



SINGLE LINE PIPING SYMBOLS

—SV—	STEAM VENT
—HWS—	HEATING-HOT WATER SUPPLY
—HWR—	HEATING-HOT WATER RETURN
—CHS—	CHILLED WATER SUPPLY
—CHR—	CHILLED WATER RETURN
—HCS—	HOT/CHILLED WATER SUPPLY
—HCR—	HOT/CHILLED WATER RETURN
—B—	BRINE SUPPLY
—BR—	BRINE RETURN
—D—	CONDENSATE DRAIN
—C—	COLD CONDENSER WATER
—CR—	HOT CONDENSER WATER
—MU—	MAKE-UP WATER
—HG—	REFRIGERANT HOT GAS
—RS—	REFRIGERANT SUCTION
—RL—	REFRIGERANT LIQUID
—CP—	CONDENSATE PUMP DISCHARGE
—BFW—	BOILER FEEDWATER
—BD—	BOILER BLOW DOWN
—FOS—	FUEL-OIL SUPPLY
—FOR—	FUEL-OIL RETURN
—FOV—	FUEL-OIL VENT
—RHS—	REHEAT HOT WATER SUPPLY
—RHR—	REHEAT HOT WATER RETURN
—LPS—	LOW PRESSURE STEAM
—LPC—	LOW PRESSURE CONDENSATE
—PSC—	PUMPED STEAM CONDENSATE
—ST—	STEAM TRAP
—DS—	DRIP STATION
—P.R.S—	PRESSURE REDUCING STATION

—FA—	PIPE ANCHOR
—PG—	PIPE GUIDE OR SLEEVES EXPANSION JOINT
—V—	VENTURI
—GV—	GATE VALVE
—G—	GLOBE VALVE
—HV—	HOSE VALVE WITH CAP
—BV—	BUTTERFLY VALVE
—CV—	CHECK VALVE
—BAL—	BALANCING VALVE
—CBV—	CALIBRATED BALANCING VALVE
—PICBY—	TWO WAY PRESSURE INDEPENDENT CONTROL AND BALANCING VALVE
—AFV—	AUTOMATIC FLOW CONTROL VALVE
—BV—	BALL VALVE
—PV—	PLUG VALVE
—SV—	SOLENOID VALVE
—SPRV—	SAFETY OR PRESSURE RELIEF, ANGLE VALVE
—SPRV—	SAFETY OR PRESSURE RELIEF, STRAIGHT THRU VALVE
—PRV—	PRESSURE REDUCING VALVE (PRV)
—ACV—	AUTOMATIC CONTROL VALVE, 2 WAY
—ACV—	AUTOMATIC CONTROL VALVE, 3 WAY
—IF—	BLIND FLANGE
—LY—	LATERAL Y
—ELB—	ELBOW, 90°
—ELB—	ELBOW, 90° TURNED UP
—ELB—	ELBOW, 90° TURNED DOWN
—ELB—	ELBOW, 45°
—TEE—	TEE
—TEE—	TEE, OUTLET TURNED UP
—TEE—	TEE, OUTLET TURNED DOWN
—CR—	CONCENTRIC REDUCER
—UR—	ECCENTRIC REDUCER (STRAIGHT INVERT) UNION
—FPC—	FLEXIBLE PIPE CONNECTION
—PG—	PRESSURE GAGE WITH SHUT OFF COCK AND SIPHON OR PULSATON DAMPENERS
—TG—	TEMPERATURE GAGE
—PT—	THERMOMETER
—PT—	PRESSURE/TEMPERATURE TEST PORT
—DCV—	DOUBLE CHECK VALVE BACKFLOW PREVENTER

DOUBLE LINE DUCTWORK SYMBOLS

12x6	RECTANGULAR DUCT (FIRST FIGURE IS FOR SIDE SHOWN, SECOND FIGURE IS FOR SIDE NOT SHOWN)
12"ø	ROUND DUCT
12x6ø	FLAT OVAL DUCT (FIRST FIGURE IS FOR SIDE SHOWN, SECOND FIGURE IS FOR SIDE NOT SHOWN)
	FLEXIBLE ROUND DUCT
—FC—	FLEXIBLE DUCT CONNECTION
—DAMPERS—	DAMPERS 3FD: 3HR FIRE DAMPER BDD: BACKDRAFT DAMPER FSD: FIRE/SMOKE DAMPER FD: FIRE DAMPER MD: MOTORIZED DAMPER SD: SMOKE DAMPER VD: VOLUME DAMPER SP: SECURE PENETRATION
—TR—	DUCT TRANSITION, ROUND OR FLAT OVAL TO RECTANGULAR
—TR—	DUCT TRANSITION, RECTANGULAR TO ROUND OR FLAT OVAL
—TR—	DUCT TRANSITION, RECTANGULAR, ROUND, OR FLAT OVAL
—R—	INCLINED RISE W/RESPECT TO AIR FLOW, RECTANGULAR
—D—	INCLINED DROP W/RESPECT TO AIR FLOW, RECTANGULAR
—R—	INCLINED RISE W/RESPECT TO AIR FLOW, ROUND OR FLAT OVAL
—D—	INCLINED DROP W/RESPECT TO AIR FLOW, ROUND OR FLAT OVAL
—90°—	90° ELBOW, RECTANGULAR WITH TURNING VANES
—45°—	45° ELBOW, RECTANGULAR
—90°—	90° ELBOW, ROUND OR FLAT OVAL (SMOOTH OR 5 PIECE ELBOWS)
—MITER—	MITERED 90° ELBOW, ROUND OR FLAT OVAL
—45°—	45° ELBOW, ROUND OR FLAT OVAL (SMOOTH OR 3 PIECE ELBOWS)
—DF—	DIVIDED FLOW FITTING
—WIL—	DUCT WILING (SPECIFIED WHEN SHOWN TYPICAL RECTANGULAR, ROUND, OVAL) SEE MECHANICAL GENERAL NOTE 4.

—TB—	TAP-IN BRANCH, RECTANGULAR
—TB—	BRANCH DUCT, CONICAL LATERAL FITTING, ROUND OR FLAT OVAL
—TB—	BRANCH DUCT, CONICAL TEE FITTING, ROUND OR FLAT OVAL
—TB—	BRANCH DUCT, "Y" FITTING, ROUND OR FLAT OVAL
—SD—	SUPPLY DUCT SECTION
—RD—	RETURN/EXHAUST DUCT SECTION
—90°—	90° ELBOW TURNED UP, RECTANGULAR
—90°—	90° ELBOW TURNED DOWN, RECTANGULAR
—90°—	90° ELBOW TURNED UP, ROUND
—90°—	90° ELBOW TURNED DOWN, ROUND
—90°—	90° ELBOW TURNED UP, FLAT OVAL
—90°—	90° ELBOW TURNED DOWN, FLAT OVAL
—CD—	CEILING DIFFUSER (4-WAY THROW UNLESS INDICATED OTHERWISE BY ARROWS)
—CD—	CEILING DIFFUSER (4-WAY THROW UNLESS INDICATED OTHERWISE BY ARROWS)
—CR—	CEILING REGISTER OR GRILLE (RETURN)
—CR—	CEILING REGISTER OR GRILLE (SUPPLY)
—R—	REGISTER OR GRILLE
—CD—	CEILING DIFFUSER WITH FLEXIBLE DUCT CONNECTION (4-WAY THROW UNLESS INDICATED OTHERWISE BY ARROWS)
—S—	LIGHT TROFFER WITH FLEXIBLE DUCT CONNECTION "S" INDICATES SOFFIT, NUMBER INDICATES CFM
—CL—	CEILING LINEAR SLOT OR INTEGRATED CEILING DIFFUSER (CLSD) WITH FLEXIBLE DUCT CONNECTION (ARROWS INDICATE THROW DIRECTIONS)
—SPS—	STATIC PRESSURE SENSOR
—H—	HUMIDIFIER

MECHANICAL GENERAL NOTES

- SEE SH G-003 & G-004 FOR ABBREVIATIONS. CHARACTER IDENTIFIERS IN LINES ON PIPING LEGEND ARE ALSO USED FOR ABBREVIATIONS.
- MECHANICAL LAYOUTS ARE SCHEMATIC. PROVIDE ANY ADDITIONAL DROPS, RISES, OR OFFSETS REQUIRED FOR A COMPLETE INSTALLATION. COORDINATE EXACT ROUTING OF WORK WITH ALL OTHER TRADES AND OBSTRUCTIONS. WORK WITH LIGHTS, CEILING GRID, AND OTHER OBSTRUCTIONS.
- UNLESS OTHERWISE INDICATED, ROUTE ALL DUCTWORK AND PIPING ABOVE CEILINGS. ROUTE ALL DUCTWORK AND PIPING AS HIGH AS POSSIBLE IN AREAS WITHOUT CEILINGS.
- DUCT DIMENSIONS ARE INSIDE CLEAR DIMENSIONS. INCREASE SHEET METAL DIMENSIONS ON LINED DUCTWORK TO MAINTAIN THE INSIDE CLEAR DIMENSIONS INDICATED.
- UNLESS OTHERWISE INDICATED, PROVIDE DUCT AND FLEXIBULE DUCT RUNOUTS TO TERMINAL AIR DEVICES SAME SIZE AS AIR DEVICE NECK.
- INSTALL CALIBRATED BALANCING VALVES AND VENTURIS WITH A MINIMUM UNRESTRICTED STRAIGHT RUN OF 5 PIPE DIAMETERS UPSTREAM AND 3 PIPE DIAMETERS DOWNSTREAM.
- SEE ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATIONS OF DIFFUSERS, LINEAR SLOT DIFFUSERS, REGISTERS, AND GRILLES.
- VERIFY EXACT SIZES AND LOCATIONS OF EXISTING WORK BEFORE PURCHASING OR FABRICATING NEW WORK FOR CONNECTION TO OR INSTALLATION IN EXISTING WORK.
- SOME SYMBOLS INDICATED ON THIS LEGEND SHEET MAY NOT APPEAR ON THE DRAWINGS.
- DO NOT LOCATE MECHANICAL WORK IN ELECTRICAL OR COMMUNICATION ROOMS, EXCEPT FOR RUNOUTS SPECIFICALLY SERVING THE RESPECTIVE ROOM.
- DUCTS CROSSING WALLS WITH A RATING OF ONE-HOUR OR LESS SHALL HAVE GALVANIZED DUCTWORK OF AT LEAST 1.2 MM THICK.

MISC SYMBOLS

0000	ROOM NUMBER
ø	ROUND DUCT
—FO—	FLAT OVAL DUCT
—PC—	POINT OF CONNECTION BETWEEN NEW AND EXISTING WORK
—R—	POINT BETWEEN EXISTING WORK TO REMAIN AND EXISTING WORK TO BE REMOVED
—WS—	WATER SENSOR (LOCATED BELOW ACCESS FLOOR)
—HD—	HEAT DETECTOR
—SD—	SMOKE DETECTOR
—DPS—	DIFFERENTIAL PRESSURE SENSOR
—VFD—	VARIABLE FREQUENCY DRIVE
—ATFP—	ANTI TERRORISM / FORCE PROTECTION SWITCH
—M—	METER
—IT—	INTERVAL TIMER
—H—	HUMIDISTAT
—T—	THERMOSTAT
—N—	NIGHT THERMOSTAT
—S—	WALL SWITCH
—V—	FUEL VAPOR SENSOR
—AD—	AIR DEVICE TYPE (SEE AIR DEVICE SCHEDULE)
—AF—	AIR DEVICE AIRFLOW (CFM)
—FA—	FLOW ARROWS INDICATE AIRFLOW DIRECTION (WHEN LESS THAN 4-WAY THROW)

SINGLE LINE DUCTWORK SYMBOLS

300x150	RECTANGULAR DUCT (FIRST FIGURE IS FOR SIDE SHOWN, SECOND FIGURE IS FOR SIDE NOT SHOWN)
1500ø	ROUND DUCT
900x450ø	FLAT OVAL DUCT (FIRST FIGURE IS FOR SIDE SHOWN, SECOND FIGURE IS FOR SIDE NOT SHOWN)
—FR—	FLEXIBLE ROUND DUCT
—FC—	FLEXIBLE DUCT CONNECTION
—DAMPERS—	DAMPERS BDD: BACKDRAFT DAMPER FSD: FIRE/SMOKE DAMPER FD: FIRE DAMPER MD: MOTORIZED DAMPER SD: SMOKE DAMPER VD: VOLUME DAMPER
—TR—	DUCT TRANSITION
—R—	INCLINED RISE W/RESPECT TO AIR FLOW, RECTANGULAR
—D—	INCLINED DROP W/RESPECT TO AIR FLOW, RECTANGULAR
—R—	INCLINED RISE W/RESPECT TO AIR FLOW, ROUND OR FLAT OVAL
—D—	INCLINED DROP W/RESPECT TO AIR FLOW, ROUND OR FLAT OVAL
—90°—	90° ELBOW, RECTANGULAR WITH TURNING VANES

—90°—	90° ELBOW, ROUND OR FLAT OVAL (SMOOTH OR 5-PIECE ELBOWS)
—45°—	45° ELBOW, RECTANGULAR
—45°—	45° ELBOW, ROUND OR FLAT OVAL (SMOOTH OR 3-PIECE ELBOWS)
—DF—	DIVIDED FLOW FITTING, RECTANGULAR
—TB—	RECTANGULAR TAP-IN BRACH OR ROUND OR FLAT OVAL CONICAL TEE
—TB—	INCLINED CONICAL TAKE-OFF, ROUND OR FLAT OVAL
—TB—	"Y" FITTING, ROUND OR FLAT OVAL
—90°—	90° ELBOW TURNED UP, RECTANGULAR
—90°—	90° ELBOW TURNED, DOWN, RECTANGULAR
—90°—	90° ELBOW TURNED UP, ROUND, FLAT OVAL SIMILAR
—90°—	90° ELBOW TURNED DOWN, ROUND, FLAT OVAL SIMILAR
—CD—	CEILING DIFFUSER (ARROWS INDICATE THROW DIRECTIONS)
—CR—	CEILING REGISTER OR GRILLE, RETURN
—CR—	CEILING REGISTER OR GRILLE, SUPPLY
—SPS—	STATIC PRESSURE SENSOR
—END—	END OF DUCT RUN

ISSUE/REVISION

NO.	DATE	DESCRIPTION
1	01/03/2025	FINAL DESIGN SUBMISSION

KEY PLAN

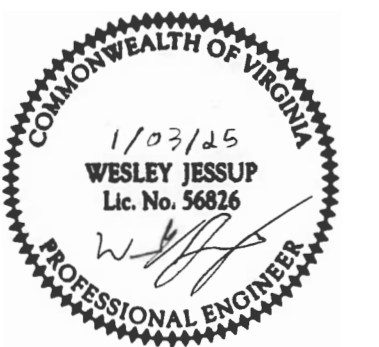
PROJECT NUMBER

SHEET TITLE

MECHANICAL LEGEND AND GENERAL NOTES

SHEET NUMBER

M-001

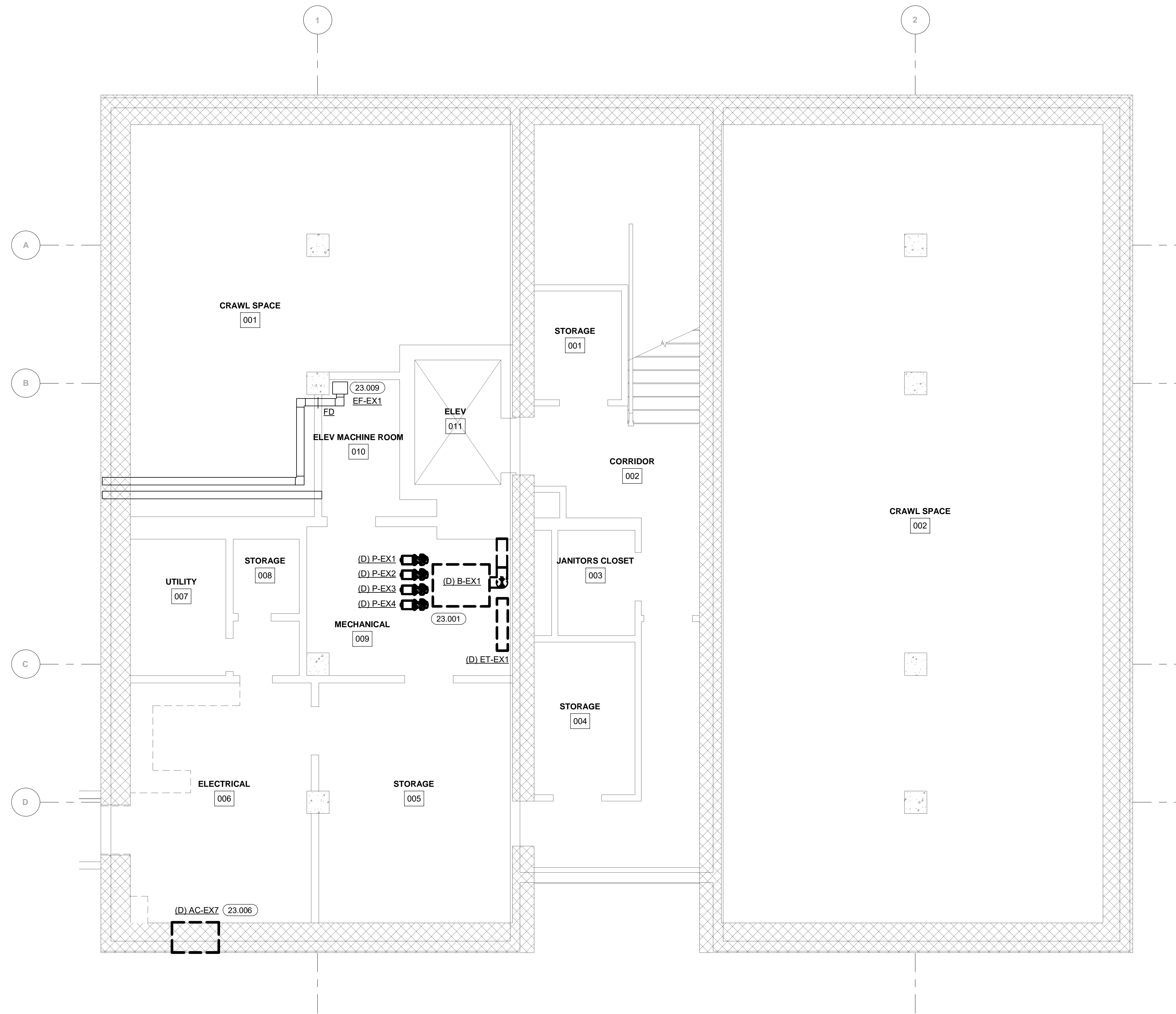


GENERAL NOTES THIS SHEET

- A. REFER TO SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.

