

# PROJECT

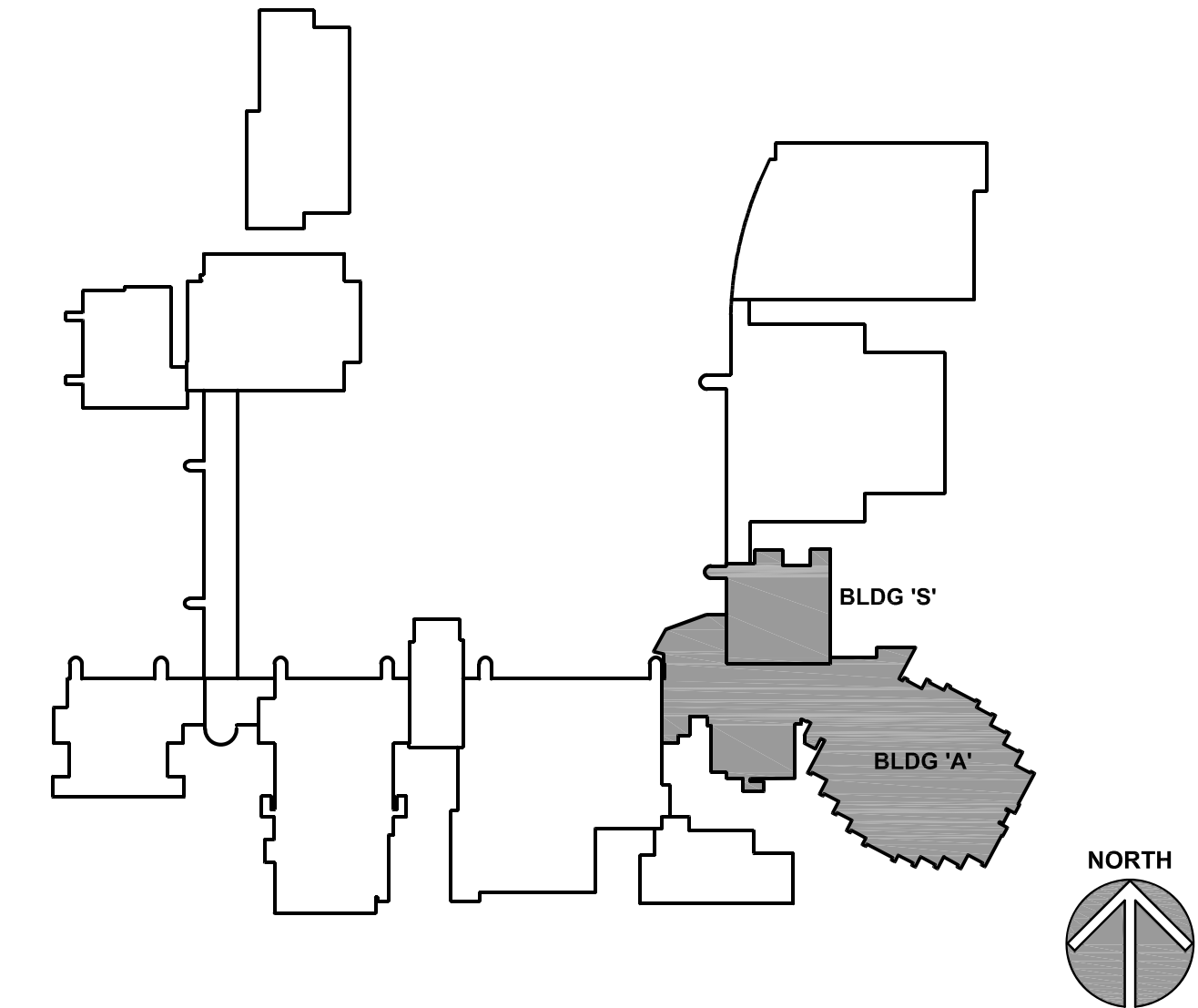
**OWNER**

**ARCHITECT/  
ENGINEER**

**BUILDINGS 'A' & 'S' HVAC  
UNIT REPLACEMENTS AND  
MISC. HVAC PROJECTS  
JOLIET JUNIOR COLLEGE  
1215 HOUBOLT ROAD  
JOLIET, IL 60431**

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## SEALS & CERTIFICATES

I HAVE PREPARED, OR CAUSED TO BE PREPARED UNDER MY DIRECT SUPERVISION, THE ATTACHED PLANS AND SPECIFICATIONS AND STATE THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND TO THE EXTENT OF MY CONTRACTUAL OBLIGATION, THEY ARE IN COMPLIANCE WITH IBC 2009 EDITION, THE ENVIRONMENTAL BARRIERS ACT AND THE ILLINOIS ACCESSIBILITY CODE.

KLUBER, INC. ILLINOIS PROFESSIONAL  
DESIGN FIRM LICENSE #184-001284

ARCHITECT'S SEAL

"G" SERIES  
"M" SERIES

	MECHANICAL ENGINEER'S SEAL

"G" SERIES  
"M" SERIES

ELECTRICAL ENGINEER'S SEAL

"G" SERIES  
"E" SERIES

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## BUILDING CODE DATA

2015 INTERNATIONAL BUILDING CODE  
2014 ILLINOIS STATE PLUMBING CODE  
2015 INTERNATIONAL MECHANICAL CODE  
2015 INTERNATIONAL FUEL AND GAS CODE  
2015 INTERNATIONAL ENERGY CODE  
2015 INTERNATIONAL FIRE PREVENTION CODE  
2018 IL ACCESSIBILITY CODE  
2014 NATIONAL ELECTRIC CODE  
LOCAL AMENDMENTS TO THE ABOVE CODES

## DRAFTING SYMBOLS AND MATERIALS LEGEND

DETAIL NUMBER	8
DRAWING NUMBER	A12.24
DETAIL NUMBER	23
DRAWING NUMBER	A7.19
DETAIL NUMBER	2
DRAWING NUMBER	6 A9.18 5
DETAIL NUMBER	1
DRAWING NUMBER	A6.05
COLUMN NUMBER	26
LOCATION ELEVATION	T/1ST FLR. 100'-0"
ROOM NUMBER	204
DOOR NO. NEW	203.2
DOOR NO. EXISTING	203.1X
NOMINAL THICKNESS	48
CONSTRUCTION TYPE	
SPECIAL CONDITION	
KEYNOTE IDENTIFICATION	15.211
WINDOW TYPE IDENTIFICATION	X
TOILET ACCESSORY IDENTIFICATION	A
SPOT ELEVATION	T/1ST FLR. 100'-0"
	CONCRETE
	BRICK MASONRY IN PLAN
	CONCRETE MASONRY IN PLAN (RUNNING BOND)
	CONCRETE MASONRY IN PLAN (STACK BOND)
	STONE MASONRY IN PLAN
	RAKED JOINT IN PLAN
	CTFL EXP. JOINT IN PLAN
	BRICK MASONRY IN SECTION DETAIL
	CONCRETE MASONRY IN SECTION DETAIL
	STONE MASONRY IN SECTION DETAIL
	STEEL IN SECTION DETAIL
	DISCONTINUOUS WOOD BLOCKING IN SECTION
	CONTINUOUS WOOD BLOCKING IN SECTION
	FINISHED WOOD IN SECTION DETAIL
	RIGID BOARD INSULATION
	RIGID BOARD INSULATION (ROOFING)
	BATT INSULATION
	GYPSUM BOARD
	ACOUSTICAL CEILING PANEL
	BITUMINOUS CONCRETE (ASPHALT) PAVING IN SECTION
	AGGREGATE BALLAST, FILL OR BACKFILL IN SECTION
	UNDISTURBED EARTH
	EARTH BACKFILL

## STANDARD ABBREVIATIONS

Ø	- AT	EXP	- EXPANSION	PL	- PLATE
A B	- ANCHOR BOLT	EXP CONST	- EXPOSED CONSTRUCTION	PL LAM	- PLASTIC LAMINATE
ABR	- ABRASIVE	FD	- FLOOR DRAIN	PLB	- PLASTER
AT-(1)	- ACOUSTIC TILE CEILING (TYPE)	FDN	- FOUNDATION	PLB'G	- PLUMBING
AF	- ABOVE FINISH FLOOR	FE	- FIRE EXTINGUISHER	PLB'G CONTR	- PLUMBING CONTRACTOR
AFG	- ABOVE FINISH GRADE	FEC	- FIRE EXTINGUISHER CABINET	PLYMD	- PLYWOOD
ACOUS	- ACOUSTIC	FHC	- FIRE HOSE CABINET	PNT	- PAINT
ADD'N	- ADDITION	FIN	- FINISH	PVC	- POLYVINYL CHLORIDE
ADD'L	- ADDITIONAL	FLR	- FLOOR	PL-(1)	- GYPSUM PLASTER (TYPE)
ADJ	- ADJACENT	FRT	- FIRE RETARDANT TREATED (RATED)	R OR RAD	- RADIUS
ADJT	- ADJUSTABLE	FUR CHN'L	- FURRING CHANNEL	R	- RISE
AL	- ALUMINUM	FTG	- FOOTING	RD	- ROOF DRAIN
ALT	- ALTERNATE	GA	- GAUGE	RO	- ROUGH OPENING
ANCH	- ANCHOR	GALV	- GALVANIZED	RF (1)	- RUBBER FLOORING (TYPE)
AP	- ACCESS PANEL	GEN CONTR	- GENERAL CONTRACTOR	RH	- RIGHT HAND
APPROX	- APPROXIMATE	GC	- GENERAL CONTRACTOR	REF	- REFERENCE
ASPH	- ASPHALT	GL	- GLASS	REINF	- REINFORCING
AUTO	- AUTOMATIC	GYP DB-(1)	- GYPSUM WALL BOARD (DRYWALL)(TYPE)	REQ'D	- REQUIRED
AVG	- AVERAGE	GYP PL-(1)	- GYPSUM PLASTER (TYPE)	RM	- ROOM
BSMT	- BASEMENT	H	- HIGH	SF	- SQUARE FOOT
BD	- BOARD	HD	- HEAVY DUTY	SI	- SQUARE INCH
BITUM	- BITUMINOUS/BITUMASTIC	HD	- HARD	SINK	- SINK
BLDG	- BUILDING	HDNR	- HARDENER	SS	- STAINLESS STEEL
BLK'G	- BLOCKING (WOOD)	HD WD-(1)	- HARD WOOD (TYPE)	SSK	- SERVICE SINK
BM	- BEAM	HDWRE	- HARDWARE	SS	- SQUARE
B.M.	- BENCH MARK	HGT	- HEIGHT	SCHED	- SCHEDULE
BT STL PL	- BENT STEEL PLATE	HM	- HOLLOW METAL	SEAL/HDNR	- SEALER/HARDENER
BRG	- BEARING	HP	- HIGH POINT	SEC	- SECTION
BRKT	- BRACKET	HORIZ	- HORIZONTAL	SHT	- SHEET
BRK	- BRICK	HTG	- HEATING	SIM	- SIMILAR
BTM	- BOTTOM	HVAC	- HEATING/VENTILATING/AIR CONDITIONING	SOG	- SLAB ON GRADE
BTWN	- BETWEEN	INCH	- INCH	SPEC	- SPECIFICATION(S)
CJ	- CONSTRUCTION/CONTRACTION JOINT	ID	- INSIDE DIAMETER	SPC'G	- SPACING
CAB	- CABINET	INCL	- INCLUDE (D)	SPK'R	- SPEAKER
CEM PL-(1)	- CEMENT PLASTER (TYPE)	INSUL	- INSULATION OR INSULATING	STN	- STN
CT PAV-(1)	- CERAMIC PAV. TILE (TYPE)	JOINT	- JOINT	STD	- STANDARD
CIPC	- CAST- IN- PLACE CONCRETE	KD	- KNOCK DOWN	STD WGT	- STANDARD WEIGHT
CLG	- CEILING	L	- LONG	STL	- STEEL
CLR	- CLEAR	LAM	- LAMINATED	STRUCT	- STRUCTURAL OR STRUCTURE
CO	- CLEAN OUT	LAV	- LAVATORY	SUSP	- SUSPEND(ED)
CMU	- CONCRETE MASONRY UNIT	LH	- LEFT HAND	SYM	- SYMMETRICAL
COL	- COLUMN	LP	- LOW POINT		- TREAD
COMB	- COMBINATION	LGT WGT	- LIGHTWEIGHT	T&G	- TONGUE AND GROOVE
COMP	- COMPRESSIBLE	LL	- LIVE LOAD	T/B	- TOP OF BEAM
COMPTD	- COMPACTED	LLH	- LONG LEG HORIZONTAL	T/C	- TOP OF CURB
CONC	- CONCRETE	LLV	- LONG LEG VERTICAL	T/F	- TOP OF FOUNDATION
CONC OPNG	- CONCRETE OPENING	LU	- LOUVER	T/S	- TOP OF SLAB
COND	- CONDITION	MO	- MASONRY OPENING	T/STL	- TOP OF STEEL
CONT	- CONTINUOUS	MT	- METAL THRESHOLD	T/W	- TOP OF WALL
CONTR	- CONTRACT (TYPE)	MAS'Y	- MASONRY	TB (4)	- TACKBOARD (LENGTH)
CRF-(1)	- CARPET (TYPE)	MATL	- MATERIAL	TOM	- TOP OF MASONRY
CT-(1)	- CERAMIC TILE (TYPE)	MAX	- MAXIMUM	TP	- TYPICAL
CTR	- COUNTER	MB-(16)	- MARKERBOARD- (LENGTH)	UNO	- UNLESS NOTED OTHERWISE
CTR SK	- COUNTER SINK	MECH	- MECHANICAL	VBC	- VINYL BASE COVED
CTS	- CENTER(S)	MECH CONTR	- MECHANICAL CONTRACTOR	VBS	- VINYL BASE STRAIGHT
CUH	- CABINET UNIT HEATER	MFR	- MANUFACTURER	VCT	- VINYL COMPOSITION TILE
CUV	- CABINET UNIT VENTILATOR	MIN	- MINIMUM	VEN PL (1)	- VENEER PLASTER (TYPE)
DIA	- DIAMETER	MISC	- MISCELLANEOUS	VERT	- VERTICAL
DIM	- DIMENSION	MSB	- MOP SERVICE BASIN (SINK)	W	- WIDE OR WIDTH
DN	- DOWN	MT(D)	- MOUNT(ED)	W/	- WITH
DR	- DOOR	METAL	- METAL	W/O	- WITHOUT
DWG'S	- DRAWINGS	NIC	- NOT IN CONTRACT	WCG	- WALL CORNER GUARD
DTL	- DETAIL	NOM	- NOMINAL	WD	- WOOD
DWL'S	- DOWELS	NTS	- NOT TO SCALE	WDN	- WINDOW
EJ	- EACH	NO	- NUMBER	WGT	- WEIGHT
EA	- EXPANSION JOINT	OA	- OVERALL	WP	- WATER PROOF
EL	- ELEVATION	OC	- ON CENTER	WWF	- WELDED WIRE FABRIC
ELEC	- ELECTRIC/ELECTRICAL	OD	- OUTSIDE DIAMETER	WSB	- WALL SERVICE BASIN
ELEC CONTR	- ELECTRICAL CONTRACTOR	OF	- OUTSIDE FACE		
ELEV	- ELEVATOR	OPN'G	- OPENING		
EMBED	- EMBEDMENT	OPP	- OPPOSITE		
EMER	- EMERGENCY	OPP HD	- OPPOSITE HAND		
EP PNT	- EPOXY PAINT	PSF	- POUNDS PER SQUARE FOOT		
EQ	- EQUAL	PSI	- POUNDS PER SQUARE INCH		
EW	- EACH WAY	PT	- PRESSURE TREATED		
EWG	- ELECTRIC WATER COOLER	PTN	- PARTITION		
EWV	- ELECTRIC WATER HEATER	PAVT	- PAVEMENT		
ER-(26)	- EXHIBIT RAIL (LENGTH)	PC	- PIECE		
EXIST	- EXISTING	PFM	- PERMANENT FLOOR MAT		

THE MATERIALS, ABBREVIATIONS, AND DRAFTING SYMBOLS LEGEND ARE EACH AN ALL INCLUSIVE MASTER LIST USED BY THIS FIRM. THE INCLUSION OF THESE LEGENDS INTO THESE DOCUMENTS DOES NOT IMPLY THAT ALL THE SYMBOLS OR MATERIALS INCLUDED IN THESE LEGENDS ARE INCORPORATED INTO THIS PROJECT.

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SET FORTH BY 2015 IBC AND SHALL CONFORM TO ALL OTHER APPLICABLE MUNICIPAL, STATE, AND FEDERAL REGULATIONS INCLUDING THE ILLINOIS ACCESSIBILITY CODE (2018) AND THE AMERICANS WITH DISABILITIES ACT.

## B: MISCELLANEOUS AND DEMOLITION NOTES

1. ALL CONTRACTORS ARE REQUIRED TO VISIT THE SITE AND BE KNOWLEDGEABLE REGARDING EXISTING CONDITIONS AND THEIR EFFECT ON THE PROPOSED WORK. CONTRACTORS SHALL VERIFY AND BE RESPONSIBLE FOR, ANY CONDITIONS REQUIRING MODIFICATION BEFORE PROCEEDING WITH THE PROJECT.
2. NOTIFY THE OWNER'S REPRESENTATIVE A MINIMUM OF 72 HOURS PRIOR TO THE INTERRUPTION OF ANY UTILITY.
3. CONTRACTORS AND SUBCONTRACTORS SHALL COORDINATE THEIR WORK WITH THAT OF OTHER TRADES.
4. NO WORK WILL BE PERMITTED TO BE INSTALLED WITHOUT RECEIPT AND SUBSEQUENT REVIEW OF FULL AND COMPLETE SUBMITTALS BY THE ARCHITECT/ENGINEER.
5. DO NOT SCALE DRAWINGS, DIMENSIONS INDICATED TAKE PRECEDENCE OVER SCALE.
6. VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD. WHERE DISCREPANCIES ARE FOUND BETWEEN DIMENSIONS OR ELEVATIONS SHOWN AND ACTUAL FIELD CONDITIONS, NOTIFY ARCHITECT/ENGINEER.
7. DEFINITIONS:
- 7.1. FURNISH: SUPPLY, DELIVER TO AND UNLOAD AT PROJECT SITE READY FOR ASSEMBLY AND INCORPORATION INTO THE WORK.
- 7.2. INSTALL: AT THE PROJECT SITE, UNPACK/UNCRATE ASSEMBLE, PLACE, ANCHOR, FINISH, PROTECT, CLEAN, AND PERFORM ALL OTHER SIMILAR OPERATIONS REQUIRED TO FULLY AND PROPERLY INCORPORATE AN ITEM INTO THE WORK. LEGALLY DISPOSE OF OR RECYCLE PACKAGING AND EXTRA MATERIAL OFF-SITE.
- 7.3. PROJECT SITE: THE SPACE AVAILABLE TO THE CONTRACTOR FOR PERFORMANCE OF CONSTRUCTION ACTIVITIES. THE EXTENT OF THE PROJECT SITE IS THE AREAS TO BE REMODELED AS INDICATED ON THE DRAWINGS, AND EXTENDS TO SUCH AREAS AS CONTAIN TERMINATIONS FOR POWER, DATA AND OTHER SERVICES.
- 7.4. OFF-SITE: OUTSIDE THE PROPERTY IN WHICH THE PROJECT SITE IS LOCATED.
- 7.5. PROVIDE: FURNISH AND INSTALL, AS DEFINED ABOVE.
8. WHERE CONFLICTS MAY EXIST BETWEEN THE REQUIREMENTS OF PORTIONS OF THE CONTRACT DOCUMENTS, THE GREATER QUANTITY, HIGHER QUALITY OR MORE STRINGENT REQUIREMENT SHALL GOVERN. THEREFORE, BY EXECUTING A CONTRACT FOR CONSTRUCTION, THE CONTRACTOR AGREES THAT: IF IT RAISED NO QUESTIONS REGARDING SUCH CONFLICTS DURING THE BIDDING PROCESS, AND IN THE ABSENCE OF A CLARIFYING ADDENDUM ISSUED DURING THE BIDDING PROCESS, IT HAS VOLUNTEERED TO COMPLY WITH THE MORE EXPENSIVE REQUIREMENT AS PART OF ITS BASE BID AND IS NOT ENTITLED TO ANY ADDITIONAL COMPENSATION TO RESOLVE THE CONFLICT.
9. THE CONTRACT DOCUMENTS REQUIRE THE CONTRACTOR TO FURNISH AND INSTALL COMPLETE PRODUCTS, SYSTEMS AND SERVICES; BY EXECUTING A CONTRACT FOR CONSTRUCTION, THE CONTRACTOR AGREES THAT THE DRAWINGS SET FORTH THE DESIGN INTENT AND, THEREFORE, MAY NOT EXPRESSLY DEPICT EVERY LENGTH, SEGMENT, PIECE, PART, COMPONENT OR UNIT OF A PRODUCT, SYSTEM OR SERVICE. THE CONTRACTOR FURTHER AGREES THAT, AS PART OF ITS BID, IT MUST FURNISH AND INSTALL EVERY LENGTH, SEGMENT, PIECE, PART, COMPONENT OR UNIT OF A PRODUCT, SYSTEM OR SERVICE, AND CONSEQUENTLY, THE CONTRACTOR IS NOT ENTITLED TO ANY ADDITIONAL COMPENSATION FOR ANY LENGTH, SEGMENT, PIECE, PART, COMPONENT OR UNIT OF A PRODUCT, SYSTEM OR SERVICE BECAUSE IT IS NOT EXPRESSLY DEPICTED HEREIN.
10. ARCHITECT SHALL BE NAMED AS ADDITIONAL INSURED ON ALL REQUIRED INSURANCE POLICIES.
11. DEFINITIONS:
- 1.1. DEMOLISH: DISCONNECT FROM SERVICE, UNFASTEN, REMOVE, DISASSEMBLE AND LEGALLY DISPOSE OF OR RECYCLE OFF-SITE.
- 1.2. SALVAGE: CAREFULLY, SO AS TO PRESERVE INTEGRITY AND USEFULNESS, DISCONNECT FROM SERVICE, UNFASTEN, REMOVE, DISASSEMBLE IF NECESSARY, AND STORE TEMPORARILY FOR REINCORPORATION INTO THE WORK OR FOR DELIVERY/TURN-OVER TO THE OWNER AS INDICATED IN THE CONSTRUCTION DOCUMENTS.
- 1.3. SALVAGE IN PLACE: PROTECT, RE-USE, CLEAN, RE-CONDITION IF NECESSARY, REFINISH IF INDICATED IN THE DRAWINGS, EXISTING INSTALLED ITEM/COMPONENT WITHOUT DISCONNECTING, UNFASTENING OR REMOVING FROM THE WORK.
2. BRING ANY UNFORESEEN OR CONFLICTING CONDITIONS TO THE IMMEDIATE ATTENTION OF THE ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE WORK.
3. REPAIR, PATCH, OR REPLACE FINISH MATERIALS OR VISIBLE ASSEMBLIES THAT ARE SOILED, Oiled, OR DAMAGED IN ANY FASHION DURING THE COURSE OF THE WORK. PERFORM PATCHING SUCH THAT EDGES BLEND INTO CONTIGUOUS SURFACES SMOOTHLY, MATCHING TEXTURE AND COLOR OF ADJACENT SURFACES.
4. SEAL PENETRATIONS OF DUCTWORK, CONDUIT OR PIPES WITH UL APPROVED MATERIALS TO MAINTAIN THE FIRE RATING OF ASSEMBLIES.
5. APPLY APPROPRIATE & COMPATIBLE SEALANT MATERIALS AS REQUIRED TO SEPARATE DISSIMILAR METALS, PLI, GAPS IN EXISTING ASSEMBLIES OR WHERE NEW AND EXISTING ASSEMBLIES MEET OR WHERE OTHERWISE REQUIRED BY THE SPECIFICATIONS.
6. UNTIL PERMANENT LIGHTING IS IN PLACE AND ENERGIZED, PROVIDE AND MAINTAIN TEMPORARY LIGHTING IN THE PROJECT AREAS, TO ACHIEVE A MINIMUM LIGHTING LEVEL OF 2 WATTS PER S.F.
7. OWNER WILL CONTINUE TO OCCUPY AREAS ADJACENT TO THE PROJECT AREAS DURING THE CONSTRUCTION PERIOD. COORDINATE WITH OWNER TO MINIMIZE CONFLICT AND TO FACILITATE OWNER'S OPERATIONS. LIMIT CONDUCT OF EXCESSIVELY NOISY OR DISRUPTIVE WORK TO TIMES WHEN MUTUALLY AGREED TO BY OWNER. REQUEST MUTUALLY AGREEABLE TIME FROM OWNER PRIOR TO CONDUCTING SUCH WORK, AND PROCEED WITH SUCH WORK ONLY AFTER RECEIVING OWNER'S EXPRESS PERMISSION TO DO SO.
- C: BIDDING NOTES
1. CONSTRUCTION SCHEDULE:
- CONSTRUCTION START AND SUBSTANTIAL COMPLETION IN ACCORDANCE WITH JIC FRONT-END DOCUMENTS.
- SCHEDULE REQUIRES THAT BUILDING 'A' & 'S' HALLS CANNOT BE SHUTDOWN FOR REPLACEMENT UNTIL MAY 17, 2021. ALL HALLS ARE THEN REQUIRED TO BE UP AND OPERATIONAL NO LATER THAN AUGUST 1, 2021.
2. ALL LIQUID AND DISRUPTIVE WORK IS TO BE PERFORMED BETWEEN THE HOURS OF 10:00 AM AND 6:00 PM.

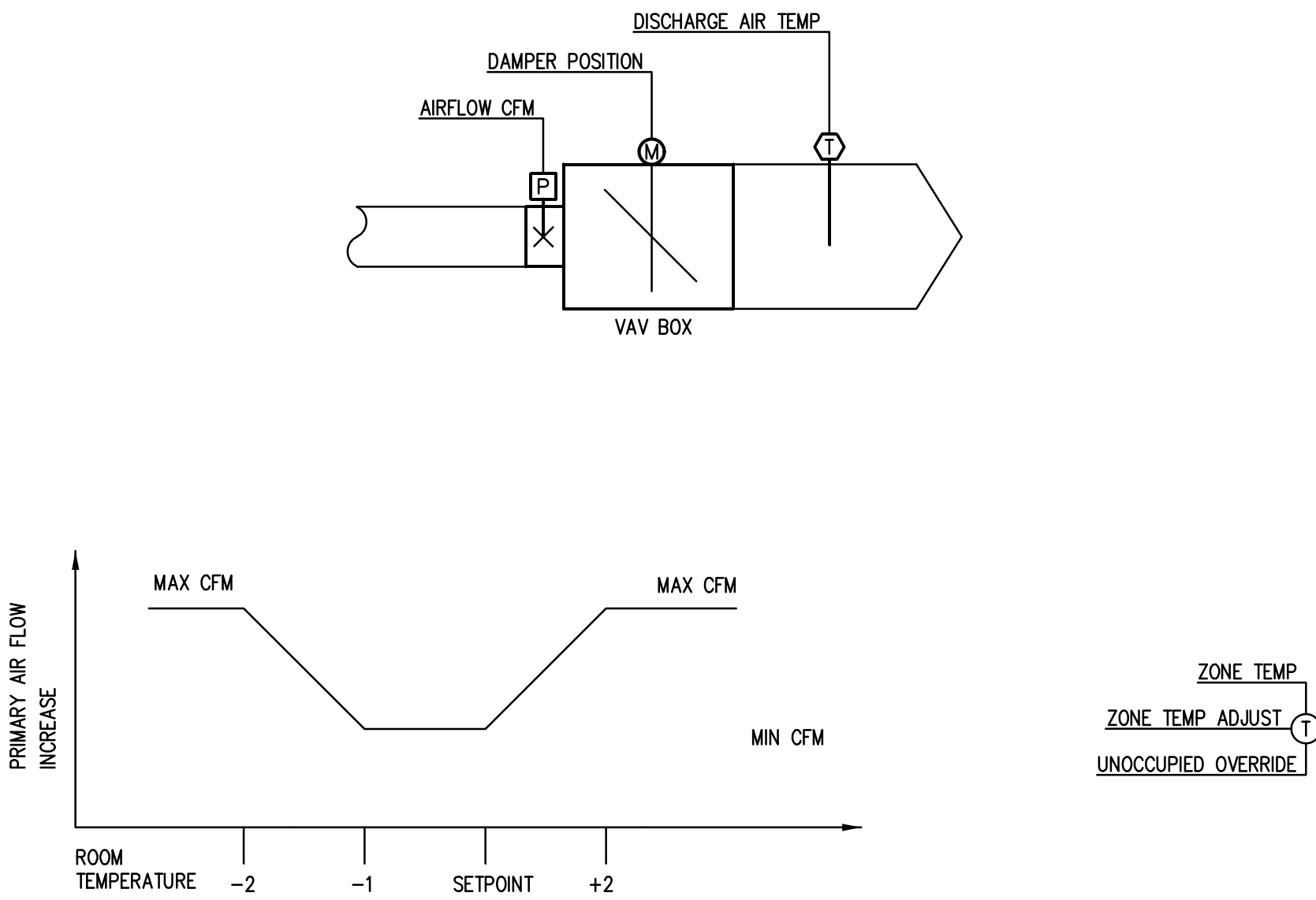
## C: BIDDING NOTES

1. CONSTRUCTION SCHEDULE:  
  
CONSTRUCTION START AND SUBSTANTIAL COMPLETION IN ACCORDANCE WITH JJC FRONT-END DOCUMENTS.  
  
SCHEDULE REQUIRES THAT BUILDING 'A' & 'S' AHUs CANNOT BE SHUTDOWN FOR REPLACEMENT UNTIL MAY 17, 2021. ALL AHUs ARE THEN REQUIRED TO BE UP AND OPERATIONAL NO LATER THAN AUGUST 1, 2021.
2. ALL LOUD AND DISRUPTIVE WORK IS TO BE PERFORMED BETWEEN THE HOURS OF 10:00 PM AND 6:00 AM.

