 AWG GND.
8	(3) #12 AWG, #12 AWG GND.
9	(E) FIRE ALARM CONTROL PANEL TO REMAIN.
10	BMS CONTROLLER TO BE LOCATED INSIDE THIS ROOM, COORDINATE EXACT MOUNTING LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
11	REFER TO SINGLE LINE DIAGRAM, SHEET EP701 FOR SIZE AND QUANTITY OF CONDUIT AND CONDUCTORS.
12	WALL MOUNT NEMA-3R PULLBOX, SIZED PER NEC. CONTRACTOR TO DETERMINE MOUNTING HEIGHT.
13	(E) BRANCH CIRCUIT BREAKER SHALL BE REPLACED TO A 20-AMPERE, 3-POLE CIRCUIT BREAKER. MATCH (E) MANUFACTURER AND AIC RATING AS REQUIRED.
14	DX CONTROLLER. COORDINATE EXACT MOUNTING LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
15	(3) #10 AWG, #10 AWG GND.
16	(E) BRANCH CIRCUIT BREAKER SHALL BE REPLACED TO 30-AMPERE, 3-POLE CIRCUIT BREAKER. MATCH (E) MANUFACTURER AND AIC RATING AS REQUIRED.
17	UNIT PROVIDED W/ DISCONNECT SWITCH.
18	(E) BRANCH CIRCUIT BREAKER SHALL BE REPLACED TO 50-AMPERE, 3-POLE CIRCUIT BREAKER. MATCH (E) MANUFACTURER AND AIC RATING AS REQUIRED.
19	PROVIDE (N) 15-AMPERE, 2-POLE CIRCUIT BREAKER IN (E) SPACE. MATCH (E) MANUFACTURER AND AIC RATING. (LOAD ADDED IS MINIMAL).
20	PROVIDE (N) 15-AMPERE, 1-POLE CIRCUIT BREAKER IN (E) SPACE. MATCH (E) MANUFACTURER AND AIC RATING. (LOAD ADDED IS MINIMAL).
21	(N) CONDUIT(S) ROUTED UP HIGH IN CEILING SPACE. CONTRACTOR TO FIELD VERIFY W/ (E) UTILITIES.

ELECTRICAL EQUIPMENT KEYNOTES 1

1	(E) MAIN 'SES-1' TO REMAIN.
2	(E) UTILITY PAD MOUNT TRANSFORMER TO REMAIN.
3	(E) YARD SWITCHBOARD TO REMAIN.
4	(E) PAD MOUNT DRY-TYPE XFMR 'T3' TO REMAIN.
5	PANEL '1-M1'.
6	(N) PANEL 'INP' REPLACING (E). CONNECT TO (E) FEEDER CONDUCTORS AS REQUIRED. SEE PANEL SCHEDULE, SHEET EP601.
8	(E) PANEL 'LCA' TO REMAIN.
9	(E) PANEL 'LCA2' TO REMAIN.
10	(N) PANEL 'P' REPLACING (E). SEE PANEL SCHEDULE & ONE LINE DIAGRAM, SHEETS EP601 & EP701 FOR ADDITIONAL INFORMATION.
11	(N) PANEL 'LCH' REPLACING (E). CONNECT TO (E) FEEDER CONDUCTORS AS REQUIRED. SEE PANEL SCHEDULE, SHEET EP601.
12	(E) PANEL 'LCK' TO REMAIN.
13	(E) PANEL 'LCJ' REPLACING (E). CONNECT TO (E) FEEDER CONDUCTORS AS REQUIRED. SEE PANEL SCHEDULE, SHEET EP601.
14	(N) PAD MOUNT, OUTDOOR RATED, DRY-TYPE TRANSFORMER 'T-P'.
15	(N) FUSED DISCONNECT SWITCH 'FSD-P'.

GENERAL NOTES

A. MAINTAIN ALL NEC REQUIRED WORKING CLEARANCES FOR ALL ELECTRICAL EQUIPMENT.
B. ALL WIRING SHALL BE (2) #12 AWG, #12 AWG GND, IN 3/4" CONDUIT, UNLESS OTHERWISE NOTED.
C. ALL BRANCH CIRCUITS SHALL HAVE DEDICATED NEUTRALS. SHARED NEUTRALS NOT ALLOWED.
D. ACCESS AND WORKING SPACE OF ALL NEW ELECTRICAL EQUIPMENT SHALL COMPLY WITH ARTICLE 110.26 OF THE NEC. THERE SHALL NOT BE ANY PIPING, DUCTS, LEAK PROTECTION APPARATUS OR OTHER EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION 6 FEET ABOVE THE ELECTRICAL EQUIPMENT PER ARTICLE 110.26(F)(1V).
E. COORDINATE LOCATION OF ALL EQUIPMENT WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

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ELECTRICAL

FIRST FLOOR ELECTRICAL PLAN

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EP101

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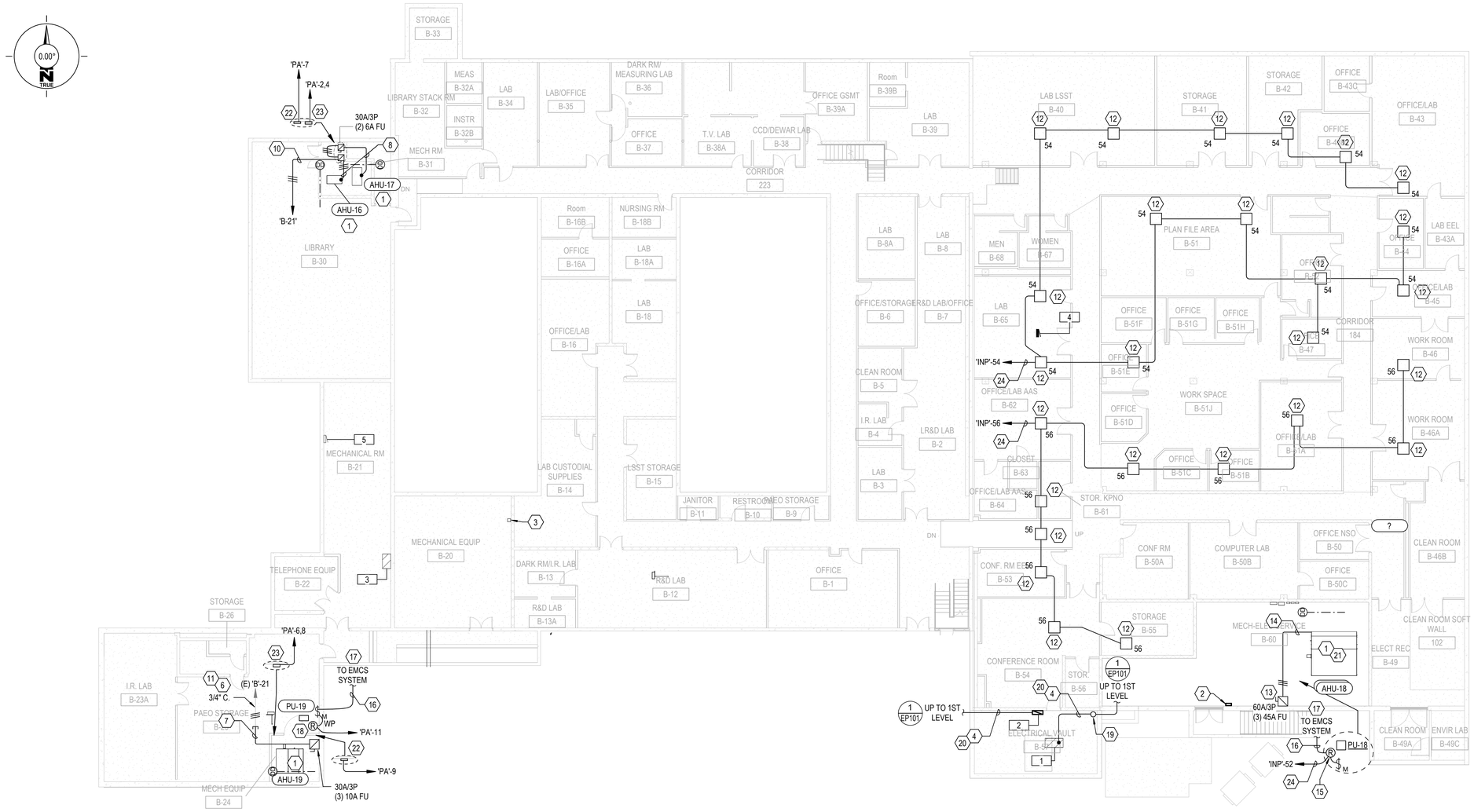