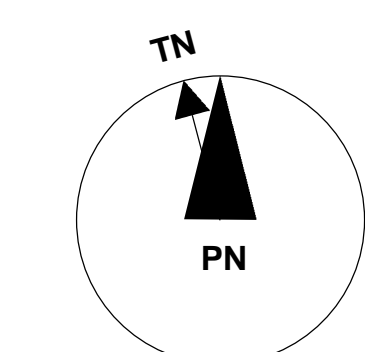
SHEET KEYNOTES:

- 23.001 DEMOLISH EXISTING BOILER AND ITS ASSOCIATED DUCT FLUE, EXPANSION TANK, PUMPS, DISTRIBUTION PIPING INCLUDING THE FIRST AND SECOND FLOORS, ELECTRICAL CONNECTIONS AND CONTROLS.
- 23.006 DEMOLISH EXISTING THROUGH-WALL AIR CONDITIONING UNIT AND ITS ASSOCIATED REFRIGERANT PIPING, ELECTRICAL CONNECTIONS AND CONTROLS. PATCH OPENING, REFER TO ARCH.
- 23.009 EXISTING EXHAUST FAN AND ASSOCIATED DUCTWORK TO REMAIN.



MECHANICAL DEMOLITION PLAN - BASEMENT

1/4" = 1'-0"



GRAPHIC SCALES

ISSUE/REVISION

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KEY PLAN

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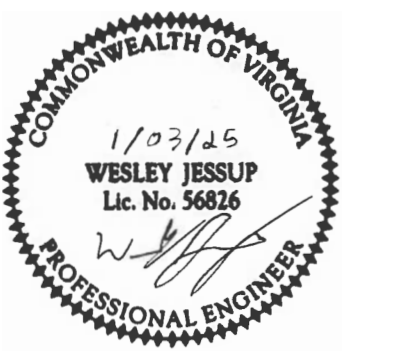
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SHEET TITLE

MECHANICAL DEMOLITION PLAN - BASEMENT

SHEET NUMBER

MD100

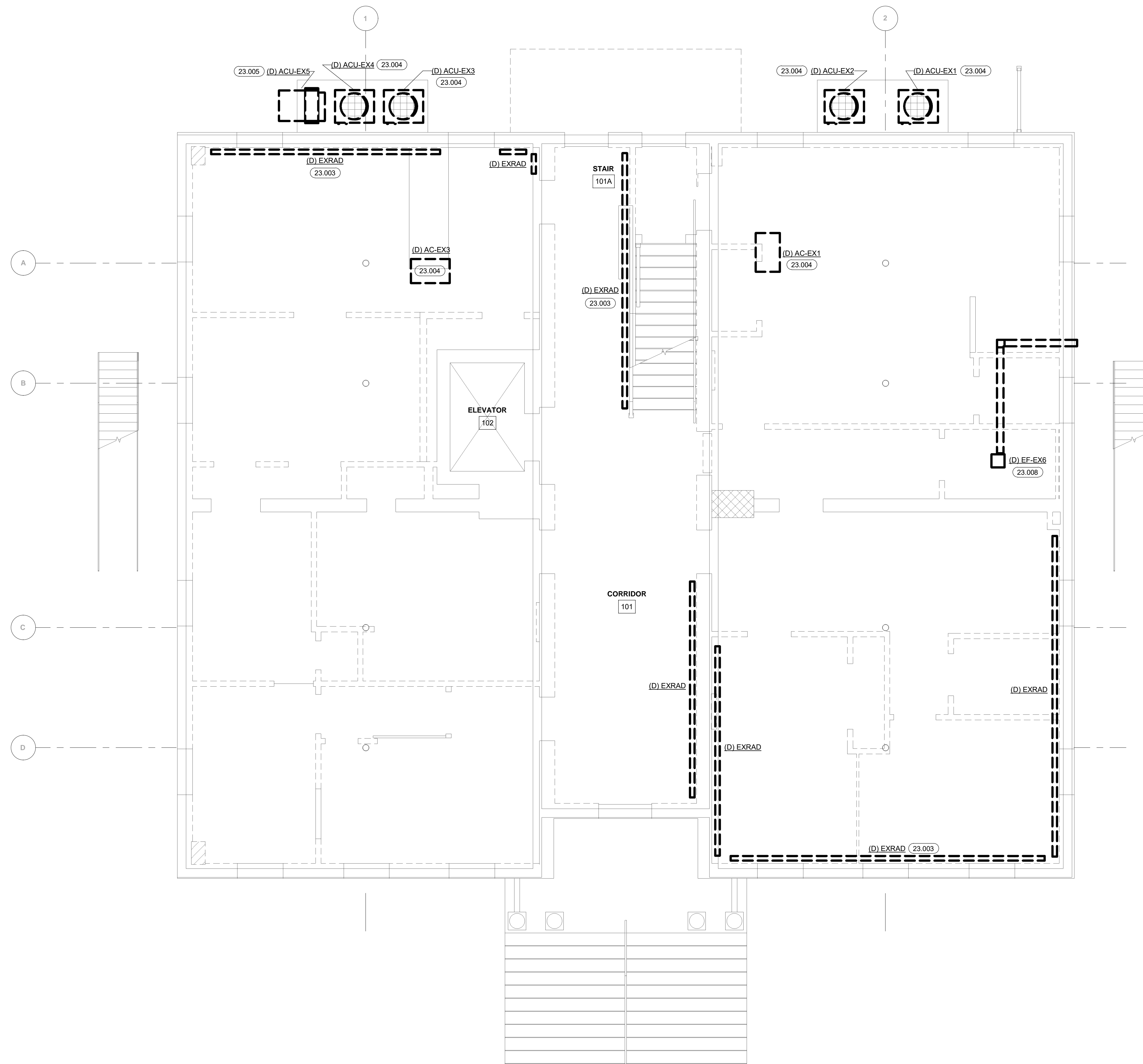


GENERAL NOTES THIS SHEET

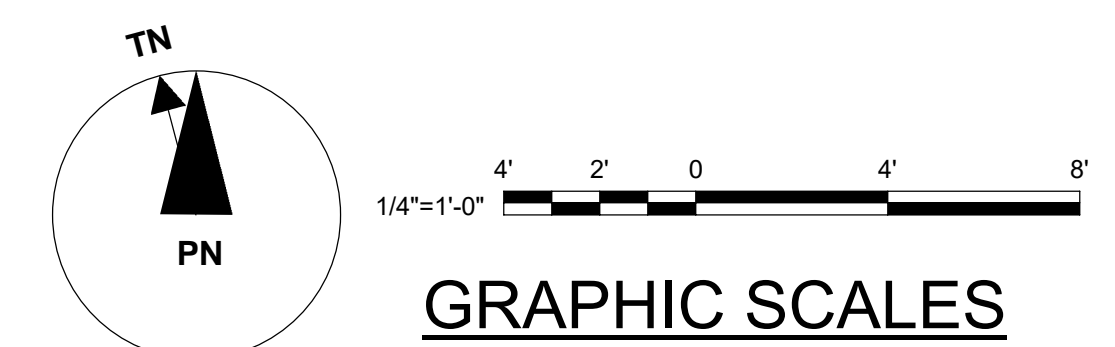
- A. REFER TO SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.

SHEET KEYNOTES:

- 23.003 DEMOLISH EXISTING PERIMETER RADIATOR AND ITS ASSOCIATED HOT WATER PIPING, ELECTRICAL CONNECTIONS AND CONTROLS. TYPICAL FOR ALL EXISTING PERIMETER RADIATORS.
- 23.004 DEMOLISH EXISTING GAS FIRED SPLIT SYSTEM INDOOR AIR CONDITIONING UNIT AND ITS ASSOCIATED OUTDOOR CONDENSING UNIT, DUCTWORK, AIR DEVICES, REFRIGERANT PIPING, ELECTRICAL CONNECTIONS AND CONTROLS. DEMOLISH GAS PIPING BACK TO THE GAS METER.
- 23.005 DEMOLISH EXISTING MINI-SPLIT SYSTEM AIR CONDITIONER SECOND FLOOR INDOOR UNIT AND ITS ASSOCIATED OUTDOOR CONDENSING UNIT, REFRIGERANT PIPING, ELECTRICAL CONNECTIONS AND CONTROLS.
- 23.008 DEMOLISH EXISTING EXHAUST FAN AND ITS ASSOCIATED DUCTWORK, ELECTRICAL CONNECTIONS AND CONTROLS. CAP AND INSULATE OPEN CONNECTION TO OUTSIDE.



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



ISSUE/REVISION

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KEY PLAN

PROJECT NUMBER

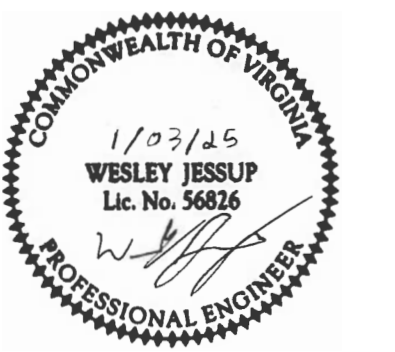
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SHEET TITLE

MECHANICAL DEMOLITION PLAN - FIRST FLOOR

SHEET NUMBER

MD101

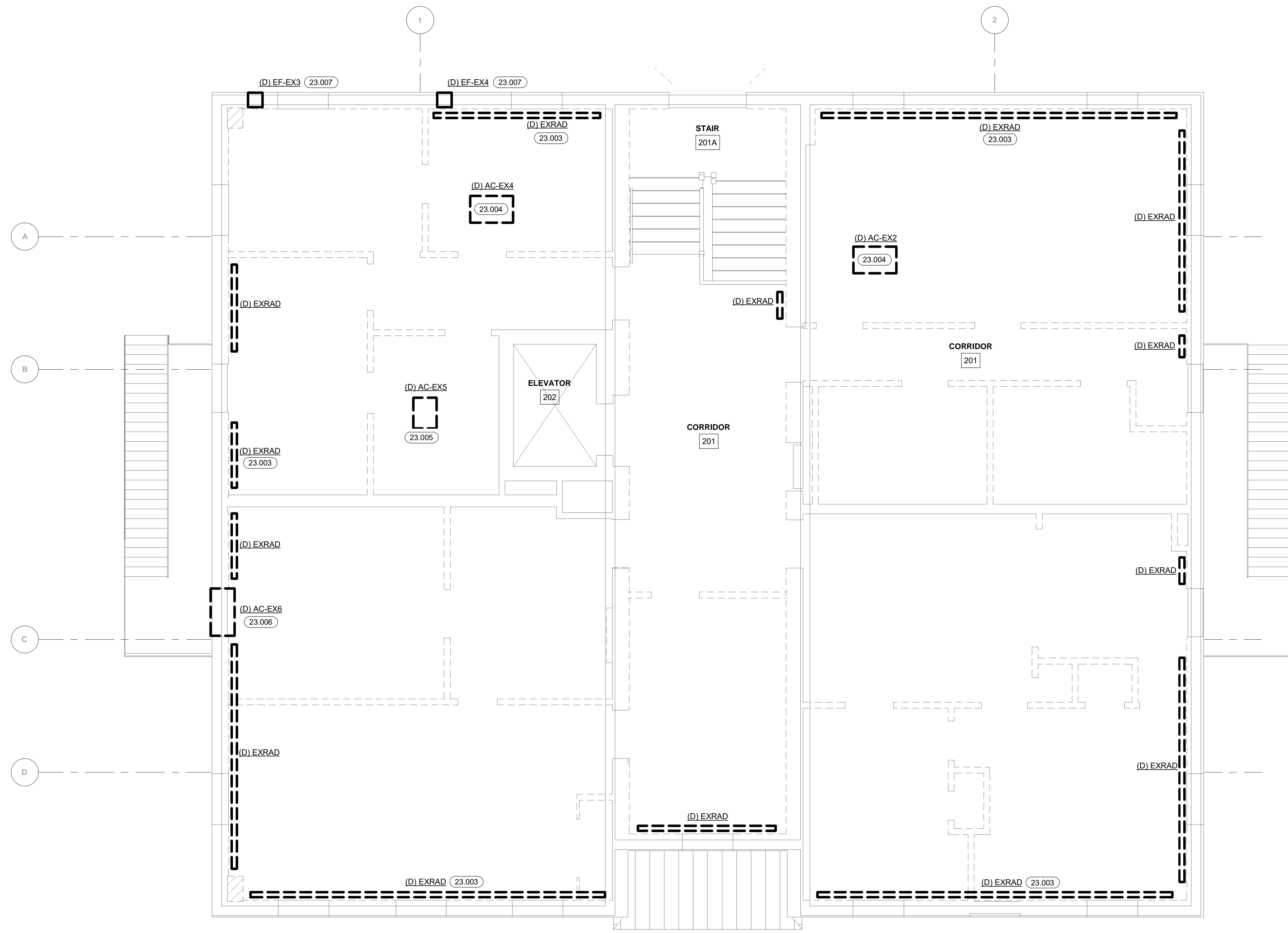


GENERAL NOTES THIS SHEET

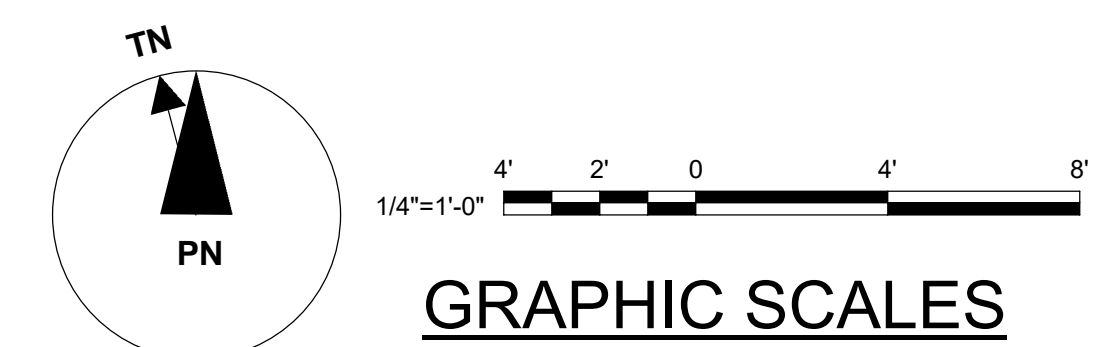
- A. REFER TO SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.

SHEET KEYNOTES:

- 23.003 DEMOLISH EXISTING PERIMETER RADIATOR AND ITS ASSOCIATED HOT WATER PIPING, ELECTRICAL CONNECTIONS AND CONTROLS. TYPICAL FOR ALL EXISTING PERIMETER RADIATORS.
- 23.004 DEMOLISH EXISTING GAS FIRED SPLIT SYSTEM INDOOR AIR CONDITIONING UNIT AND ITS ASSOCIATED OUTDOOR CONDENSING UNIT, DUCTWORK, AIR DEVICES, REFRIGREANT PIPING, ELECTRICAL CONNECTIONS AND CONTROLS. DEMOLISH GAS PIPING BACK TO THE GAS METER.
- 23.005 DEMOLISH EXISTING MINI-SPLIT SYSTEM AIR CONDITIONER SECOND FLOOR INDOOR UNIT AND ITS ASSOCIATED OUTDOOR CONDENSING UNIT, REFRIGREANT PIPING, ELECTRICAL CONNECTIONS AND CONTROLS.
- 23.006 DEMOLISH EXISTING THROUGH-WALL AIR CONDITIONING UNIT AND ITS ASSOCIATED REFRIGREANT PIPING, ELECTRICAL CONNECTIONS AND CONTROLS. PATCH OPENING, REFER TO ARCH.
- 23.007 DEMOLISH EXISTING EXHAUST FAN AND ITS ASSOCIATED ELECTRICAL CONNECTIONS AND CONTROLS. PATCH OPENING, REFER TO ARCH.