VARIABLE AIR VOLUME BOX SCHEDULE												
MARK	AIR FLOW (CFM)	MIN AIR FLOW (CFM)	INLET SIZE (IN)	REHEAT COIL							MODEL	AREA SERVED
				AIR FLOW (CFM)	MAX APD (IN WG)	EAT / LAT (°F)	WATER (GPM)	EWTLWT (°F)	MAX WPD (°F)	CAPACITY (INH)		
VAV-13A(a)	2430	2430	16	2430	0.29	55 / 93.3	9.0	180 / 157	2.45	101.0	D31RW	ZONE 13A
VAV-13A2	630	125	20 / 18	-	-	-	-	-	-	-	DQCV	OFFICES

NOTES  
1. MODEL BASED ON EXISTING NAILOR VAV BOX FOR REFERENCE ONLY.  
2. MODEL BASED ON TITUS. FIELD VERIFY EXACT DUCT SIZE PRIOR TO ORDERING.

VARIABLE AIR VOLUME BOX CONTROL SCHEMATIC



SEQUENCE OF OPERATIONS

PRESSURE INDEPENDENT AIR TERMINAL SHALL MAINTAIN ZONE TEMPERATURE HEAT/COOL SETPOINTS OF 72/75 DEGREES F (ADJ) AND UNOCCUPIED COOL/HEAT SETPOINTS OF 80/65 DEGREES F. ALL SETPOINTS SHALL BE ADJUSTABLE. HEATING / COOLING CHANGEOVER SHALL BE DETERMINED BY THE SUPPLY AIR TEMPERATURE.

OCCUPIED MODE:  
COOLING - THE TERMINAL UNIT DAMPER SHALL MODULATE TO MAINTAIN THE ZONE COOLING TEMPERATURE SETPOINT BY MODULATING SUPPLY AIR FLOW. WHEN THE ZONE TEMPERATURE IS ABOVE SETPOINT THE DAMPER SHALL MODULATE TO THE MAXIMUM CFM POSITION. WHEN THE ZONE TEMPERATURE IS BELOW SETPOINT THE DAMPER SHALL MODULATE TO THE MINIMUM CFM POSITION.

HEATING - THE TERMINAL UNIT DAMPER SHALL MODULATE TO MAINTAIN THE ZONE HEATING TEMPERATURE SETPOINT BY MODULATING SUPPLY AIR FLOW. WHEN THE ZONE TEMPERATURE IS BELOW SETPOINT THE DAMPER SHALL MODULATE TO THE MAXIMUM CFM POSITION. WHEN THE ZONE TEMPERATURE IS ABOVE SETPOINT THE DAMPER SHALL MODULATE TO THE MINIMUM CFM POSITION.

UNOCCUPIED MODE:  
THE TERMINAL UNIT DAMPER SHALL OPERATE AS DESCRIBED ABOVE WHEN THE ASSOCIATED AIR HANDLING UNIT IS ENERGIZED. THE UNIT SHALL OPERATE TO MAINTAIN THE UNOCCUPIED HEATING/COOLING SETPOINTS.

ZONE THERMOSTAT SHALL HAVE PLUS/MINUS 2° F TEMPERATURE SETPOINT ADJUSTMENT OF THE SETPOINT SET AT THE BAS AND TIMED UNOCCUPIED OVERRIDE BUTTON.

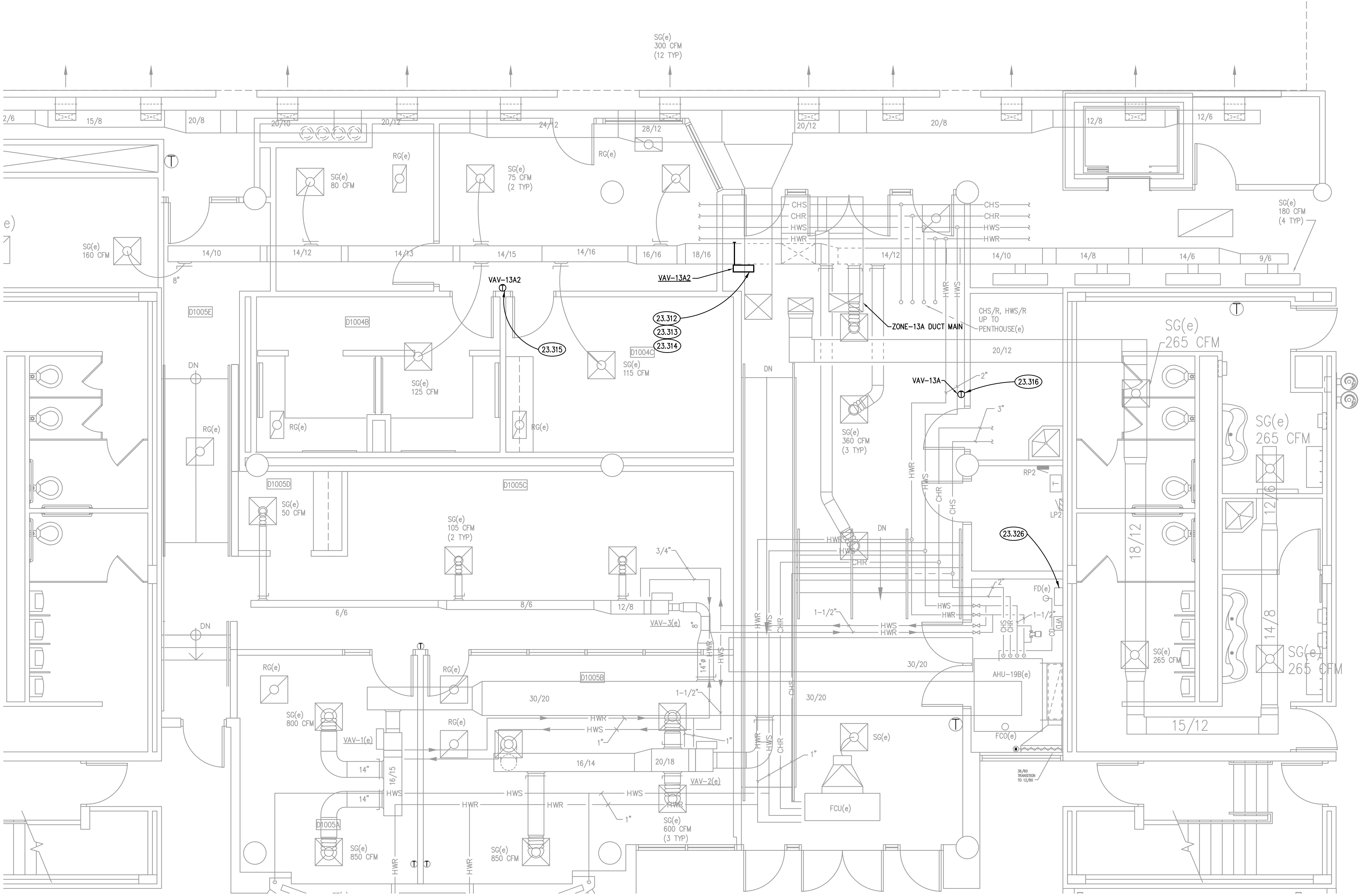
POINTS LIST

VARIABLE AIR VOLUME BOX	HARDWARE				SOFTWARE			
	AI	AO	BI	BO	SCHED	TREND	ALARM	GRAPHIC
DISCHARGE AIR TEMPERATURE	X						X	
ZONE AIR TEMPERATURE	X						X	
ZONE TEMPERATURE ADJUSTMENT	X						X	
HEATING SETPOINT		X						
COOLING SETPOINT		X						
DAMPER POSITION		X						
AIRFLOW CFM	X						X	
MINIMUM AIRFLOW SETPOINT		X						
MAXIMUM AIRFLOW SETPOINT		X						
UNOCCUPIED MODE OVERRIDE			X					

KEYNOTES

KEYNOTES ARE TYPICALLY NOT DUPLICATED WITHIN A GIVEN DETAIL. AN UN-KEYNOTED ITEM IN A DETAIL IS THE SAME AS A KEYNOTED ITEM HAVING THE SAME APPEARANCE WITHIN THE SAME DETAIL.

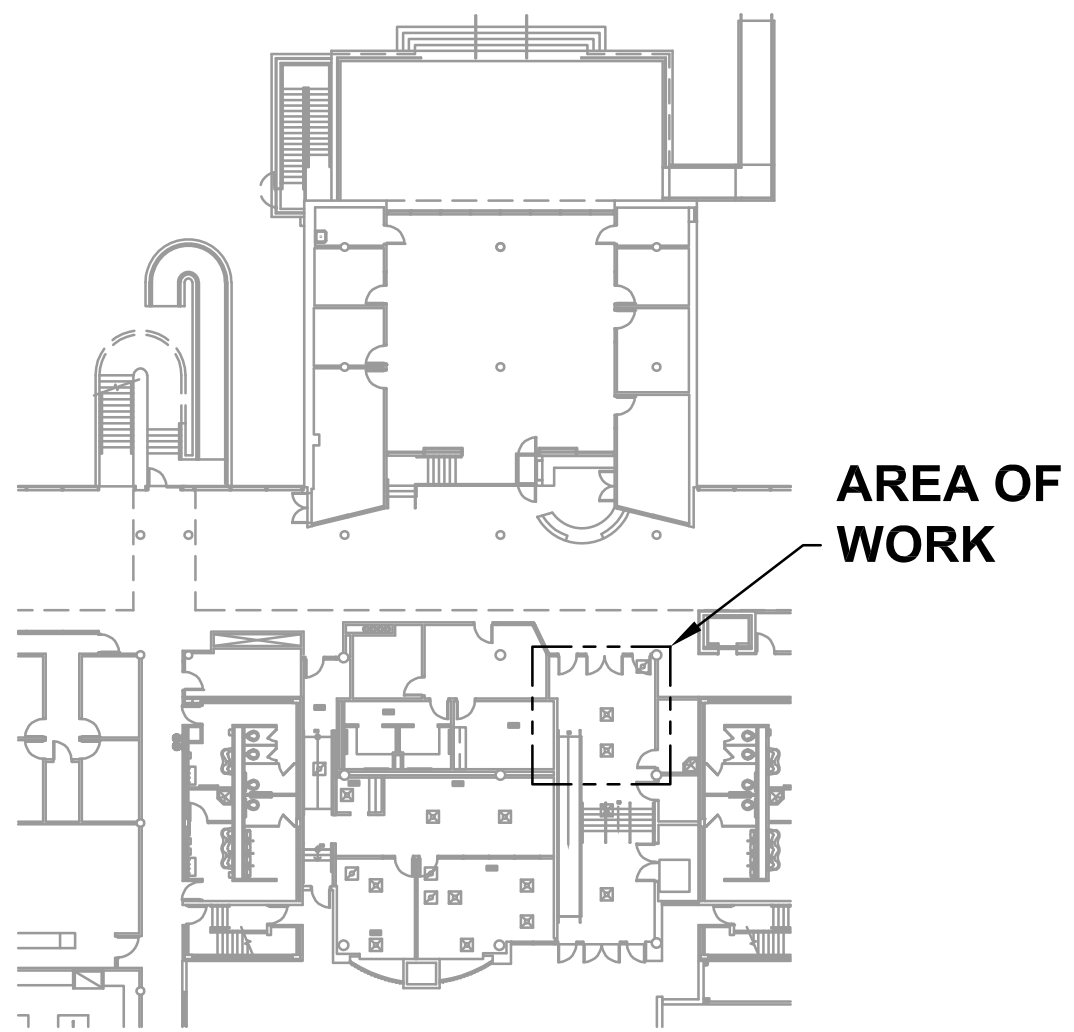
- 23.312 REMOVE, STORE AND PROTECT CEILING TILES/GRID AS REQUIRED FOR INSTALLATION OF NEW VAV BOX. REINSTALL CEILING TILES/GRID AFTER COMPLETION OF CONSTRUCTION. REPLACE ANY DAMAGED COMPONENTS.
- 23.313 PROVIDE TITUS MODEL DQCV RETROFIT VAV TERMINAL WITH DUST TIGHT ENCLOSURE. PROVIDE ALL MATERIALS AND LABOR TO INSTALL IN EXISTING DUCTWORK AS SHOWN.
- 23.314 EXISTING DUCTWORK CONTAINS 1-INCH LINER INSULATION. FIELD VERIFY EXACT SIZE OF DUCTWORK PRIOR TO CONSTRUCTION.
- 23.315 DISCONNECT AND PROTECT EXISTING THERMOSTAT SERVING VAV-13A FOR RELOCATION INTO VESTIBULE. PROVIDE NEW THERMOSTAT FOR VAV-13A2 AT THIS LOCATION. NEW THERMOSTAT SHALL MATCH OWNER STANDARDS.
- 23.316 PROVIDE ALL MATERIALS AND LABOR TO RELOCATE THERMOSTAT TO LOCATION AS SHOWN. CONFIRM FINAL LOCATION WITH OWNER.
- 23.326 PROVIDE ALL MATERIALS AND LABOR TO THE NEW VAV BOX INTO EXISTING JOHNSON CONTROLS BUILDING AUTOMATION SYSTEM.



BUILDING 'D' MECHANICAL PLAN

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

KEY PLAN



FIRST FLOOR BUILDING D

BUILDINGS 'A' & 'S' HVAC UNIT REPLACEMENTS AND MISC. HVAC PROJECTS

JOLIET JUNIOR COLLEGE  
1215 HOBOLT ROAD  
JOLIET, ILLINOIS 60431

ISSUED

JOB NO. 20-292-1329  
DRAWN BWG  
CHECKED DDW  
APPROVED DDW

SHEET TITLE  
BUILDING 'D' MECHANICAL PLAN

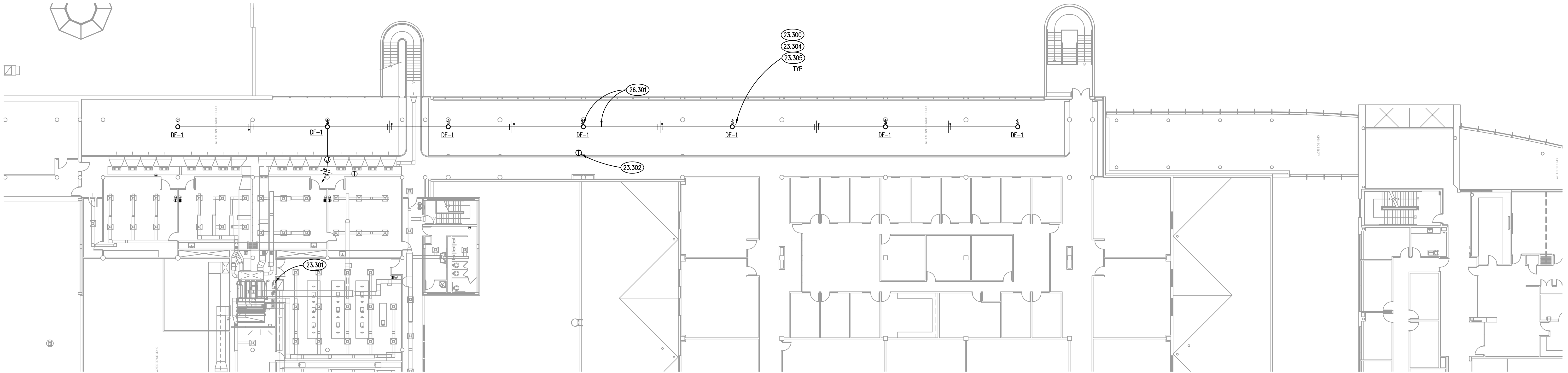
SHEET NUMBER

M300

KLuber  
Architects + Engineers

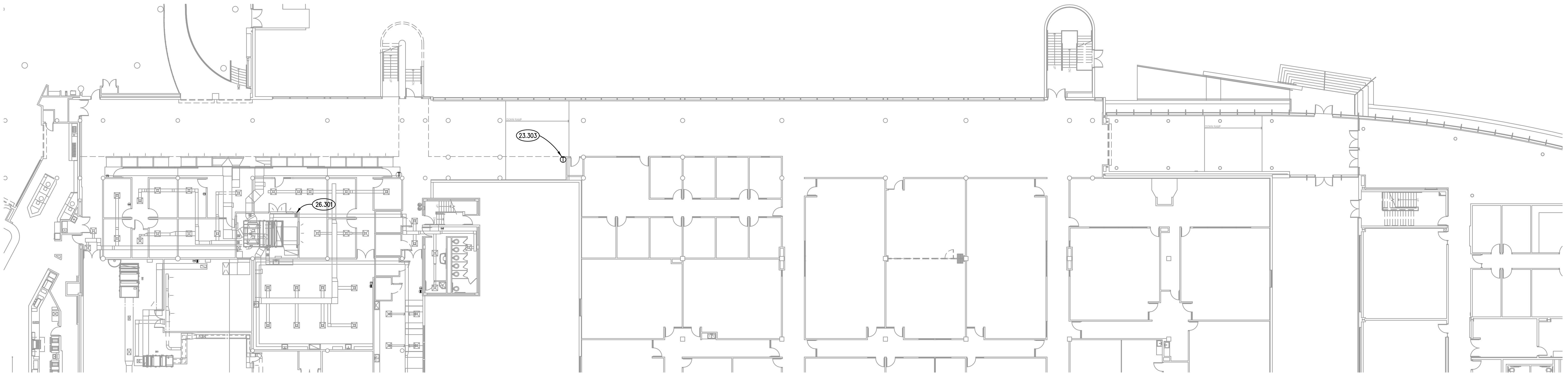
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**SECOND FLOOR MECHANICAL/ELECTRICAL PLAN**  
SCALE: 1/16" = 1'-0"

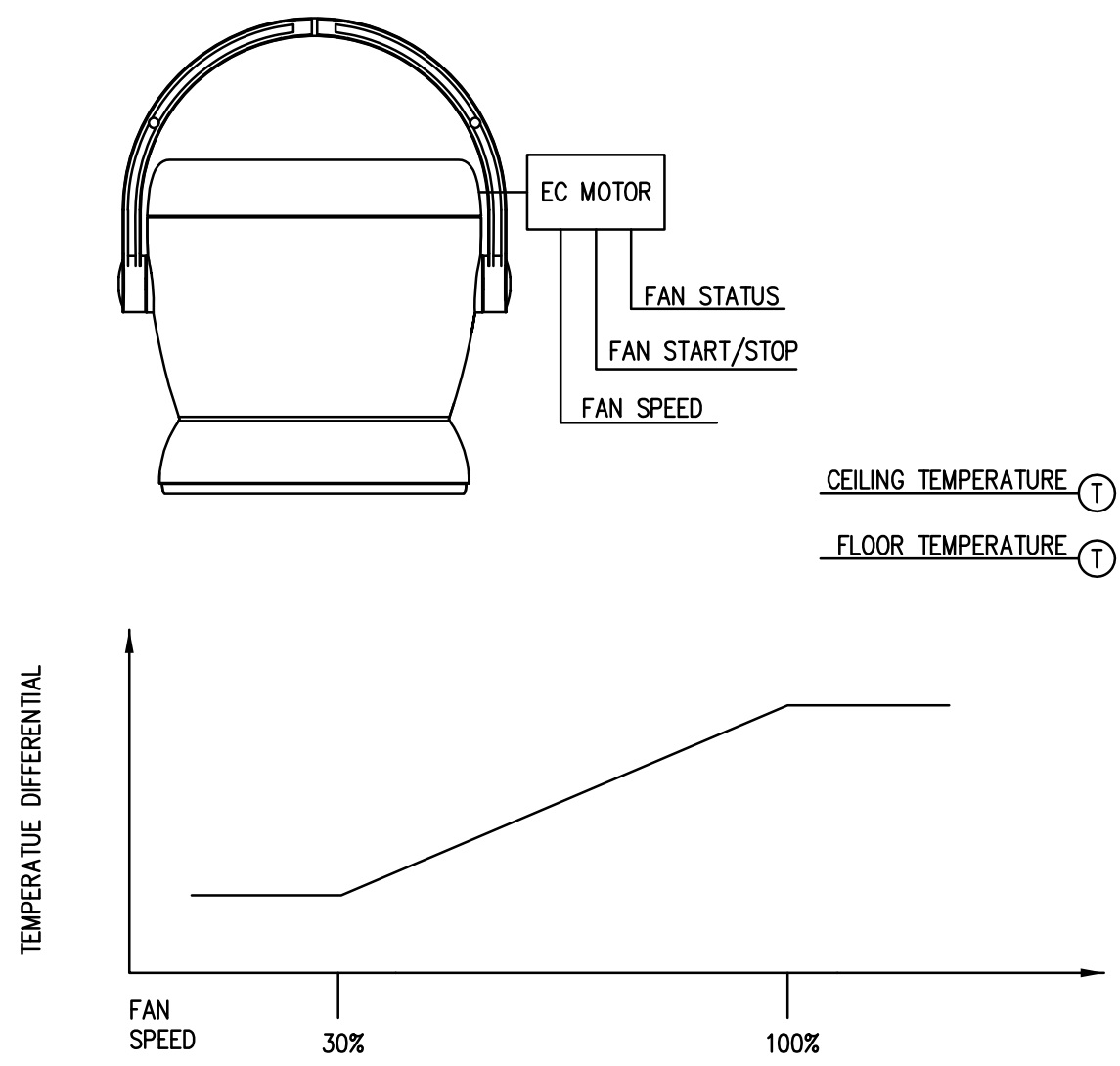
2



**FIRST FLOOR MECHANICAL PLAN**  
SCALE: 1/16" = 1'-0"

1

**DESTRATIFICATION FAN FAN CONTROL SCHEMATIC**



**SEQUENCE OF OPERATIONS**

THE FANS SHALL BE ENERGIZED AS SCHEDULED IN THE BUILDING AUTOMATION SYSTEM.

ALL OF THE FANS SHALL BE LINKED TOGETHER AND OPERATE IN UNISON. THE BUILDING AUTOMATION SYSTEM SHALL MONITOR THE TEMPERATURE DIFFERENTIAL BETWEEN THE CEILING TEMPERATURE SENSOR AND THE 1ST FLOOR TEMPERATURE SENSOR. THE BAS SHALL MODULATE THE SPEED OF THE FANS TO MAINTAIN A MAXIMUM TEMPERATURE DIFFERENTIAL OF 2 DEGREES F (ADJ.).

AN ALARM SHALL BE GENERATED IF THE TEMPERATURE DIFFERENTIAL IS MORE THAN 2 DEGREES F (ADJ.) FOR MORE THAN 30 MINUTES (ADJ.).

**POINTS LIST**

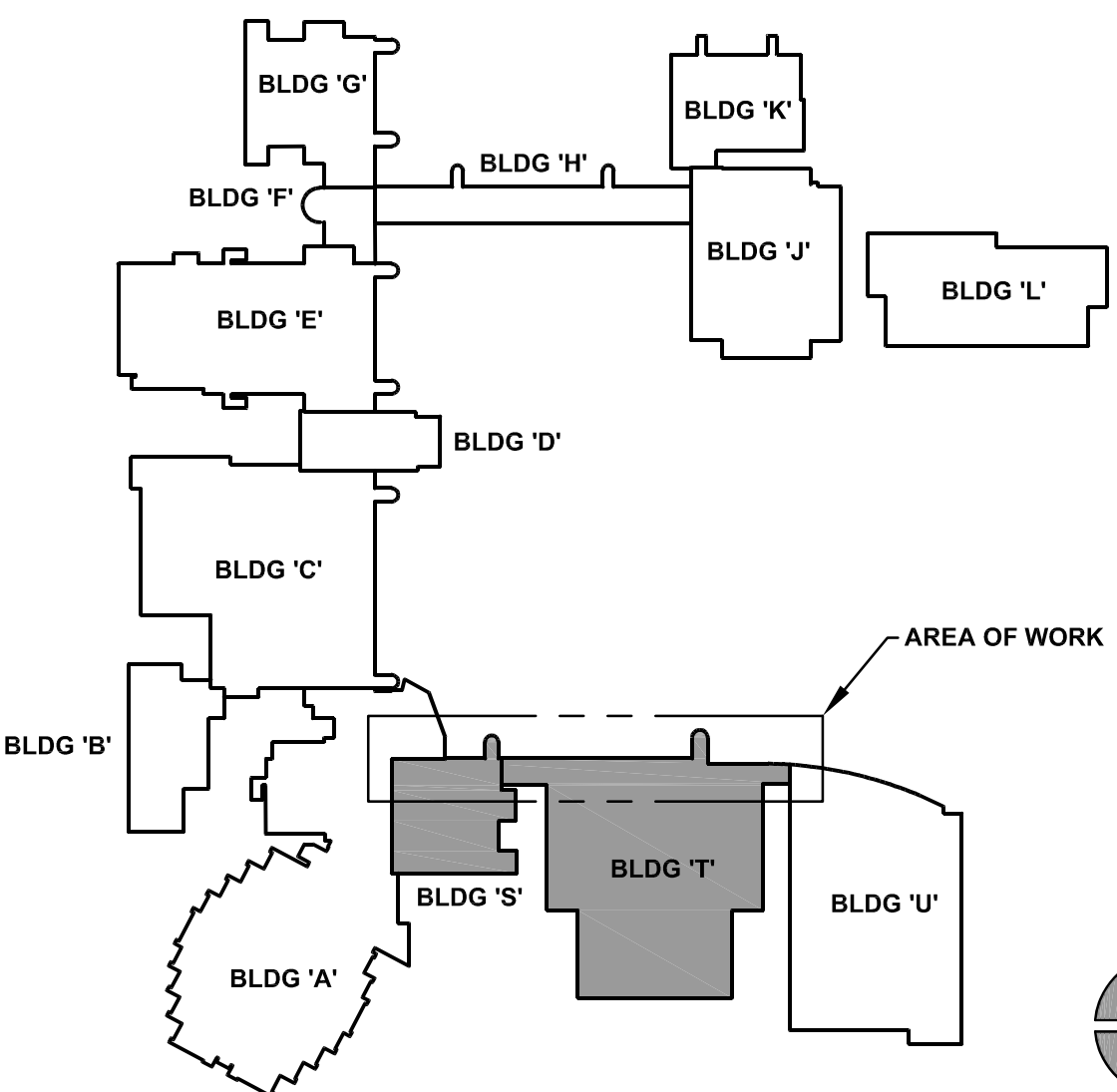
DESTRATIFICATION FAN	HARDWARE				SOFTWARE			
	AI	AO	DI	DO	SCHED	TREND	ALARM	GRAPHIC
FAN START/STOP				X	X			
FAN STATUS			X				X	X
FAN SPEED (%)		X				X		X
CEILING TEMPERATURE	X					X		X
FLOOR TEMPERATURE	X					X		X
TEMPERATURE DIFFERENTIAL	X					X	X	X

**KEYNOTES**

KEYNOTES ARE TYPICALLY NOT DUPLICATED WITHIN A GIVEN DETAIL. AN UN-KEYNOTED ITEM IN A DETAIL IS THE SAME AS A KEYNOTED ITEM HAVING THE SAME APPEARANCE WITHIN THE SAME DETAIL.

- 23.300 PROVIDE WHITE CONDUIT OR PAINTED CONDUIT TO MATCH EXISTING CEILING COLOR FOR ALL CONTROL WIRING AS REQUIRED.
- 23.301 THE OPERATION OF DESTRATIFICATION FANS INTO EXISTING JOHNSON CONTROLS BUILDING AUTOMATION SYSTEM.
- 23.302 PROVIDE WALL MOUNTED TEMPERATURE SENSOR AT THIS LOCATION. MOUNT 18-INCHES FROM CEILING.
- 23.303 PROVIDE WALL MOUNTED TEMPERATURE SENSOR AT THIS LOCATION. MOUNT 12-INCHES FROM FLOOR.
- 23.304 PROVIDE ZOO FANS; MODEL H25-EC HIGH EFFICIENCY DESTRATIFICATION FAN. FAN SHALL BE OFF-WHITE IN COLOR. INSTALL IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.
- 23.305 CONTRACTOR TO SUBMIT PROPOSED ANCHORING DETAIL TO EOR FOR REVIEW. CONTRACTOR TO NON-DESTRUCTIVELY (I.E. XRAY OR SIMILAR METHOD) LOCATE EXISTING SLAB REINFORCING TO AVOID CUTTING OR DAMAGING EXISTING SLAB REINFORCING.
- 26.301 PROVIDE ELECTRICAL CONNECTION TO DESTRATIFICATION FANS (DF-1) AND ALL ASSOCIATED BRANCH CIRCUITRY. PROVIDE DISCONNECT SWITCH AT EACH FAN. PROVIDE NEW 15 AMPERE, TWO POLE BREAKER IN PANEL 20A (LOCATED IN 1ST FLOOR MECHANICAL ROOM S1020). HOMERUN 5/12, #12G, 1/2" EMT CONDUIT TO NEW BREAKER. PROVIDE WHITE CONDUIT OR PAINT WHITE TO MATCH EXISTING CEILING.

**KEY PLAN**





A site plan of the University of Maryland Eastern Shore campus. The plan shows the layout of various buildings, labeled BLDG 'A' through BLDG 'L'. BLDG 'A' is an irregularly shaped building at the bottom left. BLDG 'B' is a rectangular building to its right. BLDG 'C' is a large rectangular building above BLDG 'B'. BLDG 'D' is a small rectangular building to the right of BLDG 'C'. BLDG 'E' is a large rectangular building to the right of BLDG 'D'. BLDG 'F' is a rectangular building above BLDG 'E'. BLDG 'G' is a rectangular building above BLDG 'F'. BLDG 'H' is a long, narrow rectangular building between BLDG 'F' and BLDG 'I'. BLDG 'I' is a rectangular building above BLDG 'H'. BLDG 'J' is a rectangular building to the right of BLDG 'I'. BLDG 'K' is a rectangular building above BLDG 'J'. BLDG 'L' is a rectangular building to the right of BLDG 'J'. A shaded area between BLDG 'F' and BLDG 'I' is labeled 'AREA OF WORK' with a line pointing to it.