BASEMENT ELECTRICAL PLAN

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

KEYNOTES

1. (N) HVAC UNIT REPLACING (E). MAKE CONNECTION AS INDICATED.
2. (E) CHILLER 3 FUSED DISCONNECT TO BE REMOVED.
3. (E) PULL BOX TO REMAIN. REFER TO SINGLE LINE DIAGRAM, SHEET EP701, FOR ADDITIONAL INFORMATION.
4. FEEDER ROUTED UP HIGH IN CEILING SPACE. CONTRACTOR TO VERIFY EXACT ROUTING IN FIELD. REFER TO SINGLE LINE DIAGRAM, SHEET EP701, FOR SIZE AND QUANTITY OF CONDUIT AND CONDUCTORS.
5. PROVIDE (N) 20-AMPERE, 3-POLE CIRCUIT BREAKER IN (E) SPACE. MATCH (E) MANUFACTURER AND AIC RATING.
6. (E) CONDUIT TO REMAIN.
7. INTERCEPT (E) CONDUIT AND EXTEND AS INDICATED. FIELD VERIFY LOCATION OF (E) CONDUIT.
8. (3) #12 AWG, #12 AWG GND., 3/4" C.
10. (6) #12 AWG, #12 AWG GND.
11. (3) #12 AWG, #12 AWG GND.
12. (N) TERMINAL UNIT PROVIDED W/ DISCONNECT SWITCH.
13. (N) DISCONNECT SWITCH REPLACING (E). (E) HOMERUN BRANCH CIRCUIT TO REMAIN.
14. (3) #6 AWG, #10 AWG GND., 1"C.
15. 120V AC CONTROL RELAY WITH 20-AMPERE CONTACTS IN NEMA-1 ENCLOSURE FOR CONTROL OF EXHAUST FAN. COIL VOLTAGE TO MATCH EMCS CONTROL VOLTAGE. RELAY SHALL ENERGIZE VIA EMCS SYSTEM.
16. PROVIDE (1) 3/4" CONDUIT W/ CONDUCTORS PROVIDED BY CONTROLS CONTRACTOR.
17. COORDINATE EXACT MOUNTING LOCATION OF EMCS CONTROL PANEL W/ MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
18. 120V AC CONTROL RELAY WITH 20-AMPERE CONTACTS IN NEMA-3R ENCLOSURE FOR CONTROL OF EXHAUST FAN. COIL VOLTAGE TO MATCH EMCS CONTROL VOLTAGE. RELAY SHALL ENERGIZE VIA EMCS SYSTEM.
19. PROVIDE COREDRILL FOR ROUTING OF CONDUIT.
20. REFER TO SINGLE LINE DIAGRAM, SHEET EP701 FOR SIZE AND QUANTITY OF CONDUIT AND CONDUCTORS.
21. NO LOAD CHANGE.
22. BMS CONTROLLER TO BE LOCATED INSIDE THIS ROOM, COORDINATE EXACT MOUNTING LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
23. DX CONTROLLER. COORDINATE EXACT MOUNTING LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
24. CONDUIT TO BE ROUTED THROUGH AHU-06 ROOM LOCATED ON 1ST FLOOR.

ELECTRICAL EQUIPMENT KEYNOTES 1

1. (E) SWITCHBOARD 'B-57' TO REMAIN.
2. FUSED DISCONNECT SWITCH 'FSD-B57', REPLACING (E) 'CHILLER 2' DISCONNECT.
3. (E) SWITCHBOARD 'B-21' TO REMAIN.
4. (N) PANEL 'INP' LOCATED ON 1ST FLOOR.
5. (E) PANEL 'PA' TO REMAIN.

GENERAL NOTES

A. MAINTAIN ALL NEC REQUIRED WORKING CLEARANCES FOR ALL ELECTRICAL EQUIPMENT.
B. ALL WIRING SHALL BE (2) #12 AWG, #12 AWG GND, IN 3/4" CONDUIT, UNLESS OTHERWISE NOTED.
C. ALL BRANCH CIRCUITS SHALL HAVE DEDICATED NEUTRALS. SHARED NEUTRALS NOT ALLOWED.
D. ACCESS AND WORKING SPACE OF ALL NEW ELECTRICAL EQUIPMENT SHALL COMPLY WITH ARTICLE 110.26 OF THE NEC. THERE SHALL NOT BE ANY PIPING, DUCTS, LEAK PROTECTION APPARATUS OR OTHER EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION 6 FEET ABOVE THE ELECTRICAL EQUIPMENT PER ARTICLE 110.26(F)(1V).
E. COORDINATE LOCATION OF ALL EQUIPMENT WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

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Issue Date: 18 JUL 2025

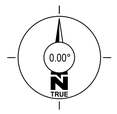
ELECTRICAL

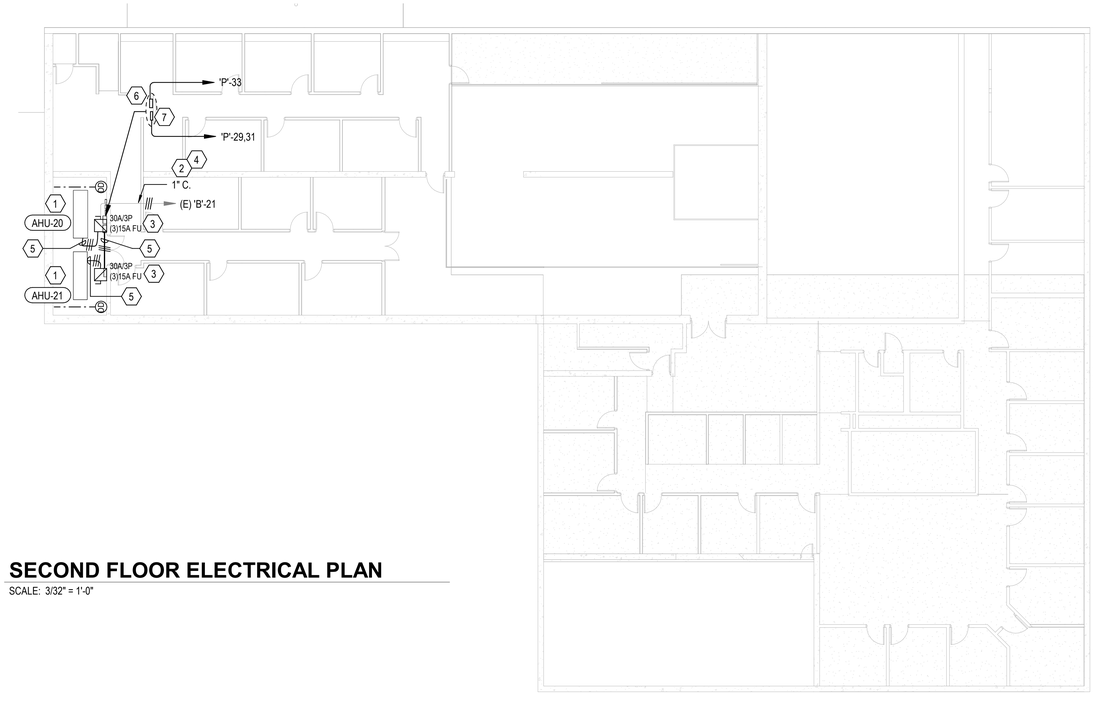
BASEMENT ELECTRICAL PLAN

Sheet Number
EP102

M3PN 240097

DATE: 7/18/2025 1:03:04 AM PATH: C:\Users\jlara.ortiz\Documents\Revit Models\25-240097-01-NOIRLab-HVAC_Basement_jlara.ortiz@m3eng.rvt





SECOND FLOOR ELECTRICAL PLAN

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

10' 5' 0' 10' 20'

3/32" = 1'-0"

KEYNOTES

1. (N) HVAC UNIT REPLACING (E). COORDINATE EXACT CONNECTION REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
2. (E) CONDUIT TO REMAIN.
3. (N) DISCONNECT SWITCH REPLACING (E).
4. (3) #10 AWG, #10 AWG GND.
5. (3) #10 AWG, #10 AWG GND., 3/4" C.
6. BMS CONTROLLER. COORDINATE EXACT MOUNTING LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
7. DX CONTROLLER. COORDINATE EXACT MOUNTING LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

GENERAL NOTES

A. MAINTAIN ALL NEC REQUIRED WORKING CLEARANCES FOR ALL ELECTRICAL EQUIPMENT.
B. ALL BRANCH CIRCUITS SHALL HAVE DEDICATED NEUTRALS. SHARED NEUTRALS NOT ALLOWED.
C. ACCESS AND WORKING SPACE OF ALL NEW ELECTRICAL EQUIPMENT SHALL COMPLY WITH ARTICLE 110.26 OF THE NEC. THERE SHALL NOT BE ANY PIPING, DUCTS, LEAK PROTECTION APPARATUS OR OTHER EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION 6 FEET ABOVE THE ELECTRICAL EQUIPMENT PER ARTICLE 110.26(F)(1V).
D. COORDINATE LOCATION OF ALL EQUIPMENT WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

NOIRLAB HVAC PROJECT
TUCSON MAIN FACILITY

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Revisions

#	Description	Date

Drawn: LHB
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Issue Date: 18 JUL 2025