MECHANICAL DEMOLITION PLAN - SECOND FLOOR
 1/4" = 1'-0"



ISSUE/REVISION

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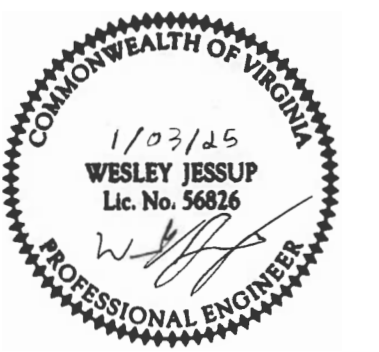
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SHEET TITLE

MECHANICAL DEMOLITION PLAN - SECOND FLOOR

SHEET NUMBER

MD102

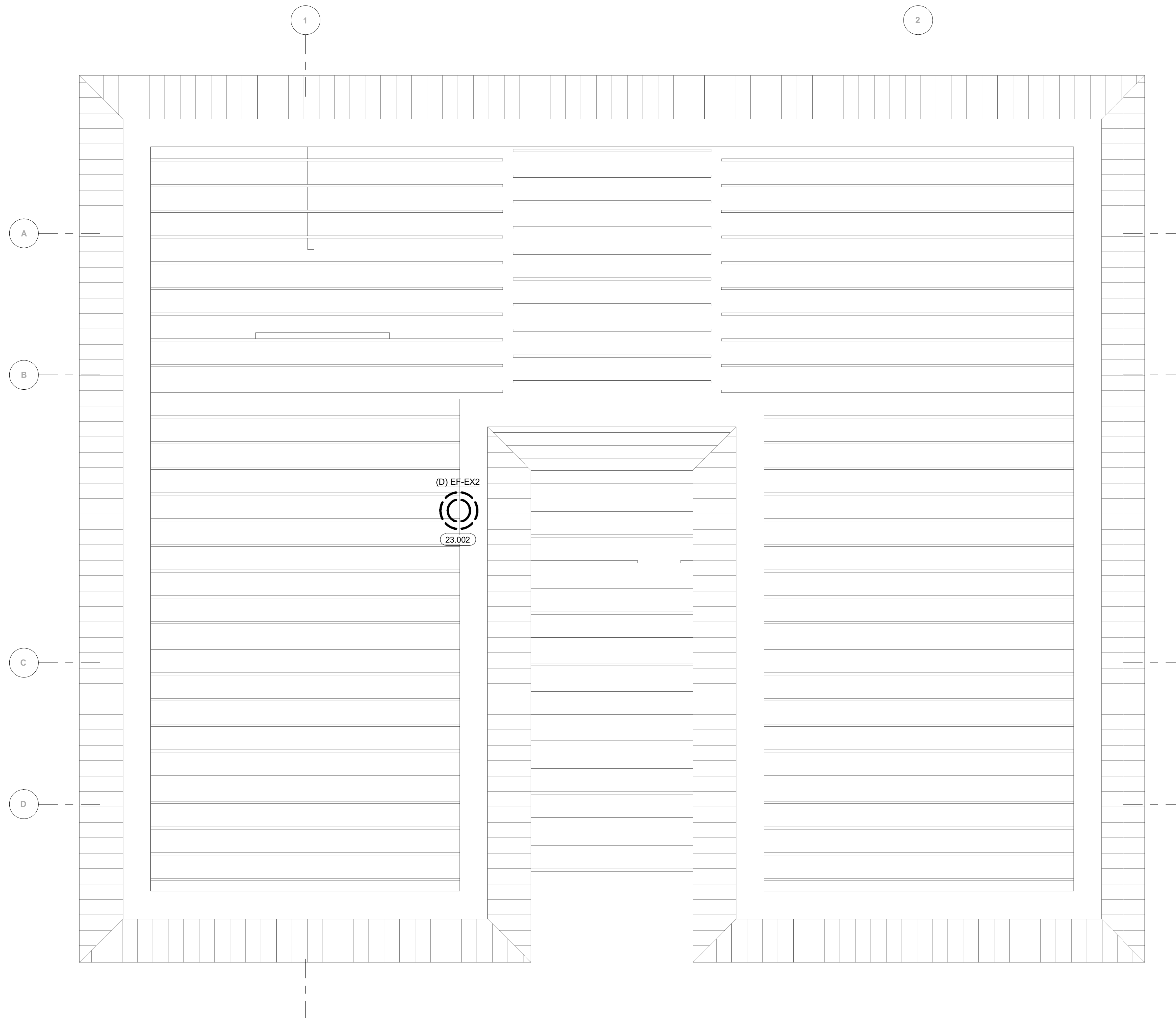


GENERAL NOTES THIS SHEET

- A. REFER TO SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.

SHEET KEYNOTES:

- 23.002 DEMOLISH EXISTING EXHAUST FAN IN ATTIC AND ITS ASSOCIATED DUCTWORK, ELECTRICAL CONNECTIONS AND CONTROLS.



MECHANICAL DEMOLITION PLAN - ATTIC

1/4" = 1'-0"

ISSUE/REVISION

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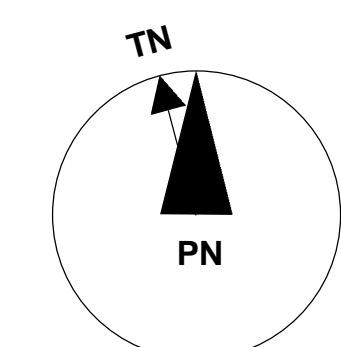
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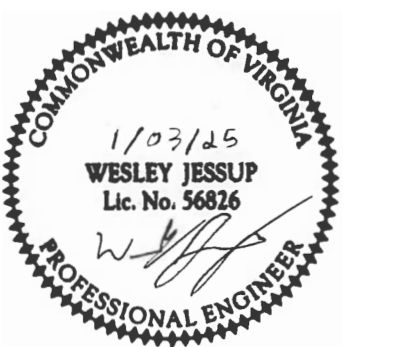
MECHANICAL DEMOLITION PLAN - ATTIC

SHEET NUMBER

MD103



GRAPHIC SCALES

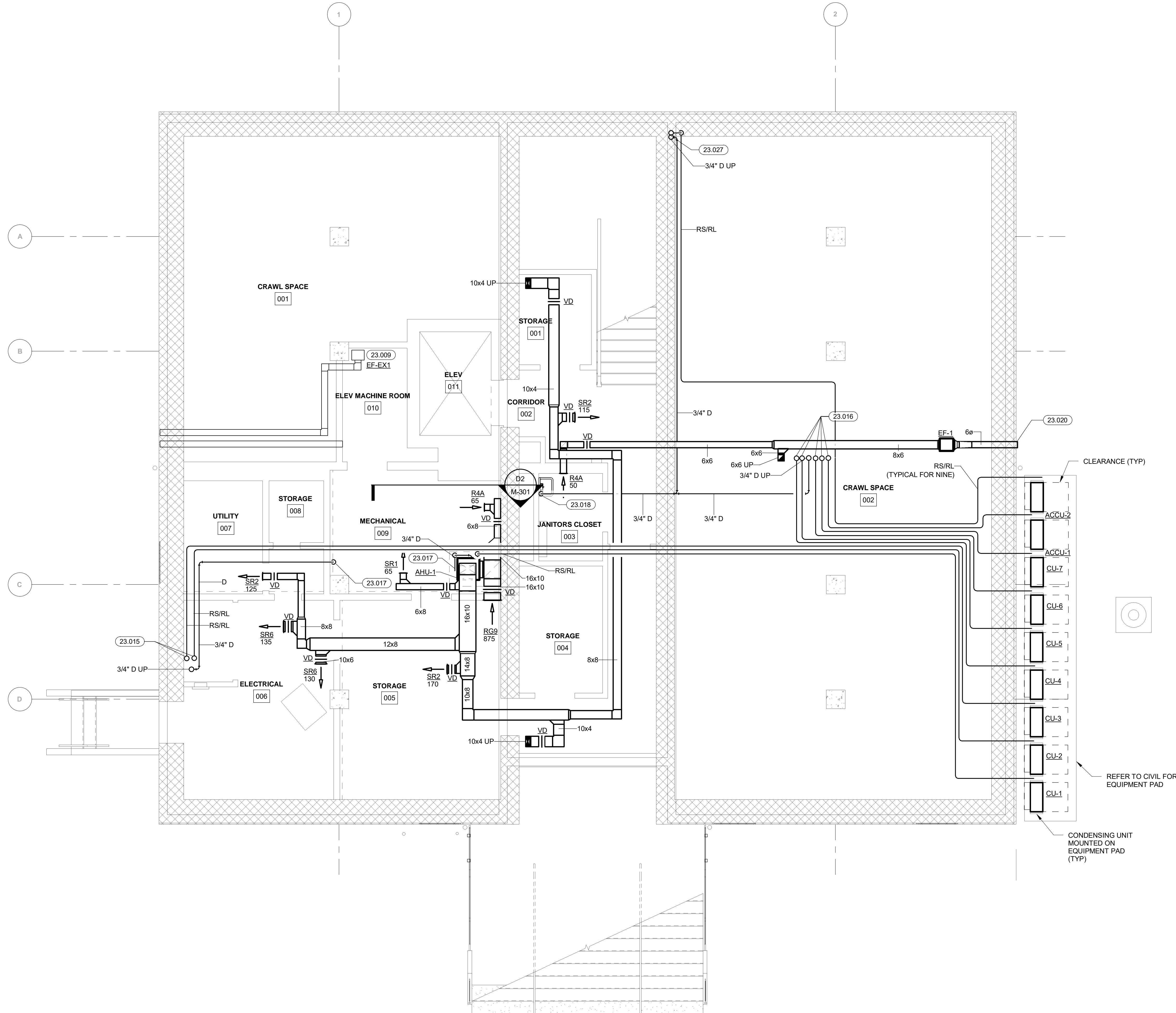


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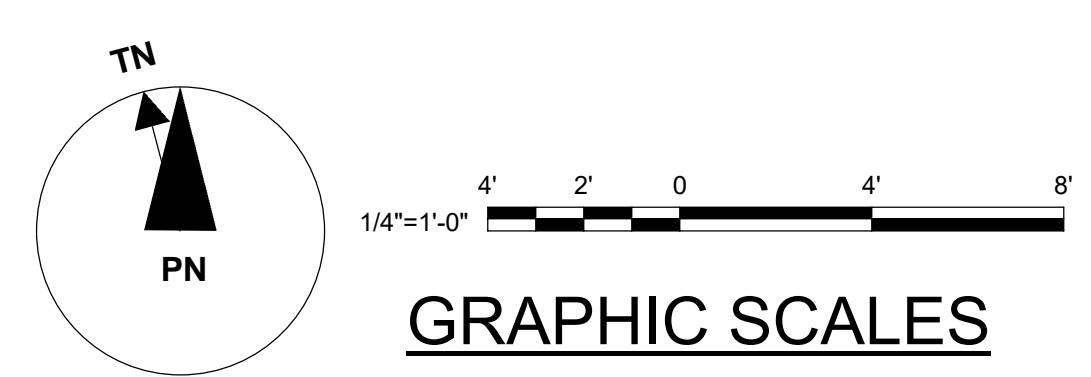
- A. REFER TO SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.

SHEET KEYNOTES:

- 23.009 EXISTING EXHAUST FAN AND ASSOCIATED DUCTWORK TO REMAIN.
- 23.015 TWO REFRIGERANT SUCTION AND TWO REFRIGERANT LIQUID LINES UP TO FRIST FLOOR. SIZE REFRIGERANT PIPING ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- 23.016 TWO REFRIGERANT SUCTION AND TWO REFRIGERANT LIQUID LINES UP TO FRIST FLOOR AND THREE REFRIGERANT SUCTION AND THREE REFRIGERANT LIQUID LINES UP TO ATTIC. SIZE REFRIGERANT PIPING ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- 23.017 ROUTE CONDENSATE DRAIN TO FLOOR DRAIN.
- 23.018 ROUTE CONDENSATE DRAIN TO MOP SINK.
- 23.020 PROVIDE EXHAUST DISCHARGE WITH 1/2" x 1/2" STAINLESS STEEL MESH.
- 23.027 ONE REFRIGERANT SUCTION AND ONE REFRIGERANT LIQUID LINE UP TO THE FIRST FLOOR. SIZE REFRIGERANT PIPING ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.



MECHANICAL DUCTWORK PLAN - BASEMENT
 1/4" = 1'-0"



ISSUE/REVISION

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1	01/03/2025	FINAL DESIGN SUBMISSION
IR		DESCRIPTION

KEY PLAN

PROJECT NUMBER

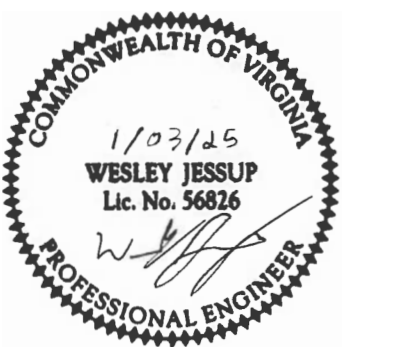
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SHEET TITLE

MECHANICAL DUCTWORK PLAN - BASEMENT

SHEET NUMBER

MH100

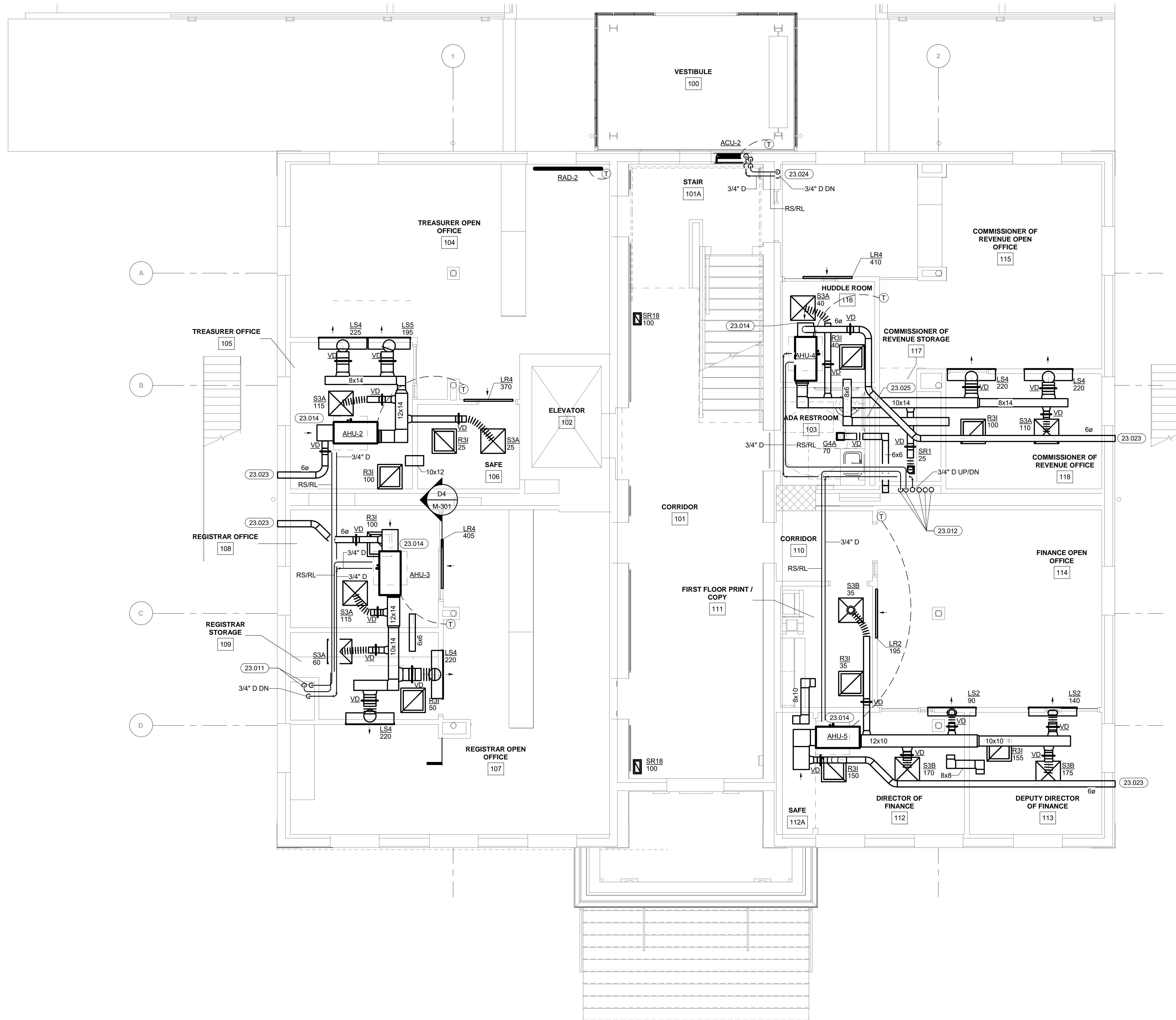


GENERAL NOTES THIS SHEET

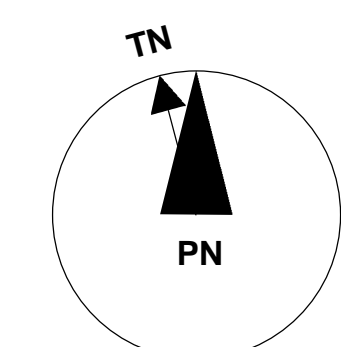
A. REFER TO SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.