1. REFER TO DRAWING G100 FOR PROJECT GENERAL NOTES.
2. ALL PIPING AND DUCTWORK IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL REQUIRED FITTINGS, OFFSETS, DROPS AND RISERS. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL MATERIAL AND LABOR FOR A COMPLETE AND WORKING SYSTEM. COORDINATE WITH OTHER TRADES FOR SPACE AVAILABLE AND RELATIVE LOCATIONS OF EQUIPMENT, PIPING, DUCTWORK, ETC.
3. ALL TAPES AND MASTICS USED TO SEAL DUCTWORK LISTED AND LABELED IN ACCORDANCE WITH UL 181A SHALL BE MARKED ACCORDINGLY. ALL TAPES AND MASTICS USED TO SEAL FLEXIBLE DUCTS AND AIR CONNECTORS SHALL COMPLY WITH UL 181B AND MARKED ACCORDINGLY.
4. THERMOSTATIC CONTROLS OF EQUIPMENT SHALL HAVE A 5°F DEADBAND.
5. GENERALLY, SMALL DIAMETER PIPE RUNS FROM DRIPS, CONDENSATE PANS AND OTHER SERVICES ARE NOT SHOWN BUT MUST BE PROVIDED.
6. SPACE ALLOCATION, COORDINATION WITH ELECTRICAL, ARCHITECTURAL & OTHER MECHANICAL COMPONENTS HAVE BEEN MADE WITH RESPECT TO ALL EQUIPMENT SCHEDULED ON THESE DRAWINGS AND IN THE SPECIFICATIONS OF THE FIRST NAMED MANUFACTURER ONLY. OTHER MANUFACTURERS ARE ACCEPTABLE PROVIDED THEY MEET PERFORMANCE REQUIREMENTS AND APPROPRIATELY COORDINATE.
7. DO NOT CUT THROUGH THE MASONRY BOND BEAMS OR OTHER STRUCTURAL ELEMENT WHEN INSTALLING OPENINGS FOR ALL DUCTWORK, PIPING, CONDUITS OR OTHER WORK. CONTRACTOR CUTTING THROUGH OR OTHERWISE DAMAGING THESE ELEMENTS WILL BE RESPONSIBLE FOR ALL ASSOCIATED ENGINEERING FEES AND SUBSEQUENT RETRO-FIT/REINFORCING DEEMED NECESSARY TO REINSTATE THE CONTINUITY OF THE DISRUPTED ELEMENTS.
8. HEATING AND COOLING DESIGN LOADS FOR THE BUILDING HAVE BEEN CALCULATED WITH ELITE SOFTWARE, COMMERCIAL HVAC LOAD PROGRAM, VERSION 8.02.34, IN ACCORDANCE WITH ASHRAE STANDARDS. INTERIOR DESIGN TEMPERATURES ARE MAXIMUM 72 DEGREES F FOR HEATING AND A MINIMUM 75 DEGREES F FOR COOLING.
9. OBTAIN AND PAY ALL COSTS FOR PERMITS, LICENSES, CERTIFICATE FILING AND ALL INSPECTIONS BY AUTHORITIES HAVING JURISDICTION.

- 2.400 DEMOLISH PORTION OF EXISTING INTERIOR FIRE-RATED DRYWALL/MASONRY WALL CONSTRUCTION TO ALLOW FOR PASSAGE OF NEW MECHANICAL EQUIPMENT; NOTE LOCATIONS OF AND THEN SALVAGE AND DISCONNECT EXISTING CARD ACCESS DEVICES, FIRE ALARM PULLS, WALL DOORSTOPS, CORNER GUARDS, SIGNAGE, ETC.; REINSTALL THESE ITEMS IN ORIGINAL LOCATIONS AFTER NEW WORK IS COMPLETE; PROVIDE TEMPORARY BRACE/SHORING TO SUPPORT MASONRY ABOVE REMOVED DOOR AND PORTION OF WALL.
- 2.401 SALVAGE EXISTING FIRE-RATED DOOR AND HARDWARE.
- 2.402 DEMOLISH EXISTING DOOR FRAME.
- 2.407 PRESERVE AND PROTECT EXISTING INTEGRAL TERRAZZO COVE BASE ON THIS SIDE OF DEMOLISHED SECTION OF WALL; RETAIN BOTTOM PORTION OF WALL TO MAINTAIN SUPPORT FOR TERRAZZO BASE; LIFT MECHANICAL EQUIPMENT OVER WALL STUB AND TERRAZZO BASE.
- 8.100 RE-INSTALL SALVAGED FIRE-RATED DOOR AND HARDWARE INTO NEW DOOR FRAME. REINSTALL AND RECONNECT SALVAGED CARD ACCESS DEVICES TO SAME POSITIONS.
- 8.102 NEW HOLLOW METAL DOOR FRAME: 16 GA.; FIRE-RATING TO MATCH EXISTING DOOR RATING; INSTALL USING EXISTING MASONRY ANCHORS ON HINGE SIDE AND NEW MASONRY ANCHORS ON LATCH SIDE.
- 9.210 DRYWALL/MASONRY ASSEMBLY: RECONSTRUCT DEMOLISHED PORTION OF WALL TO MATCH EXISTING, USING LIKE MATERIALS, TO PERMIT REINSTALLATION OF SALVAGED DOOR AND HARDWARE AND NEW FRAME AFTER NEW MECHANICAL EQUIPMENT HAS BEEN INSTALLED; PROVIDE NEW RESILIENT WALL BASE TO MATCH EXISTING; RE-INSTALL AND RECONNECT SALVAGED FIRE ALARMS, DOORSTOPS, CORNER GUARDS, SIGNAGE, ETC IN ORIGINAL LOCATIONS.
- 9.922 RE-PAINT ENTIRE NEW WALL SURFACE, TOP TO BOTTOM; BLEND PATCHED AREA INTO EXISTING WALL SURFACE. CLEAN AND TOUCH UP REINSTALLED WOOD DOOR AND PAINT NEW DOOR FRAME.
- 23.107 REMOVE THERMOSTAT FOR AIR HANDLING UNIT.
- 23.109 REMOVE THERMOSTAT FOR AIR HANDLING UNIT. REMOVE NIGHT SETBACK THERMOSTAT AND COVER OPENING WITH STAINLESS STEEL METAL WALL PLATE.
- 23.210 PROVIDE NEW THERMOSTAT FOR VAV BOX. COORDINATE WITH OWNER FOR EXACT LOCATION.
- 23.214 PROVIDE NEW THERMOSTAT AND CO2 SENSOR FOR VAV BOX.
- 23.217 PROVIDE FULL SIZE CAP FOR DUCT.
- 23.210 SALVAGE EXISTING DX9100 CONTROLLER AND PRESENT TO OWNER. PROVIDE NEW CONTROLLER.

The site plan illustrates the layout of the proposed development. It features several building footprints, with 'BLDG 'A'' and 'BLDG 'S'' highlighted in grey. 'BLDG 'A'' is a large, irregularly shaped building with a textured grey fill. 'BLDG 'S'' is a smaller, rectangular building with a solid grey fill. Other buildings are shown as white outlines. The plan also includes parking areas, landscaping, and a north arrow in the bottom right corner.



KEYNOTES

KEYNOTES ARE TYPICALLY NOT DUPLICATED WITHIN A GIVEN DETAIL. AN UN-KEYNOTED ITEM IN A DETAIL IS THE SAME AS A KEYNOTED ITEM HAVING THE SAME APPEARANCE WITHIN THE SAME DETAIL.

- 23.100 REMOVE AIR HANDLING UNIT AND ASSOCIATED DUCTWORK AS SHOWN.
- 23.101 DEMOLISH CHILLED AND HOT WATER DISTRIBUTION PIPING AND VALVES ASSOCIATED WITH AIR HANDLING UNIT BACK TO RISERS AND PROVIDE TEMPORARY CAP FOR NEW CONNECTIONS.
- 23.102 REMOVE OUTSIDE AIR DUCTWORK AS SHOWN. REMOVE DUCTWORK BACK TO RISER AND PROVIDE TEMPORARY CAP FOR NEW CONNECTION.
- 23.103 REMOVE PNEUMATIC CONTROL PANEL AND ALL ASSOCIATED END DEVICES. VERIFY ONLY POINTS IN PANEL ARE ASSOCIATED WITH AHU. IF OTHER CONTROLS ARE IN PANEL AFFECTING OTHER EQUIPMENT NOTIFY OWNER. MODIFY GRAPHICS ACCORDINGLY.
- 23.105 EXISTING PIPING INTO MECHANICAL ROOM DOES NOT HAVE ISOLATION VALVES. CHILLED WATER PIPING CONTAINS 30% GLYCOL.
- 23.106 COORDINATE WITH OWNER FOR DRAINING PIPES. OWNER TO DRAIN AND FILL CHILLED WATER AND HEATING WATER PIPING.
- 23.201 PROVIDE NEW CONNECTION BETWEEN EXISTING OUTSIDE AIR DUCTWORK AND AIR HANDLING UNIT. PROVIDE ALL REQUIRED TRANSITIONS AND FITTINGS TO MAKE THE CONNECTION.
- 23.202 PROVIDE NEW HWS/R AND CHS/R PIPING AND COIL SPECIALTIES TO AHU.
- 23.203 PROVIDE 52" X 20" PLENUM BOX FOR AIR HANDLING UNIT. PROVIDE ALL CONNECTIONS TO VAV BOXES AS SHOWN. PLENUM BOX TO BE INSTALLED UP TO CEILING.
- 23.205 PROPOSED ROUTE OF CONDENSATE PIPING. DISCHARGE IN NEAREST FLOOR DRAIN.
- 23.206 PROVIDE NEW VAV BOXES. PROVIDE ALL REQUIRED TRANSITIONS AND FITTINGS. MAINTAIN CLEARANCE AROUND BOXES FOR SERVICING.
- 23.207 PROVIDE NEW DDC CONTROLLER FOR AHU. PROVIDE GRAPHICS AND INTERFACE INTO CAMPUS BUILDING AUTOMATION SYSTEM. COORDINATE EXACT LOCATION WITH OWNER.

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BUILDINGS 'A' & 'S' HVAC UNIT REPLACEMENTS AND MISC. HVAC PROJECTS

JOLIET JUNIOR COLLEGE  
1215 HOBBS ROAD  
JOLIET, ILLINOIS 60431

ISSUED

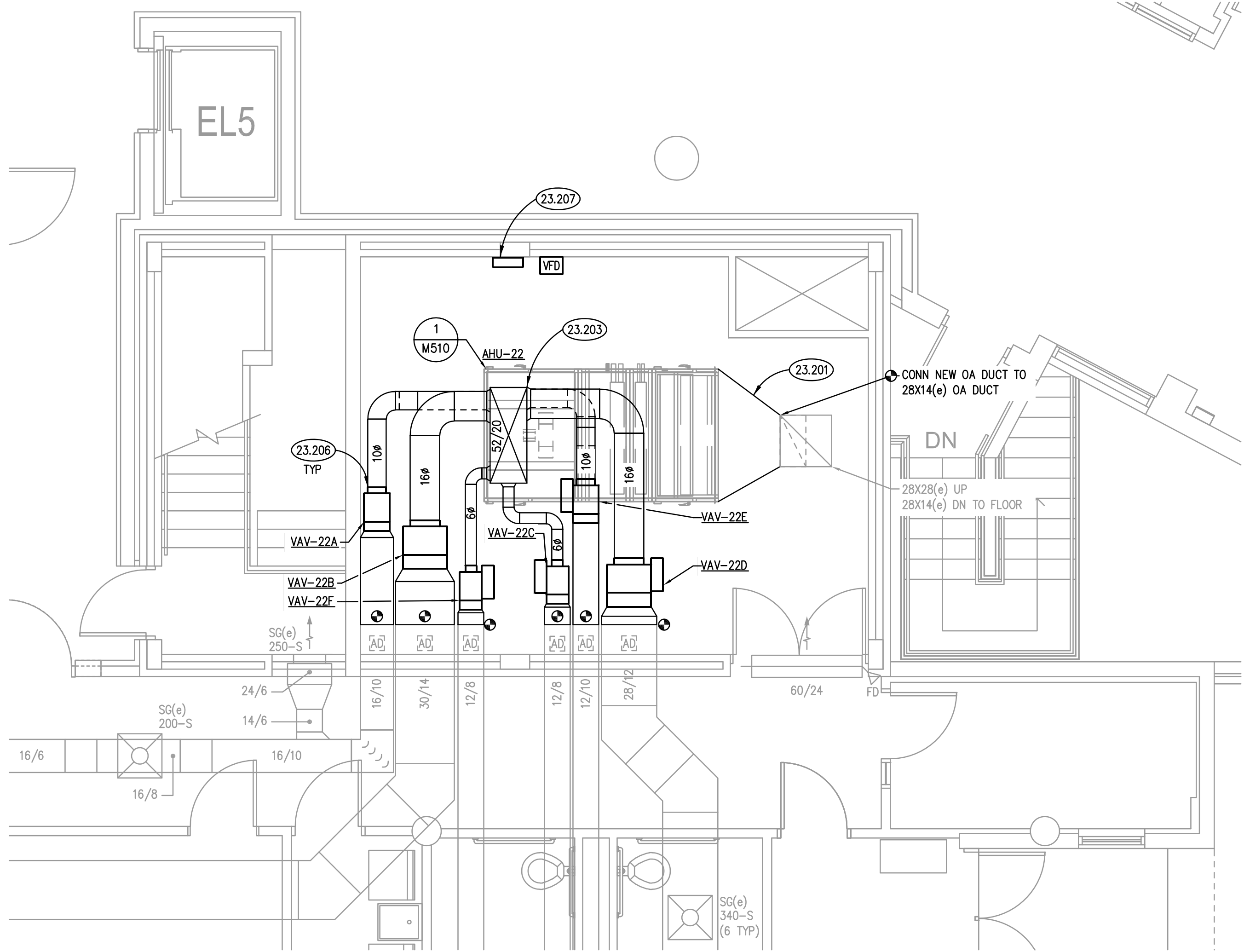
JOB NO. 20-292-1329  
DRAWN EDW  
CHECKED DDW  
APPROVED DDW

SHEET TITLE

BUILDING "A" FIRST FLOOR ENLARGED MECHANICAL PLANS

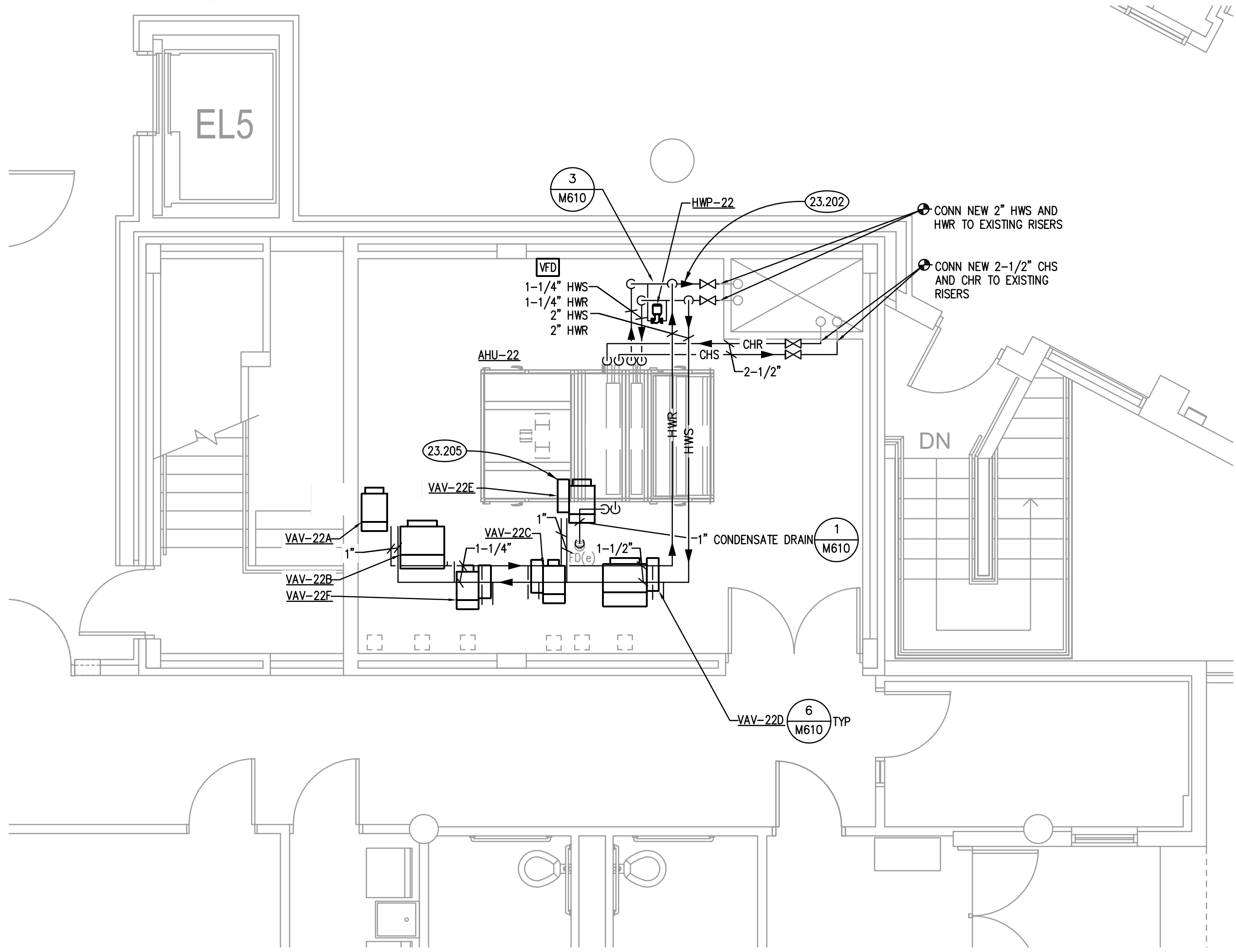
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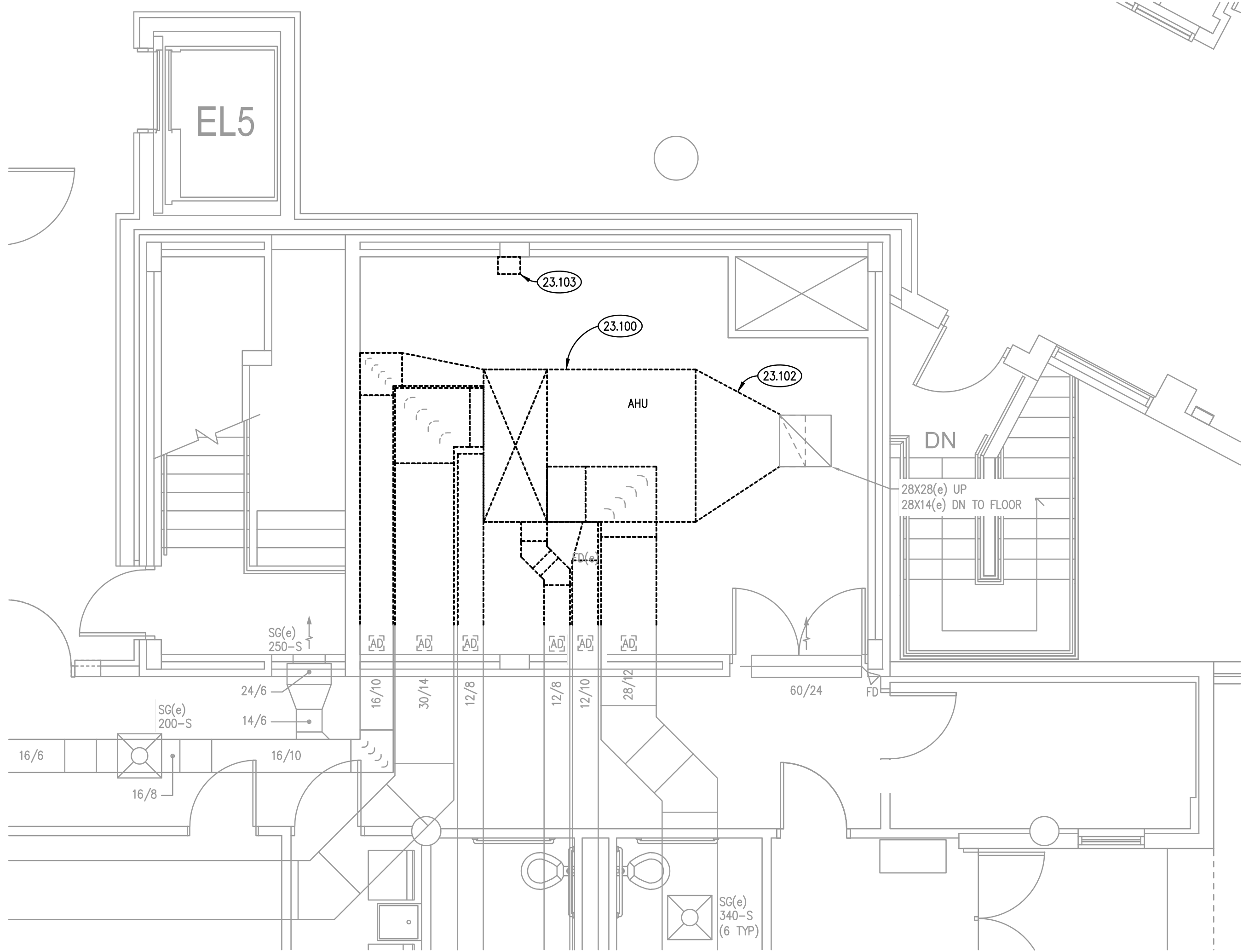
A1701 VENTILATION PLAN 1

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



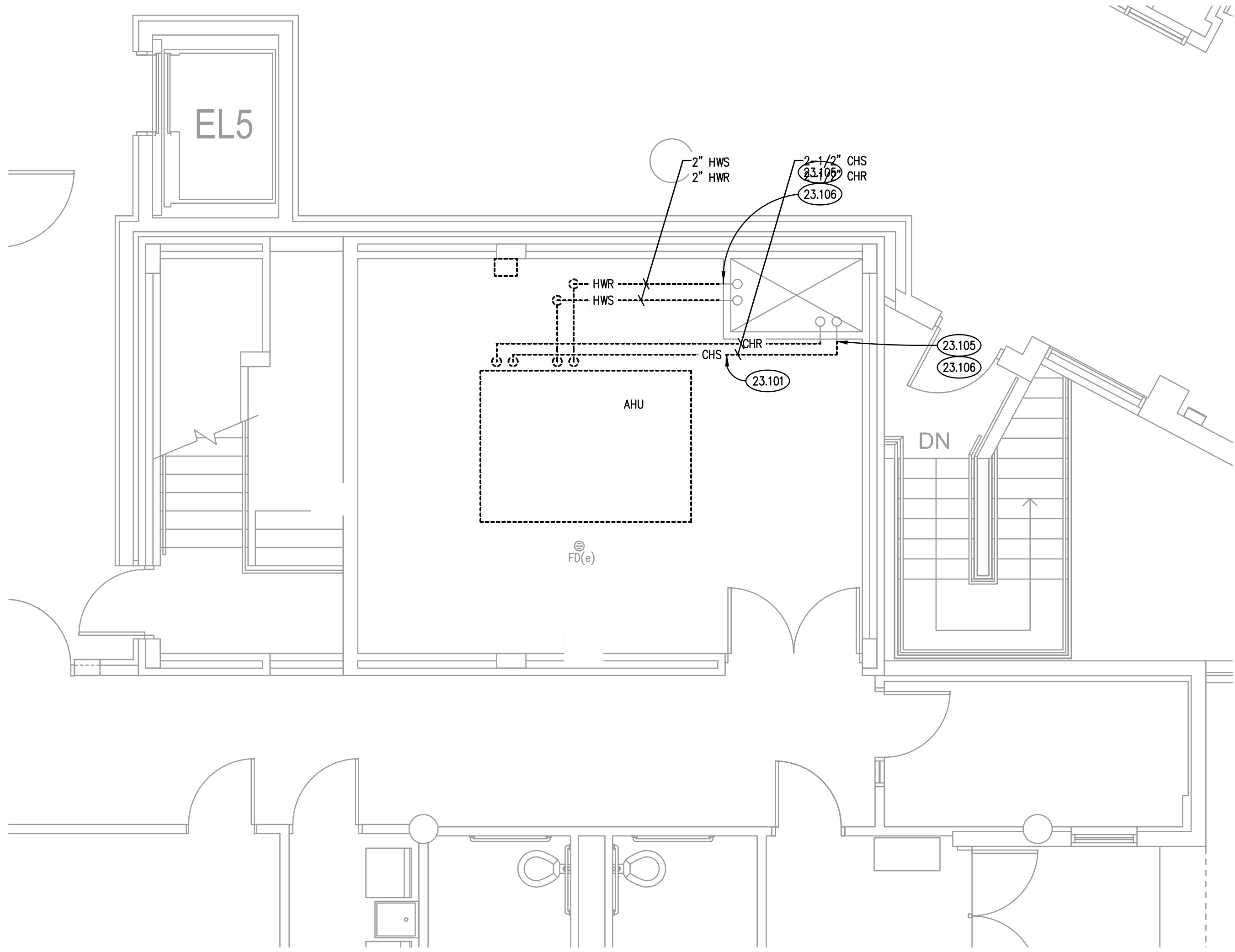
A1701 PIPING PLAN 2

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



A1701 VENTILATION DEMOLITION PLAN 3

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



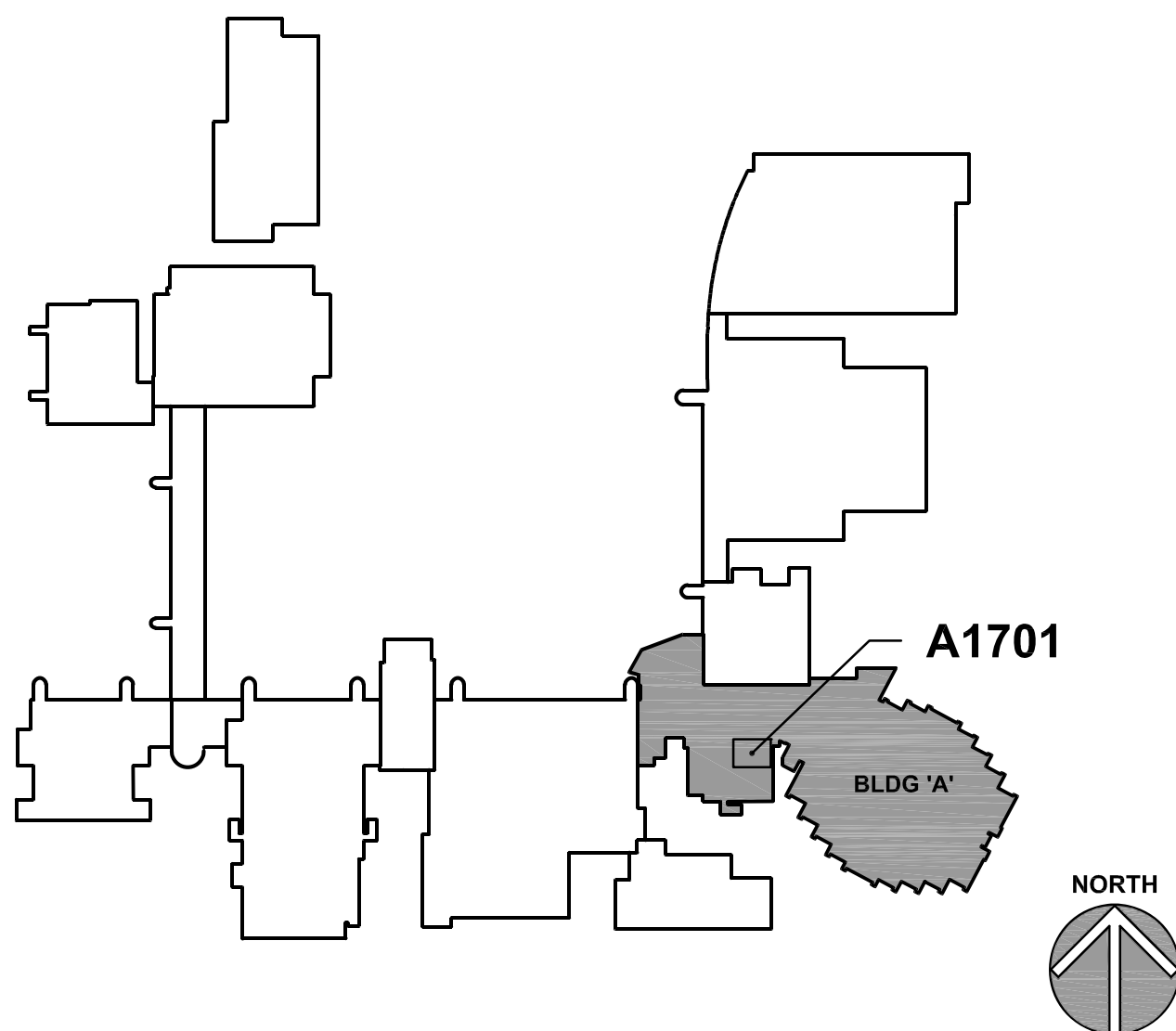
A1701 PIPING DEMOLITION PLAN 4

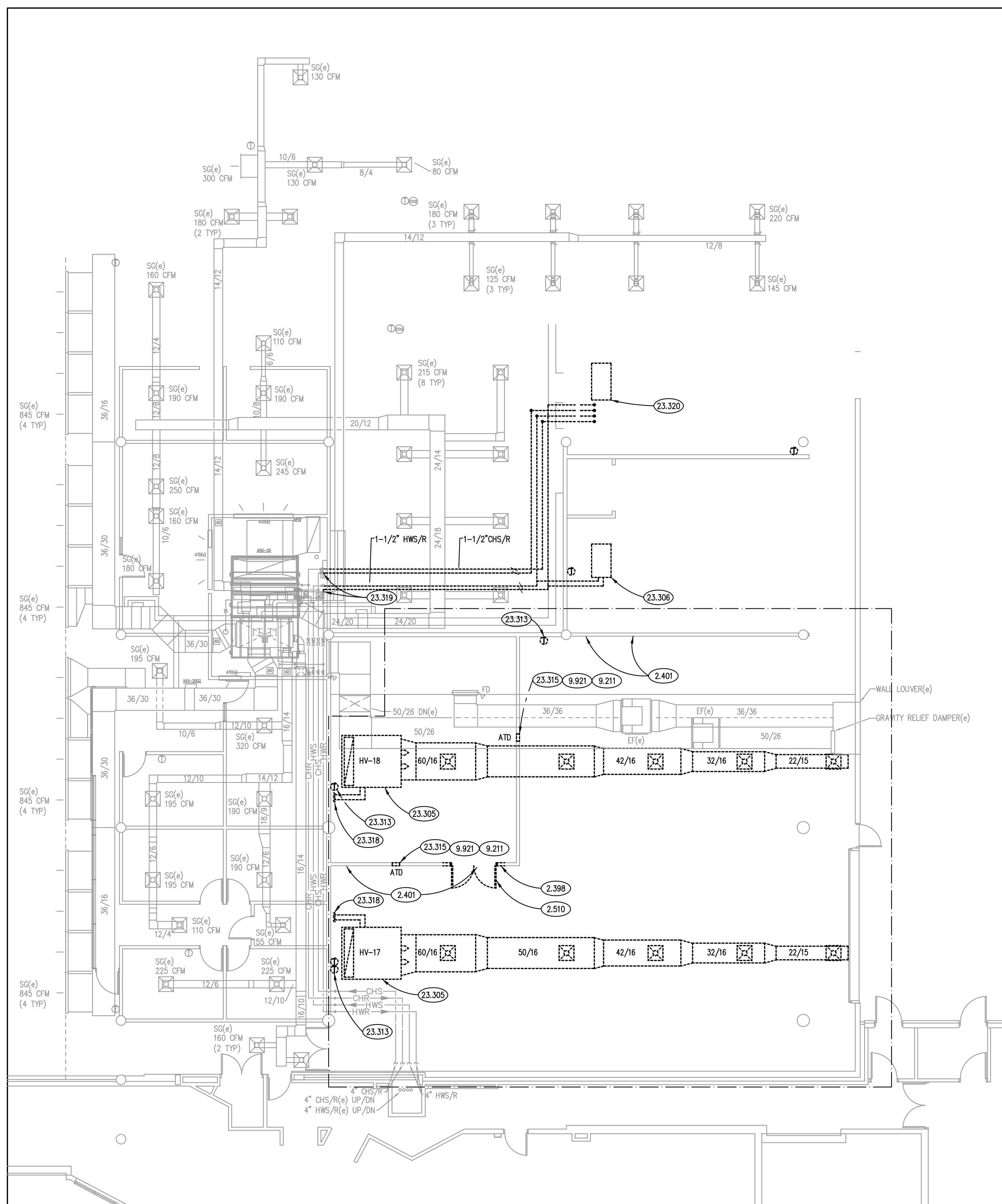
SCALE: 1/4" = 1'-0"