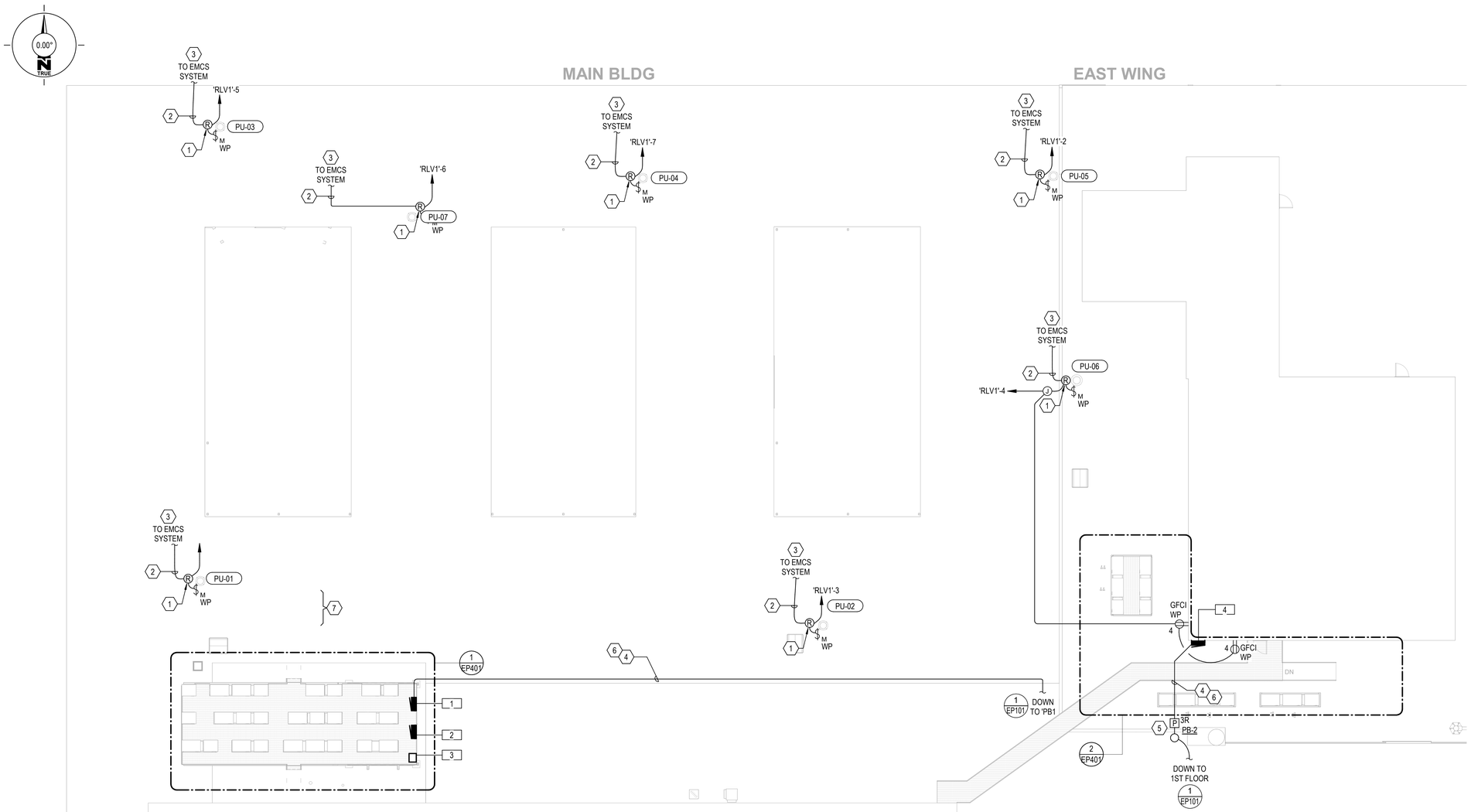
ELECTRICAL

SECOND FLOOR
ELECTRICAL PLAN

Sheet Number
EP103

M3PN 240097

DWT: 7/18/2025, 11:09:26 AM, RTH, T:\Drawings\Revit\Working Models\25 07 18 HVAC.rvt\HVAC Replacement_plans_interiors.rvt



ROOF OVERALL ELECTRICAL PLAN

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

1 EP104

KEYNOTES

1. 120V AC CONTROL RELAY WITH 20-AMPERE CONTACTS IN NEMA-3R ENCLOSURE FOR CONTROL OF EXHAUST FAN. COIL VOLTAGE TO MATCH EMCS CONTROL VOLTAGE. RELAY SHALL ENERGIZE VIA EMCS SYSTEM.
2. PROVIDE (1) 3/4" CONDUIT W/ CONDUCTORS PROVIDED BY CONTROLS CONTRACTOR.
3. COORDINATE EXACT MOUNTING LOCATION OF EMCS CONTROL PANEL W/ MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
4. REFER TO SINGLE LINE DIAGRAM, SHEET EP701 FOR SIZE AND QUANTITY OF CONDUIT AND CONDUCTORS.
5. NEMA-3R PULL BOX SIZED PER NEC MOUNTED ON PARAPET.
6. CONDUIT(S) ROUTED ON ROOF. BOTTOM OF CONDUIT SHALL BE SEPARATED FROM ROOF BY NO LESS THAN 7/8".
7. PANELBOARD/MINI POWER CENTER TO BE MOUNTED ON STRUCTURAL SYSTEM. PROVIDE METAL CHANNEL FRAME AS REQUIRED FOR MOUNTING OF PANELBOARD.

ELECTRICAL EQUIPMENT KEYNOTES 1

1. (N) PANEL 'R-HVM1A'.
2. (N) PANEL 'R-HVM1B'.
3. (N) MINI-POWER CENTER 'R-LV1'.
4. (N) PANEL 'R-HVM2A'.

GENERAL NOTES

A. MAINTAIN ALL NEC REQUIRED WORKING CLEARANCES FOR ALL ELECTRICAL EQUIPMENT.
B. ALL WIRING SHALL BE (2) #12 AWG, #12 AWG GND, IN 3/4" CONDUIT, UNLESS OTHERWISE NOTED.
C. ALL BRANCH CIRCUITS SHALL HAVE DEDICATED NEUTRALS. SHARED NEUTRALS NOT ALLOWED.
D. ACCESS AND WORKING SPACE OF ALL NEW ELECTRICAL EQUIPMENT SHALL COMPLY WITH ARTICLE 110.26 OF THE NEC. THERE SHALL NOT BE ANY PIPING, DUCTS, LEAK PROTECTION APPARATUS OR OTHER EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION 6 FEET ABOVE THE ELECTRICAL EQUIPMENT PER ARTICLE 110.26(F)(1V).
E. COORDINATE LOCATION OF ALL EQUIPMENT WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.

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ELECTRICAL

ROOF OVERALL ELECTRICAL PLAN

Sheet Number
EP104

M3PN 240097

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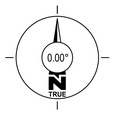
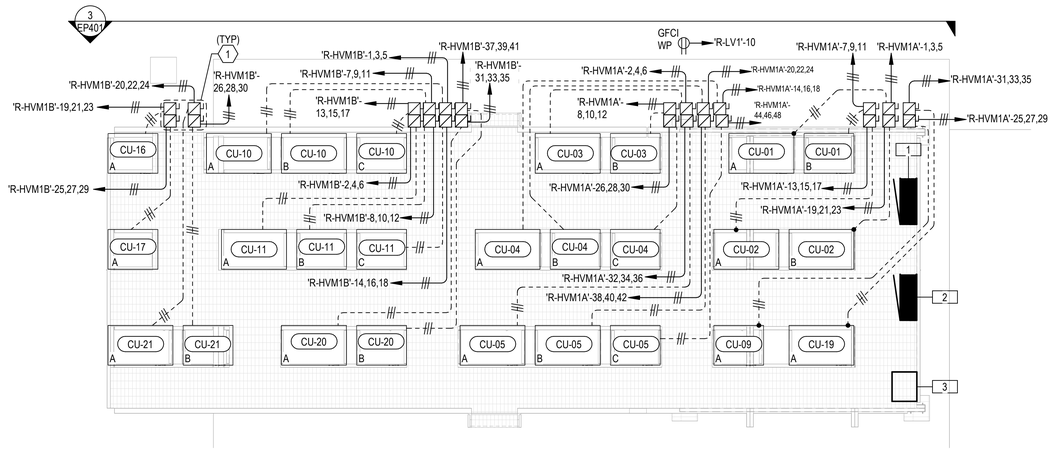
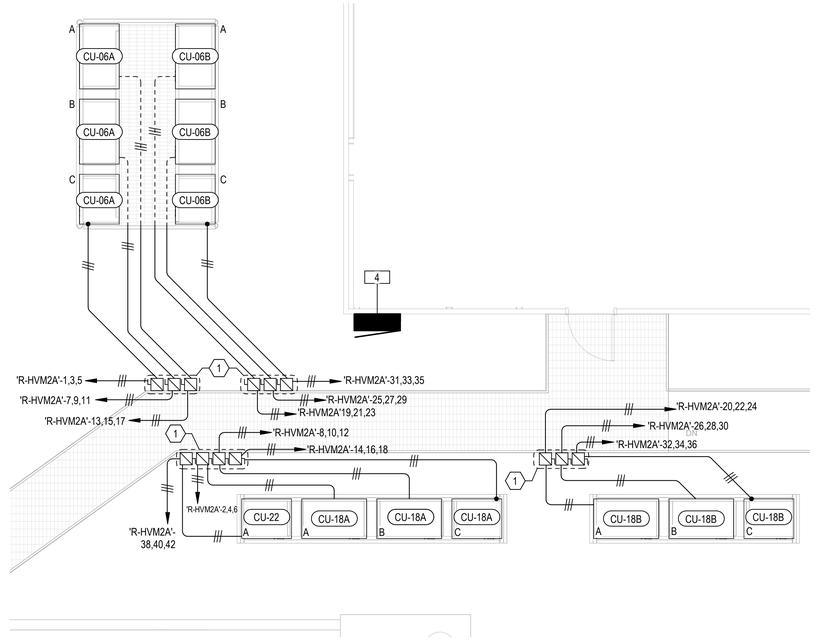