SHEET KEYNOTES:

- 23.011 THREE REFRIGERANT SUCTION AND THREE REFRIGERANT LIQUID LINES DOWN TO BASEMENT. SIZE REFRIGERANT PIPING ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- 23.012 THREE REFRIGERANT SUCTION AND THREE REFRIGERANT LIQUID LINES DOWN TO BASEMENT AND THREE REFRIGERANT SUCTION AND THREE REFRIGERANT LIQUID LINES UP FROM ATTIC AND DOWN TO BASEMENT. SIZE REFRIGERANT PIPING ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- 23.014 PROVIDE RETURN DUCT OPENING WITH 1/2" x 1/2" STAINLESS STEEL MESH.
- 23.023 OUTSIDE AIR CONNECTION. BALANCE TO OUTSIDE AIR FLOW SCHEDULED ON M-601. DUCT OUTDOORS AND PROVIDE INTAKE HOOD WITH 1/2" x 1/2" STAINLESS STEEL MESH.
- 23.024 FLOOR MOUNT ACU-2 INSIDE OF WALL CAVITY OF DEMOLISHED EXISTING DOOR. REFER TO ARCH. ROUTE PIPING FROM CRAWL SPACE THROUGH FURRED WALL TO CEILING BELOW STAIRS THEN ROUTE EXPOSED PIPING DOWN INTO WALL CAVITY. PAINT EXPOSED PIPING TO MATCH CEILING COLOR SELECTED BY ARCHITECT. PROVIDE CONDENSATE PUMP INSIDE OF WALL CAVITY.
- 23.025 PROVIDE TRANSFER DUCT OPEN ENDS WITH 1/2" x 1/2" STAINLESS STEEL MESH.



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



GRAPHIC SCALES

ISSUE/REVISION

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KEY PLAN

PROJECT NUMBER

60730109

SHEET TITLE

MECHANICAL DUCTWORK PLAN - FIRST FLOOR

SHEET NUMBER

MH101

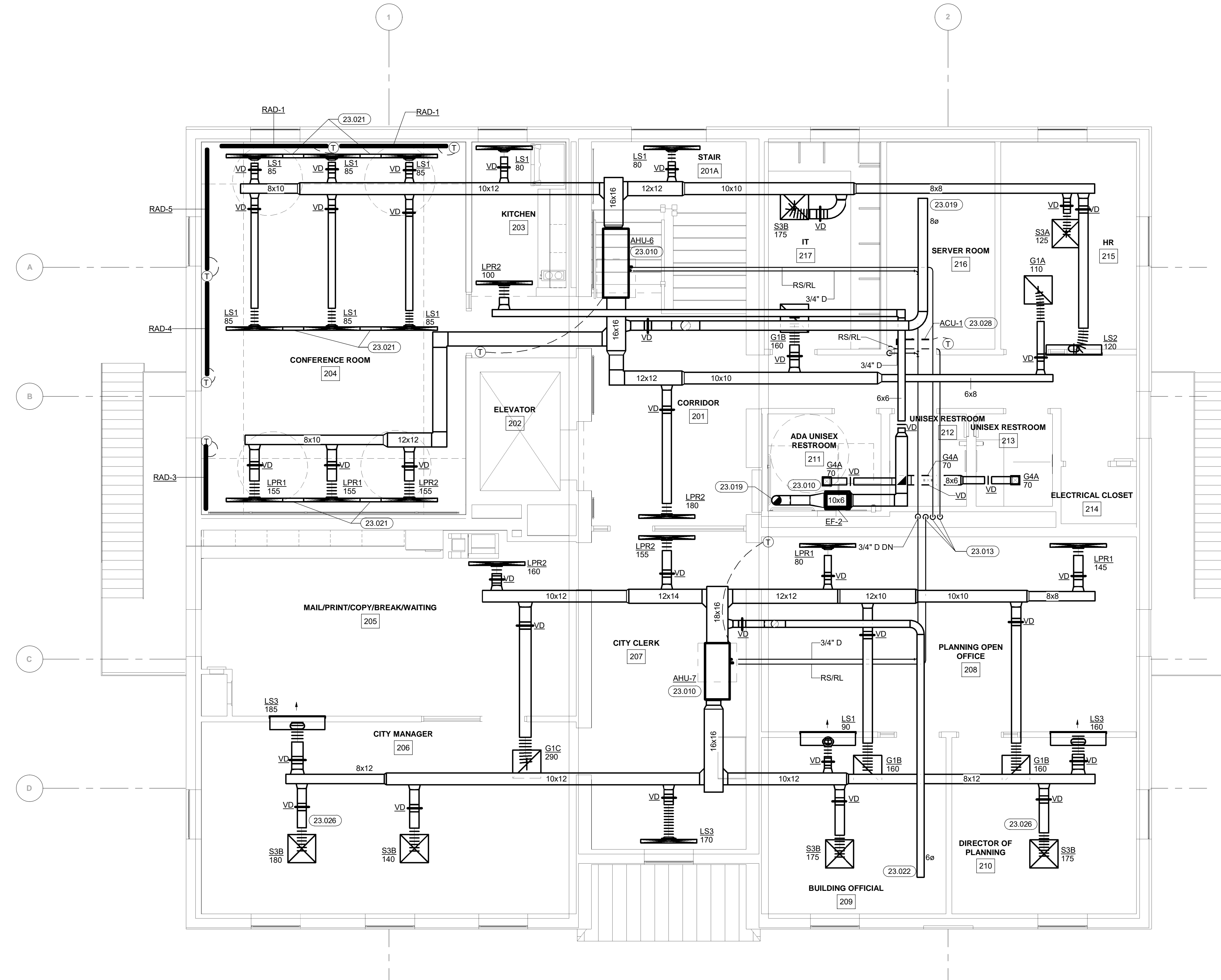


GENERAL NOTES THIS SHEET

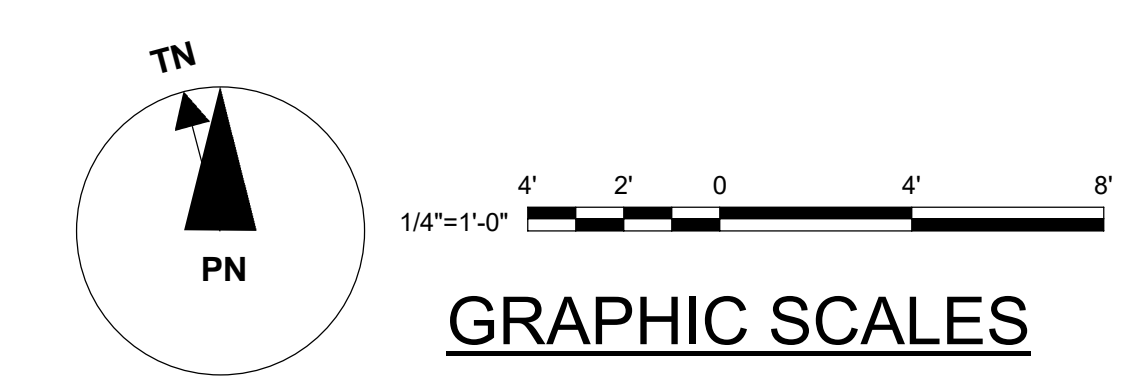
A. REFER TO SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.

SHEET KEYNOTES:

- 23.010 DUCTWORK, PIPING, AND MECHANICAL EQUIPMENT IN ATTIC SPACE ABOVE.
- 23.013 THREE REFRIGERANT SUCTION AND THREE REFRIGERANT LIQUID LINES UP FROM ATTIC AND DOWN TO BASEMENT. SIZE REFRIGERANT PIPING ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- 23.019 ROUTE EXHAUST DUCT THROUGH ROOF AND PROVIDE GOOSENECK DISCHARGE WITH 1/2" x 1/2" STAINLESS STEEL MESH.
- 23.021 PROVIDE INACTIVE SLOT SECTION IDENTICAL TO ACTIVE SECTIONS TO MAINTAIN ONE CONTINUOUS SLOT.
- 23.022 OUTSIDE AIR CONNECTION. BALANCE TO OUTSIDE AIR FLOW SCHEDULED ON M-601. DUCT TO ATTIC LOUVER AND PROVIDE OPENING WITH 1/2" x 1/2" STAINLESS STEEL MESH.
- 23.026 PENETRATE ATTIC WITH HARD DUCT BEFORE TRANSITIONING TO FLEXIBLE DUCT. TYPICAL FOR ALL DUCTWORK PENETRATING ATTIC DECK. LIMIT FLEXIBLE DUCT LENGTHS TO 5'.
- 23.028 MOUNT ACU-1 ABOVE DOOR.



MECHANICAL DUCTWORK PLAN - SECOND FLOOR
 1/4" = 1'-0"



ISSUE/REVISION

NO.	DATE	DESCRIPTION
1	01/03/2025	FINAL DESIGN SUBMISSION
IR		DESCRIPTION

KEY PLAN

PROJECT NUMBER

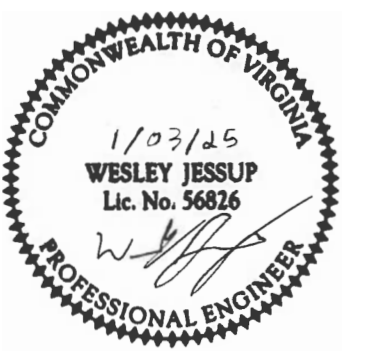
60730109

SHEET TITLE

MECHANICAL DUCTWORK PLAN - SECOND FLOOR

SHEET NUMBER

MH102



IR	DATE	FINAL DESIGN SUBMISSION DESCRIPTION
1	01/03/2025	FINAL DESIGN SUBMISSION

60730109

MECHANICAL SECTIONS

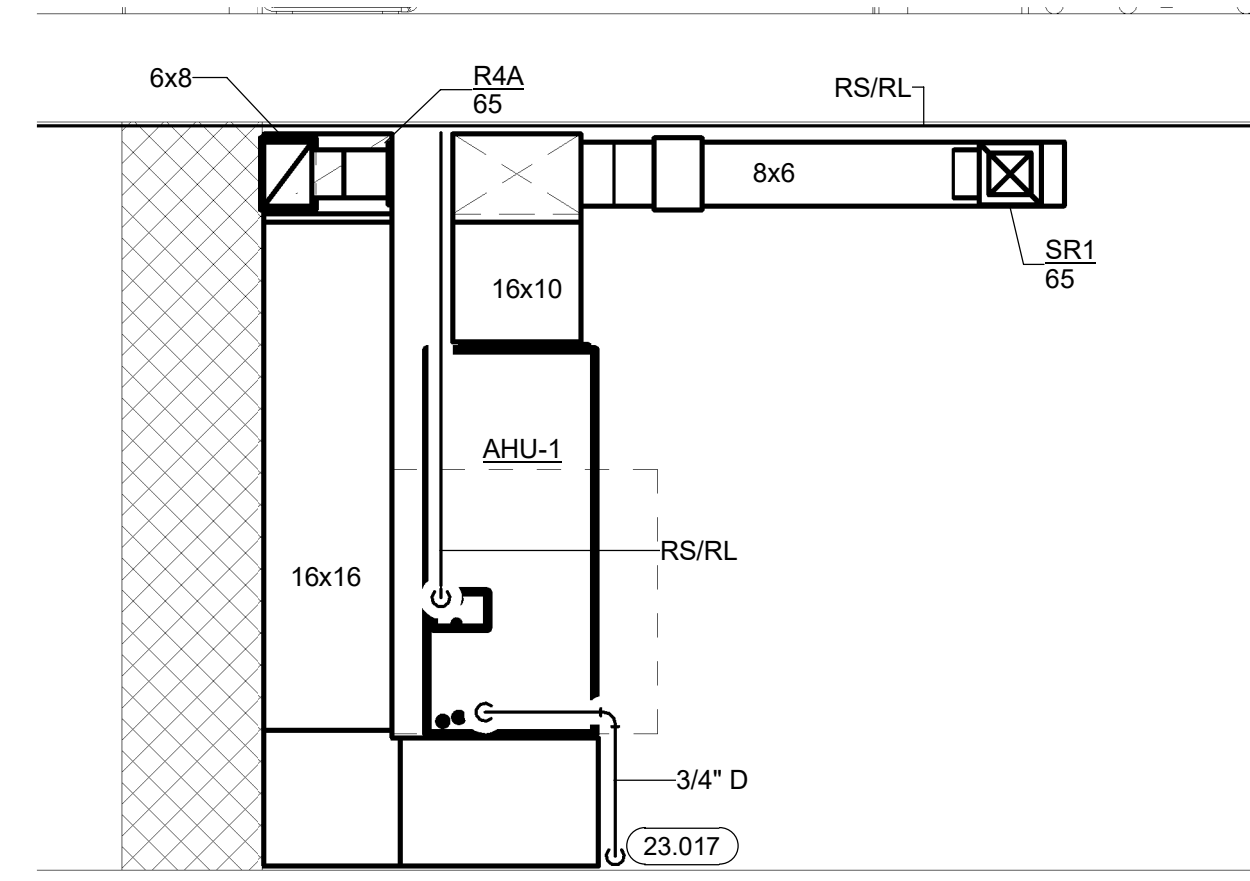
M-301

GENERAL NOTES THIS SHEET

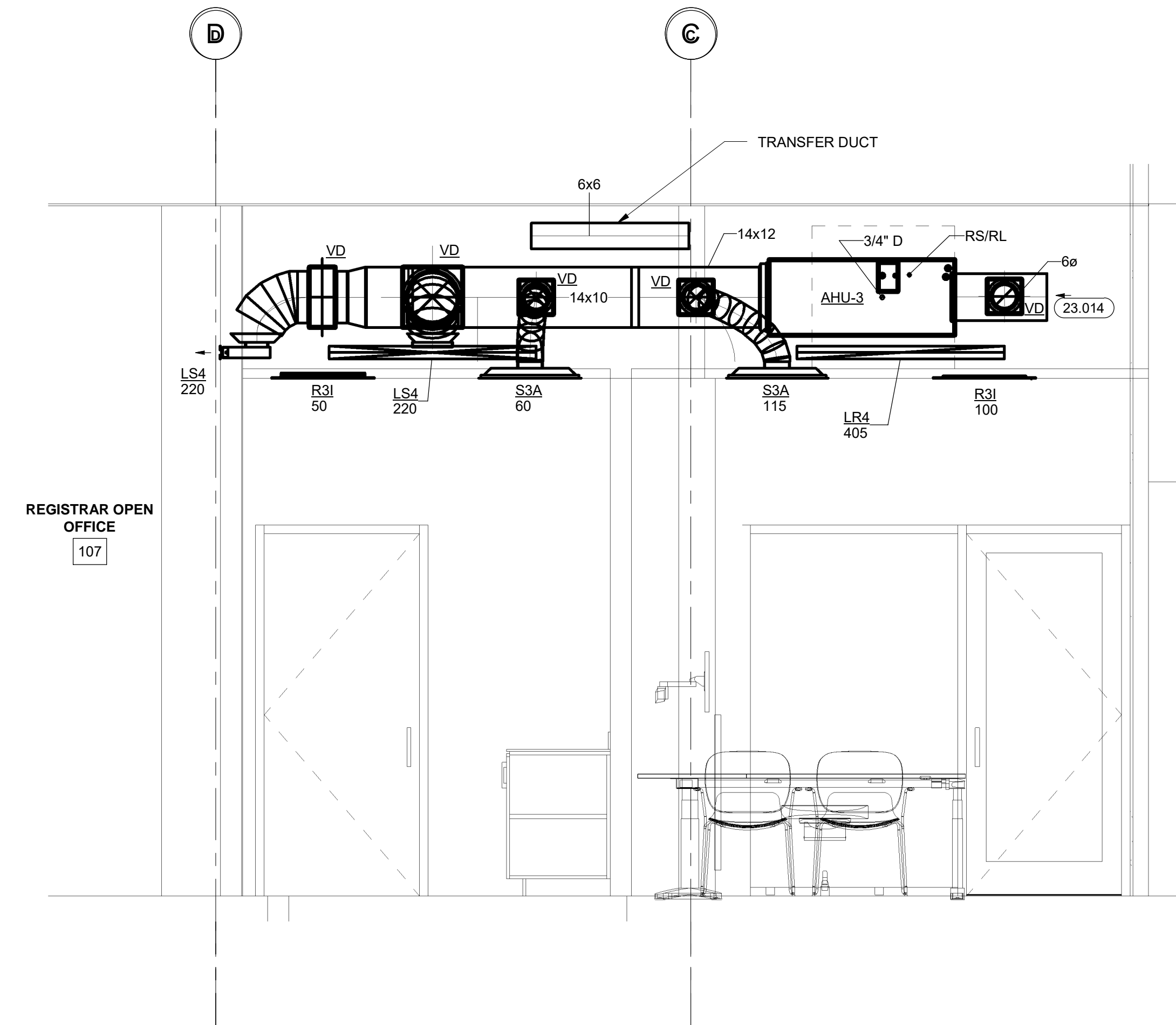
- A. REFER TO SHEET M001 FOR MECHANICAL LEGEND AND GENERAL NOTES.

SHEET KEYNOTES:

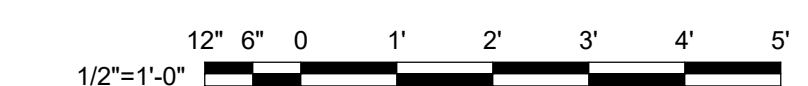
- 23.014 PROVIDE RETURN DUCT OPENING WITH 1/2" x 1/2" STAINLESS STEEL MESH.
- 23.017 ROUTE CONDENSATE DRAIN TO FLOOR DRAIN.