GENERAL NOTES

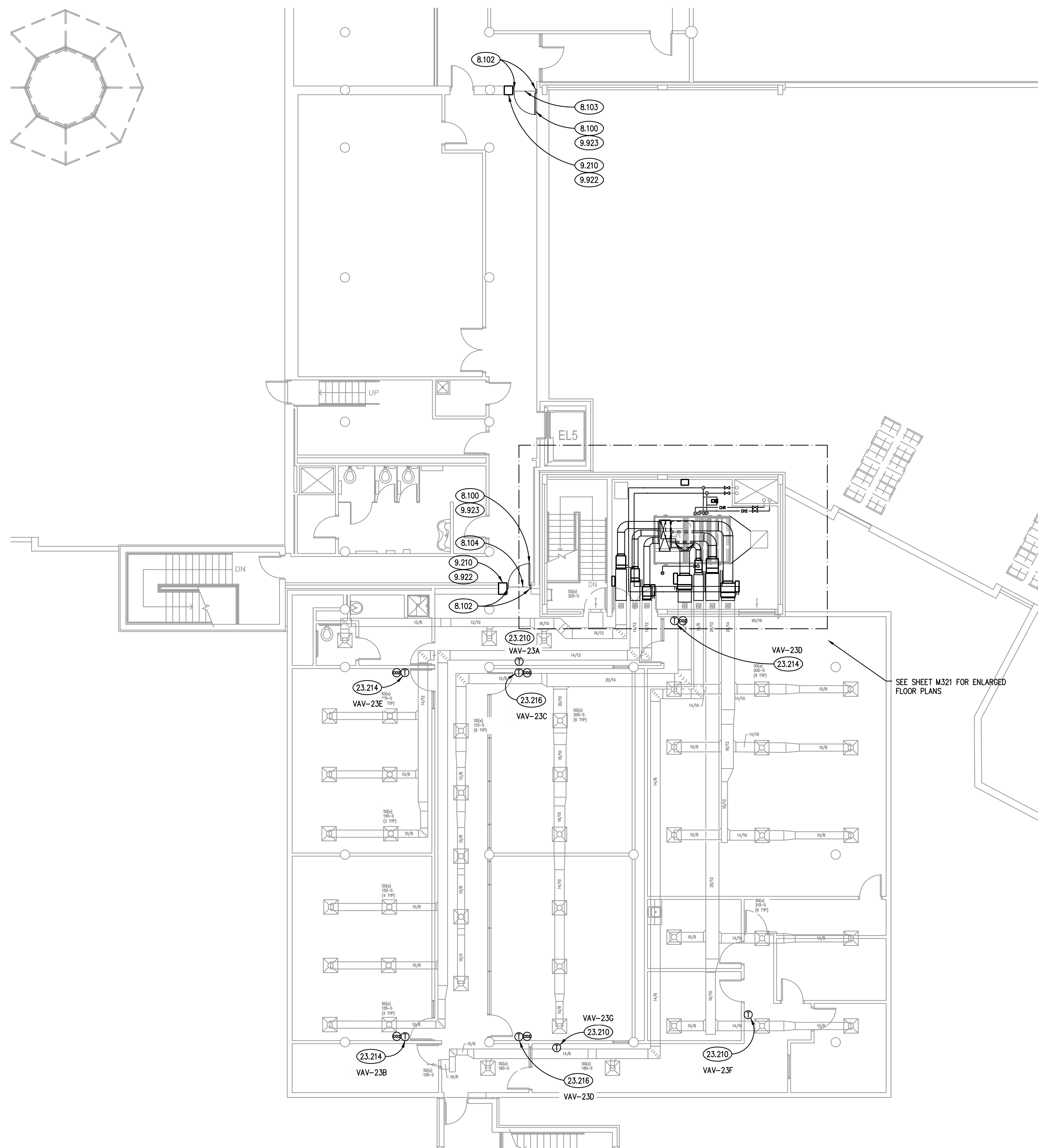
1. REFER TO DRAWING G100 FOR PROJECT GENERAL NOTES.
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3. ALL TAPES AND MASTICS USED TO SEAL DUCTWORK LISTED AND LABELED IN ACCORDANCE WITH UL 181A SHALL BE MARKED ACCORDINGLY. ALL TAPES AND MASTICS USED TO SEAL FLEXIBLE DUCTS AND AIR CONNECTORS SHALL COMPLY WITH UL 181B AND MARKED ACCORDINGLY.
4. THERMOSTATIC CONTROLS OF EQUIPMENT SHALL HAVE A 5" F DEADBAND.
5. GENERALLY, SMALL DIAMETER PIPE RUNS FROM DRIPS, CONDENSATE PANS AND OTHER SERVICES ARE NOT SHOWN BUT MUST BE PROVIDED.
6. SPACE ALLOCATION, COORDINATION WITH ELECTRICAL, ARCHITECTURAL & OTHER MECHANICAL COMPONENTS HAVE BEEN MADE WITH RESPECT TO ALL EQUIPMENT SCHEDULED ON THESE DRAWINGS AND IN THE SPECIFICATIONS OF THE FIRST NAMED MANUFACTURER ONLY. OTHER MANUFACTURERS ARE ACCEPTABLE PROVIDED THEY MEET PERFORMANCE REQUIREMENTS AND AFOREMENTIONED COORDINATION.
7. DO NOT CUT THROUGH THE MASONRY BOND BEAMS OR OTHER STRUCTURAL ELEMENT WHEN INSTALLING OPENINGS REQUIRED FOR ALL DUCTWORK, PIPING, CONDUITS OR OTHER WORK. CONTRACTOR CUTTING THROUGH OR OTHERWISE DAMAGING THESE ELEMENTS WILL BE RESPONSIBLE FOR ALL ASSOCIATED ENGINEERING FEES AND SUBSEQUENT RETRO-FIT/REINFORCING DEEMED NECESSARY TO REINSTATE THE CONTINUITY OF THE DISRUPTED ELEMENTS.
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9. OBTAIN AND PAY ALL COSTS FOR PERMITS, LICENSES, CERTIFICATE FILING AND ALL INSPECTIONS BY AUTHORITIES HAVING JURISDICTION.

KEY PLAN







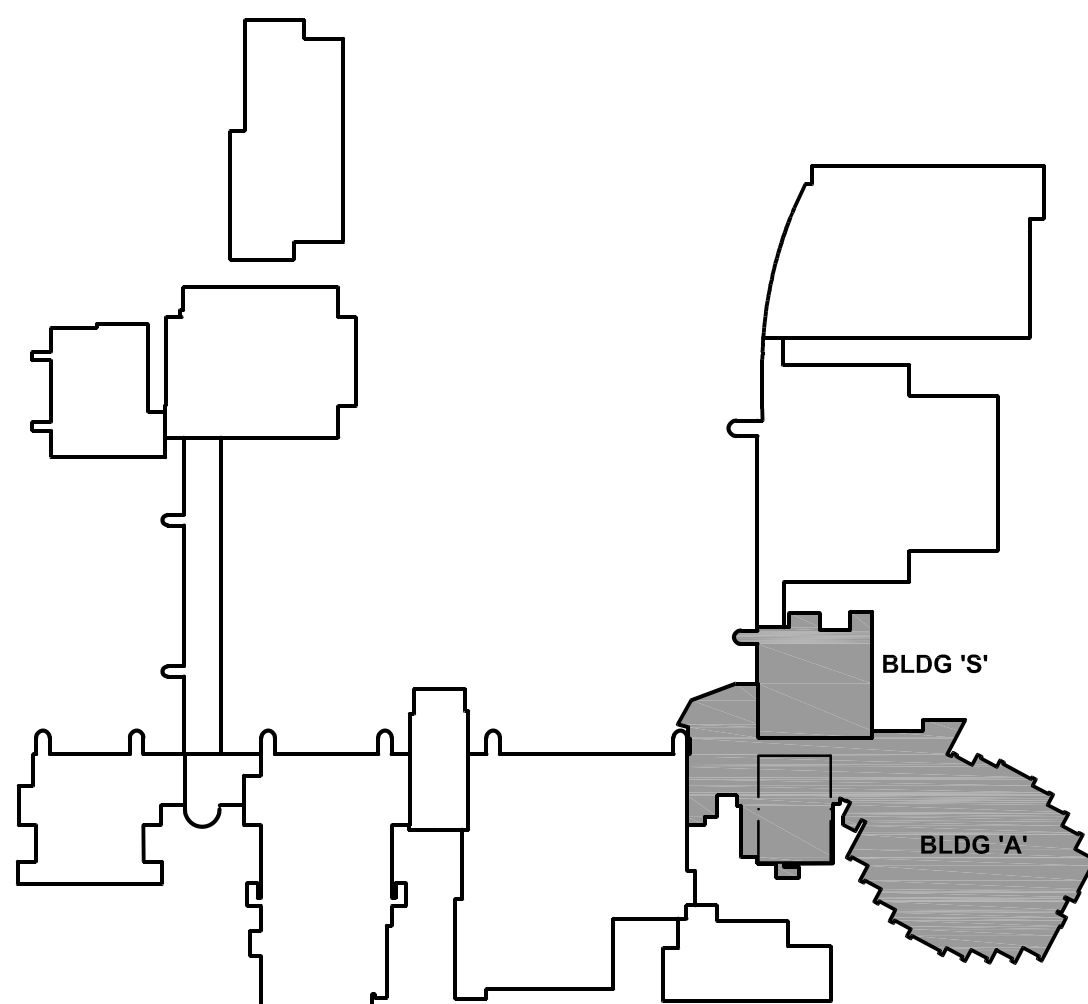


**BUILDING 'A' PARTIAL SECOND FLOOR NEW WORK PLAN**  
SCALE: 1/8" = 1'-0"

## KEYNOTES

- 2.399 CREATE AN OPENING IN EXISTING EXTERIOR WALL CONSTRUCTION FOR NEW MECHANICAL LOUVER; REFER TO NEW WORK PLAN.
- 2.400 DEMOLISH PORTION OF EXISTING INTERIOR FIRE-RATED DRYWALL/MASONRY WALL CONSTRUCTION TO ALLOW FOR INSTALLATION OF NEW MECHANICAL EQUIPMENT; NOTE LOCATIONS OF AND THEN SALVAGE AND DISCONNECT EXISTING CARD ACCESS DEVICES, FIRE ALARM PULLS, WALL DOORSTOPS, CORNER GUARDS, SIGNAGE, ETC.; REINSTATE THESE ITEMS IN ORIGINAL LOCATIONS AFTER NEW WORK IS COMPLETE; PROVIDE TEMPORARY BRACING/SUPPORTING TO SUPPORT MASONRY ABOVE REMOVED DOOR AND PORTION OF WALL.
- 2.401 SALVAGE EXISTING FIRE-RATED DOOR AND HARDWARE.
- 2.402 DEMOLISH EXISTING DOOR FRAME.
- 2.403 DEMOLISH EXISTING FLOOR TRANSITION STRIP.
- 2.404 SALVAGE EXISTING FLOOR-METAL THRESHOLD.
- 2.406 RE-INSTALL SALVAGED FIRE-RATED DOOR AND HARDWARE INTO NEW DOOR FRAME. REINSTALL AND RECONNECT SALVAGED SDO ACCESS DEVICES IN SAME POSITION.
- 8.102 NEW HOLLOW METAL DOOR FRAME: 16 GA.; FIRE-RATING TO MATCH EXISTING DOOR RATING; INSTALL USING EXISTING MASONRY ANCHORS ON HINGE SIDE AND NEW MASONRY ANCHORS ON LATCH SIDE.
- 8.103 NEW FLOOR TRANSITION STRIP TO MATCH EXISTING.
- 8.104 RE-INSTALL SALVAGED METAL THRESHOLD AFTER NEW METAL DOOR FRAME IS INSTALLED.
- 9.210 DRYWALL/MASONRY ASSEMBLY: RECONSTRUCT DEMOLISHED PORTION OF WALL TO MATCH EXISTING, USING LIKE MATERIALS, TO PERMIT REINSTALLATION OF SALVAGED DOOR AND HARDWARE AND NEW FRAME AFTER NEW MECHANICAL EQUIPMENT HAS BEEN INSTALLED; PROVIDE NEW RESILIENT WALL BASE TO MATCH EXISTING; RE-INSTALL AND RECONNECT SALVAGED FIRE ALARMS, DOORSTOPS, CORNER GUARDS, SIGNAGE, ETC IN ORIGINAL LOCATIONS.
- 9.922 RE-PAINT ENTIRE NEW WALL SURFACE, TOP TO BOTTOM; BLEND PATCHED AREA INTO EXISTING WALL SURFACE. CLEAN AND TOUCH UP REPAINTED WOOD DOOR AND PAINT NEW DOOR FRAME.
- 23.937 REMOVE THERMOSTAT FOR AIR HANDLING UNIT.
- 23.109 REMOVE THERMOSTAT FOR AIR HANDLING UNIT. REMOVE NIGHT SETBACK THERMOSTAT AND COVER OPENING WITH STAINLESS STEEL METAL PLATE.

## KEY PLAN

[illegible]



KEYNOTES

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- 23.100 REMOVE AIR HANDLING UNIT AND ASSOCIATED DUCTWORK AS SHOWN.
- 23.101 DEMOLISH CHILLED AND HOT WATER DISTRIBUTION PIPING AND VALVES ASSOCIATED WITH AIR HANDLING UNIT BACK TO RISERS AND PROVIDE TEMPORARY CAP FOR NEW CONNECTIONS.
- 23.102 REMOVE OUTSIDE AIR DUCTWORK AS SHOWN. REMOVE DUCTWORK BACK TO RISER AND PROVIDE TEMPORARY CAP FOR NEW CONNECTION.
- 23.103 REMOVE PNEUMATIC CONTROL PANEL AND ALL ASSOCIATED END DEVICES. VERIFY ONLY POINTS IN PANEL ARE ASSOCIATED WITH AHU. IF OTHER CONTROLS ARE IN PANEL AFFECTING OTHER EQUIPMENT NOTIFY OWNER. MODIFY GRAPHICS ACCORDINGLY.
- 23.105 EXISTING PIPING INTO MECHANICAL ROOM DOES NOT HAVE ISOLATION VALVES. CHILLED WATER PIPING CONTAINS 30% GLYCOL.
- 23.106 COORDINATE WITH OWNER FOR DRAINING PIPES. OWNER TO DRAIN AND FILL CHILLED WATER AND HEATING WATER PIPING.
- 23.108 REMOVE INACTIVE TEMPERATURE SENSORS INSTALLED ON OUTSIDE AIR DUCT AND CAP DUCT AIR TIGHT.
- 23.110 REMOVE EXHAUST FAN TIMER CONTROL PANEL AND MIGRATE EXHAUST FAN POINTS AND CONTROLS TO BAS.
- 23.200 EXISTING IT RACK. PROTECT RACK AND ALL ASSOCIATED WIRING THROUGHOUT ALL PHASES OF CONSTRUCTION.
- 23.201 PROVIDE NEW CONNECTION BETWEEN EXISTING OUTSIDE AIR DUCTWORK AND AIR HANDLING UNIT. PROVIDE ALL REQUIRED TRANSITIONS AND FITTINGS TO MAKE THE CONNECTION.
- 23.204 PROVIDE 52" X 18" PLENUM BOX FOR AIR HANDLING UNIT. PROVIDE ALL CONNECTIONS TO VAV BOXES AS SHOWN. PLENUM BOX TO BE INSTALLED TO ALLOW A TIGHT TO CEILING 30" X 8" RECTANGULAR ELBOW OFF THE TOP TO VAV-23D.
- 23.206 PROVIDE NEW VAV BOXES. PROVIDE ALL REQUIRED TRANSITIONS AND FITTINGS. MAINTAIN CLEARANCE AROUND BOXES FOR SERVING.
- 23.207 PROVIDE NEW DDC CONTROLLER FOR AHU. PROVIDE GRAPHICS AND INTERFACE INTO CAMPUS BUILDING AUTOMATION SYSTEM. COORDINATE EXACT LOCATION WITH OWNER.
- 23.208 PROVIDE VARIABLE FREQUENCY DRIVE FOR NEW AHU IN PLACE OF LOCAL DISCONNECT.
- 23.211 INSTALL 30" X 8" TAKEOFF OFF TOP OF PLENUM BOX. ROUTE TIGHT TO DECK ABOVE CONDUIT.
- 23.212 HOLD VAV-23D TIGHT TO DECK. TRANSITION DOWNSTREAM DUCTWORK DOWN AND CONNECT TO EXISTING WALL PENETRATION.

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**BUILDINGS 'A' & 'S' HVAC UNIT REPLACEMENTS AND MISC. HVAC PROJECTS**  
JOLIET JUNIOR COLLEGE  
1215 HOBOLT ROAD  
JOLIET, ILLINOIS 60431

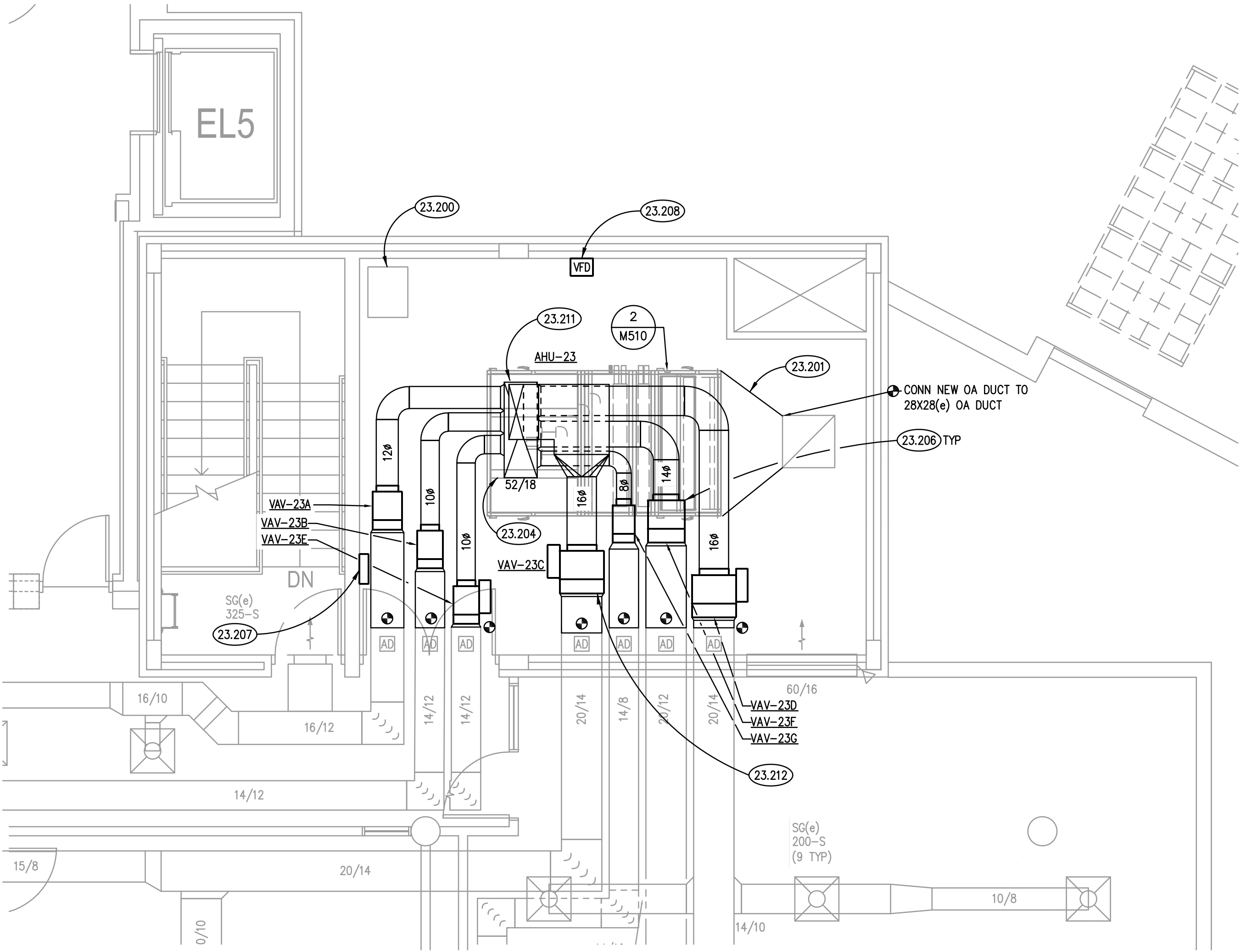
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1/20/20	

JOB NO. 20-292-1329  
DRAWN EDW  
CHECKED DDW  
APPROVED DDW

SHEET TITLE  
BUILDING "A"  
PARTIAL SECOND  
FLOOR ENLARGED  
MECHANICAL PLANS

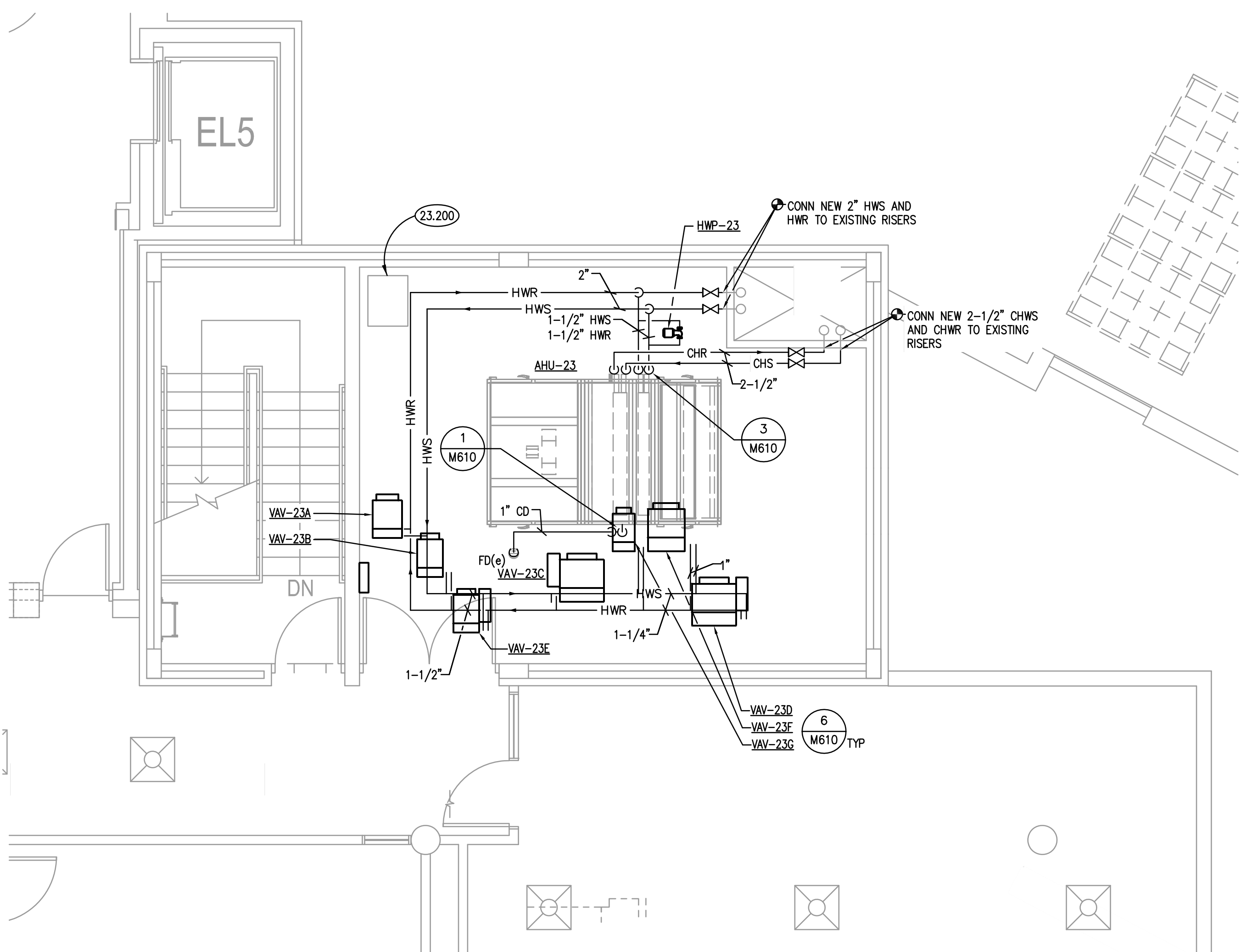
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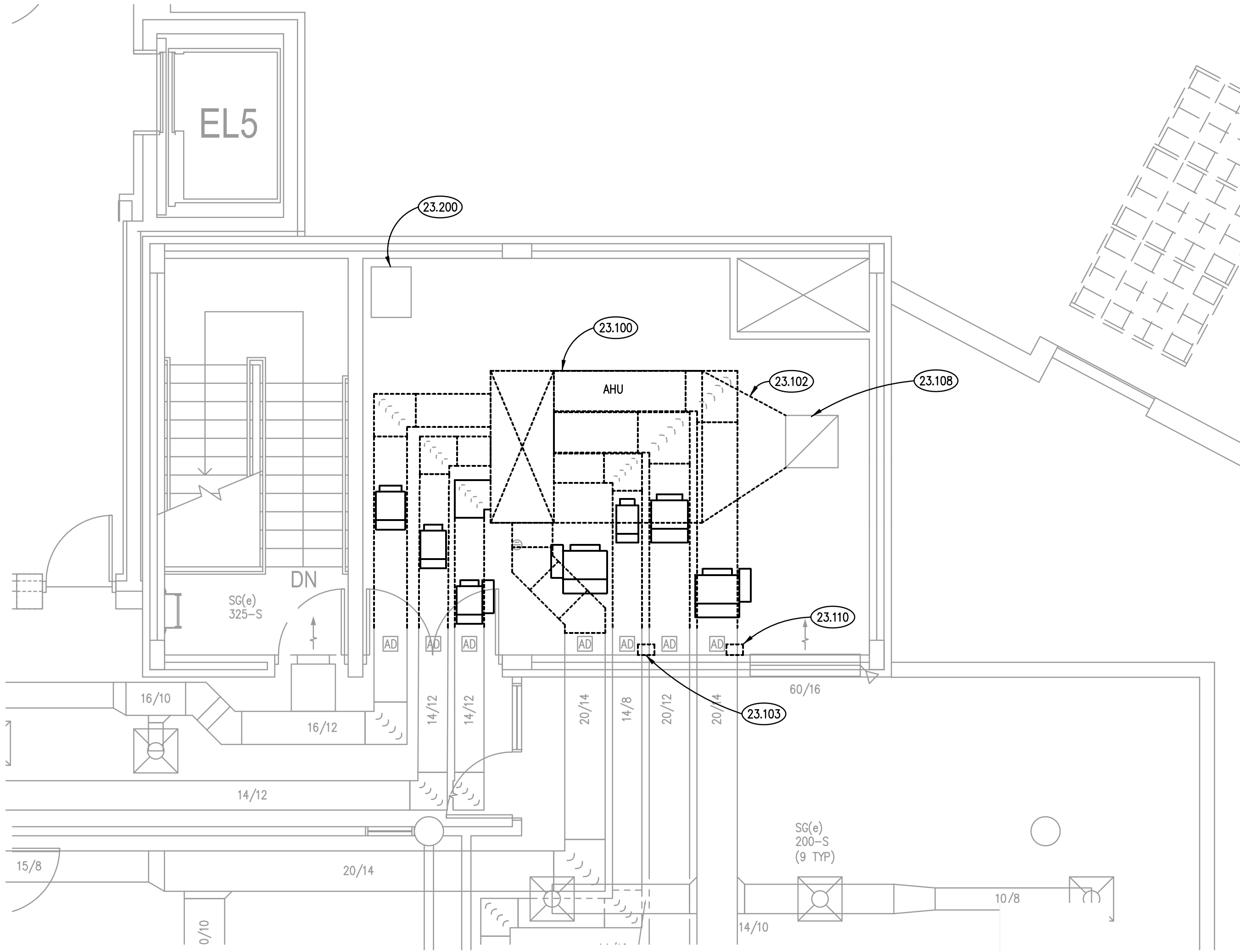
A2701 VENTILATION PLAN 1