ENLARGED WEST ROOF HVAC POWER PLAN

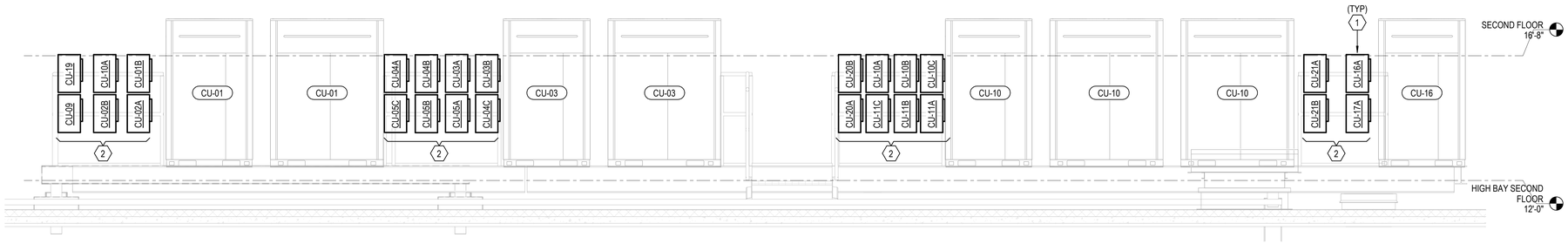
1 EP401



ENLARGED EAST ROOF HVAC POWER PLAN

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

2 EP401



WEST ROOF HVAC SECTION

SCALE: 1/2" = 1'-0"

3 EP401

4' 2' 0' 4' 8'
1/4" = 1'-0"

2' 1' 0' 2' 4'
1/2" = 1'-0"

KEYNOTES

1. MOUNT DISCONNECTS ON STRUCTRAL FRAME. PROVIDE METAL CHANNEL FRAME AS REQUIRED. SEE DETAIL #3, THIS SHEET FOR MOUNTING ELEVATION OF DISCONNECTS.
2. CONDENSING UNIT DISCONNECTS. SEE 'HVAC DISCONNECT SCHEDULE', THIS SHEET FOR SIZE OF DISCONNECT.

ELECTRICAL EQUIPMENT KEYNOTES 1

1. PANEL 'R-HVM1A'.
2. PANEL 'R-HVM1B'.
3. MINI-POWER CENTER 'R-LV1'.
4. PANEL 'R-HVM2A'.

HVAC DISCONNECT SCHEDULE

MARK	VOLTAGE	DISC. SWT & FSE SIZE	NEMA RATING	DESIGNATOR
'CU-01'	600V-3Ø	60A/3P, 40A FU (RK1)	3R	A
'CU-01'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	B
'CU-02'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	A
'CU-02'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	B
'CU-03'	600V-3Ø	60A/3P, 40A FU (RK1)	3R	A
'CU-03'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	B
'CU-04'	600V-3Ø	60A/3P, 40A FU (RK1)	3R	A
'CU-04'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	B
'CU-04'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	C
'CU-05'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	A
'CU-05'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	B
'CU-05'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	C
'CU-06A'	600V-3Ø	60A/3P, 40A FU (RK1)	3R	A
'CU-06A'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	B
'CU-06A'	600V-3Ø	60A/3P, 20A FU (RK1)	3R	C
'CU-06B'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	A
'CU-06B'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	B
'CU-06B'	600V-3Ø	60A/3P, 20A FU (RK1)	3R	C
'CU-09'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	A
'CU-10'	600V-3Ø	60A/3P, 40A FU (RK1)	3R	A
'CU-10'	600V-3Ø	60A/3P, 40A FU (RK1)	3R	B
'CU-10'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	C
'CU-11'	600V-3Ø	60A/3P, 40A FU (RK1)	3R	A
'CU-11'	600V-3Ø	60A/3P, 40A FU (RK1)	3R	B
'CU-11'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	C
'CU-16'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	A
'CU-17'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	A
'CU-18A'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	A
'CU-18A'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	B
'CU-18A'	600V-3Ø	60A/3P, 20A FU (RK1)	3R	C
'CU-18B'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	A
'CU-18B'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	B
'CU-18B'	600V-3Ø	60A/3P, 20A FU (RK1)	3R	C
'CU-19'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	A
'CU-20'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	A
'CU-20'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	B
'CU-21'	600V-3Ø	60A/3P, 35A FU (RK1)	3R	A
'CU-21'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	B
'CU-22'	600V-3Ø	30A/3P, 20A FU (RK1)	3R	A

GENERAL NOTES

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B. ALL WIRING SHALL BE (2) #12 AWG, #12 AWG GND, IN 3/4" CONDUIT, UNLESS OTHERWISE NOTED.
C. ALL BRANCH CIRCUITS SHALL HAVE DEDICATED NEUTRALS. SHARED NEUTRALS NOT ALLOWED.
D. ACCESS AND WORKING SPACE OF ALL NEW ELECTRICAL EQUIPMENT SHALL COMPLY WITH ARTICLE 110.26 OF THE NEC. THERE SHALL NOT BE ANY PIPING, DUCTS, LEAK PROTECTION APPARATUS OR OTHER EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION 6 FEET ABOVE THE ELECTRICAL EQUIPMENT PER ARTICLE 110.26(F)(1V).
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Revisions

#	Description	Date

Drawn: LHB
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ELECTRICAL

ENLARGED PLANS

Sheet Number
EP401

M3PN 240097

DATE: 7/18/2025 - 1:05:26 AM PATH: C:\Users\jacob.johnson\Documents\My Models\EP401-M3PN.rvt PLOTTED BY: Jacob Johnson

MINI POWER CENTER 'RLV1'

TYPE: | PROJECT: M3-PN240097 | BUS AMPACITY:
SERVICE: 240/120 WYE | FED FROM: R-M1 | SECONDARY CB: 70A
POLES: 24 | NEUTRAL: 100%
LOCATION: | U.O.N., SIZE CONDUITS PER NEC, BASED ON TYPE THWN/THHW | AIC: 10,000 (SECONDARY CB)
MOUNTING: SURFACE | NEMA: 1

#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	POLE	CB	COND	WIRE GND	LOAD NAME	#
1	PU-1	#12	3/4"	20A	1	0.696	0.696	1	20A	3/4"	#12	PU-5	2
3	PU-2	#12	3/4"	20A	1		0.696	0.696	1	20A	3/4"	#12	PU-6	4
5	PU-3	#12	3/4"	20A	1	0.696	0.696		1	20A	3/4"	#12	PU-7	6
7	PU-4	#12	3/4"	20A	1			0.696	0.180	1	20A	3/4"	#12	WEST SIDE ROOF RCPT	8
9	SPARE			20A	1					1	20A			SPARE	10
11	SPARE			20A	1					1	20A			SPARE	12
13	SPACE													SPACE	14
15	SPACE													SPACE	16
17	SPACE													SPACE	18
19	SPACE													SPACE	20
21	SPACE													SPACE	22
23	SPACE													SPACE	24
			TOTAL CONNECTED kVA			2.78	2.27								
			TOTAL CONNECTED AMPS			23.2	18.9								

	CONN. LOAD	DEMAND FACTOR	EST. DEMAND	PANEL TOTALS	
CONTINUOUS kVA @125%	0.00	125%	0.00		
NON-CONTINOUS kVAD	5.05	100%	5.05	TOTAL CODE LOAD	5.1 kVA
MOTOR kVA + 25%	0.00	125%	0.00		
KITCHEN kVA (Total circuits) 0	0.00	100%	0.00	TOTAL CODE CURRENT	21.1 AMP

NOTES:

EXS PANEL 'PA'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 400A
SERVICE: 240/120 WYE | FED FROM: | MAINS: 300A MCB
POLES: 42 | NEUTRAL: 100%
LOCATION: | U.O.N., SIZE CONDUITS PER NEC, BASED ON TYPE THWN/THHW | AIC: EXS
MOUNTING: SURFACE | NEMA: 1

#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	POLE	CB	COND	WIRE GND	LOAD NAME	#
1							0.03	2	20A	3/4"	#12	AHU-17 DX CTRL	2 #
3	SPARE			50A	2			0.03					4
5								2	20A	3/4"	#12	AHU-19 DX CTRL	6 #
$ 7	AHU-17 BMS CTRL	#12	3/4"	20A	1		0.10						8
$ 9	AHU-19 BMS CTRL	#12	3/4"	20A	1	0.10		2	20A			SPARE	10
$ 11	PU-19	#12	3/4"	20A	1		0.70						12
$ 13	BMS CRTL	#12	3/4"	20A	1	0.10		2	30A			SPARE	14
15	SPARE			20A	1								16
17	SPARE			20A	1			2	30A			SPARE	18
19	SPARE			20A	1								20
21	SPARE			20A	1			2	30A			SPARE	22
23	SPARE			20A	1								24
25	SPARE			20A	1			2	40A			SPARE	26
27	SPARE			20A	1								28
29	SPARE			20A	1			2	40A			SPARE	30
31	SPARE			20A	1								32
33	SPARE			20A	1			1	20A			SPARE	34
35	SPARE			20A	1								36
37	SPARE			20A	1			2	150A	(E)	(E)	(E) PANEL 'G'	38
39	SPARE			20A	1								40
41	SPARE			20A	1								42

NOTES:
NEW LOADS ARE SHOWN AS BOLD
(N) DEVICE REPLACING (E) DEVICE. DEVICE SHALL BE OF THE GFCI TYPE.
$ CONNECT TO (E) SPARE CIRCUIT BREAKER.