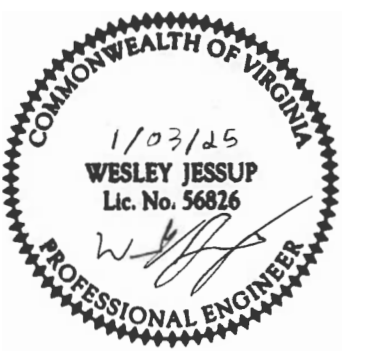
D2
M-301
MECHANICAL SECTION - BASEMENT
 1/2" = 1'-0"



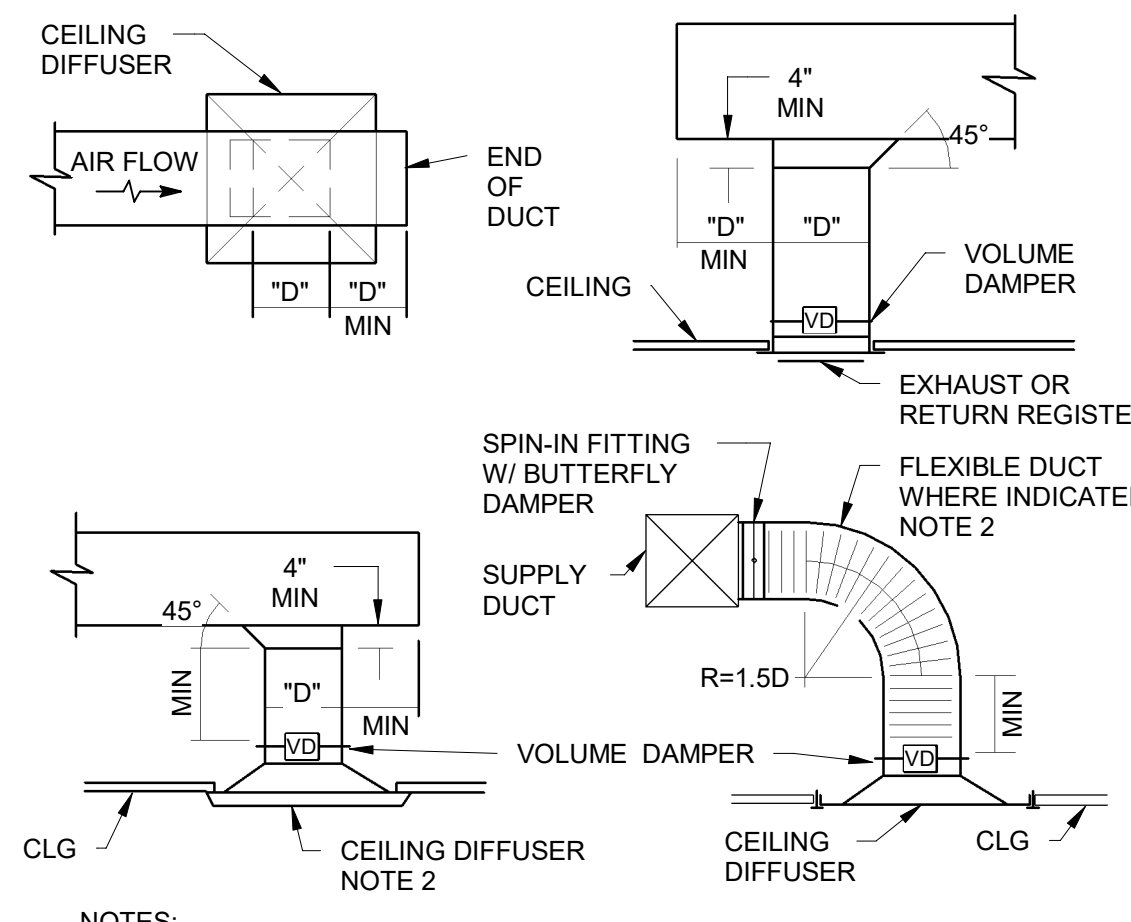
D4
M-301
MECHANICAL SECTION - REGISTRAR OFFICE
 1/2" = 1'-0"



GRAPHIC SCALES

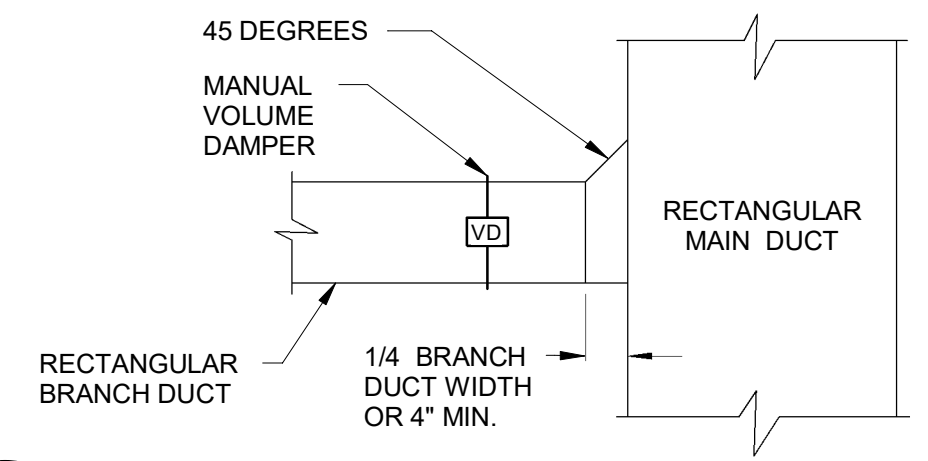


NO.	DATE	DESCRIPTION
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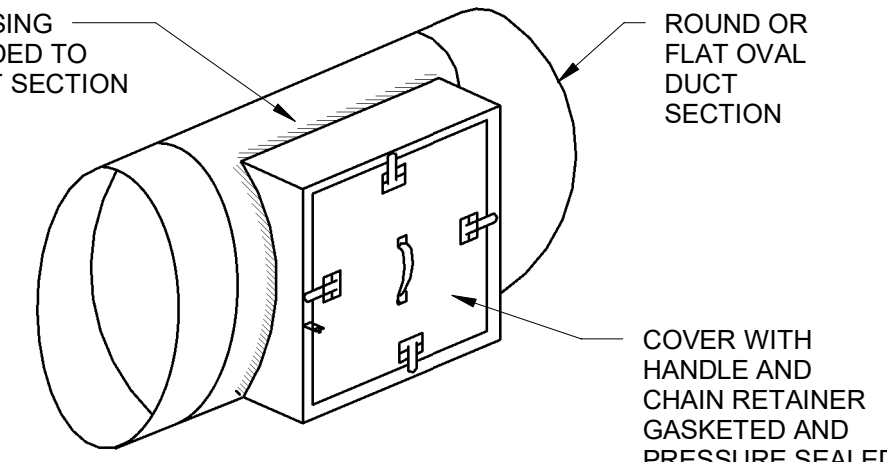


E1
M-501
TYPICAL DUCT CONNECTION DETAILS
 NO SCALE

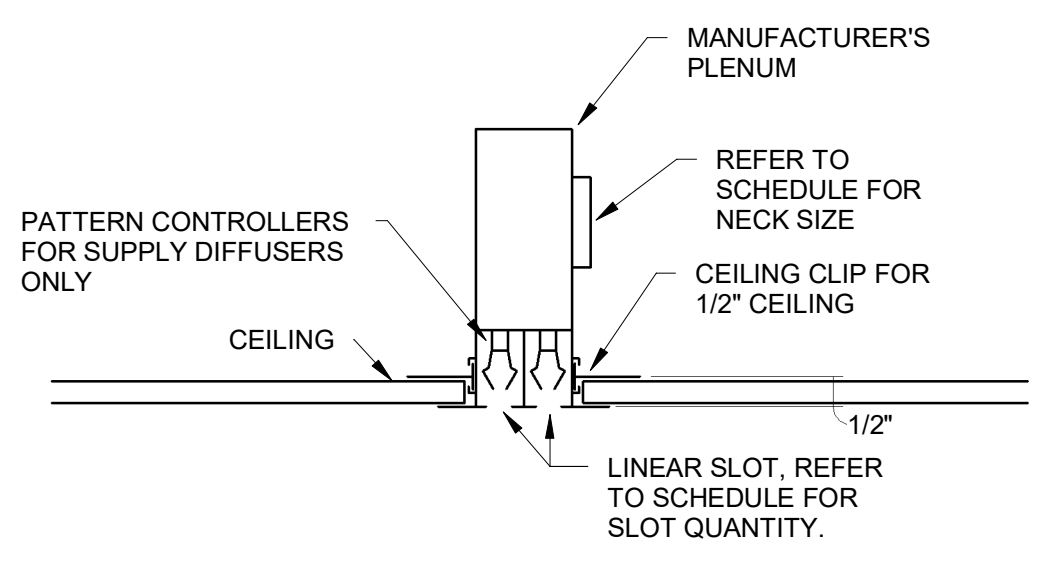
NOTES:
 1. "D" IS THROAT DIA OR SIDE DIM. OF SQUARE CONN.
 2. MIN LENGTH OF STRAIGHT DUCT ABOVE CD IS "D".
 3. ABOVE DETAILS ARE REPRESENTATIVE OF STANDARD DUCT CONNECTIONS. ONLY. THESE DETAILS ARE NOT INTENDED TO SHOW ALL POSSIBLE DUCT CONNECTIONS.



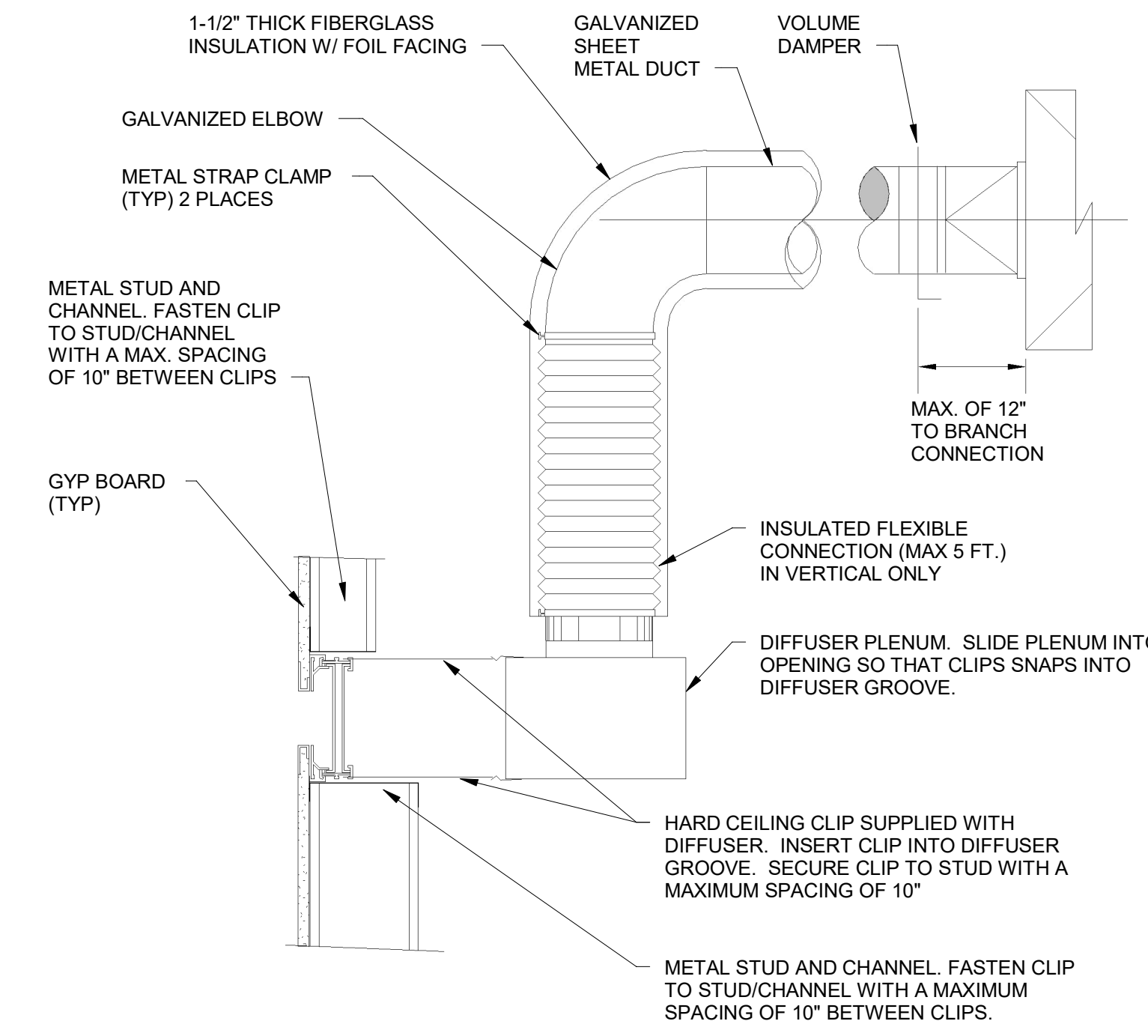
E2
M-501
BRANCH DUCT DETAIL
 NO SCALE



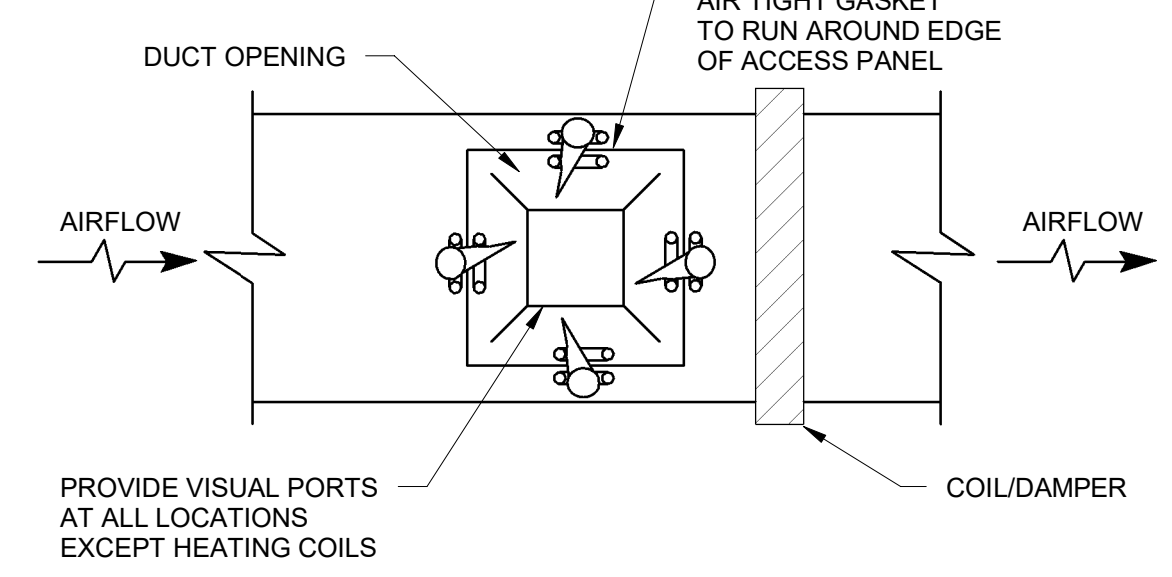
E4
M-501
TYPICAL ACCESS SECTION FOR ROUND/OVAL DUCT DETAIL
 NO SCALE



E5
M-501
LINEAR SLOT DIFFUSER DETAIL
 NO SCALE

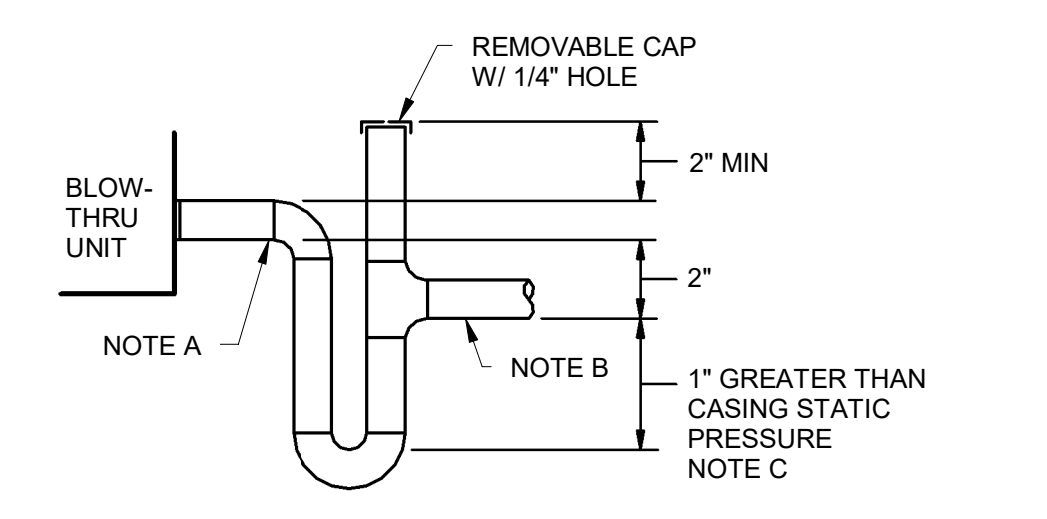
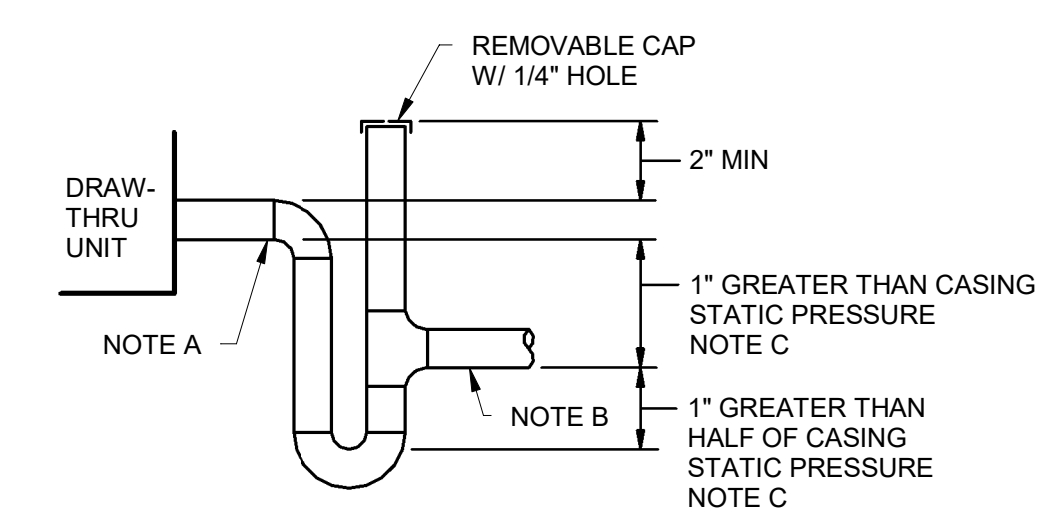