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



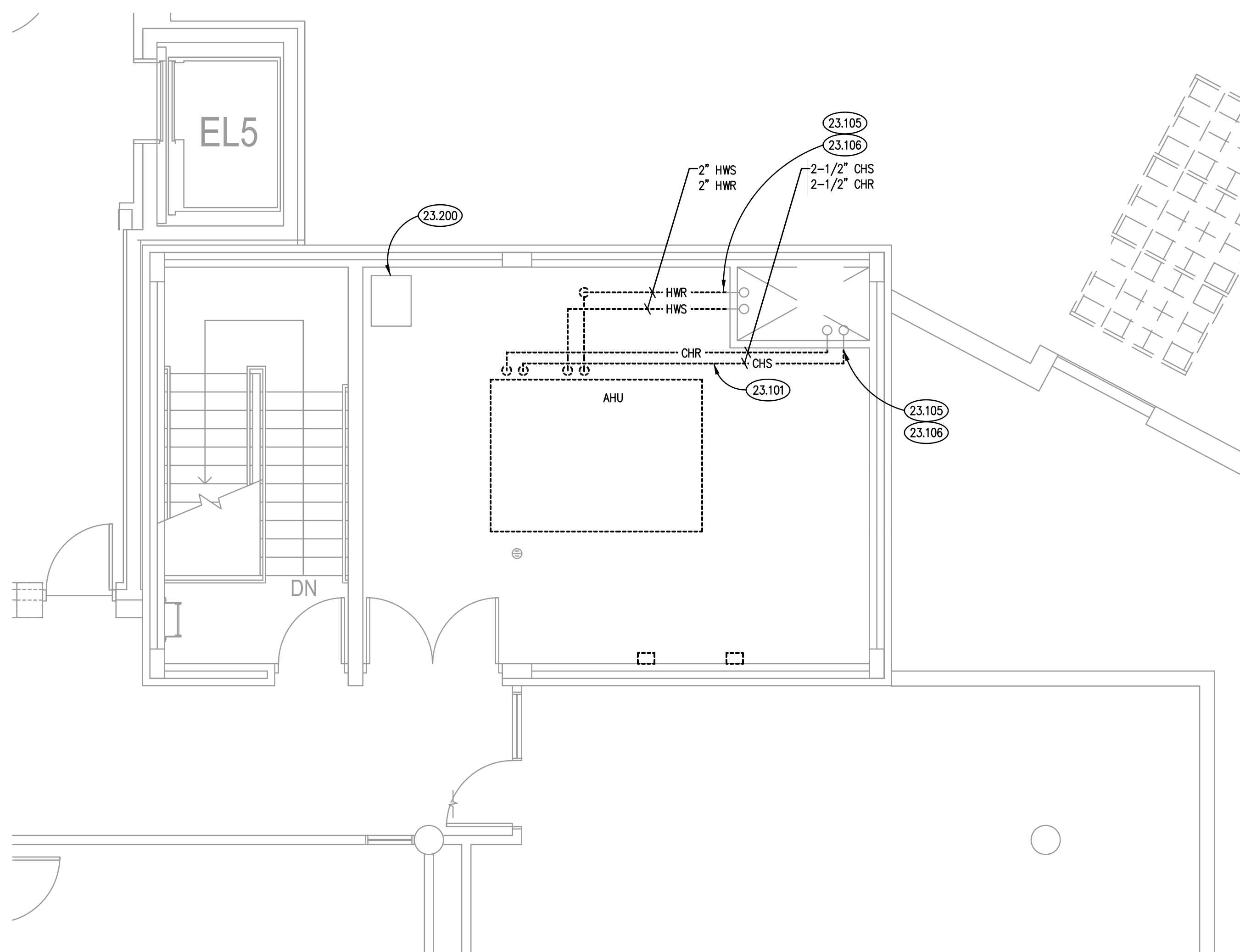
A2701 PIPING PLAN 2

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



A2701 VENTILATION DEMOLITION PLAN 3

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



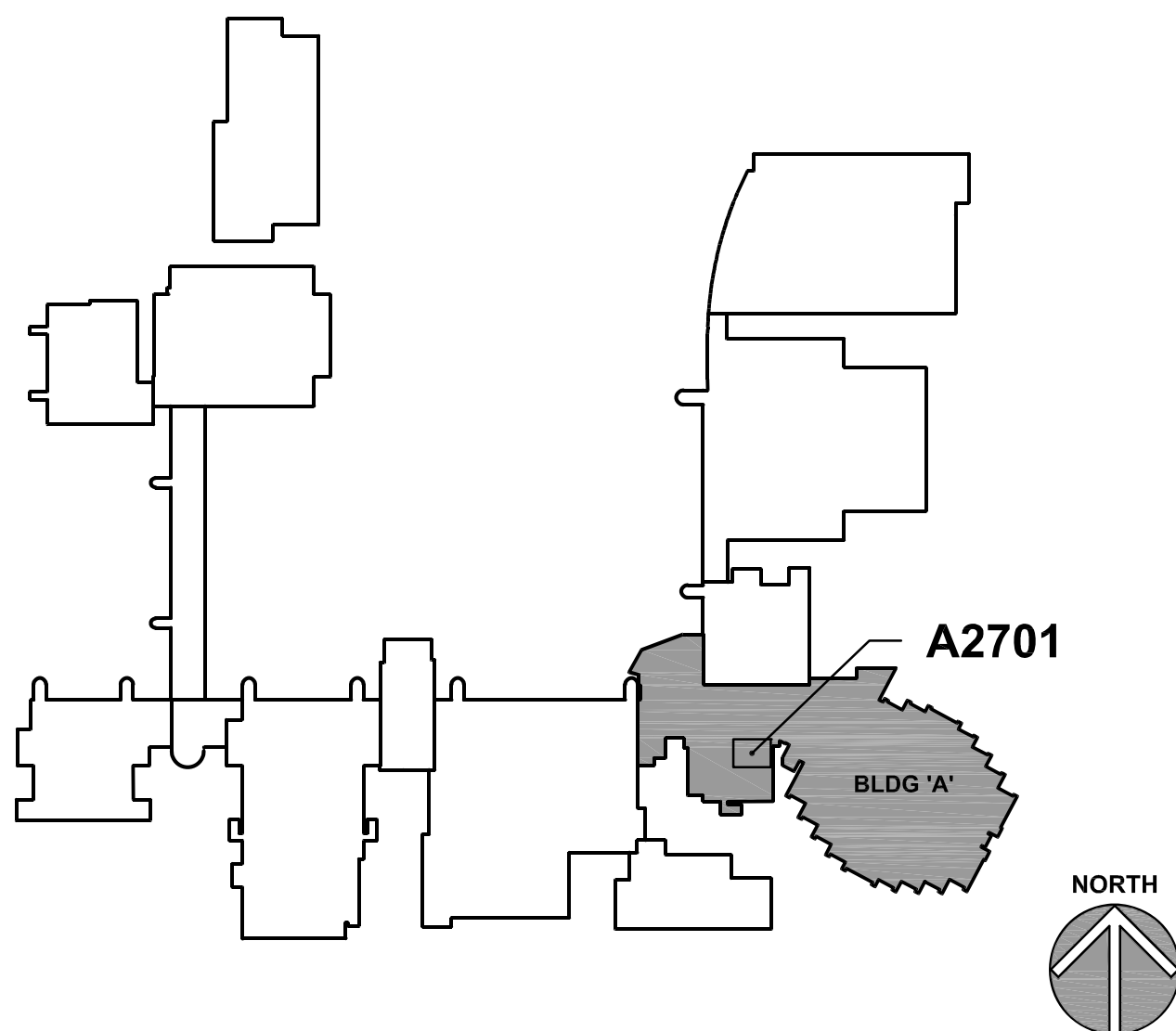
A2701 PIPING DEMOLITION PLAN 4

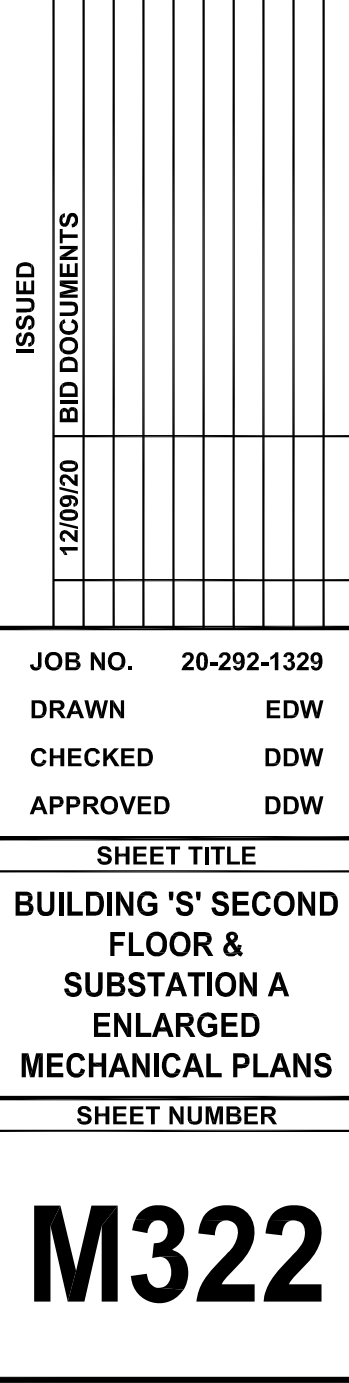
SCALE: 1/4" = 1'-0"


GENERAL NOTES

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2. ALL PIPING AND DUCTWORK IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL REQUIRED FITTINGS, OFFSETS, DROPS AND RISES. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL NECESSARY LABOR FOR A COMPLETE AND WORKING SYSTEM. COORDINATE WITH OTHER TRADES FOR SPACE AVAILABLE AND RELATIVE LOCATIONS OF EQUIPMENT, PIPING, DUCTWORK, ETC.
3. ALL TAPES AND MASTICS USED TO SEAL DUCTWORK LISTED AND LABELED IN ACCORDANCE WITH UL 181A SHALL BE MARKED ACCORDINGLY. ALL TAPES AND MASTICS USED TO SEAL FLEXIBLE DUCTS AND AIR CONNECTORS SHALL COMPLY WITH UL 181B AND MARKED ACCORDINGLY.
4. THERMOSTATIC CONTROLS OF EQUIPMENT SHALL HAVE A 5°F DEADBAND.
5. GENERALLY, SMALL DIAMETER PIPE RUNS FROM DRIPS, CONDENSATE PANS AND OTHER SERVICES ARE NOT SHOWN BUT MUST BE PROVIDED.
6. SPACE ALLOCATION, COORDINATION WITH ELECTRICAL, ARCHITECTURAL & OTHER MECHANICAL COMPONENTS HAVE BEEN MADE WITH RESPECT TO ALL EQUIPMENT SCHEDULED ON THESE DRAWINGS AND IN THE SPECIFICATIONS OF THE FIRST NAMED MANUFACTURER ONLY. OTHER MANUFACTURERS ARE ACCEPTABLE PROVIDED THEY MEET PERFORMANCE REQUIREMENTS AND AFOREMENTIONED COORDINATION.
7. DO NOT CUT THROUGH THE MASONRY BOND BEAMS OR OTHER STRUCTURAL ELEMENT WHEN INSTALLING OPENINGS REQUIRED FOR ALL DUCTWORK, PIPING, CONDUITS OR OTHER WORK. CONTRACTOR CUTTING THROUGH OR OTHERWISE DAMAGING THESE ELEMENTS WILL BE RESPONSIBLE FOR ALL ASSOCIATED ENGINEERING FEES AND SUBSEQUENT RETRO-FIT/REINFORCING DEEMED NECESSARY TO REINSTATE THE CONTINUITY OF THE DISRUPTED ELEMENTS.
8. HEATING AND COOLING DESIGN LOADS FOR THE BUILDING HAVE BEEN CALCULATED WITH ELITE SOFTWARE. COMMERCIAL HVAC LOADS PROGRAM, VERSION 8.02.34, IN ACCORDANCE WITH ASHRAE STANDARDS. INTERIOR DESIGN TEMPERATURES ARE MAXIMUM 72 DEGREES F FOR HEATING AND A MINIMUM OF 75 DEGREES F FOR COOLING.
9. OBTAIN AND PAY ALL COSTS FOR PERMITS, LICENSES, CERTIFICATE FILING AND ALL INSPECTIONS BY AUTHORITIES HAVING JURISDICTION.

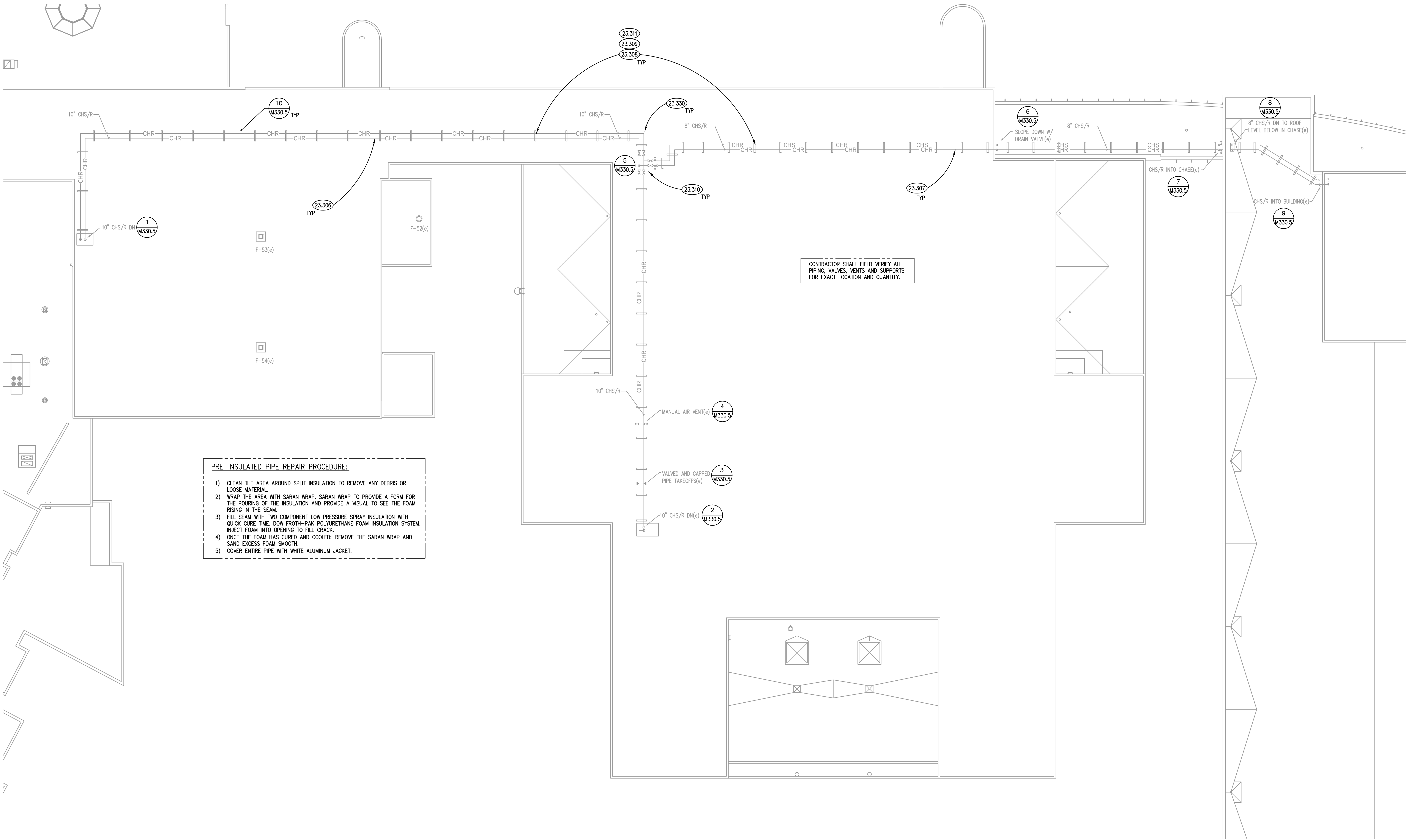
KEY PLAN





- NORTH
- 
- A circular compass rose with a vertical line pointing up labeled 'NORTH', a vertical line pointing down labeled 'SOUTH', a horizontal line pointing right labeled 'EAST', and a horizontal line pointing left labeled 'WEST'. The four quadrants are shaded in different patterns: top-left is diagonal lines, top-right is horizontal lines, bottom-left is vertical lines, and bottom-right is diagonal lines.





**PRE-INSULATED PIPE REPAIR PROCEDURE:**

- 1) CLEAN THE AREA AROUND SPLIT INSULATION TO REMOVE ANY DEBRIS OR LOOSE MATERIAL.
- 2) WRAP THE AREA WITH SARAN WRAP. SARAN WRAP TO PROVIDE A FORM FOR THE POURING OF THE INSULATION AND PROVIDE A VISUAL TO SEE THE FOAM RISING IN THE SEAM.
- 3) FILL SEAM WITH TWO COMPONENT LOW PRESSURE SPRAY INSULATION WITH QUICK CURE TIME. DOW FROTH-PAK POLYURETHANE FOAM INSULATION SYSTEM. INJECT FOAM INTO OPENING TO FILL CRACK.
- 4) ONCE THE FOAM HAS CURED AND COOLED; REMOVE THE SARAN WRAP AND SAND EXCESS FOAM SMOOTH.
- 5) COVER ENTIRE PIPE WITH WHITE ALUMINUM JACKET.

CONTRACTOR SHALL FIELD VERIFY ALL PIPING, VALVES, VENTS AND SUPPORTS FOR EXACT LOCATION AND QUANTITY.

**MECHANICAL ROOF PLAN**  
SCALE: 1/16" = 1'-0"

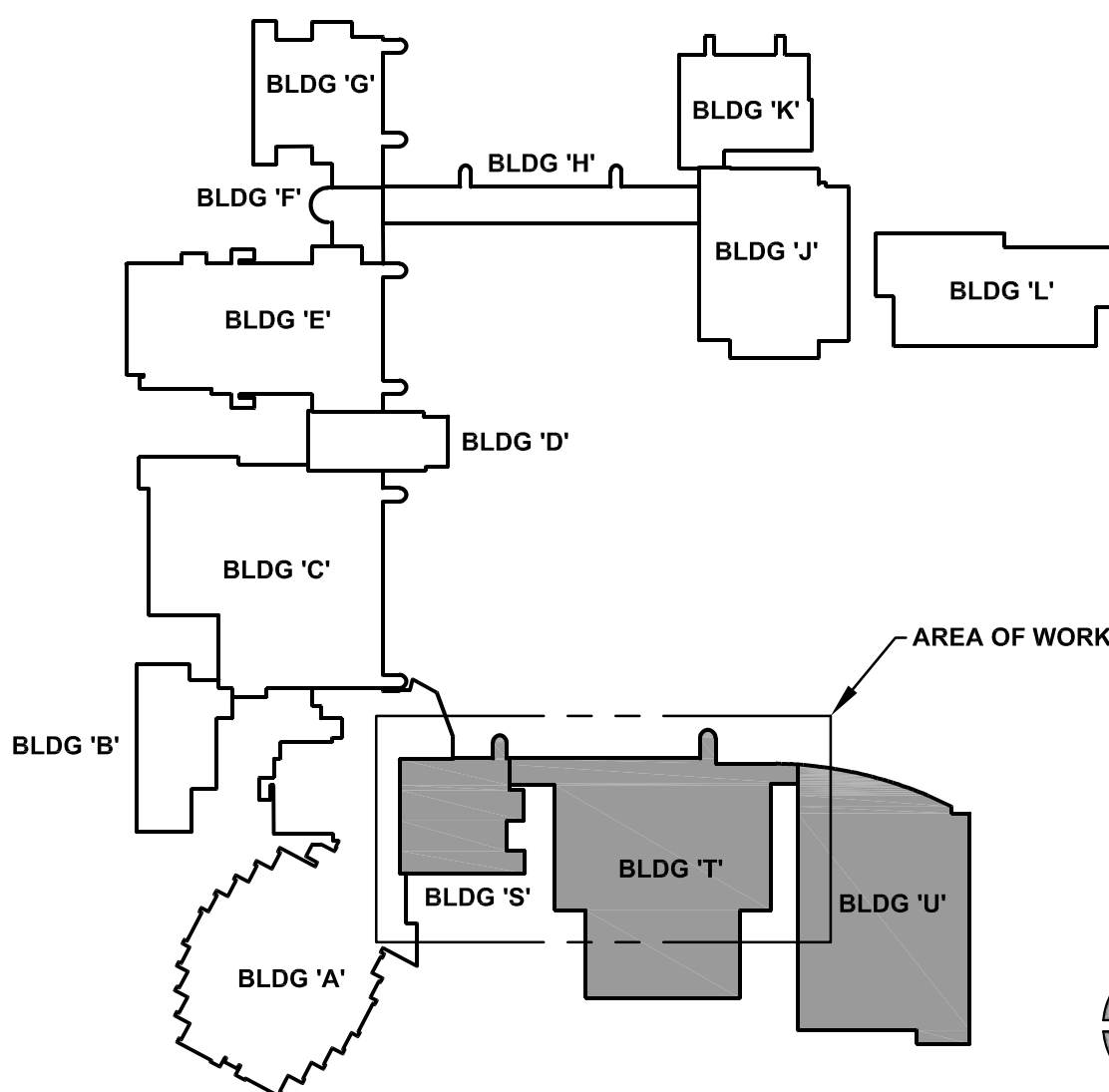
1

**KEYNOTES**

KEYNOTES ARE TYPICALLY NOT DUPLICATED WITHIN A GIVEN DETAIL. AN UN-KEYNOTED ITEM IN A DETAIL IS THE SAME AS A KEYNOTED ITEM HAVING THE SAME APPEARANCE WITHIN THE SAME DETAIL.

- 23.306 EXISTING 10-INCH CHILLED WATER PIPING PRE-INSULATED WITH 2-INCHES OF INSULATION.
- 23.307 EXISTING 8-INCH CHILLED WATER PIPING PRE-INSULATED WITH 1-INCH OF INSULATION.
- 23.308 PRE-INSULATED PIPE INSULATION HAS FAILED AND SPLIT OPEN IN MULTIPLE LOCATIONS. CONTRACTOR TO FIELD VERIFY LOCATIONS OF SPLIT INSULATION AND PROVIDE ALL MATERIALS AND LABOR TO REPAIR FAILED INSULATION. REFER TO PRE-INSULATED PIPE REPAIR PROCEDURE.
- 23.309 FIELD VERIFY ALL PIPE ELBOWS AND JOINTS FOR FAILED ELASTOMERIC INSULATION. CONTRACTOR TO REMOVE AND REPLACE ANY INSULATION THAT HAS FAILED.
- 23.310 REMOVE AND REPLACE ALL FLEXIBLE ELASTOMERIC INSULATION AROUND ALL PIPING SPECIALTIES. PROVIDE NEW 2-INCH FLEXIBLE ELASTOMERIC INSULATION AROUND PIPING SPECIALTY AND PROVIDE WHITE ALUMINUM JACKET ON PIPE.
- 23.311 PROVIDE ALUMINUM PROTECTIVE JACKET ON CHILLED WATER PIPING ON ROOF IN ITS ENTIRETY. JACKET SHALL BE A MINIMUM 0.016-INCH ALUMINUM WITH FACTORY APPLIED BAKED ON FINISH OF HIGHLY DURABLE HARD FILM ACRYLIC OR POLYESTER PAINT ON THE EXTERIOR SURFACE, STUCCO EMBOSSED FINISH, WHITE IN COLOR. JACKETING SHALL CONFORMING TO ASTM C1729 & ASTM B-209 WITH 3 MILS POLYFILM MOISTURE BARRIER. SEAMS SHALL BE LOCATED ON THE BOTTOM SIDE OF PIPING. INSTALL JACKET IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS. MANUFACTURER SHALL BE JOHNS MANVILLE JM ALUMINUM JACKETING, RPR PRODUCTS INSUL-MATE OR EQUAL. CONTRACTOR TO SUBMIT JACKETING FOR APPROVAL.
- 23.330 PROVIDE ALUMINUM PROTECTIVE JACKET ON ALL PIPING ELBOWS. JACKET SHALL BE A MINIMUM 0.024-INCH ALUMINUM WITH SMOOTH FINISH AND POLYFILM MOISTURE BARRIER. COLOR = WHITE TO. JACKETING SHALL CONFORM TO ASTM C1729 & ASTM B209. INSTALL IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS. MANUFACTURER JOHNS MANVILLE JM MULTI-FIT ELBOW, RPR PRODUCTS INSUL-MATE OR EQUAL. CONTRACTOR TO SUBMIT JACKETING FOR APPROVAL.

**KEY PLAN**



ISSUED		BID DOCUMENTS	
12/19/20			

JOB NO.	20-292-1329
DRAWN	BWG
CHECKED	DDW
APPROVED	DDW

SHEET TITLE

MECHANICAL ROOF PLAN

SHEET NUMBER

**M330**

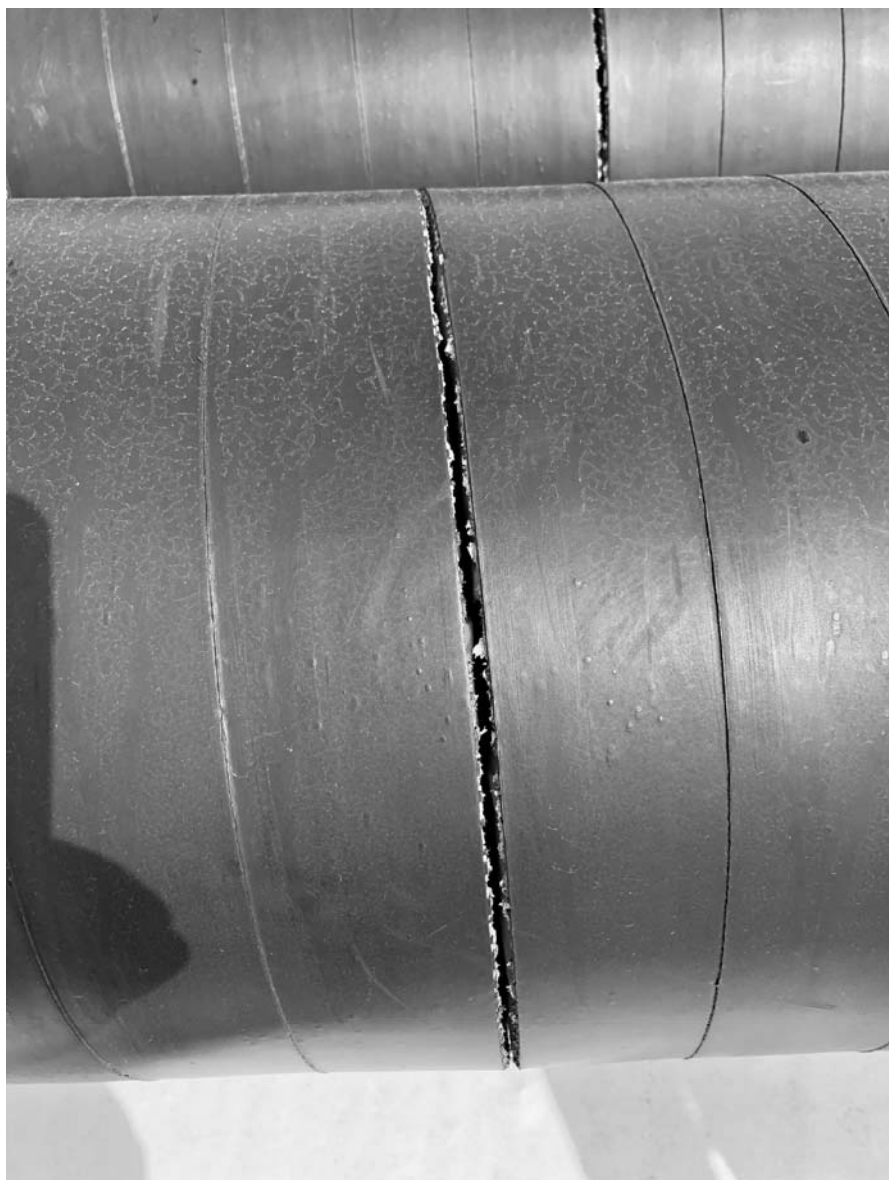




**PIPING PHOTO** 9  
SCALE: NTS

**PIPING PHOTO** 5  
SCALE: NTS

**PIPING PHOTO** (1)  
SCALE: NTS



**TYPICAL PIPING INSULATION CONDITION** 10  
SCALE: NTS

**PIPING PHOTO** 6  
SCALE: NTS

**PIPING PHOTO** (2)  
SCALE: NTS



**NOT USED**   
SCALE: NTS

**PIPING PHOTO** 7  
SCALE: NTS

### PIPING PHOTO

SCALE: NTS

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**NOT USED**   
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# PIPING PHOTO

SCALE: NTS

8

### PIPING PHOTO

SCALE: NTS

4





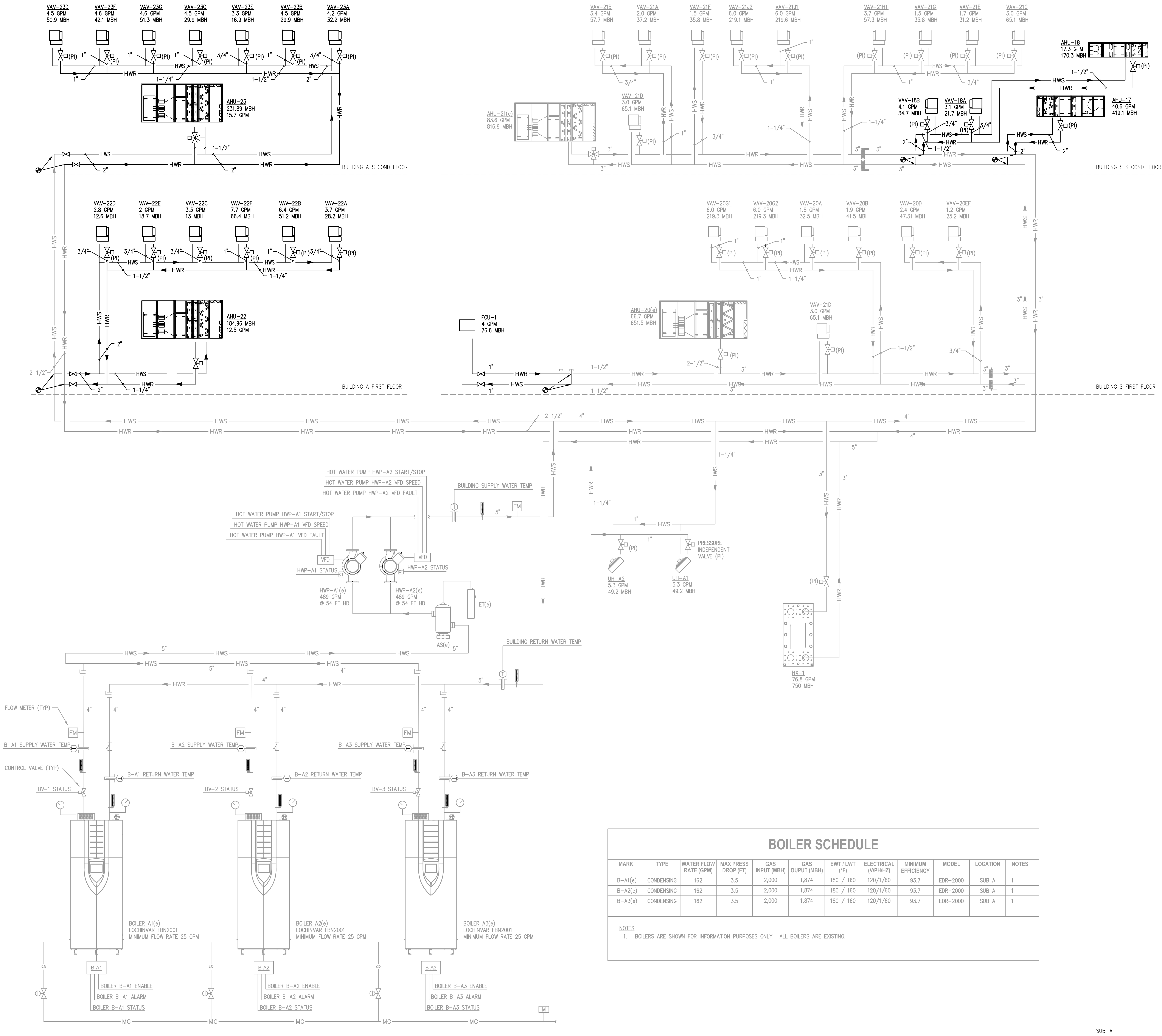
KEYNOTES ARE TYPICALLY NOT DUPLICATED WITHIN A GIVEN DETAIL. AN UN-KEYNOTED ITEM IN A DETAIL IS THE SAME AS A KEYNOTED ITEM HAVING THE SAME APPEARANCE WITHIN THE SAME DETAIL.