(N) PANEL 'P'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 200A
SERVICE: 208/120 WYE | FED FROM: | MAINS: MLO
POLES: 48 | NEUTRAL: 100%
LOCATION: | UNLESS OTHERWISE NOTED, SIZE CONDUITS PER NEC, BASED ON TYPE THWN/XHHW | AIC: 10,000
MOUNTING: SURFACE | NEMA: 1

#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	CKT. KVA C	POLE	CB	COND	WIRE GND	LOAD NAME	#
1						2.64								2
3	AHU-11	#10	(E)	30A	3		2.64		3	20A	(E)	(E)	(E) LOAD	4 $
5								2.64						6
7						3.00	0.61		2	15A	(E)	#12	AHU-12	8 #
$ 9	(E) LOAD	(E)	(E)	50A	3		3.00	0.61						10
11								3.00	1	20A			SPARE	12
13	TU-11-01 - 04"	#12	3/4"	15A	1	0.10	0.48		2	15A	(E)	#12	AHU-14	14 #
15							3.00	0.48						16
$ 17	(E) LOAD	(E)	(E)	50A	3			3.00 0.48	2	15A	3/4"	#12	AHU-10	18 #
19						3.00	0.48							20
# 21	AHU-09	#12	3/4"	15A	2		0.61	0.61	2	15A	3/4"	#12	AHU-15	22 #
23								0.61 0.61						24
# 25	AHU-13	#12	3/4"	15A	2	0.48	0.03		2	15A	3/4"	#12	AHU-11 DX CTRL	26
27							0.48	0.03						28
# 29	AHU-20/21 DX CTRL	#12	3/4"	15A	2			0.03 0.10	1	20A	3/4"	#12	BMS CTRL	30
31						0.03			1	20A			SPARE	32
33	AHU-20/21 BMS CTRL	#12	3/4"	20A	1		0.10		1	20A			SPARE	34
35	SPARE			20A	1				1	20A			SPARE	36
37	SPARE			20A	1				1	20A			SPARE	38
39	SPARE			20A	1				1	20A			SPARE	40
41	SPARE			20A	1				1	20A			SPARE	42
43	SPARE			20A	1				1	20A			SPARE	44
45	SPARE			20A	1				1	20A			SPARE	46
47	SPARE			20A	1				1	20A			SPARE	48
			TOTAL CONNECTED kVA			10.85	11.57	10.48						
			TOTAL CONNECTED AMPS			90.4	96.4	87.3						

	CONN. LOAD	DEMAND FACTOR	EST. DEMAND	PANEL TOTALS	
CONTINUOUS kVA @125%	0.00	125%	0.00	TOTAL CONN. LOAD	32.9 kVA
NON-CONTINOUS kVAD	32.90	100%	32.90	TOTAL EST. DEMAND	32.9 kVA
MOTOR kVA + 25%	0.00	125%	0.00	TOTAL CONNECTED CURRENT	91.3 AMP
KITCHEN kVA 0	0.00	100%	0.00	TOTAL EST. DEMAND CURRENT	91.3 AMP

NOTES:
NEW LOADS ARE SHOWN AS BOLD
$ CONNECT (E) BRANCH CIRCUIT TO (N) PANELBOARD AS REQUIRED.
# PROVIDE GFCI TYPE CIRCUIT BREAKER.

(N) PANEL 'INP'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 200A
SERVICE: 208/120 WYE | FED FROM: | MAINS: MLO
POLES: 60 | NEUTRAL: 100%
LOCATION: | UNLESS OTHERWISE NOTED, SIZE CONDUITS PER NEC, BASED ON TYPE THWN/XHHW | AIC: 10,000
MOUNTING: RECESSED | NEMA: 1

#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	CKT. KVA C	POLE	CB	COND	WIRE GND	LOAD NAME	#
$ 1	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	2 $
$ 3	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	4 $
$ 5	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	6 $
$ 7	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	8 $
$ 9	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	10 $
$ 11	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	12 $
$ 13	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	14 $
$ 15	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	16 $
$ 17	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	18 $
$ 19	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	20 $
$ 21	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	22 $
$ 23	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	24 $
$ 25	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	26 $
$ 27	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	28 $
$ 29	(E) LOAD	(E)	(E)	20A	1				1	20A			SPARE	30
$ 31	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	32 $
$ 33	(E) LOAD	(E)	(E)	20A	1				1	15A			SPARE	34
$ 35	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	36 $
$ 37	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	38 $
$ 39	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	40 $
$ 41	(E) LOAD	(E)	(E)	20A	1				1	20A	(E)	(E)	(E) LOAD	42 $
43	SPARE			20A	1				1	20A			SPARE	44
45	SPARE			20A	1				1	20A			SPARE	46
47	SPARE			20A	1				1	20A			SPARE	48
49	SPARE			20A	1				1	20A			SPARE	50
51	SPARE			20A	1			0.70	1	20A	3/4"	#12	BASEMENT PU-18	52
53	SPARE			20A	1			0.10	1	20A	3/4"	#12	BASEMENT EAST TERMINAL UNITS	54
# 55	AHU-06 DX CTRL	#12	3/4"	15A	1	0.03	0.10		1	20A	3/4"	#12	BASEMENT EAST TERMINAL UNITS	56
57							0.03	0.10	1	20A	3/4"	#12	1ST FLR EAST TERMINAL UNITS	58
59	AHU-06 BMS CTRL	#12	3/4"	20A	1			0.10 0.10	1	20A	3/4"	#12	1ST FLR EAST TERMINAL UNITS	60

NOTES:
NEW LOADS ARE SHOWN AS BOLD
$ CONNECT (E) BRANCH CIRCUIT TO (N) PANELBOARD AS REQUIRED.
# PROVIDE GFCI TYPE CIRCUIT BREAKER.

(N) PANEL 'LCJ'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 200A
SERVICE: 240/120 WYE | FED FROM: | MAINS: MLO
POLES: 60 | NEUTRAL: 100%
LOCATION: | U.O.N., SIZE CONDUITS PER NEC, BASED ON TYPE THWN/THHW | AIC: 10000
MOUNTING: SURFACE | NEMA: 1

#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	POLE	CB	COND	WIRE GND	LOAD NAME	#
$ 1	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	2 $
$ 3	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	4 $
$ 5	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	6 $
$ 7	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	8 $
$ 9	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	10 $
$ 11	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	12 $
$ 13	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	14 $
$ 15	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	16 $
$ 17	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	18 $
$ 19	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	20 $
$ 21	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	22 $
23	SPARE			20A	1			1	20A			SPARE	24
25	SPARE			20A	1			1	20A			SPARE	26
27	SPARE			20A	1			1	20A			SPARE	28
29	SPARE			20A	1			1	20A			SPARE	30
31	SPARE			20A	1			1	20A			SPARE	32
33	AHU-04 TERMINAL UNITS	#12	3/4"	20A	1	0.10	0.10	1	20A	3/4"	#12	AHU-05 TERMINAL UNITS	34
# 35	AHU-04 DX CTRL	#12	3/4"	15A	2		0.03 0.03	2	15A	3/4"	#12	AHU-05 DX CTRL	36
37						0.03	0.03						38
39	AHU-04 BMS CTRL	#12	3/4"	20A	1		0.10 0.10	1	20A	3/4"	#12	AHU-05 BMS CTRL	40

NOTES:
NEW LOADS ARE SHOWN AS BOLD
$ CONNECT (E) BRANCH CIRCUIT TO (N) PANELBOARD AS REQUIRED.
# PROVIDE GFCI TYPE CIRCUIT BREAKER.