C1
M-501
SIDEWALL LINEAR DIFFUSER
 NO SCALE

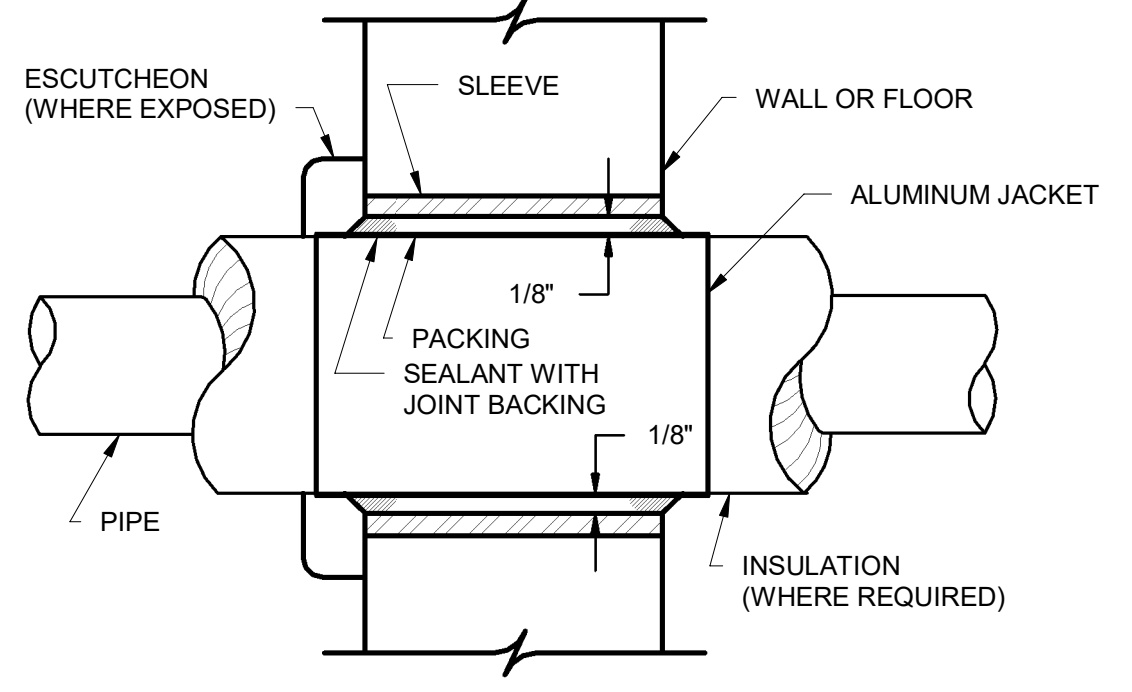


DUCT SIZE	ACCESS PANEL SIZE
6" TO 15"	10" W x (DUCT DEPTH - 2")D
15" TO 21"	12" W x (DUCT DEPTH - 2")D
21" AND ABOVE	18" W x (DUCT DEPTH - 2")D

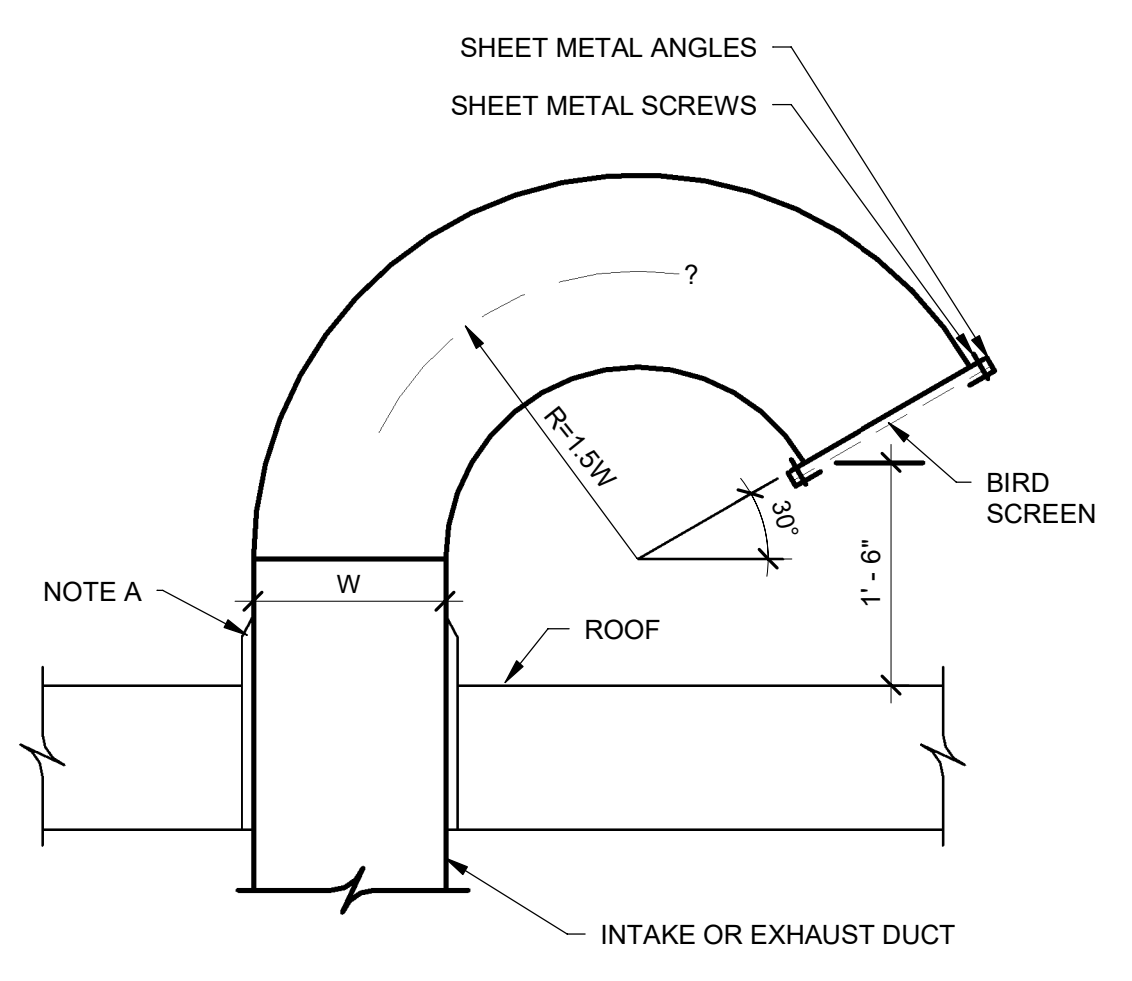
C3
M-501
DUCT ACCESS PANEL DETAIL
 12" = 1'-0"



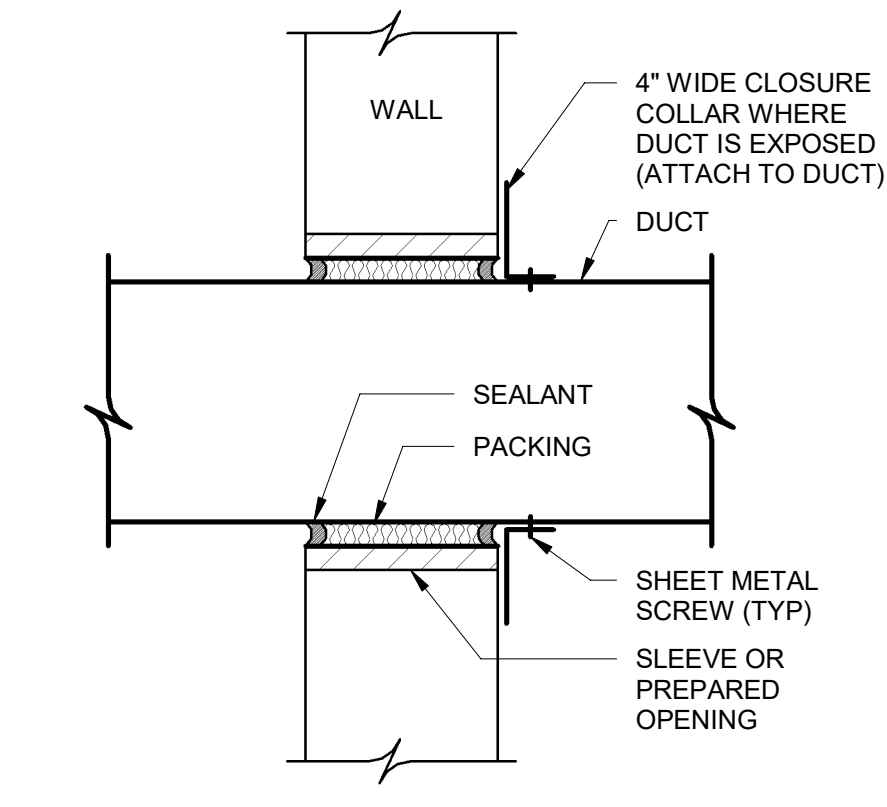
C5
M-501
AIR HANDLING UNIT CONDENSATE DRAIN
 NO SCALE



A1
M-501
PIPE PENETRATIONS THRU WALLS
 NO SCALE



A3
M-501
AIR INTAKE OR EXHAUST DUCTWORK DETAIL
 NO SCALE



A5
M-501
DUCT PENETRATION THRU WALLS
 NO SCALE

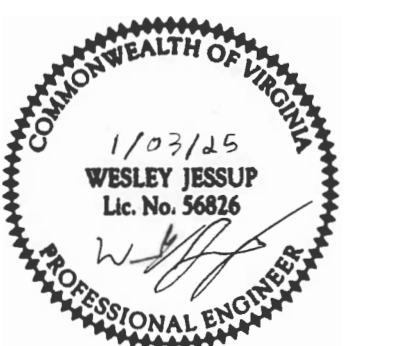


Table with 3 columns: Issue No., Date, Description. Row 1: 1, 01/03/2025, FINAL DESIGN SUBMISSION.

AIR DEVICE SCHEDULE table with columns: UNIT DATA (TAG, FUNCTION, MANUFACTURER, MODEL, FACE SIZE), BASIS OF DESIGN (NECK SIZE, MATERIAL, INTEGRAL VOLUME DAMPER, MAX NC), GENERAL DATA, and SCHEDULE NOTES.

ELECTRIC RESISTANCE PERIMETER RADIATION SCHEDULE table with columns: UNIT DATA (TAG, LOCATION, TYPE), BASIS OF DESIGN (MANUFACTURER, MODEL), TOTAL CAPACITY (MBH), ELECTRICAL DATA (VOLTS, PHASE), and SCHEDULE NOTES.

SCHEDULE NOTES THIS SHEET table with columns: TAG, LOCATION, FUNCTION, MANUFACTURER, MODEL, FAN TYPE, PERFORMANCE DATA (FLOW, ESP, DRIVE, HP, BHP, VOLTS, PHASE, VFD), MOTOR DATA (WEIGHT, SCHEDULE NOTES).

FAN SCHEDULE table with columns: UNIT DATA (TAG, LOCATION, FUNCTION), BASIS OF DESIGN (MANUFACTURER, MODEL), PERFORMANCE DATA (FAN TYPE, FLOW, ESP, DRIVE, HP, BHP, VOLTS, PHASE, VFD), MOTOR DATA (WEIGHT, SCHEDULE NOTES).

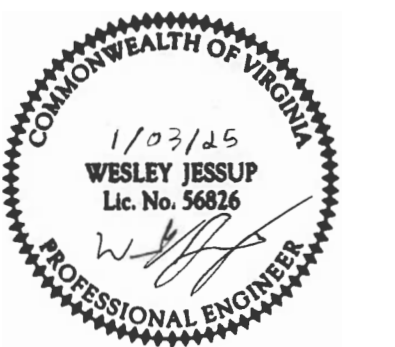
DUCTLESS SPLIT SYSTEM SCHEDULE (DX) table with columns: INDOOR UNIT DATA (TAG, LOCATION, TYPE, MANUFACTURER, INDOOR MODEL, AIRFLOW), BASIS OF DESIGN, INDOOR COOLING DATA (TOTAL COOLING CAPACITY, SENSIBLE COOLING CAPACITY), INDOOR HEATING DATA (HEAT PUMP, HEATING CAPACITY), FILTER SECTIONS, OUTDOOR UNIT DATA (TAG, OUTDOOR MODEL, MCA, MOCP, VOLTS, PHASE), and SCHEDULE NOTES.

AIR HANDLING UNIT SCHEDULE (DX) table with columns: UNIT DATA (TAG, SERVES, MANUFACTURER, MODEL), BASIS OF DESIGN, SUPPLY FAN DATA (TOTAL AIRFLOW, MIN OA, ESP, VFD), CAPACITY (TOTAL, SENSIBLE, E.A.T., L.A.T., W.B.), HEATING COIL (TOTAL CAPACITY, E.A.T., L.A.T., PRE-FILTER), FILTER SECTIONS, OUTDOOR UNIT ELECTRICAL DATA (VOLTS, PHASE, VFD, MCA, MOCP), and SCHEDULE NOTES.

MECHANICAL SPECIFICATIONS SUBMITTALS: PROVIDE MANUFACTURER'S CATALOG DATA AND SHOP DRAWINGS FOR THE FOLLOWING: AIR HANDLING UNITS, FANS, SPLIT-SYSTEM AIR CONDITIONERS, PERIMETER RADIATORS, AIR DEVICES, DDC CONTROLS, TAB REPORT, COORDINATION OF WORK, TESTING AND BALANCING, IDENTIFICATION AND LABELS, BUILDING TEMPERATURE CONTROLS, SPACE TEMPERATURE SENSORS, PIPING, COPPER TUBE, WROUGHT-COPPER FITTINGS, SOLDER JOINT, BRAZING FILLER METALS, FLEXIBLE CONNECTORS, END CONNECTIONS, CONDENSATE DRAIN PIPING, HVAC PIPING INSULATION, PRODUCTS DO NOT CONTAIN ASBESTOS, LEAD, MERCURY, OR MERCURY COMPOUNDS.