A site plan of the University of Illinois at Chicago campus. A specific building, labeled 'BLDG 'J'', is highlighted in a dark gray box. A dashed line outlines a larger area surrounding this building, which is labeled 'AREA OF WORK' with an arrow pointing to it. The plan shows various other buildings and open spaces across the campus.

# M331



SUBSTATION A PIPING SCHEMATIC



SEQUENCE OF OPERATIONS (e)

BOILER (B-A1, B-A2, B-A3):

THE BOILER CONTROLLER SHALL CONTROL THE OPERATION OF THE THREE BOILERS. THE LEAD BOILER SHALL BE ENABLED WHEN THE OUTSIDE AIR TEMPERATURE FALLS BELOW 60 DEGREES F (ADJ). THE BOILER CONTROL PANEL SHALL EQUALIZE THE RUN TIME OF THE THREE BOILERS AUTOMATICALLY AT SET INTERVALS.

THE BOILER CONTROL PANEL SHALL ENERGIZE THE BOILERS IN A ENERGY OPTIMIZATION SEQUENCE. ON A CALL FOR HEAT THE FIRST BOILER CONTROL VALVE BV-X SHALL OPEN. THE FIRST BOILER SHALL MODULATE ITS FIRING RATE TO MAINTAIN THE HEATING WATER TEMPERATURE SETPOINT. ONCE THE FIRST BOILER REACHES 50% OF ITS FIRING RATE THE SECOND BOILER CONTROL VALVE BV-X SHALL OPEN. THE BOILER CONTROLLER SHALL CALCULATE THE RATE AT WHICH THE FIRST AND SECOND BOILER SHOULD FIRE TO MEET THE BUILDING LOAD. THE BOILERS SHALL THEN MODULATE THEIR FIRING RATE TOGETHER TO MAINTAIN THE HEATING WATER TEMPERATURE SETPOINT. ONCE THE FIRST AND SECOND BOILER REACH 50% OF ITS FIRING RATE, THE THIRD BOILER CONTROL VALVE BV-X SHALL OPEN. THE BOILER CONTROLLER SHALL CALCULATE THE RATE AT WHICH THE FIRST, SECOND, AND THIRD BOILER SHOULD FIRE TO MEET THE BUILDING LOAD. THE BOILER SHALL THEN MODULATE THEIR FIRING RATE TOGETHER TO MAINTAIN THE HEATING WATER TEMPERATURE SETPOINT.

AS THE HEATING DEMAND DECREASES, THE BOILERS FIRING RATE SHALL MODULATE DOWN TOGETHER UNTIL THEY REACH A MINIMUM OF 10% OF THEIR FIRING RATE AT WHICH TIME THE THIRD BOILER SHALL BE DE-ENERGIZED AND THE ASSOCIATED BOILER CONTROL VALVE BV-X SHALL CLOSE. THE FIRST AND SECOND BOILER FIRING RATE SHALL THEN MODULATE TO MEET THE HEATING LOAD. WHEN THE FIRST AND SECOND BOILER REACH A MINIMUM OF 10% OF THEIR FIRING RATE, THE SECOND BOILER SHALL BE DE-ENERGIZED AND THE ASSOCIATED BOILER CONTROL VALVE BV-X SHALL CLOSE. THE FIRST BOILER FIRING RATE SHALL THEN MODULATE TO MEET THE HEATING LOAD.

THE HEATING WATER TEMPERATURE SHALL BE RESET BASED ON OUTDOOR AIR TEMPERATURE. THE WATER TEMPERATURE SHALL BE 180 DEGREES F WHEN THE OUTDOOR AIR TEMPERATURE IS 0 DEGREES F. THE WATER TEMPERATURE SHALL BE 100 DEGREES F WHEN THE OUTDOOR AIR TEMPERATURE IS 60 DEGREES F. TEMPERATURE RESET CURVES AND SETPOINTS SHALL BE ADJUSTABLE.

AN ALARM SHALL BE GENERATED IF THERE IS A BOILER ALARM OR A LOW WATER LEVEL ALARM.

IF THE BOILER EMERGENCY SHUTDOWN SWITCH IS ACTIVATED. ALL OF THE BOILERS SHALL BE IMMEDIATELY DE-ENERGIZED AND AN ALARM SHALL BE GENERATED.

PUMP (HWP-A1, HWP-A2):

THE HEATING WATER PUMPS SHALL OPERATE IN A LEAD/LAG SEQUENCE. IF THE LEAD PUMP FAILS, THE LAG PUMP SHALL BE ENERGIZED. THE PUMPS SHALL BE ALTERNATED AS LEAD AT SET INTERVALS.

UPON A CALL FOR HEAT THE LEAD PUMP SHALL BE ENERGIZED. THE PUMP SPEED SHALL MODULATE TO MEET SYSTEM DEMAND BASED ON SENSORLESS SYSTEM PRESSURE CONTROL.

AN ALARM SHALL BE GENERATED UPON A PUMP OR A VFD FAULT STATUS.

NOTE: UNTIL THE SYSTEM IS CHANGED OVER TO VARIABLE FLOW, ALL BOILER VALVES (BV-1, BV-2, BV-3) SHALL REMAIN OPEN.

POINTS LIST(e)

BOILER (B-A1, B-A2, B-A3)	HARDWARE				SOFTWARE			
	AI	AO	DI	DO	SCHED	TREND	ALARM	GRAPHIC
BOILER ENABLE (B-A1, B-A2, B-A3)				X	X			X
BOILER STATUS (B-A1, B-A2, B-A3)			X				X	X
BOILER ALARM (B-A1, B-A2, B-A3)			X				X	X
BUILDING HOT WATER FLOW RATE (FM)				X			X	X
HOT WATER PUMP START/STOP (HWP-A1, HWP-A2)	X						X	X
HOT WATER PUMP STATUS (HWP-A1, HWP-A2)			X				X	X
HOT WATER PUMP VFD SPEED (HWP-A1, HWP-A2)			X				X	X
HOT WATER PUMP VFD FAULT (HWP-A1, HWP-A2)			X				X	X
BUILDING SUPPLY WATER TEMPERATURE	X						X	X
BUILDING RETURN WATER TEMPERATURE	X						X	X
BUILDING HOT WATER SETPOINT		X					X	X
BOILER SUPPLY WATER TEMPERATURE (B-A1, B-A2, B-A3)							X	X
BOILER RETURN WATER TEMPERATURE (B-A1, B-A2, B-A3)							X	X
OUTSIDE AIR TEMPERATURE							X	X
GAS FLOW MEASUREMENT	X						X	X
BOILER KILL SWITCH STATUS			X				X	X
BOILER CONTROL VALVE (BV-1, BV-2, BV-3)			X				X	X
BOILER FLOW RATE FM (B-A1, B-A2, B-A3)		X					X	X

BUILDINGS 'A' & 'S' HVAC UNIT REPLACEMENTS AND MISC. HVAC PROJECTS

JOLIET JUNIOR COLLEGE  
1215 HOBBS ROAD  
JOLIET, ILLINOIS 60431

ISSUED

JOB NO. 20-292-1329  
DRAWN EDW  
CHECKED DDW  
APPROVED DDW

SHEET TITLE

PIPING SCHEMATIC

SHEET NUMBER

M410

KLUBER  
Architects + Engineers

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# AHU-22, AHU-23 TEMPERATURE CONTROL SCHEMATIC

## POINTS LIST

AIR HANDLING UNIT (AHU-22, AHU-23)	HARDWARE				SOFTWARE		
	AI	AO	DI	DO	SCHED	TREND	ALARM
OCCUPIED/UNOCCUPIED MODE			X		X		X
SUPPLY FAN START/STOP				X	X		
SUPPLY FAN STATUS			X				X
SUPPLY FAN VFD SPEED			X			X	X
SUPPLY FAN VFD FAULT			X				X
OUTSIDE AIR TEMPERATURE (EXISTING GLOBAL POINT)	X					X	X
SUPPLY AIR TEMPERATURE	X					X	X
RETURN AIR TEMPERATURE	X					X	X
MIXED AIR TEMPERATURE	X					X	X
OUTSIDE AIR HUMIDITY (EXISTING GLOBAL POINT)	X					X	X
RETURN AIR HUMIDITY	X					X	X
LOW LIMIT TEMPERATURE			X			X	X
OUTSIDE AIR DAMPER		X				X	X
OUTSIDE AIR CFM	X					X	X
RETURN AIR DAMPER		X				X	X
HOT WATER COIL CONTROL VALVE		X				X	X
CHILLED WATER COIL CONTROL VALVE		X				X	X
FILTER STATUS			X			X	X
RETURN AIR SMOKE DETECTOR STATUS			X			X	X
PUMP STATUS			X			X	X
ECONOMIZER STATUS			X	X		X	X
DUCT STATIC PRESSURE	X					X	X
DUCT STATIC PRESSURE SETPOINT	X					X	X
HIGH STATIC PRESSURE SHUTDOWN		X				X	X
SPACE STATIC PRESSURE	X					X	X
SPACE CO2 DETECTOR LEVEL	X					X	X
SPACE CO2 LEVEL SETPOINT HIGH / LOW		X				X	X
OUTSIDE AIR DAMPER POSITION SETPOINT HIGH / LOW		X				X	X

NOTES:  
 1. HEATING CONTROL VALVE SHALL HAVE SPRING RETURN ACTUATORS TO FAIL OPEN DURING LOSS OF POWER.  
 2. OUTSIDE AIR DAMPERS SHALL HAVE SPRING RETURN ACTUATORS TO FAIL IN CLOSE POSITION DURING LOSS OF POWER.

## SEQUENCE OF OPERATIONS

### AIR HANDLING UNIT (AHU-22, AHU-23):

THE OCCUPIED/UNOCCUPIED MODE SCHEDULING SHALL BE MADE AT THE BUILDING AUTOMATION SYSTEM. PROVISIONS SHALL BE MADE FOR MANUAL SHUTDOWN OF EQUIPMENT. ALL SETPOINTS SHALL BE ADJUSTABLE. UNOCCUPIED SPACE TEMPERATURE SETPOINTS SHALL BE 80 DEGREES F COOLING AND 65 DEGREES F HEATING.

SUPPLY FAN - THE SUPPLY FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED MODE AND INTERMITTENTLY DURING UNOCCUPIED MODE. THE SUPPLY FAN VARIABLE FREQUENCY DRIVE SHALL MODULATE THE SPEED OF THE FAN TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT. IF AIRFLOW IS NOT DETECTED WITHIN TWO MINUTES AFTER A START COMMAND THE FAN MOTOR SHALL BE DE-ENERGIZED AND AN AUDIBLE ALARM SHALL BE ACTIVATED AT THE BAS OPERATOR'S WORKSTATION. IF A HIGH STATIC PRESSURE IS SENSED IN THE SUPPLY AIR THE SUPPLY FAN SHALL BE DE-ENERGIZED AND SIGNAL AN ALARM CONDITION.

STATIC PRESSURE/SUPPLY AIR TEMPERATURE RESET - THE SUPPLY FAN VFDs SHALL MODULATE THE FANS TO MAINTAIN A DUCT STATIC PRESSURE SETPOINT. THE BAS SHALL CONTROL SUPPLY FAN SPEED TO MAINTAIN A CRITICAL STATIC PRESSURE SETPOINT. UPON FAILURE OF COMMUNICATION THE AHUS SHALL OPERATE ON THEIR OWN STATIC PRESSURE CONTROL IN A STAND ALONE MODE. THE SETPOINT SHALL RESET TO OPTIMIZE FAN SPEED AS FOLLOWS:

1. THE BUILDING AUTOMATION SYSTEM SHALL MONITOR THE DAMPER POSITION OF ALL VAV TERMINAL UNITS AND DETERMINE THE CRITICAL ZONE (CZ), WHICH IS THE VAV TERMINAL UNIT THAT IS MOST OPEN.
2. WHEN THE CZ IS MORE THAN 85% OPEN, THE SUPPLY FAN DISCHARGE STATIC PRESSURE SETPOINT SHALL BE RESET DOWNWARD 10% OF THE PREVIOUS SETPOINT AT A FREQUENCY OF 10 MINUTES UNTIL THE CZ IS MORE THAN 97% OPEN OR THE STATIC PRESSURE SETPOINT HAS RESET DOWNWARD TO THE SYSTEM MINIMUM SETTING.
3. WHEN THE CZ IS LESS THAN 85% OPEN, THE SUPPLY FAN DISCHARGE STATIC PRESSURE SETPOINT IS AT THE MINIMUM SETTING. THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET UPWARD IN INCREMENTS OF 0.5° F AT A FREQUENCY OF 10 MINUTES AND THE STATIC PRESSURE SETPOINT HELD CONSTANT UNTIL THE CZ IS MORE THAN 97% OPEN OR THE DISCHARGE AIR TEMPERATURE IS RESET TO ITS MAXIMUM SETTING OF 10° F (ADJ) ABOVE THE DISCHARGE AIR TEMPERATURE SETPOINT.
4. THE REVERSE CONTROL SEQUENCE SHALL OCCUR WHEN THE CZ IS 98% OPEN UNTIL THE DISCHARGE AIR TEMPERATURE AND STATIC TEMPERATURE SETPOINTS ARE A THEIR DESIGN SETPOINT.

SMOKE DETECTORS - UPON DETECTION OF SMOKE THE FANS SHALL BE DE-ENERGIZED, CLOSE OUTSIDE AIR DAMPER, AND SIGNAL ALARM LOCALLY AND AT FIRE ALARM PANEL.

OA/RA DAMPERS - AN AIRFLOW MEASURING STATION/DAMPER SENSOR SHALL MODULATE THE OUTSIDE AIR DAMPERS TO MAINTAIN THE MINIMUM OUTSIDE AIR CFM SETPOINT. AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F. THE ECONOMIZER SHALL HAVE A MAXIMUM OUTSIDE AIR INTAKE OF 5,000 CFM (ADJ). IN UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND RETURN AIR DAMPER OPEN DURING OPTIMIZED START.

DEMAND CONTROLLED VENTILATION - THE AIR HANDLING UNIT SHALL UTILIZE A CO2 BASED DEMAND CONTROLLED VENTILATION WITH VENTILATION RESET. THE BAS SHALL CALCULATE THE AMOUNT OF VENTILATION (Vv1) REQUIRED TO SATISFY THE CRITICAL ZONE BASED ON ASHRAE STANDARD 62.1 CALCULATIONS. THE BUILDING AUTOMATION SYSTEM SHALL MONITOR THE PRIMARY AIRFLOW FOR EACH VAV BOX AND TOTAL THE PRIMARY AIRFLOW (Vp2) AND REQUIRED OUTDOOR AIRFLOW (Vv2) TO DETERMINE THE HIGHEST OUTDOOR AIR FRACTION (Vv2) REQUIRED. THE BAS SHALL THEN CALCULATE THE SYSTEM VENTILATION EFFICIENCY (Ev2) AND THE REQUIRED CORRECTED OUTDOOR AIR INTAKE FLOW (Vv1). FOR ZONES WITH CO2 SENSORS, THE ZONE CO2 CONCENTRATION SHALL DETERMINE THE REQUIRED AMOUNT OF OUTDOOR AIR REQUIRED FOR THAT ZONE BASED ON A CO2 SETPOINT. AS ZONE CO2 CONCENTRATION CHANGES, OR AS ZONE VENTILATION EFFICIENCIES CHANGE, THE CORRECTED OUTDOOR AIR AMOUNT SHALL BE RESET TO MEET THE REQUIRED VENTILATION FOR THE CRITICAL ZONE. WHEN THE UNIT IS IN ECONOMIZER MODE, DEMAND CONTROL VENTILATION SHALL BE DISABLED.

ECONOMIZER - AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND THE OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F. THE ECONOMIZER SHALL HAVE FAULT AND DETECTION DIAGNOSTICS (FDD). THE FDD SHALL ALARM AT THE BAS OPERATOR'S WORKSTATION IF ANY OF THE FOLLOWING FAULTS OCCUR:

1. AN AIR TEMPERATURE SENSOR FAILURE/FAULT
2. NOT ECONOMIZING WHEN THE UNIT SHOULD BE ECONOMIZING
3. ECONOMIZING WHEN THE UNIT SHOULD NOT BE ECONOMIZING
4. DAMPERS NOT MODULATING
5. EXCESS OUTDOOR AIR IS DETECTED.

COOLING MODE - THE COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60 DEGREES F. THE AHU SHALL BEGIN A MORNING COOL-DOWN AT LEAST ONE HOUR BEFORE OCCUPIED MODE.

HEATING MODE - THE HOT WATER COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE TEMPERATURE SETPOINT OF 65 DEGREES F WHEN IN THE OCCUPIED MODE. THE AHU SHALL BEGIN A MORNING WARM-UP AT LEAST ONE HOUR BEFORE OCCUPIED MODE. AFTER SPACE TEMPERATURE REACHES 70 DEGREES F IN ALL ZONES THE AHU SHALL OPERATE IN THE OCCUPIED MODE.

HWP, PUMP CONTROL - THE PUMP SHALL RUN CONTINUOUSLY WHEN THE OUTSIDE AIR IS BELOW 40 DEG F. ABOVE 40 DEG F OUTSIDE AIR, THE PUMP SHALL BE OFF.

OPTIMIZED START - THE AHU SHALL BEGIN A MORNING WARM-UP/COOL DOWN BEFORE OCCUPIED MODE AS CALCULATED BY THE BAS FOR THE SPACE TO BE AT OCCUPIED TEMPERATURE SETPOINT AT THE START OF THE OCCUPIED MODE. AFTER SPACE TEMPERATURE REACHES THE OCCUPIED SETPOINT THE AHU SHALL OPERATE IN THE OCCUPIED MODE.

## FAN COIL CONTROL SCHEMATIC

### SEQUENCE OF OPERATIONS

THE SUPPLY FAN SHALL CONTINUOUSLY WHEN THE BUILDING IS OCCUPIED AND SCHEDULED IN THE BUILDING AUTOMATION SYSTEM. IF AIRFLOW IS NOT DETECTED AT ANY TIME, THE FAN MOTOR SHALL BE DE-ENERGIZED AND AN ALARM SHALL BE GENERATED AT THE BAS.

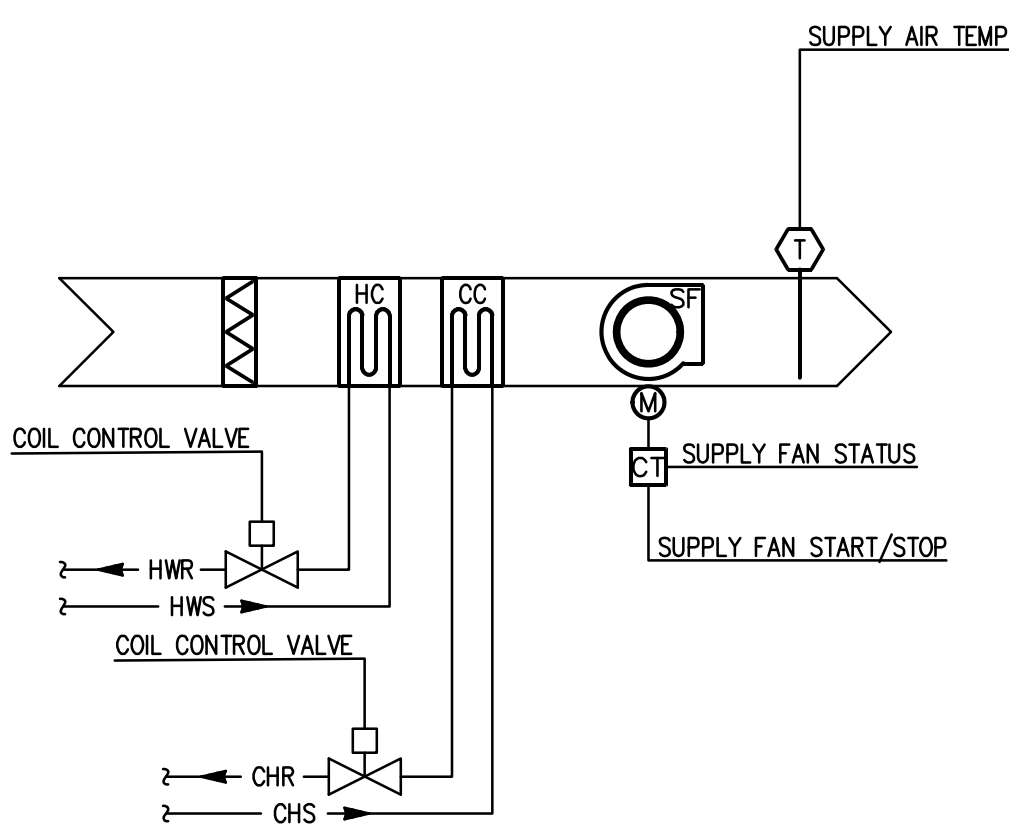
OCCUPIED MODE:  
 SPACE THERMOSTAT SHALL DICTATE COOLING/HEATING MODE.  
 COOLING MODE: WHENEVER THE SPACE TEMPERATURE IS 2 DEGREES F (ADJ) ABOVE THE SETPOINT, THE CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE TEMPERATURE.  
 HEATING MODE: WHENEVER THE SPACE TEMPERATURE IS 2 DEGREES F (ADJ) BELOW THE SETPOINT, THE CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE TEMPERATURE.

UNOCCUPIED MODE:  
 THE SUPPLY FAN SHALL OPERATE INTERMITTENTLY WITH THE COIL CONTROL VALVE AS REQUIRED TO MAINTAIN THE UNOCCUPIED COOLING/HEATING SETPOINTS.

ZONE THERMOSTAT SHALL HAVE PLUS/MINUS 2° F TEMPERATURE SETPOINT ADJUSTMENT OF THE SETPOINT SET AT THE BAS AND TIMED UNOCCUPIED OVERRIDE BUTTON.

### POINTS LIST

FAN COIL UNIT	HARDWARE				SOFTWARE		
	AI	AO	DI	DO	SCHED	TREND	ALARM
OCCUPIED/UNOCCUPIED MODE			X		X		X
FAN START/STOP				X	X		
FAN STATUS			X				X
SUPPLY AIR TEMPERATURE	X					X	X
SPACE AIR TEMPERATURE	X					X	X
COOLING CONTROL VALVE		X				X	
HEATING CONTROL VALVE		X				X	



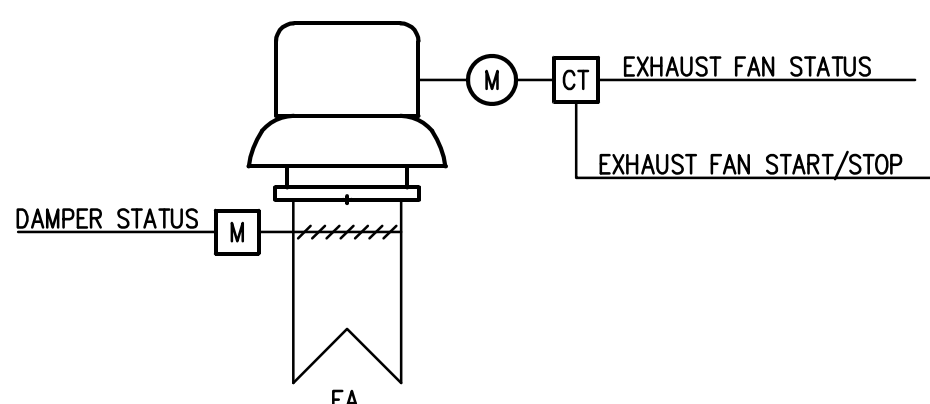
## EXHAUST FAN CONTROL SCHEMATIC

### SEQUENCE OF OPERATIONS

F-46(a)  
 F-47(a)  
 THE EXHAUST FAN SHALL BE ENERGIZED BY SCHEDULE SET BY THE BUILDING AUTOMATION SYSTEM. THE EXHAUST FAN SHALL BE ENERGIZED BY SCHEDULE SET BY THE BUILDING AUTOMATION SYSTEM.

### POINTS LIST

EXHAUST FAN	HARDWARE				SOFTWARE		
	AI	AO	DI	DO	SCHED	TREND	ALARM
FAN START/STOP				X	X		X
FAN STATUS			X			X	X
DAMPER STATUS			X			X	X



## VARIABLE AIR VOLUME BOX CONTROL SCHEMATIC

### SEQUENCE OF OPERATIONS

PRESSURE INDEPENDENT AIR TERMINAL SHALL MAINTAIN ZONE TEMPERATURE HEAT/COOL SETPOINTS OF 72/75 DEGREES F (ADJ) AND UNOCCUPIED COOL/HEAT SETPOINTS OF 80/65 DEGREES F. ALL SETPOINTS SHALL BE ADJUSTABLE.

OCCUPIED MODE:  
 COOLING - THE TERMINAL UNIT DAMPER SHALL MODULATE TO MAINTAIN THE ZONE COOLING TEMPERATURE SETPOINT BY MODULATING SUPPLY AIR FLOW. WHEN THE ZONE TEMPERATURE IS ABOVE SETPOINT THE DAMPER SHALL MODULATE TO THE MAXIMUM COOLING CFM POSITION. WHEN THE ZONE TEMPERATURE IS BELOW SETPOINT THE DAMPER SHALL MODULATE TO THE MINIMUM CFM POSITION.

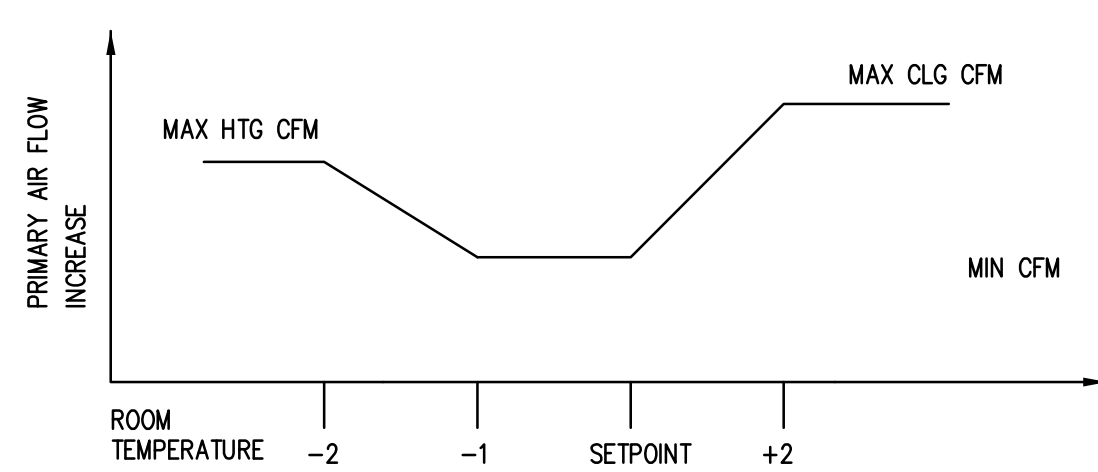
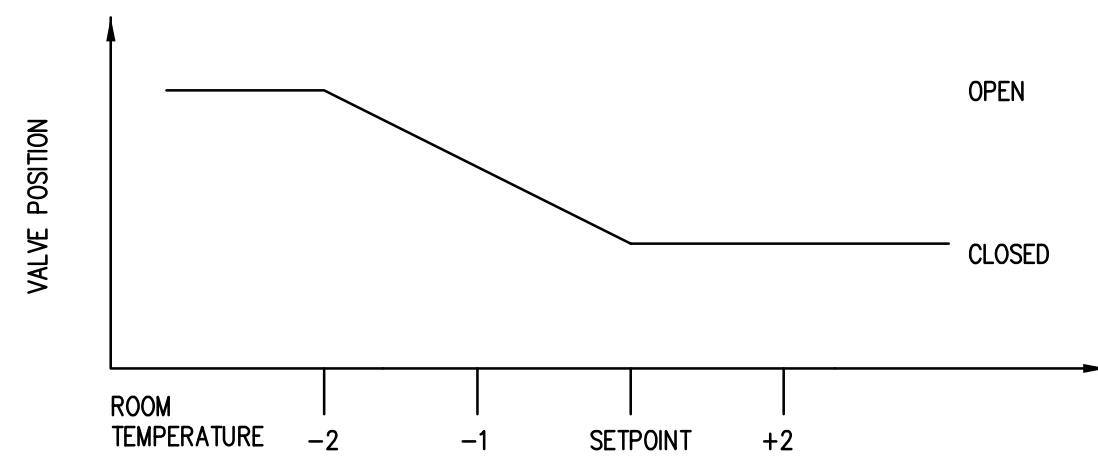
HEATING - WHEN THE TERMINAL UNIT DAMPER HAS REACHED THE MINIMUM CFM POSITION AND THE ZONE TEMPERATURE IS BELOW SETPOINT THE VALVE SHALL MODULATE OPEN TO PROVIDE A DISCHARGE AIR TEMPERATURE OF 95 DEGREES F. IF THE ZONE CONTINUES TO REMAIN BELOW SETPOINT THE TERMINAL UNIT DAMPER SHALL MODULATE TO THE HEATING CFM MAXIMUM CFM. THE VALVE SHALL MODULATE IN UNISON WITH THE DAMPER TO MAINTAIN A 95° F DISCHARGE AIR TEMPERATURE. AS THE ZONE TEMPERATURE INCREASES THE DAMPER AND VALVE SHALL REACT IN A REVERSE MANNER.