PANEL '1-M1'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 250A
SERVICE: 480/277 WYE | FED FROM: | MAINS: MLO
POLES: 78 | NEUTRAL: 100%
LOCATION: | UNLESS OTHERWISE NOTED, SIZE CONDUITS PER NEC, BASED ON TYPE THWN/XHHW | AIC: 35,000
MOUNTING: SURFACE | NEMA: 3R

#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	CKT. KVA C	POLE	CB	COND	WIRE GND	LOAD NAME	#
1	PANEL 'P'					10.02	12.30							2
3	VIA	#2-8	1-1/4"	100A	3		11.54	12.30	3	50A	1"	#6-10	AH-08	4
5	XFMR 'T-P'							10.38 12.30						6
7	SPARE			20A	1				1	20A			SPARE	8
9	SPARE			20A	1				1	20A			SPARE	10
11	SPARE			20A	1				1	20A			SPARE	12
13	SPARE			20A	1				1	20A			SPARE	14
15	SPARE			20A	1				1	20A			SPARE	16
17	SPARE			20A	1				1	20A			SPARE	18
19	SPARE			20A	1				1	20A			SPARE	20
21	SPACE												SPACE	22
23	SPACE												SPACE	24
25	SPACE												SPACE	26
27	SPACE												SPACE	28
29	SPACE												SPACE	30
31	SPACE												SPACE	32
33	SPACE												SPACE	34
35	SPACE												SPACE	36
37	SPACE												SPACE	38
39	SPACE												SPACE	40
41	SPACE												SPACE	42
			TOTAL CONNECTED kVA			23.12	23.84	22.68						
			TOTAL CONNECTED AMPS			83.5	86.1	81.9						

	CONN. LOAD	DEMAND FACTOR	EST. DEMAND	PANEL TOTALS	
CONTINUOUS kVA @125%	0.00	125%	0.00	TOTAL CONN. LOAD	69.6 kVA
NON-CONTINOUS kVAD	32.74	100%	32.74	TOTAL EST. DEMAND	78.9 kVA
MOTOR kVA + 25%	36.91	125%	46.14	TOTAL CONNECTED CURRENT	83.8 AMP
KITCHEN kVA 0	0.00	100%	0.00	TOTAL EST. DEMAND CURRENT	94.9 AMP

NOTES:

(N) PANEL 'LCH'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 200A
SERVICE: 240/120 WYE | FED FROM: | MAINS: MLO
POLES: 42 | NEUTRAL: 100%
LOCATION: | U.O.N., SIZE CONDUITS PER NEC, BASED ON TYPE THWN/THHW | AIC: 10000
MOUNTING: SURFACE | NEMA: 1

#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	POLE	CB	COND	WIRE GND	LOAD NAME	#
$ 1	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	2 $
$ 3	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	4 $
$ 5	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	6 $
$ 7	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	8 $
$ 9	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	10 $
$ 11	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	12 $
$ 13	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	14 $
$ 15	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	16 $
$ 17	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	18 $
$ 19	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	20 $
$ 21	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	22 $
$ 23	(E) LOAD	(E)	(E)	30A	1			1	20A	(E)	(E)	(E) LOAD	24 $
$ 25	(E) LOAD	(E)	(E)	20A	1			1	20A	(E)	(E)	(E) LOAD	26 $
27				20A	1			1	20A				28
29				20A	1			1	20A				30
31				20A	1			1	20A				32
33				20A	1			1	20A				34
35	AHU-02 TERMINAL UNITS	#12	3/4"	20A	1		0.10	1	20A	3/4"	#12	AHU-01 TERMINAL UNITS	36
# 37	AHU-02 DX CTRL	#12	3/4"	15A	2	0.03	0.03	2	15A	3/4"	#12	AHU-01 DX CTRL	38
39							0.03 0.03						40
41	AHU-02 BMS CTRL	#12	3/4"	20A	1	0.10	0.10	1	20A	3/4"	#12	AHU-01 BMS CTRL	42

NOTES:
NEW LOADS ARE SHOWN AS BOLD
$ CONNECT (E) BRANCH CIRCUIT TO (N) PANELBOARD AS REQUIRED.
# PROVIDE GROUND FAULT CIRCUIT BREAKER.

NOIRLAB HVAC PROJECT
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ARCHITECTURE
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Revisions

#	Description	Date

Drawn: LHB
Checked: LHB
Issue Date: 18 JUL 2025

ELECTRICAL

PANEL SCHEDULES

Sheet Number
EP601

M3PN 240097

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PANEL 'R-HVM1A'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 600A
SERVICE: 480Y277 WYE | FED FROM: | MAINS: MLO
POLES: 60 | | NEUTRAL: 100%
LOCATION: | UNLESS OTHERWISE NOTED, SIZE CONDUITS PER NEC, BASED ON TYPE THWN/XHHW | AIC: 35,000
MOUNTING: SURFACE | | NEMA: 3R

	#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	CKT. KVA C	POLE	CB	COND	WIRE GND	LOAD NAME	#	
	1						6.07	6.07							2	
#	3	CU-01A	#8-10	3/4"	40A	3		6.07	6.07		3	40A	3/4"	#8-10	CU-03A	4 #
	5								6.07	6.07						6
	7						3.88	3.88								8
#	9	CU-01B	#12	3/4"	20A	3		3.88	3.88		3	20A	3/4"	#12	CU-03B	10 #
	11								3.88	3.88						12
	13						5.46	6.07								14
#	15	CU-02A	#8-10	3/4"	35A	3		5.46	6.07		3	40A	3/4"	#8-10	CU-04A	16 #
	17								5.46	6.07						18
	19						5.46	3.88								20
#	21	CU-02B	#8-10	3/4"	35A	3		5.46	3.88		3	20A	3/4"	#12	CU-04B	22 #
	23								5.46	3.88						24
	25						3.88	3.88								26
#	27	CU-09A	#12	3/4"	20A	3		3.88	3.88		3	20A	3/4"	#12	CU-04C	28 #
	29								3.88	3.88						30
	31						5.46	6.82								32
#	33	CU-19A	#8-10	3/4"	35A	3		5.46	6.82		3	35A	3/4"	#8-10	CU-05A	34 #
	35								5.46	6.82						36
	37	SPACE					6.82								SPACE	38
	39	SPACE						6.82			3	35A	3/4"	#8-10	CU-05B	40 #
	41	SPACE							6.82						SPACE	42
	43	SPACE					4.85								SPACE	44
	45	SPACE						4.85			3	20A	3/4"	#12	CU-05C	46 #
	47	SPACE							4.85						SPACE	48
	49	SPACE													SPACE	50
	51	SPACE													SPACE	52
	53	SPACE													SPACE	54
	55	SPACE													SPACE	56
	57	MINI-POWER CENTER	#4-10	1"	60A	2		2.78							SPACE	58
	59								2.78						SPACE	60

PANEL 'R-HVM1B'	58.44	58.44	58.44
TOTAL CONNECTED kVA	130.90	133.68	133.68
TOTAL CONNECTED AMPS	472.6	482.6	482.6

	CONN. LOAD	DEMAND FACTOR	EST. DEMAND	PANEL TOTALS	
CONTINUOUS kVA @125%	0.00	125%	0.00	TOTAL CONN. LOAD	398.3 kVA
NON-CONTINOUS kVAD	398.25	100%	398.25	TOTAL EST. DEMAND	398.3 kVA
MOTOR kVA + 25%	0.00	125%	0.00	TOTAL CONNECTED CURRENT	479.0 AMP
KITCHEN kVA 0	0.00	100%	0.00	TOTAL EST. DEMAND CURRENT	479.0 AMP

NOTES: PROVIDE FEED THRU LUGS.
DEVICE SHALL BE OF THE GFCI TYPE.

PANEL 'R-HVM2A'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 250A
SERVICE: 480Y277 WYE | FED FROM: | MAINS: MLO
POLES: 48 | | NEUTRAL: 100%
LOCATION: | UNLESS OTHERWISE NOTED, SIZE CONDUITS PER NEC, BASED ON TYPE THWN/XHHW | AIC: 35,000
MOUNTING: SURFACE | | NEMA: 1

	#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	CKT. KVA C	POLE	CB	COND	WIRE GND	LOAD NAME	#	
	1						6.69	5.46							2	
#	3	CU-06A-A	#8-10	3/4"	40A	3		6.69	5.46		3	35A	3/4"	#8-10	CU-18A-A	4 #
	5								6.69	5.46						6
	7						5.46	5.46								8
#	9	CU-06A-B	#8-10	3/4"	35A	3		5.46	5.46		3	35A	3/4"	#8-10	CU-18A-B	10 #
	11								5.46	5.46						12
	13						3.88	3.88								14
#	15	CU-06A-C	#12	3/4"	20A	3		3.88	3.88		3	20A	3/4"	#12	CU-18A-C	16 #
	17								3.88	3.88						18
	19						5.46	5.46								20
#	21	CU-06B-A	#8-10	3/4"	35A	3		5.46	5.46		3	35A	3/4"	#8-10	CU-18B-A	22 #
	23								5.46	5.46						24
	25						5.46	5.46								26
#	27	CU-06B-B	#8-10	3/4"	35A	3		5.46	5.46		3	35A	3/4"	#8-10	CU-18B-B	28 #
	29								5.46	5.46						30
	31						3.88	3.88								32
#	33	CU-06B-C	#12	3/4"	20A	3		3.88	3.88		3	20A	3/4"	#12	CU-18B-C	34 #
	35								3.88	3.88						36
	37	SPACE					3.85									38
	39	SPACE						3.85			3	20A	3/4"	#12	CU-22A	40 #
	41	SPACE							3.85							42
	43	SPACE													SPACE	44
	45	SPACE													SPACE	46
	47	SPACE													SPACE	48

TOTAL CONNECTED kVA	64.27	64.27	64.27
TOTAL CONNECTED AMPS	232.0	232.0	232.0

	CONN. LOAD	DEMAND FACTOR	EST. DEMAND	PANEL TOTALS	
CONTINUOUS kVA @125%	0.00	125%	0.00	TOTAL CONN. LOAD	192.8 kVA
NON-CONTINOUS kVAD	192.81	100%	192.81	TOTAL EST. DEMAND	192.8 kVA
MOTOR kVA + 25%	0.00	125%	0.00	TOTAL CONNECTED CURRENT	231.9 AMP
KITCHEN kVA 0	0.00	100%	0.00	TOTAL EST. DEMAND CURRENT	231.9 AMP

NOTES: # DEVICE SHALL BE OF THE GFCI TYPE.