6. DUCTS: ALL DUCTWORK SHALL BE GALVANIZED STEEL. DUCT SHALL BE FABRICATED IN ACCORDANCE WITH SMACNA HVAC DUCT CONSTRUCTION STANDARDS. INSULATE ALL SUPPLY AIR DUCTWORK AND INSULATE RETURN/EXHAUST DUCTWORK LOCATED IN THE ATTIC SPACE. PROVIDE MINERAL OR GLASS FIBER INSULATION COMPLYING WITH ASTM C 553, TYPE II AND ASTM C 1290 TYPE III WITH FACTORY-APPLIED FSK JACKET. INSULATION SHALL HAVE A FLAME-SPREAD INDEX OF 25 OR LESS AND A SMOKE-DEVELOPED RESISTANCE OF 50 OR LESS. THICKNESS OF INSULATION SHALL ENSURE AN R-VALUE GREATER THAN OR EQUAL TO R-6. FSK JACKET: ALUMINUM-FOIL, FIBERGLASS-REINFORCED SCRIM WITH WHITE KRAFT-PAPER BACKING, COMPLYING WITH ASTM C 1136, TYPE II. PROVIDE DUCTWORK THAT MEETS THE THE REQUIREMENTS OF SEAL CLASS A. PRESSURE RATINGS FOR DUCTWORK: 1. OUTSIDE AIR: 6 INCHES WG 2. SUPPLY UPSTREAM OF TUS: 6 INCHES WG 3. SUPPLY DOWNSTREAM OF TUS: 1 INCH WG 4. RETURN: -2 INCHES WG 5. EXHAUST: -2 INCH WG 6. TRANSFER DUCT: -0.5 INCH WG 7. LINEAR SLOT DIFFUSERS/REGISTER MATERIAL: ALUMINUM. FINISH: WHITE. DIFFUSER/DAMPERS: MULTI-POSITION DEFLECTOR BLADES. PLENUMS: STEEL. 8. LAY IN DIFFUSERS MATERIAL: ALUMINUM. FINISH: BAKED ENAMEL, WHITE. PATTERN-FOUR-WAY FIXED DISCHARGE WITH REMOVABLE CORE. DAMPERS: RADIAL OPPOSED BLADE. 9. REGISTERS/GRILLES MATERIAL: ALUMINUM. FINISH: BAKED ENAMEL, WHITE. FACE BLADE ARRANGEMENT: FIXED EGGRATE GRID SPACED 1/2 INCH APART. MOUNTING: LAY IN DAMPER TYPE: NONE. 10. INLINE EXHAUST FANS: HOUSING: ALUMINUM FAN TYPE: CENTRIFUGAL BACKWARD INCLINED WHEEL: ALUMINUM DRIVE: DIRECT DRIVEN MOTOR MOUNTED ON VIBRATION ISOLATION MOTORS: COMPLY WITH NEMA DESIGNATION, TEMPERATURE RATING, SERVICE FACTOR, ENCLOSURE TYPE, AND EFFICIENCY REQUIREMENTS. EFFICIENCY: PREMIUM EFFICIENT MOTORS AS DEFINED IN NEMA MG 1. 11. AIR HANDLING UNIT FRAME: MODULAR AND PROVIDING OVERALL STRUCTURAL INTEGRITY WITHOUT RELIANCE ON CASING PANELS FOR STRUCTURAL SUPPORT. CASING JOINTS: HERMETICALLY SEALED AT EACH CORNER AND AROUND ENTIRE PERIMETER. CONSTRUCTION: GALVANIZED STEEL CASING INSULATION THICKNESS: 1 INCHES. PANELS: INSULATED PANELS OF SAME MATERIAL AND THICKNESSES AS CASING CONDENSATE DRAIN PANS: DOUBLE-WALL, STAINLESS-STEEL SHEET WITH SPACE BETWEEN WALLS FILLED WITH FOAM INSULATION AND MOISTURE-TIGHT SEAL. FILTERS: 2" PLEATED MERV 8 PRE-FILTER. FAN AND DRIVE ASSEMBLIES: STATICALLY AND DYNAMICALLY BALANCED AND DESIGNED FOR CONTINUOUS OPERATION AT MAXIMUM-RATED FAN SPEED AND MOTOR HORSEPOWER. FANS: CENTRIFUGAL, GALVANIZED STEEL; MOUNTED ON SOLID-STEEL SHAFT. SHAFTS: WITH FIELD-ADJUSTABLE ALIGNMENT. TURNED, GROUND, AND POLISHED HOT-ROLLED STEEL WITH KEYWAY. HOUSINGS: FORMED AND REINFORCED-STEEL PANELS TO FORM CURVED SCROLL HOUSINGS WITH SHAPED CUT-OFF AND SPUN-METAL INLET BELL BRACING. STEEL ANGLE OR CHANNEL SUPPORTS FOR MOUNTING AND SUPPORTING FAN SCROLL, WHEEL, MOTOR, AND ACCESSORIES. HOUSINGS, PLENUM FANS: STEEL FRAME AND PANEL; FABRICATED WITHOUT FAN SCROLL AND VOLUTE HOUSING. PROVIDE INLET SCREENS FOR TYPE SWSI FANS. DRIVE, DIRECT: FACTORY-MOUNTED, DIRECT DRIVE. MOTORS: COMPLY WITH NEMA DESIGNATION, TEMPERATURE RATING, SERVICE FACTOR, ENCLOSURE TYPE, AND EFFICIENCY REQUIREMENTS. ENCLOSURE TYPE: TOTALLY ENCLOSED, FAN COOLED. EFFICIENCY: PREMIUM EFFICIENT MOTORS AS DEFINED IN NEMA MG 1. CONTROLLERS, ELECTRICAL DEVICES, AND WIRING: COMPLY WITH REQUIREMENTS FOR ELECTRICAL DEVICES AND CONNECTIONS SPECIFIED IN ELECTRICAL SECTIONS. REFRIGERANT COIL: ALUMINUM-PLATE FIN AND SEAMLESS COPPER TUBE IN STEEL CASING WITH EQUALIZING-TYPE VERTICAL DISTRIBUTOR. POLYMER STRIP SHALL PREVENT ALL COPPER COIL FROM CONTACTING STEEL COIL FRAME OR CONDENSATE PAN. COIL SPLIT: INTERLACED. CONDENSATE DRAIN PAN: GALVANIZED STEEL WITH CORROSION-RESISTANT COATING FORMED WITH PITCH AND DRAIN CONNECTIONS. COMPRESSOR: SCROLL, HERMETICALLY SEALED, WITH RUBBER VIBRATION ISOLATORS. MOTOR: VARIABLE SPEED, AND INCLUDES THERMAL- AND CURRENT-SENSITIVE OVERLOAD DEVICES, START CAPACITOR, RELAY, AND CONTACTOR. ACCUMULATOR: SUCTION TUBE. CONDENSER COIL: SEAMLESS COPPER-TUBE, ALUMINUM-FIN COIL; CIRCUITED FOR INTEGRAL LIQUID SUBCOOLER, WITH REMOVABLE DRAIN PAN AND BRASS SERVICE VALVES WITH SERVICE PORTS. CONDENSER FAN: DIRECT-DRIVE, ALUMINUM PROPELLER FAN, WITH PERMANENTLY LUBRICATED, TOTALLY ENCLOSED FAN MOTOR WITH THERMAL-OVERLOAD PROTECTION AND BALL BEARINGS. SECONDARY CONDENSATE DRAIN PANS: FABRICATED WITH SINGLE-WALL, GALVANIZED-STEEL SHEET TWO PERCENT SLOPE IN AT LEAST TWO PLANES TO COLLECT CONDENSATE FROM COOLING COILS (INCLUDING COIL PIPING CONNECTIONS, COIL HEADERS, AND RETURN BENDS) AND HUMIDIFIERS, AND TO DIRECT WATER TOWARD DRAIN CONNECTION.

12. SPLIT-SYSTEM AIR CONDITIONERS WALL-MOUNTED AND CABINET. EVAPORATOR-FAN COMPONENTS: CABINET: ENAMELED STEEL WITH REMOVABLE PANELS ON FRONT AND ENDS IN COLOR SELECTED BY ARCHITECT, AND DISCHARGE DRAIN PANS WITH DRAIN CONNECTION. REFRIGERANT COIL: COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS AND THERMAL-EXPANSION VALVE. COMPLY WITH ARI 206/110. FAN: DIRECT DRIVE, CENTRIFUGAL. MOUNT UNIT-MOUNTED DISCONNECT SWITCHES ON EXTERIOR OF UNIT. DRAIN CONNECTION: LOCATED AT LOWEST POINT OF PAN AND SIZED TO PREVENT OVERFLOW. TERMINATE WITH THREADED NIPPLE ON ONE END OF PAN. MINIMUM CONNECTION SIZE: NPS 1. PAN-TOP SURFACE COATING: ASPHALTIC WATERPROOFING COMPOUND. OUTDOOR UNITS AIR-COOLED. COMPRESSOR-CONDENSER COMPONENTS: CASING: STEEL, FINISHED WITH BAKED ENAMEL IN COLOR SELECTED BY ARCHITECT, WITH REMOVABLE PANELS FOR ACCESS TO CONTROLS. WEEP HOLES FOR WATER DRAINAGE, AND MOUNTING HOLES IN BASE. PROVIDE BRASS SERVICE VALVES, FITTINGS, AND GAGE PORTS ON EXTERIOR OF CASING. COMPRESSOR: HERMETICALLY SEALED WITH CRANKCASE HEATER AND MOUNTED ON VIBRATION ISOLATION DEVICE. COMPRESSOR MOTOR SHALL HAVE THERMAL- AND CURRENT-SENSITIVE OVERLOAD DEVICES, START CAPACITOR, RELAY, AND CONTACTOR. COMPRESSOR TYPE: SCROLL. REFRIGERANT COIL: COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS AND LIQUID SUBCOOLER. COMPLY WITH ARI 206/110. ACCESSORIES: CONDENSATE PUMP. 9. PERIMETER RADIATORS: MOUNTING: WALL MOUNTED CABINET. COLOR: BLACK. ELECTRIC-RESISTANCE HEATING COILS: NICKEL-CHROMIUM HEATING WIRE, FREE OF EXPANSION NOISE AND HUM, MOUNTED IN CERAMIC INSERTS IN A GALVANIZED-STEEL HOUSING, WITH PRIMARY AUTOMATIC, AND SECONDARY MANUAL, RESET THERMAL CUTOUPS. TERMINATE ELEMENTS IN STAINLESS STEEL MACHINE-STAKED TERMINALS SECURED WITH STAINLESS STEEL HARDWARE. ACCESSORIES: LOW-VOLTAGE THERMOSTAT WITH LINE-VOLTAGE RELAY.



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CONTROL SYMBOLS

<p>CONTROL POINT INPUT/OUTPUT</p>	<p>AIRFLOW MEASURING DEVICE OR HUMIDIFIER</p>
<p>DUCT/EQUIPMENT/PIPE MOUNTED CONTROL DEVICE</p>	<p>AIR FILTER</p>
<p>CEILING/WALL MOUNTED CONTROL DEVICE</p>	<p>ELECTRIC, HYDRONIC, DX, STEAM OR GAS COIL</p>
<p>2-WAY CONTROL VALVE</p> <p>FO: FAIL OPEN FC: FAIL CLOSED FL: FAIL IN LAST POSITION</p>	<p>FAN</p>
<p>3-WAY CONTROL VALVE</p> <p>C: COMMON FO: FAIL OPEN FC: FAIL CLOSED FL: FAIL IN LAST POSITION</p>	<p>PUMP</p>
<p>AVERAGING / CONTINUOUS SENSING ELEMENT SENSOR OR SWITCH</p>	<p>OPPOSED BLADE DAMPER</p> <p>MD: MOTORIZED DAMPER SD: SMOKE DAMPER FD: FIRE DAMPER FSD: COMBINATION FIRE / SMOKE DAMPER FO: FAIL OPEN FC: FAIL CLOSED FL: FAIL IN LAST POSITION</p>
<p>SINGLE POINT SENSOR OR SWITCH</p>	<p>PARALLEL BLADE DAMPER</p> <p>MD: MOTORIZED DAMPER SD: SMOKE DAMPER FD: FIRE DAMPER FSD: COMBINATION FIRE / SMOKE DAMPER FO: FAIL OPEN FC: FAIL CLOSED FL: FAIL IN LAST POSITION</p>
<p>IMMERSION TEMPERATURE SENSOR</p> <p>THERMOWELL</p>	<p>MOTOR STARTER, ELECTRONICALLY COMMUTATED MOTOR, VARIABLE FREQUENCY DRIVE, CONTROL PANEL</p>
<p>DIFFERENTIAL PRESSURE SENSOR OR SWITCH</p> <p>PS: PRESSURE SENSOR PNEUMATIC OR COPPER TUBING HI: HIGH LO: LOW</p>	<p>DUCT CONTINUATION</p> <p>OUTDOOR AIR</p>
<p>CONTROL ABBREVIATIONS</p> <p>AI: ANALOG INPUT AO: ANALOG OUTPUT AF: AIRFLOW MEASURING DEVICE AS: AIRFLOW SWITCH CO2: CARBON DIOXIDE SENSOR CO: CARBON MONOXIDE SENSOR CP: CONTROL PANEL CS: CURRENT SENSOR CSW: CURRENT SWITCH DDC: DIRECT DIGITAL CONTROLS DI: DIGITAL INPUT DL: DATA LINK DO: DIGITAL OUTPUT DSD: DUCT SMOKE DETECTOR EA: ELECTRIC ACTUATOR EA: EXHAUST AIR ECM: ELECTRONICALLY COMMUTATED MOTOR ES: END SWITCH ESD: EMERGENCY AIR DISTRIBUTION SHUTOFF SWITCH FM: FLOW METER FS: FLOW SWITCH FZ: FREEZESTAT H: HUMIDITY SENSOR LS: LEVEL SENSOR LSW: LEVEL SWITCH MS: MOTOR STARTER OA: OUTDOOR AIR OS: OCCUPANCY SENSOR PS: PRESSURE SENSOR PSW: PRESSURE SWITCH RA: RETURN AIR RE: RELAY S: SWITCH SA: SUPPLY AIR T: TEMPERATURE SENSOR TA: TRANSFER AIR TH: TEMPERATURE AND HUMIDITY SENSOR TS: TEMPERATURE SWITCH VFD: VARIABLE FREQUENCY DRIVE VS: VIBRATION SENSOR VSW: VIBRATION SWITCH</p>	<p>PIPE CONTINUATION</p> <p>HWR</p>

GENERAL SEQUENCE OF OPERATION

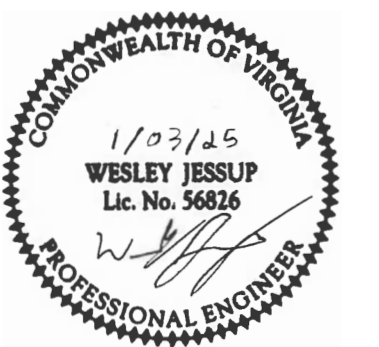
- A. ADJUSTABLE SET POINTS: PROVIDE FUNCTIONALITY TO ADJUST ALL SET POINTS OR SET POINT LIMITS, WHERE SET POINT RESET LOGIC IS UTILIZED, AT THE DDC GRAPHICAL INTERFACE.
- B. TRENDING: PROVIDE FUNCTIONALITY TO SELECT POINTS FOR TRENDING, ADJUST THEIR FREQUENCY AND GENERATE CUSTOM TREND REPORTS AT THE BMS GRAPHICAL INTERFACE.
- C. DUCT SMOKE DETECTOR ALARM / EQUIPMENT SHUTDOWN: ON ACTIVATION OF DUCT SMOKE DETECTOR, REPORT THE ALARM DIRECTLY TO THE FIRE ALARM SYSTEM (FAS) AND SHUT DOWN ASSOCIATED EQUIPMENT BY THE DDC.
- D. CONTROL POWER: UNLESS OTHERWISE INDICATED ON THE ELECTRICAL DRAWINGS, PROVIDE CONTROL POWER TO TERMINAL UNITS, CONTROL VALVES, CONTROL DAMPERS, AND OTHER CONTROL DEVICES BY THE DDC FROM THE NEAREST DDC PANEL OR ASSOCIATED DDC CONTROLLER. PROVIDE REQUIRED STEP DOWN TRANSFORMERS BY THE DDC.
- E. VARIABLE FREQUENCY DRIVE COMMUNICATIONS DATA LINK: PROVIDE, AT MINIMUM, THE FOLLOWING VARIABLE FREQUENCY DRIVE VIRTUAL POINTS BY ITS COMMUNICATIONS DATA LINK: ACCUMULATIVE RUN TIME, ACCUMULATIVE KILOWATT HOURS, FAULT RESET, OUTPUT VOLTAGE, OUTPUT AMPERAGE AND OUTPUT FREQUENCY. PROVIDE ALL AVAILABLE MAINTENANCE, FAULT OR ALARM STATUS VIRTUAL POINTS.
- F. SYSTEM SET POINT RESET BASED ON ZONES OR SYSTEMS: AUTOMATICALLY DETECT ZONES AND SYSTEMS THAT EXCESSIVELY DRIVE SET POINT RESET LOGIC AND GENERATE AN ALARM. PROVIDE FUNCTIONALITY TO REMOVE ZONES OR SYSTEMS FROM SET POINT RESET LOGIC AT THE BMS GRAPHICAL INTERFACE.
- G. SET POINT DEVIATION ALARM: ON DEVIATION OF TEMPERATURE, HUMIDITY, AIRFLOW OR OTHER CONTROL VARIABLE FROM SET POINT, GENERATE AN ALARM.
- H. COMMAND FAILURE ALARM: ON COMMAND FAILURE, WHERE EQUIPMENT COMMAND DOES NOT MATCH ITS FEEDBACK OR STATUS, GENERATE AN ALARM.
- I. COMMUNICATIONS FAILURE ALARM: ON FAILURE TO COMMUNICATE WITH A CONTROLLER OR CONTROL DEVICE, GENERATE AN ALARM.
- J. ALARM LIMITS AND DELAYS: INCLUDE ALARM HIGH AND LOW LIMITS AND TIMED DELAYS THAT PREVENT NUISANCE ALARMS FROM OCCURRING WITHIN NORMAL ERROR OR RESPONSE TIME.
- K. POWER FAILURE: ON LOSS OF POWER, RETURN VALVE AND DAMPER ACTUATORS TO THEIR FAIL SAFE POSITIONS. ON RESTORATION OF POWER, AUTOMATICALLY RESUME NORMAL OPERATION.