UNOCCUPIED MODE:  
 THE TERMINAL UNIT DAMPER AND REHEAT SHALL OPERATE AS DESCRIBED ABOVE WHEN THE ASSOCIATED AIR HANDLING UNIT IS ENERGIZED. THE UNIT SHALL OPERATE TO MAINTAIN THE UNOCCUPIED HEATING/COOLING SETPOINTS.

ZONE THERMOSTAT SHALL HAVE PLUS/MINUS 2° F TEMPERATURE SETPOINT ADJUSTMENT OF THE SETPOINT SET AT THE BAS AND TIMED UNOCCUPIED OVERRIDE BUTTON.

### POINTS LIST

VARIABLE AIR VOLUME BOX	HARDWARE				SOFTWARE		
	AI	AO	BI	BO	SCHED	TREND	ALARM
DISCHARGE AIR TEMPERATURE	X					X	
ZONE AIR TEMPERATURE	X					X	
ZONE TEMPERATURE ADJUSTMENT	X					X	
HEATING SETPOINT		X					
COOLING SETPOINT		X					
DAMPER POSITION		X					
AIRFLOW CFM	X	X				X	
MINIMUM AIRFLOW SETPOINT		X					
MAXIMUM COOLING AIRFLOW SETPOINT		X					
MAXIMUM HEATING AIRFLOW SETPOINT		X					
ZONE HIGH TEMPERATURE ALARM		X				X	
ZONE LOW TEMPERATURE ALARM		X				X	
REHEAT COIL 2-WAY VALVE		X				X	
UNOCCUPIED MODE OVERRIDE		X					
ZONE CO2 LEVEL	X						
CO2 SETPOINT (HIGH / LOW)		X					



MODULATE PRIMARY VALVE FULLY OPEN WHEN ROOM AIR TEMPERATURE IS 2 DEGREES ABOVE SETPOINT.  
 MODULATE PRIMARY AIR VALVE AND HEATING VALVE AS REQUIRED TO MAINTAIN 95 DEGREES F DISCHARGE AIR TEMPERATURE.

## POINTS LIST

NOTES:

1. HEATING CONTROL VALVE SHALL HAVE SPRING RETURN ACTUATORS TO FAIL OPEN DURING LOSS OF POWER.
2. OUTSIDE AIR DAMPERS SHALL HAVE SPRING RETURN ACTUATORS TO FAIL IN CLOSE POSITION DURING LOSS OF POWER.

## SEQUENCE OF OPERATIONS

THE OCCUPIED/UNOCCUPIED MODE SCHEDULING SHALL BE MADE AT THE BUILDING AUTOMATION SYSTEM. PROVISIONS SHALL BE MADE FOR MANUAL SHUTDOWN OF EQUIPMENT. ALL SETPOINTS SHALL BE ADJUSTABLE. UNOCCUPIED SPACE TEMPERATURE SETPOINTS SHALL 80 DEGREES F COOLING AND 65 DEGREES F HEATING.

SUPPLY FAN - DURING THE OCCUPIED MODE THE SUPPLY FAN SHALL RUN CONTINUOUSLY. IF AIRFLOW IS NOT DETECTED WITHIN TWO MINUTES AFTER A START COMMAND, THE FAN MOTOR SHALL BE DE-ENERGIZED AND AN AUDIBLE ALARM SHALL BE ACTIVATED AT THE BAS OPERATOR'S WORKSTATION. DURING THE UNOCCUPIED MODE, THE SUPPLY FAN SHALL CYCLE INTERMITTENTLY TO MAINTAIN A HIGH SETPOINT. THE OUTSIDE AIR DAMPERS SHALL REMAIN CLOSED. IN HEATING MODE THE VALVE SHALL BE FULL OPEN.

OA/RA DAMPERS - THE OUTSIDE AIR DAMPERS SHALL OPEN TO A MINIMUM POSITION WHEN THE UNIT IS IN OCCUPIED MODE. IN UNOCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED.

ECONOMIZER - AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND THE OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F. THE ECONOMIZER SHALL HAVE FAULT AND DETECTION DIAGNOSTICS (FDD). THE FDD SHALL ALARM AT THE BAS OPERATOR'S WORKSTATION IF ANY OF THE FOLLOWING FAULTS OCCUR:

2. NOT ECONOMIZING WHEN THE UNIT SHOULD BE ECONOMIZING

3. ECONOMIZING WHEN THE UNIT SHOULD NOT BE ECONOMIZING
4. DAMPERS NOT MODULATING
5. EXCESS OUTDOOR AIR IS DETECTED.

THE AIR HANDLING UNIT SHALL HAVE OPERATE AS SINGLE ZONE VARIABLE AIR VOLUME UNIT.

SINGLE ZONE VARIABLE AIR VOLUME;

1. COOLING MODE - DURING THE COOLING MODE OF OPERATION THE SUPPLY FAN SPEED SHALL VARY BETWEEN MINIMUM SPEED AND 100% SPEED AS NEEDED TO MAINTAIN THE SPACE TEMPERATURE. THE COOLING VALVE SHALL MODULATE TO MAINTAIN THE ROOM TEMPERATURE WITHIN THE SPECIFIED RANGE.

2. HEATING MODE - DURING THE HEATING MODE OF OPERATION THE SUPPLY FAN SHALL MODULATE BETWEEN 50% AND 100% AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE. THE HEATING VALVE SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT OF 90 DEGREES.

HWP-17, PUMP CONTROL - THE PUMP SHALL RUN CONTINUOUSLY WHEN THE OUTSIDE AIR IS BELOW 40 DEG F. ABOVE 40 DEG OUTSIDE AIR THE PUMP SHALL BE OFF.

OPTIMIZED START - THE AHU SHALL BEGIN A MORNING WARM-UP/COOL DOWN BEFORE OCCUPIED MODE AS CALCULATED BY THE BAS. AFTER SPACE TEMPERATURE REACHES THE OCCUPIED SETPOINT THE AHU SHALL OPERATE IN THE OCCUPIED MODE.



1. COMPONENTS AND INTERCONNECTIONS SHOWN ARE SCHEMATIC ONLY.
2. CONTRACTOR IS RESPONSIBLE FOR PROVIDING COMPONENTS, SENSORS, RELAYS, ETC, TO ENSURE A COMPLETE OPERATING SYSTEM.
3. SMOKE DETECTORS ARE TO BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR

## POINTS LIST

NOTES:

1. HEATING CONTROL VALVE SHALL HAVE SPRING RETURN ACTUATORS TO FAIL OPEN DURING LOSS OF POWER.
2. OUTSIDE AIR DAMPERS SHALL HAVE SPRING RETURN ACTUATORS TO FAIL IN CLOSE POSITION DURING LOSS OF POWER.

## SEQUENCE OF OPERATIONS

THE OCCUPIED/UNOCCUPIED MODE SCHEDULING SHALL BE MADE AT THE BUILDING AUTOMATION SYSTEM. PROVISIONS SHALL BE MADE FOR MANUAL SHUTDOWN OF EQUIPMENT. ALL SETPOINTS SHALL BE ADJUSTABLE. UNOCCUPIED SPACE TEMPERATURE SETPOINTS SHALL BE 80 DEGREES F COOLING AND 65 DEGREES F HEATING.

SUPPLY FAN - THE SUPPLY FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED MODE AND INTERMITTENTLY DURING UNOCCUPIED MODE. THE SUPPLY FAN VARIABLE FREQUENCY DRIVE SHALL MODULATE THE SPEED OF THE FAN TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT. IF AIRFLOW IS NOT DETECTED WITHIN TWO MINUTES AFTER A START COMMAND THE FAN MOTOR SHALL BE DE-ENERGIZED AND AN AUDIBLE ALARM SHALL BE ACTIVATED AT THE BAS OPERATOR'S WORKSTATION. IF A HIGH STATIC PRESSURE IS SENSED IN THE SUPPLY AIR THE SUPPLY FAN SHALL BE DE-ENERGIZED AND SIGNAL AN ALARM CONDITION.

STATIC PRESSURE/SUPPLY AIR TEMPERATURE RESET – THE SUPPLY FAN VFDs SHALL MODULATE THE FANS TO MAINTAIN A DUCT STATIC PRESSURE SETPOINT. THE BAS SHALL CONTROL SUPPLY FAN SPEED TO MAINTAIN A CRITICAL STATIC PRESSURE SETPOINT. UPON FAILURE OF COMMUNICATION THE AHUs SHALL OPERATE ON THEIR OWN STATIC PRESSURE CONTROL IN STAND ALONE MODE. THE SETPOINT SHALL RESET TO OPTIMIZE FAN SPEED AS FOLLOWS;

1. THE BUILDING AUTOMATION SYSTEM SHALL MONITOR THE DAMPER POSITION OF ALL VAV TERMINAL UNITS AND DETERMINE THE CRITICAL ZONE (CZ), WHICH IS THE LOWEST TERMINAL UNIT THAT IS MOST OPEN.
2. WHEN THE CRITICAL ZONE (CZ) REACHES 90% OF ITS FULL OPEN POSITION, THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET DOWNWARD 10% OF THE PREVIOUS SETPOINT AT A FREQUENCY OF 10 MINUTES UNTIL THE CZ IS MORE THAN 97% OPEN OR THE STATIC PRESSURE SETPOINT HAS RESET DOWNWARD TO THE SYSTEM MINIMUM SETTING.
3. WHEN THE CZ IS LESS THAN 95% OPEN AND THE STATIC PRESSURE SETPOINT IS AT THE MINIMUM SETTING, THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE RESET UPWARD 10% OF THE PREVIOUS SETPOINT AT A FREQUENCY OF 10 MINUTES AND THE STATIC PRESSURE SETPOINT HELD CONSTANT UNTIL THE CZ IS MORE THAN 97% OPEN OR THE DISCHARGE AIR TEMPERATURE IS RESET TO ITS MAXIMUM SETTING OF 10°F (ΔO) ABOVE THE DISCHARGE AIR TEMPERATURE SETPOINT.
4. THE SEQUENCE CONTROLLER SHALL MAINTAIN THE CZ AT 95% OPEN UNTIL THE DISCHARGE AIR TEMPERATURE SETPOINT AND STATIC PRESSURE SETPOINTS ARE AT THEIR DESIGN SETPOINT.

SMOKE DETECTORS - UPON DETECTION OF SMOKE THE FANS SHALL BE DE-ENERGIZED, CLOSE OUTSIDE AIR DAMPER, AND SIGNAL ALARM LOCALLY AND AT FIRE ALARM PANEL.

OA/RA DAMPERS – AN AIRFLOW MEASURING STATION/DAMPER SENSOR SHALL MODULATE THE OUTSIDE AIR DAMPERS TO MAINTAIN THE MINIMUM OUTSIDE AIR CFM SETPOINT. AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND OUTSIDE AIR TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F. THE ECONOMIZER SHALL HAVE A MAXIMUM OUTSIDE AIR INTAKE OF 2,500 CFM. IN OCCUPIED MODE THE OUTSIDE AIR DAMPER SHALL BE FULLY CLOSED. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND RETURN AIR DAMPER OPEN DURING OPTIMIZED START.

DEMAND CONTROLLED VENTILATION: THE OUTSIDE AIR DAMPER POSITION IS VARIED BETWEEN THE MINIMUM VENTILATION LEVEL BASED ON THE AREA OUTDOOR AIRFLOW RATE, AND THE MAXIMUM DESIGN VENTILATION LEVEL BASED ON THE AREA AND PEOPLE OUTDOOR AIRFLOW RATE. THE OUTSIDE AIR DAMPER POSITION IS MODULATED IN DIRECT PROPORTION TO THE SPACE CO2 SENSORS READ A CO2 CONCENTRATION LEVEL BELOW THE SPACE CO2 MINIMUM SETPOINT OF 800 PPM (ASHRAE 62.1-2001). WHEN THE OUTSIDE AIR DAMPER SHALL OPEN TO THE MINIMUM OR DAMPER POSITION SETPOINT. THE MINIMUM DAMPER POSITION SHALL BE 10% OF THE OUTSIDE AIR DAMPER POSITION. WHEN THE SPACE CO2 SENSORS READ A CO2 CONCENTRATION ABOVE THE MINIMUM SPACE CO2 SETPOINT, THE OUTSIDE AIR DAMPERS SHALL MODULATE TO ALLOW MORE VENTILATION AIR IN. AS THE SPACE CO2 LEVEL APPROACHES THE MAXIMUM SPACE CO2 SETPOINT OF 1000 PPM (ASHRAE 62.1-2001), THE OUTSIDE AIR DAMPER POSITION WILL BE MODULATED TO THE MAXIMUM DAMPER POSITION SETPOINT. THE DAMPER POSITION SHALL BE MODULATED IN A DIRECTLY PROPORTIONAL RELATIONSHIP TO THE SPACE CO2 SENSORS LIMITS AND THEIR CORRESPONDING DAMPER POSITION LIMITS. IN UNOCCUPIED MODE, THE OUTSIDE AIR DAMPERS SHALL BE FULLY CLOSED.

ECONOMIZER - AN ECONOMIZER SHALL MODULATE THE DAMPERS BASED ON DIFFERENTIAL ENTHALPY OF THE RETURN AIR AND THE

1. AN AIR TEMPERATURE SENSOR FAILURE/FAULT
2. NOT ECONOMIZING WHEN THE UNIT SHOULD BE ECONOMIZING
3. ECONOMIZING WHEN THE UNIT SHOULD NOT BE ECONOMIZING
4. DAMPERS NOT MODULATING
5. EXCESS OUTDOOR AIR IS DETECTED.

COOLING MODE - THE COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN A SUPPLY AIR TEMPERATURE OF 55 DEGREES F WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60 DEGREES F. THE AHU SHALL BEGIN A MORNING COOL-DOWN AT LEAST ONE HOUR BEFORE OCCUPIED MODE.

HEATING MODE - THE HOT WATER COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN A DISCHARGE TEMPERATURE SETPOINT OF 65 DEGREES F WHEN IN THE OCCUPIED MODE. THE AHU SHALL BEGIN A MORNING WARM-UP AT AT LEAST ONE HOUR BEFORE OCCUPIED MODE AFTER SPACE TEMPERATURE REACHES 70 DEGREES F IN ALL ZONES THE AHU SHALL OPERATE IN THE OCCUPIED MODE.

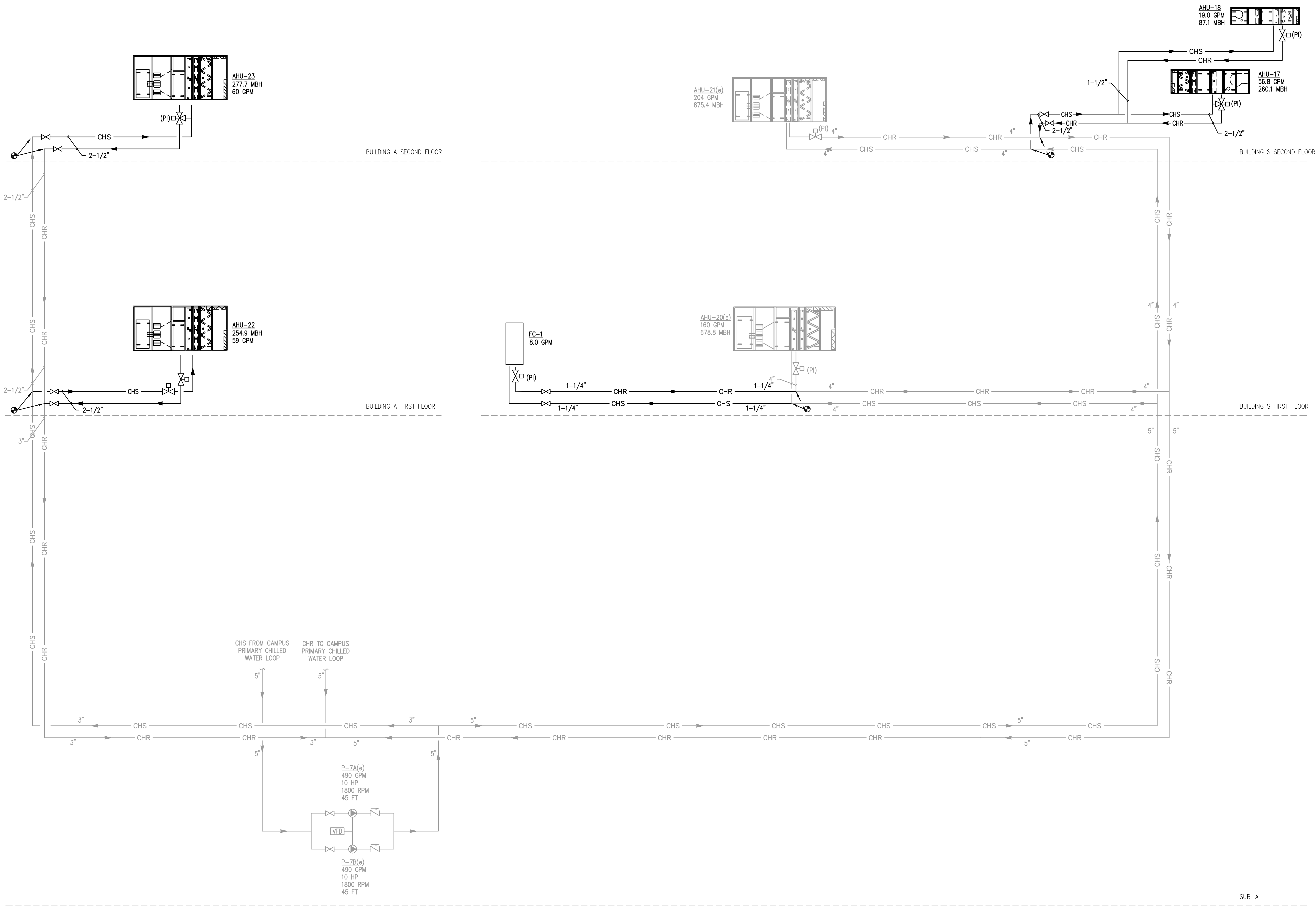
HWP-18, PUMP CONTROL - THE PUMP SHALL RUN CONTINUOUSLY WHEN THE OUTSIDE AIR IS BELOW 40 DEG F. ABOVE 40 DEG F OUTSIDE AIR TO THE PUMP SHALL BE OFF.



1. COMPONENTS AND INTERCONNECTIONS SHOWN ARE SCHEMATIC ONLY.
2. CONTRACTOR IS RESPONSIBLE FOR PROVIDING COMPONENTS, SENSORS, RELAYS, ETC, TO ENSURE A COMPLETE OPERATING SYSTEM.
3. SMOKE DETECTORS ARE TO BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR



SUBSTATION A CHILLED WATER PIPING SCHEMATIC



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ISSUED		BID DOCUMENTS							
12/9/20									

JOB NO.	20-292-1329
DRAWN	EDW
CHECKED	DDW
APPROVED	DDW

SHEET TITLE
CHILLED WATER PIPING SCHEMATIC

SHEET NUMBER
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ISSUED	
DATE	DESCRIPTION
12/19/20	BID DOCUMENTS

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APPROVED	DDW

SHEET TITLE

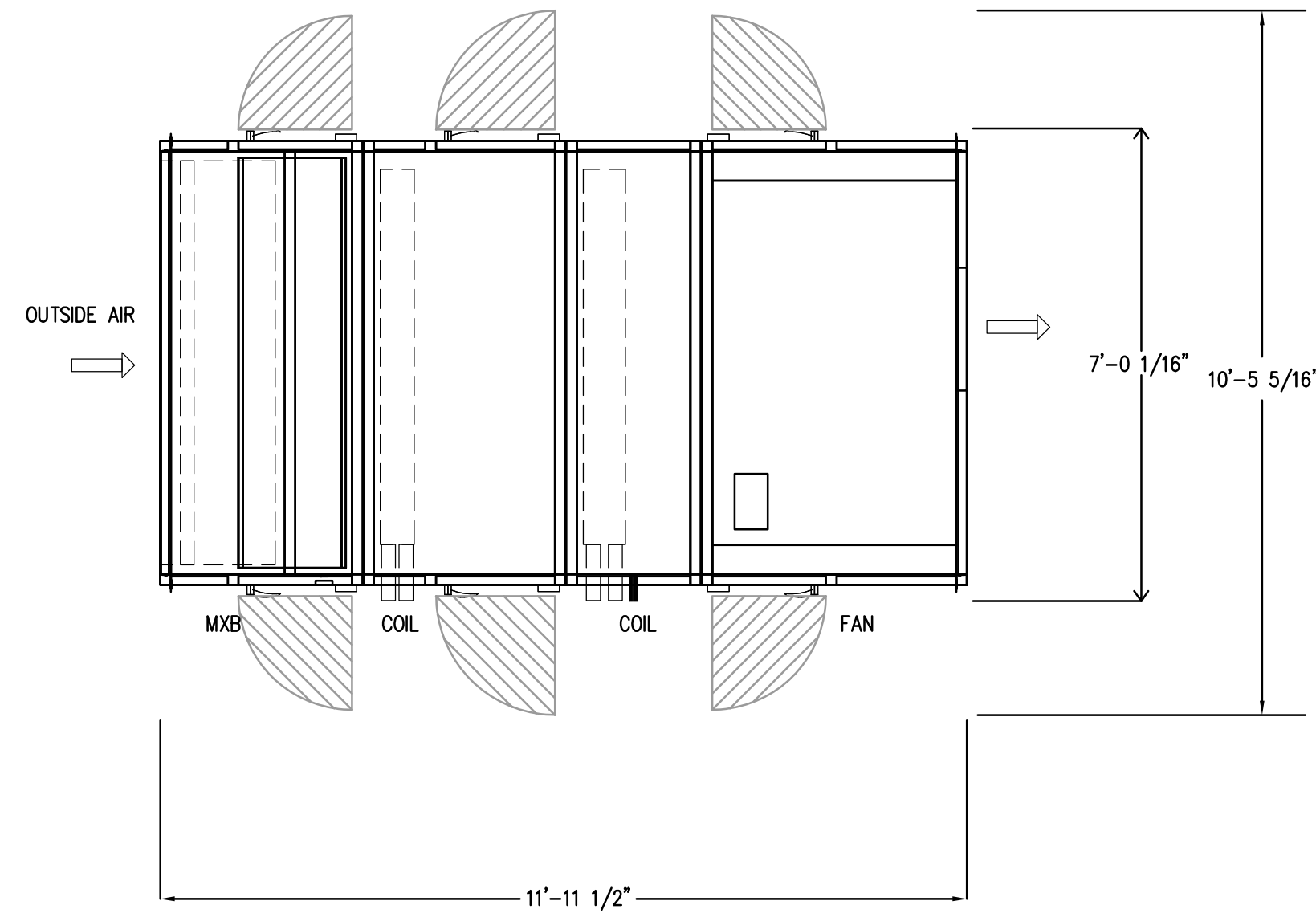
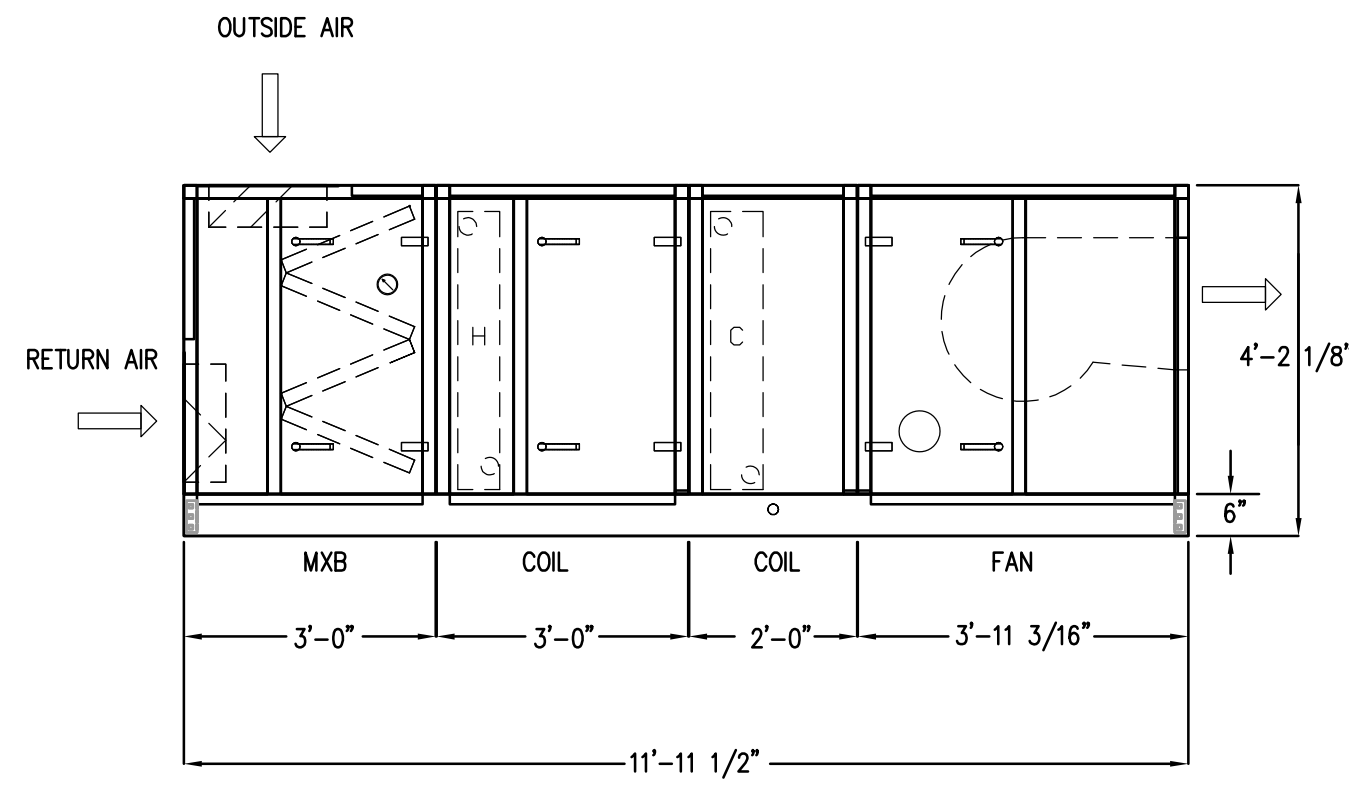
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SHEET NUMBER