PANEL 'R-HVM1B'

TYPE: | PROJECT: M3-PN | BUS AMPACITY: 600A
SERVICE: 480Y277 WYE | FED FROM: | MAINS: MLO
POLES: 48 | | NEUTRAL: 100%
LOCATION: | UNLESS OTHERWISE NOTED, SIZE CONDUITS PER NEC, BASED ON TYPE THWN/XHHW | AIC: 35,000
MOUNTING: SURFACE | | NEMA: 1

	#	LOAD NAME	WIRE GND	COND	CB	POLE	CKT. KVA A	CKT. KVA B	CKT. KVA C	POLE	CB	COND	WIRE GND	LOAD NAME	#	
	1						6.69	6.07							2	
#	3	CU-10A	#8-10	3/4"	40A	3		6.69	6.07		3	40A	3/4"	#8-10	CU-11A	4 #
	5								6.69	6.07						6
	7						6.69	3.88								8
#	9	CU-10B	#8-10	3/4"	40A	3		6.69	3.88		3	20A	3/4"	#12	CU-11B	10 #
	11								6.69	3.88						12
	13						3.88	3.88								14
#	15	CU-10C	#12	3/4"	20A	3		3.88	3.88		3	20A	3/4"	#12	CU-11C	16 #
	17								3.88	3.88						18
	19						3.85	5.46								20
#	21	CU-16A	#12	3/4"	20A	3		3.85	5.46		3	35A	3/4"	#8-10	CU-21A	22 #
	23								3.85	5.46						24
	25						3.88	3.85								26
#	27	CU-17A	#12	3/4"	20A	3		3.88	3.85		3	20A	3/4"	#12	CU-21B	28 #
	29								3.88	3.85						30
	31						5.46								SPACE	32
#	33	CU-20A	#8-10	3/4"	35A	3		5.46							SPACE	34
	35								5.46						SPACE	36
	37						4.85								SPACE	38
	39	CU-20B	#12	3/4"	20A	3		4.85							SPACE	40
	41								4.85						SPACE	42
	43	SPACE													SPACE	44
	45	SPACE													SPACE	46
	47	SPACE													SPACE	48

TOTAL CONNECTED kVA	58.44	58.44	58.44
TOTAL CONNECTED AMPS	211.0	211.0	211.0

	CONN. LOAD	DEMAND FACTOR	EST. DEMAND	PANEL TOTALS	
CONTINUOUS kVA @125%	0.00	125%	0.00	TOTAL CONN. LOAD	175.3 kVA
NON-CONTINOUS kVAD	175.31	100%	175.31	TOTAL EST. DEMAND	175.3 kVA
MOTOR kVA + 25%	0.00	125%	0.00	TOTAL CONNECTED CURRENT	210.9 AMP
KITCHEN kVA 0	0.00	100%	0.00	TOTAL EST. DEMAND CURRENT	210.9 AMP

NOTES: # DEVICE SHALL BE OF THE GFCI TYPE.

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ARCHITECTURE
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Revisions

#	Description	Date

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ELECTRICAL

PANEL SCHEDULES

Sheet Number
EP602

M3PN 240097

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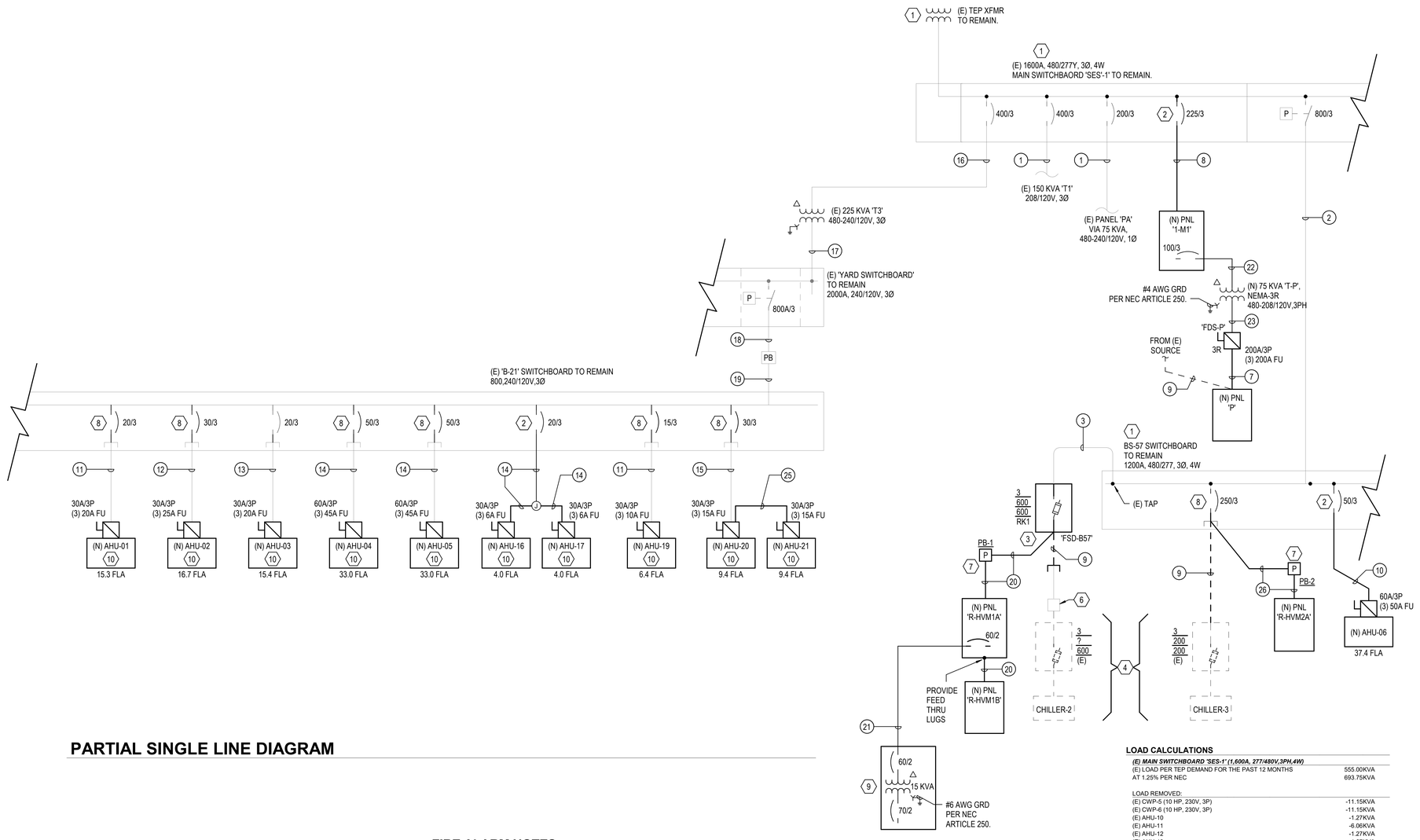
PARTIAL SINGLE LINE DIAGRAM



LOAD CALCULATIONS

(E) MAIN SWITCHBOARD 'SES-1' (1,600A, 277/480V,3PH,4W)

(E) LOAD PER TEP DEMAND FOR THE PAST 12 MONTHS	555.00KVA
AT 1.25% PER NEC	693.75KVA
LOAD REMOVED:	
(E) CWP-5 (10 HP, 230V, 3P)	-11.15KVA
(E) CWP-6 (10 HP, 230V, 3P)	-11.15KVA
(E) AHU-10	-1.27KVA
(E) AHU-11	-6.06KVA
(E) AHU-12	-1.27KVA
(E) AHU-13	-1.67KVA
(E) AHU-14	-1.67KVA
LOAD ADDED:	
(E) 'B-57'	184.24KVA
(N) PANEL '1-M1'	78.88KVA
TOTAL CODE LOAD	922.62KVA

922.6KVA/(1.732*480V)= 1110AMPS

SES-1 NOTE: WE WILL NEED THE HIGHEST DEMAND KW FOR THE PAST 12 MONTHS FROM THE UTILITY. M3 UNDERSTANDS THAT INFORMATION HAS BEEN PROVIDED TO US AT THE INITIAL OF THE PROJECT, HOWEVER, IT HAS BEEN APPROXIMATELY 1 YEAR WHEN M3 RECEIVED THE UTILITY DEMAND, THEREFORE WE NEED UPDATED UTILITY DEMAND.