ATS MONITORING:

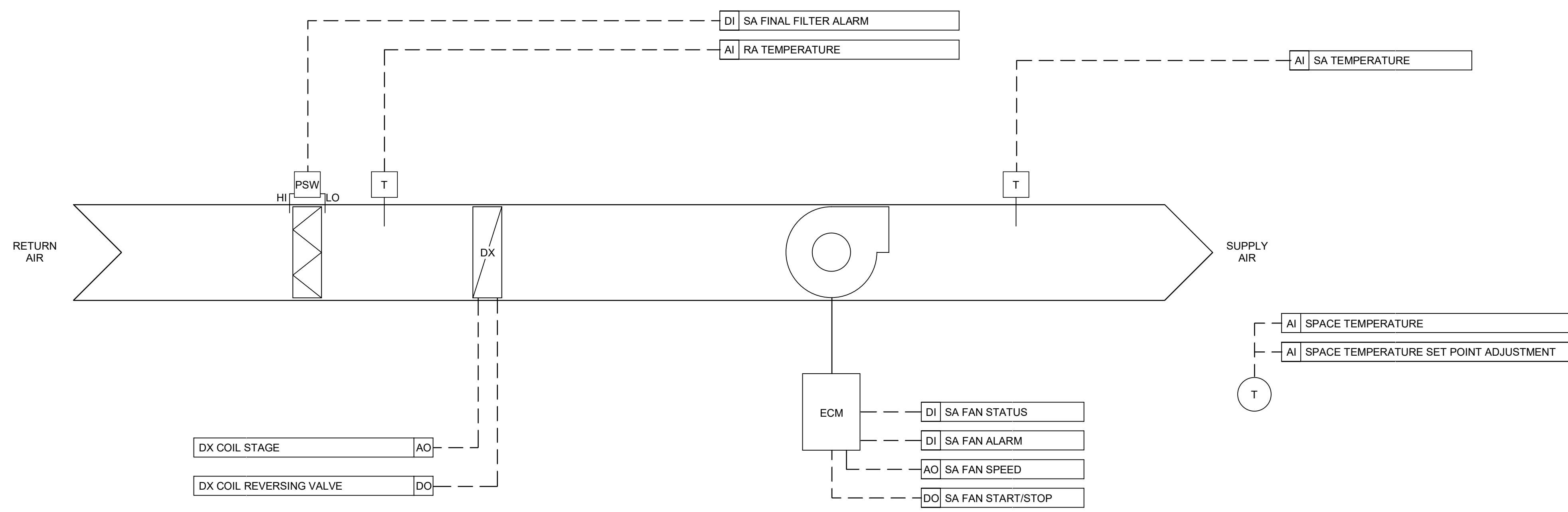
- A. CONTINUOUSLY MONITOR POSITION OF ATS-01 POINTS VIA DRY CONTACTS.

GENERATOR MONITORING AND ALARMING:

- A. CONTINUOUSLY MONITOR AND ALARM ALL AVAILABLE POINTS, INCLUDED AT A MINIMUM:
 1. GENERATOR COMMUNICATIONS LOSS
 2. GENERATOR STATUS
 3. FUEL LEVEL LOW ALARM
 4. GENERATOR GENERAL ALARM STATUS

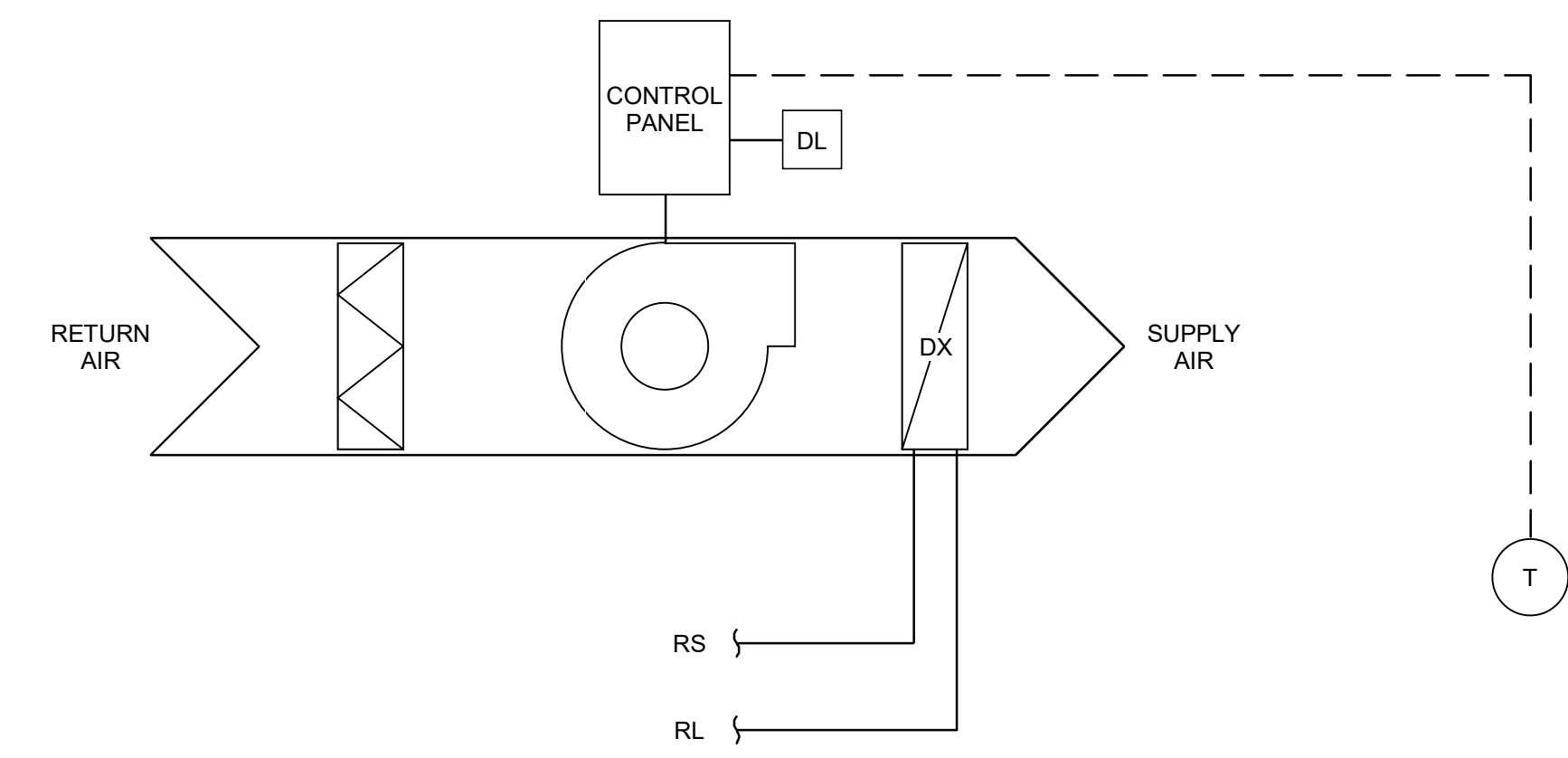


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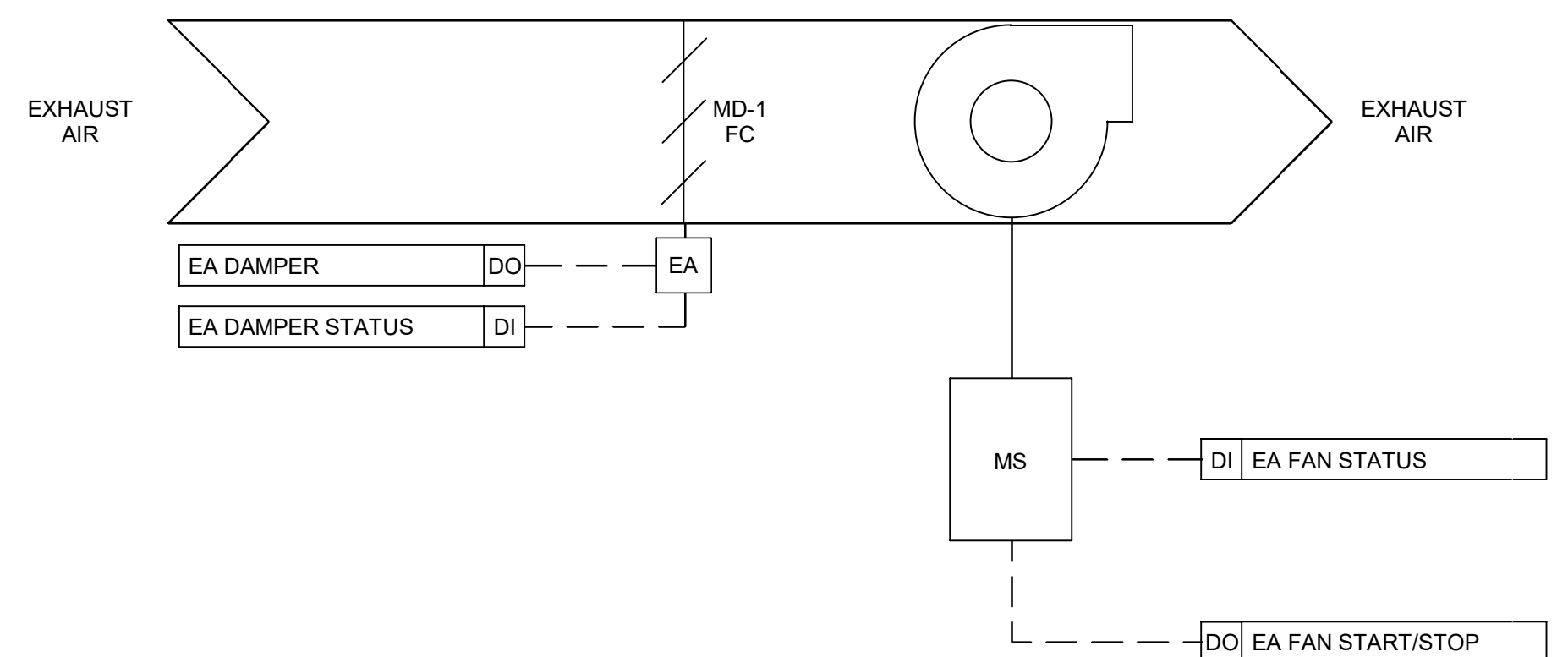
- TYPICAL AIR HANDLING UNIT (AHU-1, 2, 3, 4, 5, 6, & 7) SEQUENCE OF OPERATION**
- A. GENERAL: SERVES SINGLE TEMPERATURE CONTROL ZONE. CONTROL TO SATISFY ZONE DEMAND.
 - B. SCHEDULING: OPERATE OCCUPIED OR UNOCCUPIED MODE BASED ON TIME OF DAY SCHEDULING. DURING OCCUPIED MODE, MAINTAIN OCCUPIED SPACE TEMPERATURE SET POINT OF 72°F. DURING UNOCCUPIED MODE, MAINTAIN UNOCCUPIED SPACE TEMPERATURE HEATING SET POINT OF 60°F AND UNOCCUPIED SPACE TEMPERATURE COOLING SET POINT OF 80°F.
 1. SPACE TEMPERATURE SET POINT ADJUSTMENT: ALLOW SET POINT ADJUSTMENT AT SPACE TEMPERATURE SENSOR AND LIMIT ADJUSTMENT TO ± 3°F.
 2. UNOCCUPIED MODE OVERRIDE PUSH BUTTON: UPON ACTIVATION OF THE SPACE SENSOR UNOCCUPIED MODE OVERRIDE PUSH BUTTON, OPERATE OCCUPIED AND DISABLE DEMAND CONTROLLED VENTILATION FOR 2 HOURS.
 - C. SUPPLY FAN START/STOP CONTROL:
 1. IN OCCUPIED MODE, OPERATE THE SUPPLY FAN CONTINUOUSLY.
 2. IN UNOCCUPIED MODE, CYCLE THE SUPPLY FAN ON AND OFF TO SATISFY ASSOCIATE ZONE TEMPERATURE SET POINTS. ON A FALL IN ANY ASSOCIATED ZONE SPACE TEMPERATURE BELOW ITS UNOCCUPIED SPACE TEMPERATURE HEATING SET POINT OR ON A RISE ABOVE ITS UNOCCUPIED SPACE TEMPERATURE COOLING SET POINT, ENERGIZE THE SUPPLY FAN. ON A RETURN IN ASSOCIATE ZONE SPACE TEMPERATURE WITHIN UNOCCUPIED SET POINTS, DEENERGIZE THE SUPPLY FAN. MAINTAIN A 5°F DEAD BAND BETWEEN ENERGIZING AND DEENERGIZING THE SUPPLY FAN.
 - D. SUPPLY FAN SPEED CONTROL: STAGE FAN SPEED BETWEEN ITS THREE SPEEDS IN THE "AUTO" SETTING TO ADJUST BASED ON SPACE TEMPERATURE.
 - E. SUPPLY AIR TEMPERATURE CONTROL:
 1. WHEN THE SUPPLY FAN IS ENERGIZED, CONTROL THE DX COIL TO MAINTAIN SPACE TEMPERATURE AT SET POINT. ON A RISE IN SPACE TEMPERATURE ABOVE SET POINT, STAGE THE DX COIL TO COOL. ON A FALL IN SPACE TEMPERATURE, REVERSE THE SEQUENCE. ON A FURTHER FALL IN SUPPLY TEMPERATURE BELOW SET POINT, ENERGIZE THE DX COIL REVERSING VALVE AND STAGE THE DX COIL TO HEAT. ON A RISE IN SPACE TEMPERATURE, REVERSE THE SEQUENCE. WHEN THE SUPPLY FAN IS DEENERGIZED, DEENERGIZE THE DX COIL.
 - F. DIRTY FILTER ALARM: ON A RISE IN FILTER DIFFERENTIAL PRESSURE ABOVE SET POINT, GENERATE AN ALARM.

1 VAV AIR HANDLING UNIT
 M-702 NO SCALE



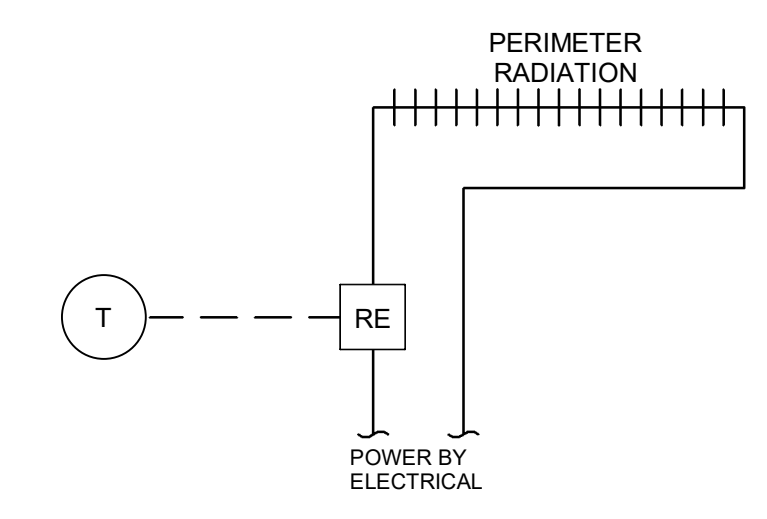
- TYPICAL DUCTLESS SPLIT SYSTEM (ACU-1) SEQUENCE OF OPERATION**
- A. GENERAL: CONTROL TO MAINTAIN ZONE TEMPERATURE. PROVIDE SET POINT ADJUSTMENT AND CONTINUOUSLY MONITOR SPACE TEMPERATURE AND ALARMS AT THE DDC SYSTEM.
 - B. SCHEDULING: OPERATE CONTINUOUSLY, MAINTAIN SPACE TEMPERATURE SET POINT OF 72°F.
 - C. SPACE TEMPERATURE SET POINT ADJUSTMENT: ALLOW SET POINT ADJUSTMENT AT SPACE TEMPERATURE SENSOR.
 - D. SPACE TEMPERATURE CONTROL: OPERATE UNIT UNDER IS OWN MICROPROCESSOR CONTROL SYSTEM. WHEN SPACE TEMPERATURE IS ABOVE SET POINT, ENERGIZE UNIT AND MODULATE ITS REVERSING VALVE TO THE COOL POSITION. ON A FALL IN SPACE TEMPERATURE BELOW SET POINT, ENERGIZE THE UNIT AND MODULATE ITS REVERSING VALVE TO THE HEAT POSITION.

2 DUCTLESS SPLIT SYSTEM
 M-702 NO SCALE



- TYPICAL CONSTANT AIR VOLUME GENERAL EXHAUST FAN (EF-1 & 2) SEQUENCE OF OPERATION**
- A. SCHEDULING: OPERATE OCCUPIED OR UNOCCUPIED BASED ON TIME OF DAY SCHEDULING.
 - B. EXHAUST FAN START/STOP CONTROL:
 1. IN OCCUPIED MODE, OPEN THE EXHAUST FAN ISOLATION DAMPER AND ENERGIZE THE EXHAUST FAN TO RUN CONTINUOUSLY.
 2. IN UNOCCUPIED MODE, DEENERGIZE THE EXHAUST FAN AND CLOSE THE EXHAUST FAN ISOLATION DAMPER.
 - C. EXHAUST FAN FAILURE ALARM: ON FAILURE TO RUN, DISABLE THE EXHAUST FAN, CLOSE THE EXHAUST FAN ISOLATION DAMPER AND GENERATE AN ALARM.

3 EXHAUST FAN
 M-702 NONE



- TYPICAL PERIMETER RADIATION (RAD-) SEQUENCE OF OPERATION**
- A. GENERAL: CONTROL TO MAINTAIN ZONE TEMPERATURE BY ITS LOCAL THERMOSTAT.
 - B. SPACE TEMPERATURE CONTROL: ON A RISE IN SPACE TEMPERATURE ABOVE SET POINT OF 70°F, ENERGIZE THE HEATING COIL TO HEAT. ON A FALL IN SPACE TEMPERATURE BELOW SET POINT, REVERSE THE SEQUENCE.

4 TYPICAL PERIMETER RADIATION
 M-702 NO SCALE