(E) 'B-57' (800A, 277/480V, 3PH, 4W)

LOAD REMOVED:	
(E) CHILLER-2 (267.8 MCA, 480V, 3P)	-222.6KVA
(E) CHILLER-3 (225 MCA, 480V, 3P)	-187.1KVA
(E) AHU-06 (34 FLA, 480V, 3P)	-28.3KVA
LOAD ADDED:	
(N) PANEL 'R-HVM1A/R-HVM1B'	398.3KVA
(N) PANEL 'R-HVM2A'	192.8KVA
(N) AHU-06 (37.4 FLA, 480V/3P)	31.1KVA
ADDED LOAD	184.2KVA

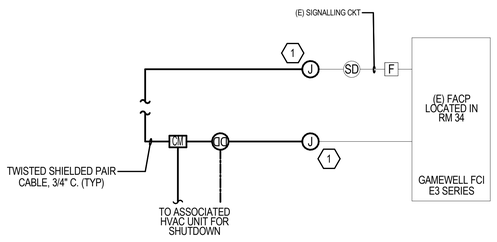
184.2KVA/(1.732*480V)= 222AMPS

B-57 NOTE: LOAD ADDED IS MORE THAN WHAT LOAD IS BEING REMOVED, THEREFORE 30-DAY RECORDERS WILL BE REQUIRED TO BE INSTALLED. RECORDERS SHALL READ THE HIGHEST AVERAGE KW REACHED AND MAINTAINED FOR A 15-MINUTE INTERVAL CONTINUOSELY RECORDED FOR A MINIMUM OF 30-DAYS.

(E) SECTION 'B-21' (460A, 240/120V, 3PH, 4W)

LOAD REMOVED:	
(E) AHU-01	-5.7KVA
(E) AHU-02	-8.0KVA
(E) AHU-03	-5.7KVA
(E) AHU-04	-12.1KVA
(E) AHU-05	-12.1KVA
(E) AHU-08	-1.7KVA
(E) AHU-09	-1.3KVA
(E) AHU-16/17	-2.2KVA
(E) AHU-19	-2.7KVA
(E) AHU-20/21	-10.0KVA
(E) HWP-1 (1.5 HP, 230V, 3P)	-2.39KVA
(E) HWP-2 (1.5 HP, 230V, 3P)	-2.39KVA
LOAD ADDED:	
(N) AHU-01	6.1KVA
(N) AHU-02	6.7KVA
(N) AHU-03	6.1KVA
(N) AHU-04	13.1KVA
(N) AHU-05	13.1KVA
(N) AHU-16/17	3.2KVA
(N) AHU-19	2.5KVA
(N) AHU-20/21	7.5KVA
NET LOAD REDUCTION	-7.74KVA

PARTIAL FIRE ALARM DIAGRAM



FIRE ALARM NOTES

1. CONTRACTOR SHALL PROVIDE BOOSTER POWER SUPPLIES AS REQUIRED BY MANUFACTURER. COORDINATE LOCATIONS WITH OWNER. PROVIDE SMOKE DETECTOR WITHIN 2' OF EACH BOOSTER POWER SUPPLY.
2. SEE SYSTEMS PLANS FOR LOCATIONS AND NUMBER OF DEVICES.
3. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2018 IFC & IBC AND CITY OF TUCSON AMENDMENTS.
4. ALL WIRING SHALL BE PULLED SPLICE FREE. THE USE OF WIRE NUTS IS PROHIBITED.
5. PROVIDE 6' SEPARATION BETWEEN SUPPLY AND RETURN LOOPS. (TYP FOR ALL INITIATION LOOPS).
6. INSTALL NEW WIRING AS A CLASS 'B' SYSTEM. EACH CIRCUIT OUTGOING AND RETURN CONDUCTORS EXITING AND RETURNING TO THE CONTROL UNIT ARE TO BE ROUTED SEPARATELY AS REQUIRED BY NFPA 72. ALL WIRING SHALL BE PER THE REQUIREMENTS OF NFPA 72.
7. DESIGN IS CONCEPTUAL ONLY. CONTRACTOR SHALL ADD ADDITIONAL DEVICES TO COMPLY WITH CODES LISTED ABOVE AT NO ADDITIONAL COST TO OWNER.
8. CONTRACTOR SHALL PROVIDE ADDITIONAL DEVICES IF REQUIRED BY THE FIRE MARSHALL AT NO ADDITIONAL COST TO THE OWNER.
9. ALL WORK SHALL BE IN ACCORDANCE WITH THE ARIZONA FIRE CODE.
10. PROVIDE SHOP DRAWING FOR REVIEW AND APPROVAL.

FIRE ALARM KEYNOTES (#)

1. INTERCEPT & EXTEND EXISTING CONDUIT & CONDUCTORS AS INDICATED.

KEYNOTES (1)

1. (E) EQUIPMENT TO REMAIN.
2. (N) CIRCUIT BREAKER IN (E) SPACE . MATCH (E) MANUFACTURER AND AIC RATING.
3. (N) FUSED DISCONNECT REPLACING (E).
4. (E) ELECTRICAL TO BE REMOVED.
5. (E) CONDUIT TO BE INTERCEPTED AND EXTENDED AS INDICATED.
6. (E) PULL BOX TO REMAIN. REFER TO FLOOR PLANS FOR APPROXIMATE LOCATION.
7. PROVIDE PULL BOX SIZED PER THE NEC. REFER TO FLOOR PLANS FOR APPROXIMATE LOCATION.
8. (N) CIRCUIT BREAKER REPLACING (E). MATCH (E) MANUFACTURER AND AIC RATING AS REQUIRED.
9. EATON MINI-POWER CENTER #P48G11S15CUB OR EQUAL.
10. (N) HVAC UNIT REPLACING (E).
11. (N) PANEL 'P' REPLACING (E).

WIRE AND CONDUIT KEYNOTES (1)

1. (E) FEEDER TO REMAIN.
2. (E) (3) SETS: (3) #350 KCMIL, (1) #3/0 AWG NEUTRAL, #1/0 AWG GND., 3" C EACH SET TO REMAIN.
3. (E) (2) 3" C W/ (N) (4) #350 KCMIL, #2/0 AWG GND. REPLACING (E) CONDUCTORS IN EACH CONDUIT.
4. (E) 3-1/2" C TO REMAIN. (E) CONDUCTORS TO BE REPLACED WITH PULLCORD. PROVIDE CAP..
5. (N) (4) #600 KCMIL, #2 AWG GND., 3-1/2" C.
6. (E) 2" C W/ (N) (4) #3/0 AWG., #6 AWG GND. REPLACING (E) CONDUCTORS.
7. (N) (4) #3/0 AWG, #6 AWG GND., 2-1/2" C.
8. (N) (4) #4/0 AWG, #4 AWG GND., 2-1/2" C.
9. (E) FEEDER TO BE REMOVED.
10. (3) #6 AWG, #10 AWG GND., 1" C.
11. (E) 3/4" C TO REMAIN W/ (N) (3) #12 AWG, #12 AWG GND REPLACING (E) BRANCH CONDUCTORS.
12. (E) 3/4" C TO REMAIN W/ (N) (3) #10 AWG, #10 AWG GND REPLACING (E) BRANCH CONDUCTORS.
13. (E) 1" C TO REMAIN W/ (N) (3) #12 AWG, #12 AWG GND REPLACING (E) BRANCH CONDUCTORS.
14. (E) 3/4" C TO REMAIN W/ (N) (3) #6 AWG, #10 AWG GND REPLACING (E) BRANCH CONDUCTORS.
15. (E) 1" C TO REMAIN W/ (N) (3) #10 AWG, #10 AWG GND REPLACING (E) BRANCH CONDUCTORS.
16. (E) 400A FEEDER TO REMAIN.
17. (E) (2) SETS: (4) #350 KCMIL, 3-1/2" C EACH SET.
18. (E) (1) 3-1/2" C W/ (4) SETS OF (3) #4/0 AWG, (1) #1/0 AWG NEUTRAL.
19. (E) (2) SETS: (3) #4/0 AWG, (1) #1/0 AWG NEUTRAL, 3" C EACH SET.
20. (N) (3) SETS: (4) #350 KCMIL, #1 AWG GND., 3" C EACH SET.
21. (N) (3) #4 AWG, #10 AWG GND., 1" C.
22. (N) (3) #2 AWG, #8 AWG GND., 1-1/4" C.
23. (N) (4) #3/0 AWG, #4 AWG GND., 2-1/2" C.
24. (N) (3) #12 AWG, #12 AWG GND., 3/4" C.
25. (N) (3) #10 AWG, #10 AWG GND., 3/4" C.
26. (N) (4) #250 KCMIL, #4 AWG GND., 2-1/2" C.

GENERAL NOTES

A. ELECTRICAL SHOWN AS DASH SHALL BE REMOVED (U.O.N.).
B. ELECTRICAL SHOWN AS BOLD IS NEW.

NOIRLAB HVAC PROJECT
TUCSON MAIN FACILITY

BID DOCUMENTS

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Revisions

#	Description	Date

Drawn: LHB
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Issue Date: 18 JUL 2025

ELECTRICAL

PARTIAL SINGLE LINE DIAGRAM

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