**M510**

SIDE VIEW

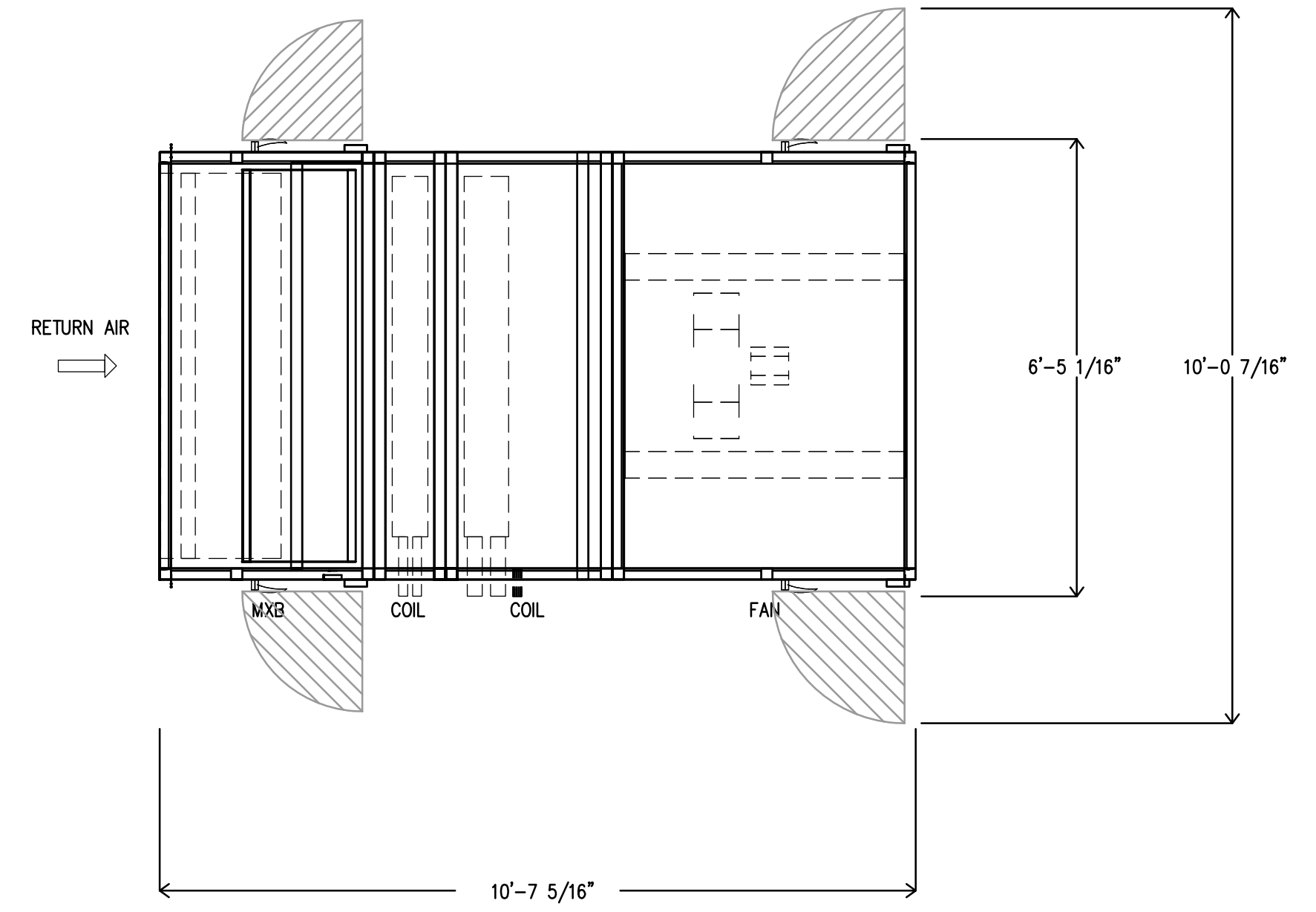
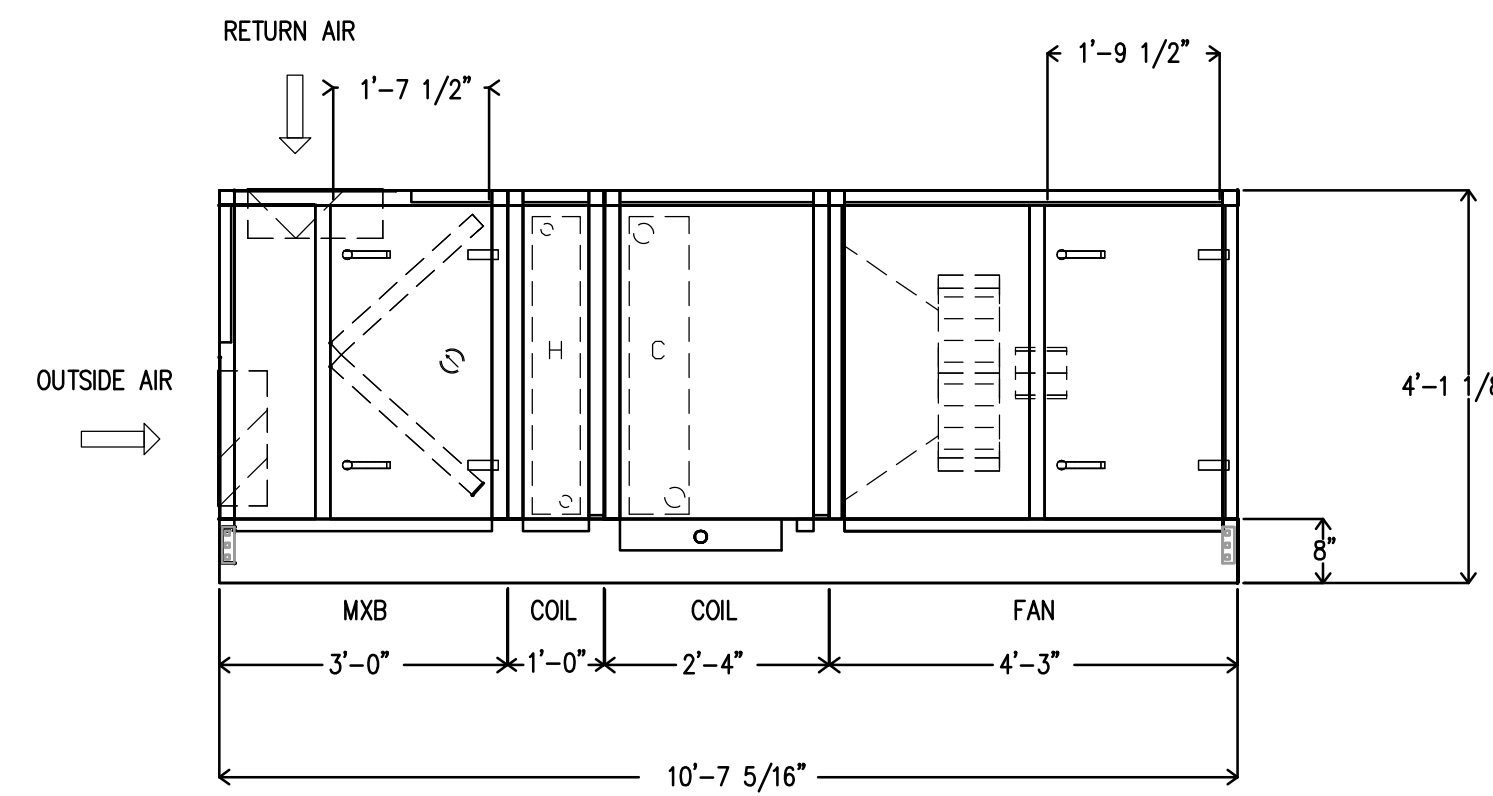
PLAN VIEW



(ALTERNATE NO. 1) AIR HANDLING UNIT (AHU-17) DETAIL  
SCALE: NTS 3

SIDE VIEW

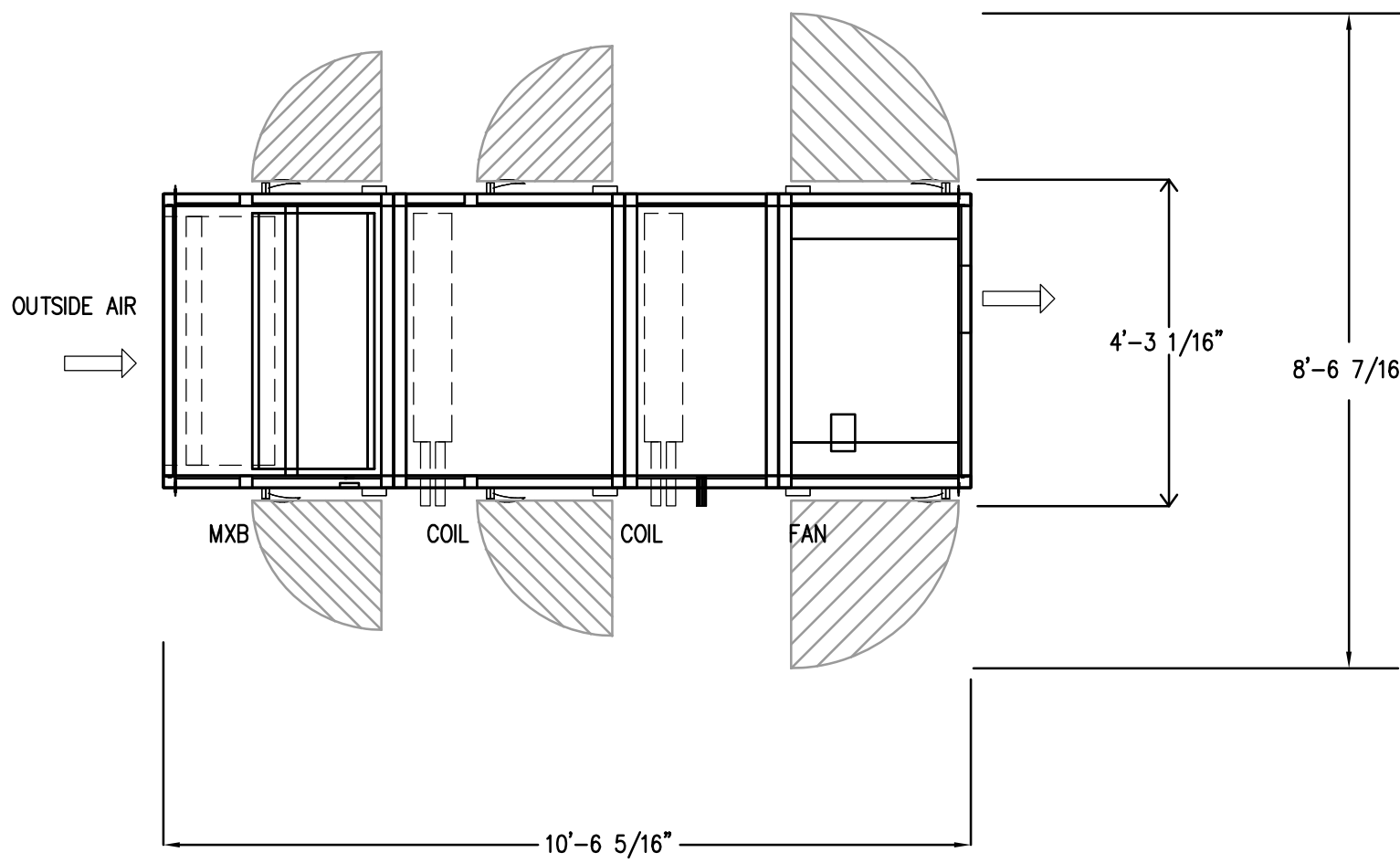
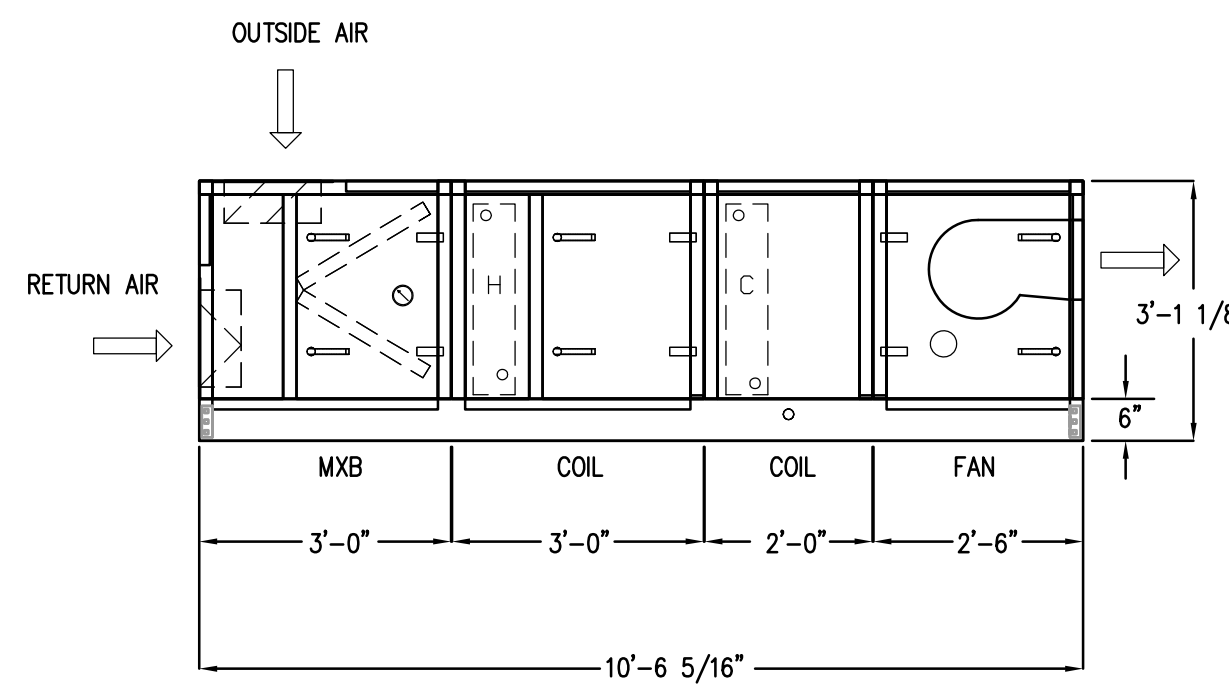
PLAN VIEW



AIR HANDLING UNIT (AHU-22) DETAIL  
SCALE: NTS 1

SIDE VIEW

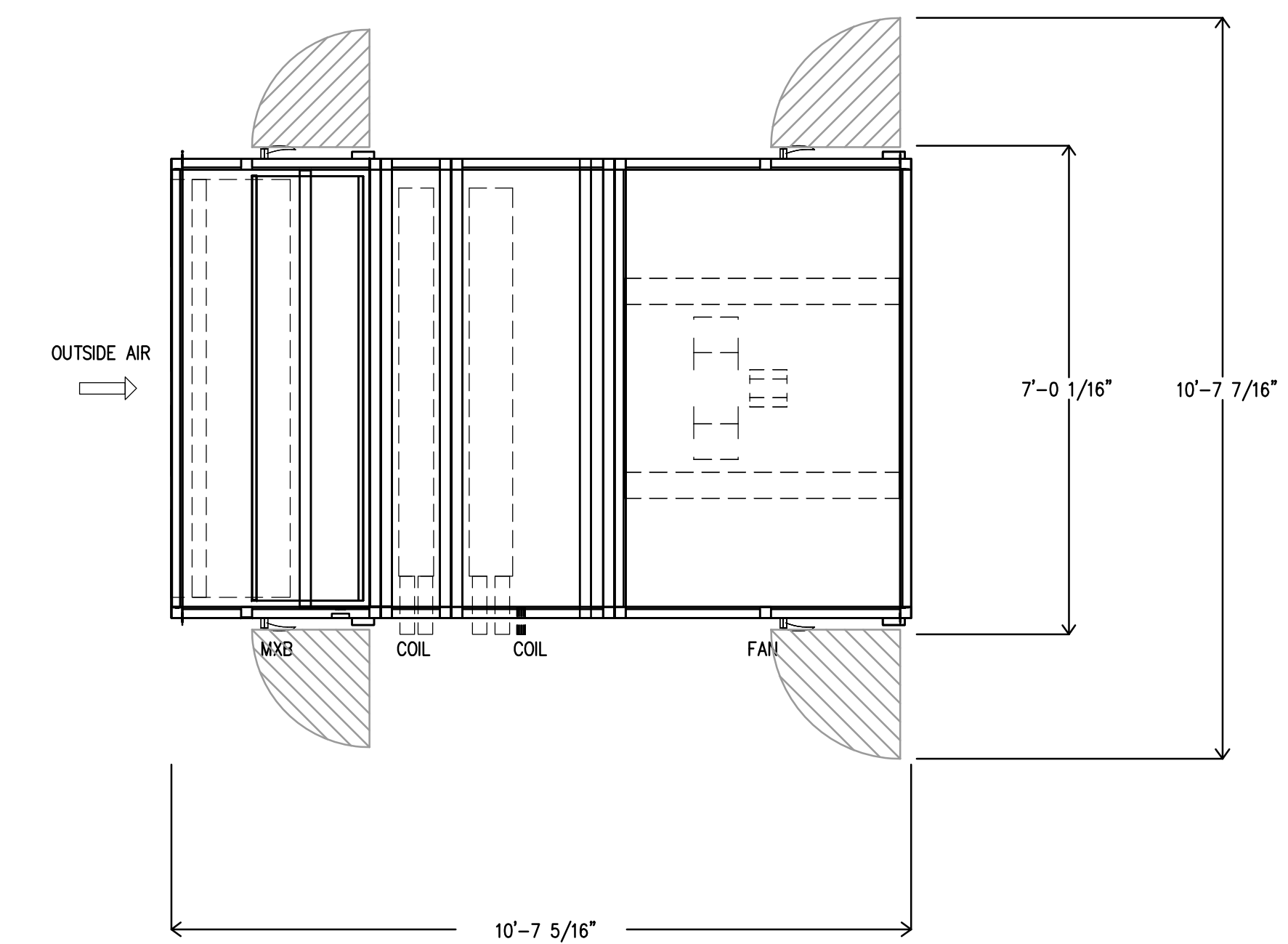
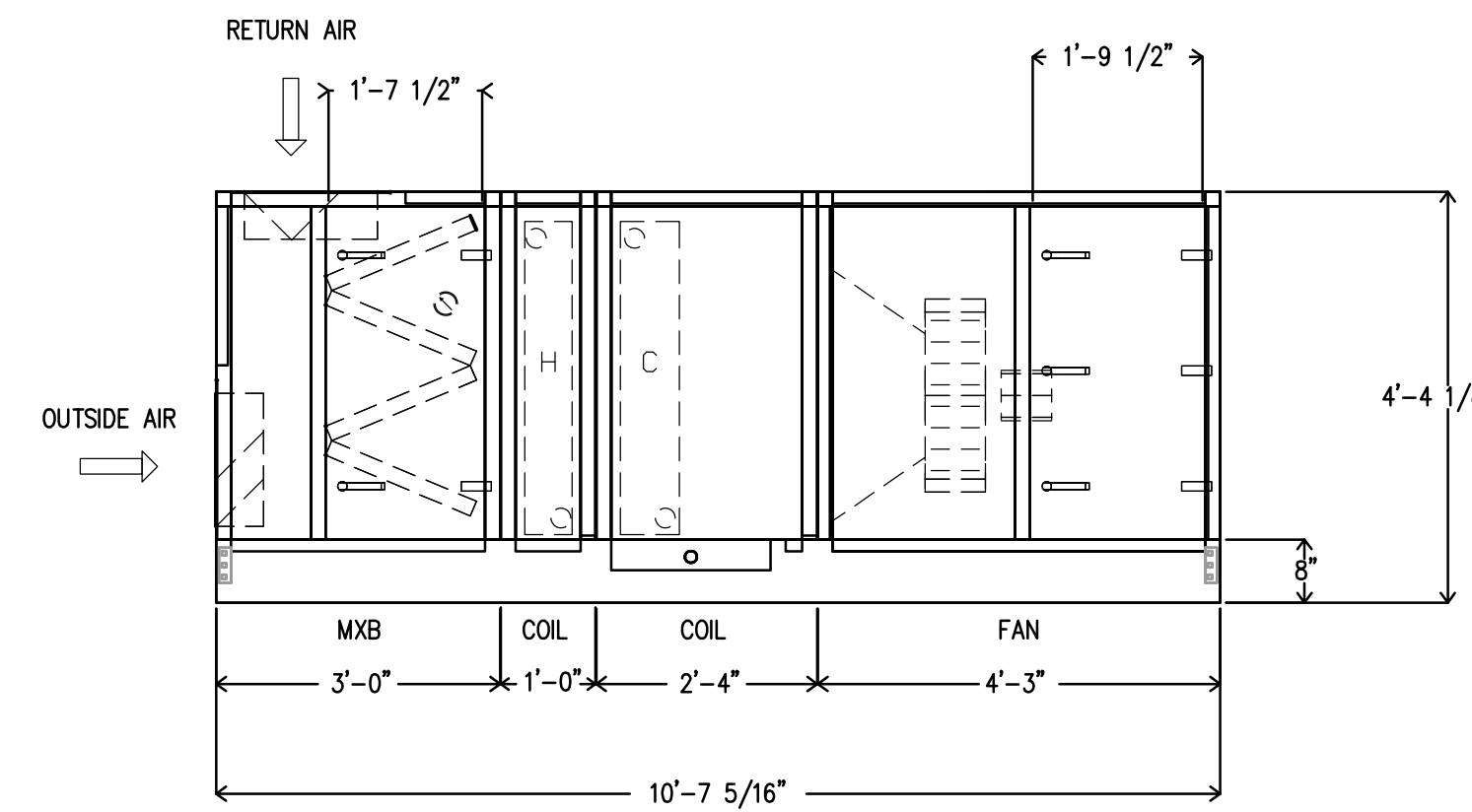
PLAN VIEW



(ALTERNATE NO. 1) AIR HANDLING UNIT (AHU-18) DETAIL  
SCALE: NTS 4

SIDE VIEW

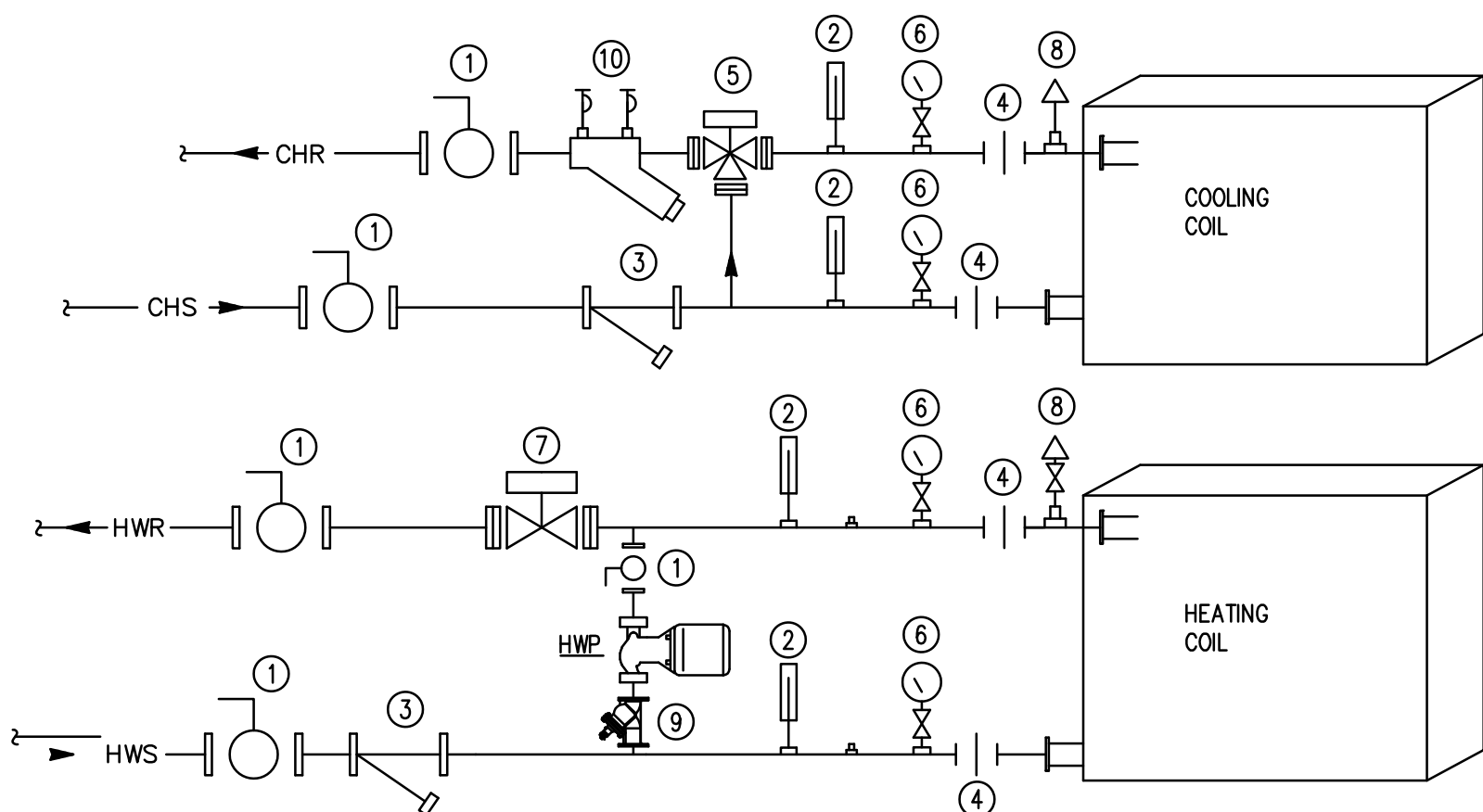
PLAN VIEW



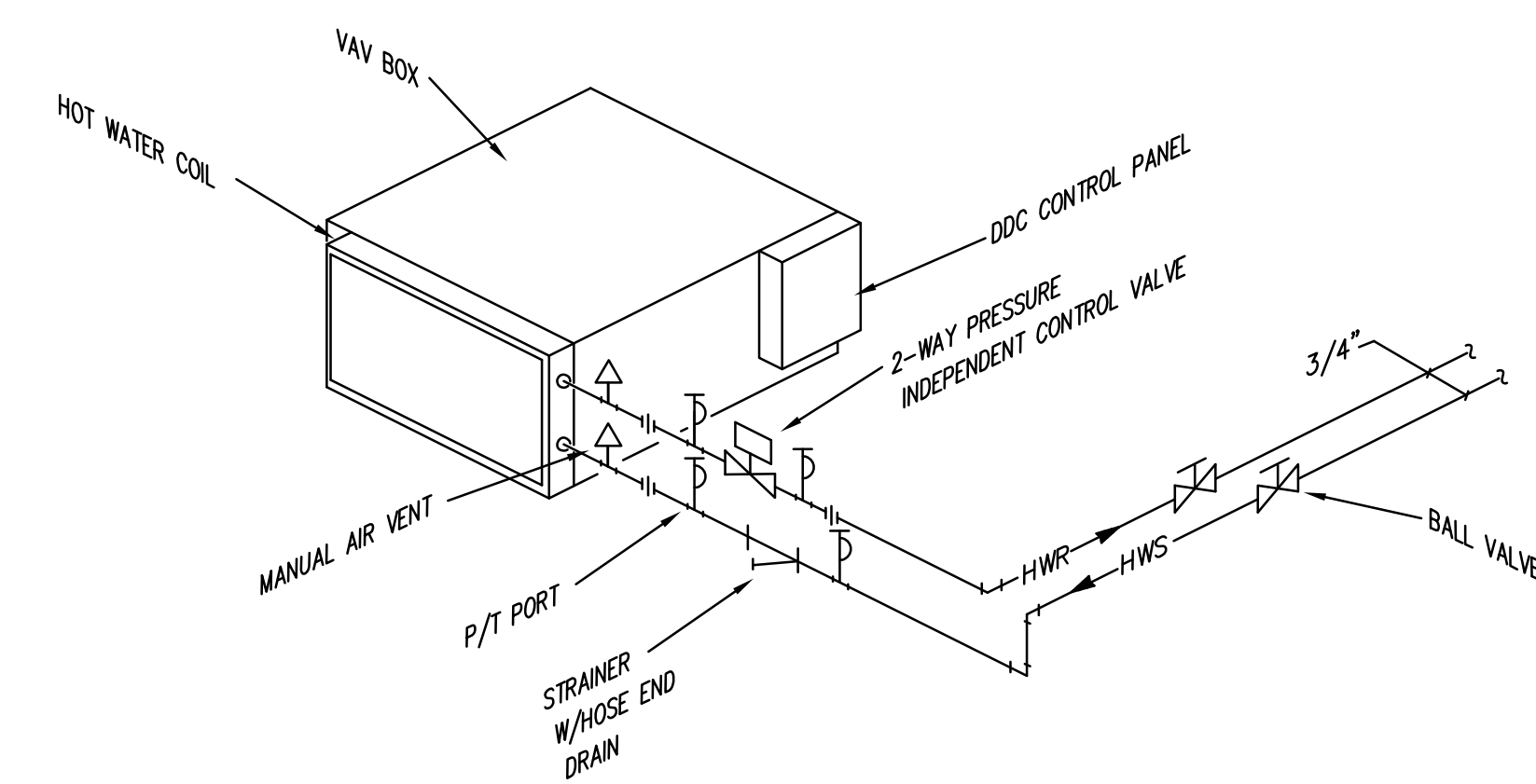
AIR HANDLING UNIT (AHU-23) DETAIL  
SCALE: NTS 2



- NOTES:
1. SEPARATE PIPING SPECIALTIES ARE SHOWN. MODULAR COMPONENTS ARE ACCEPTABLE.
  2. ALTERNATE NO. 1: AHU-17 HOT WATER COIL REIRC. PIPING = 2"

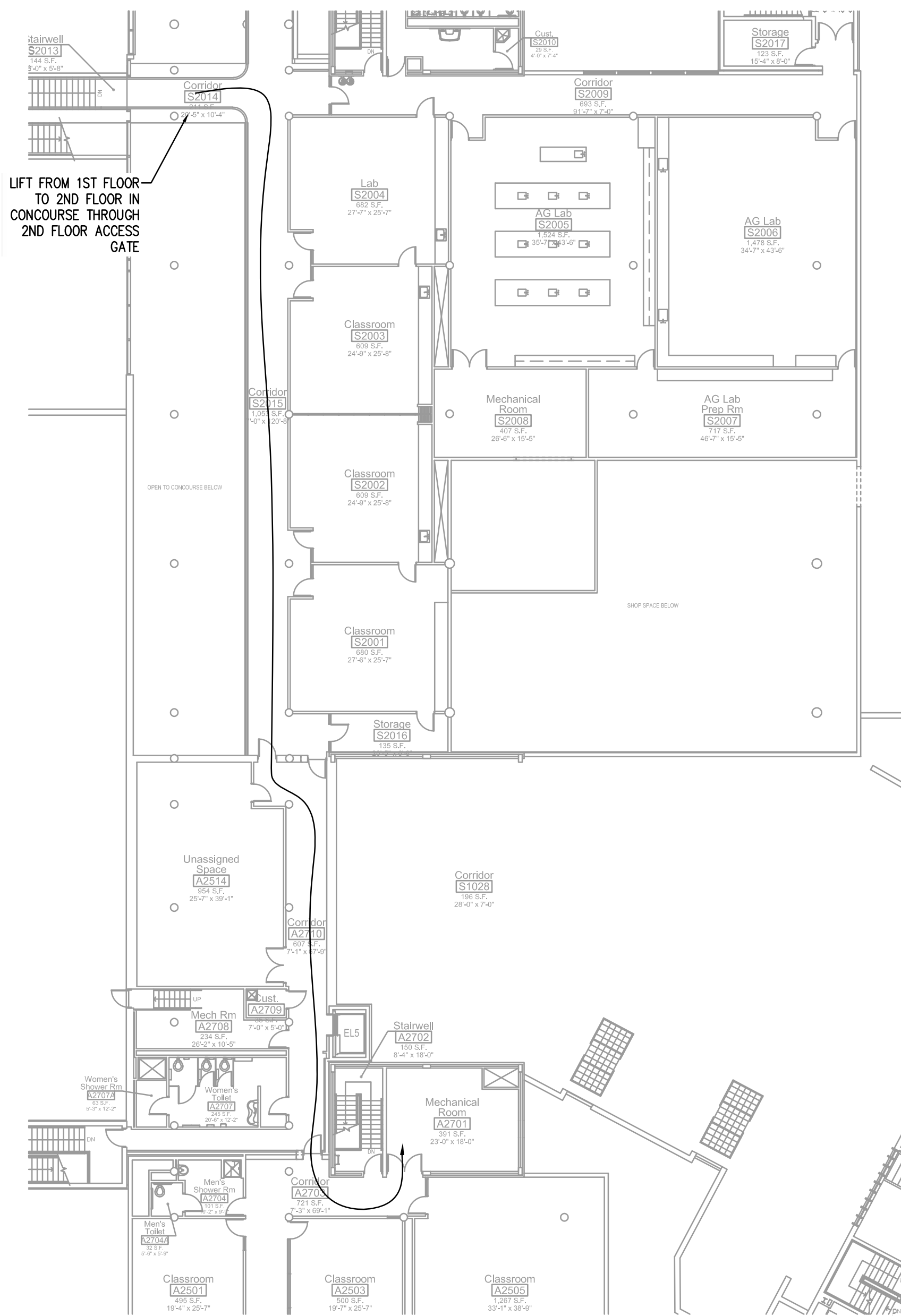


**AHU-17 PIPING DETAIL**  
SCALE: NTS **5**



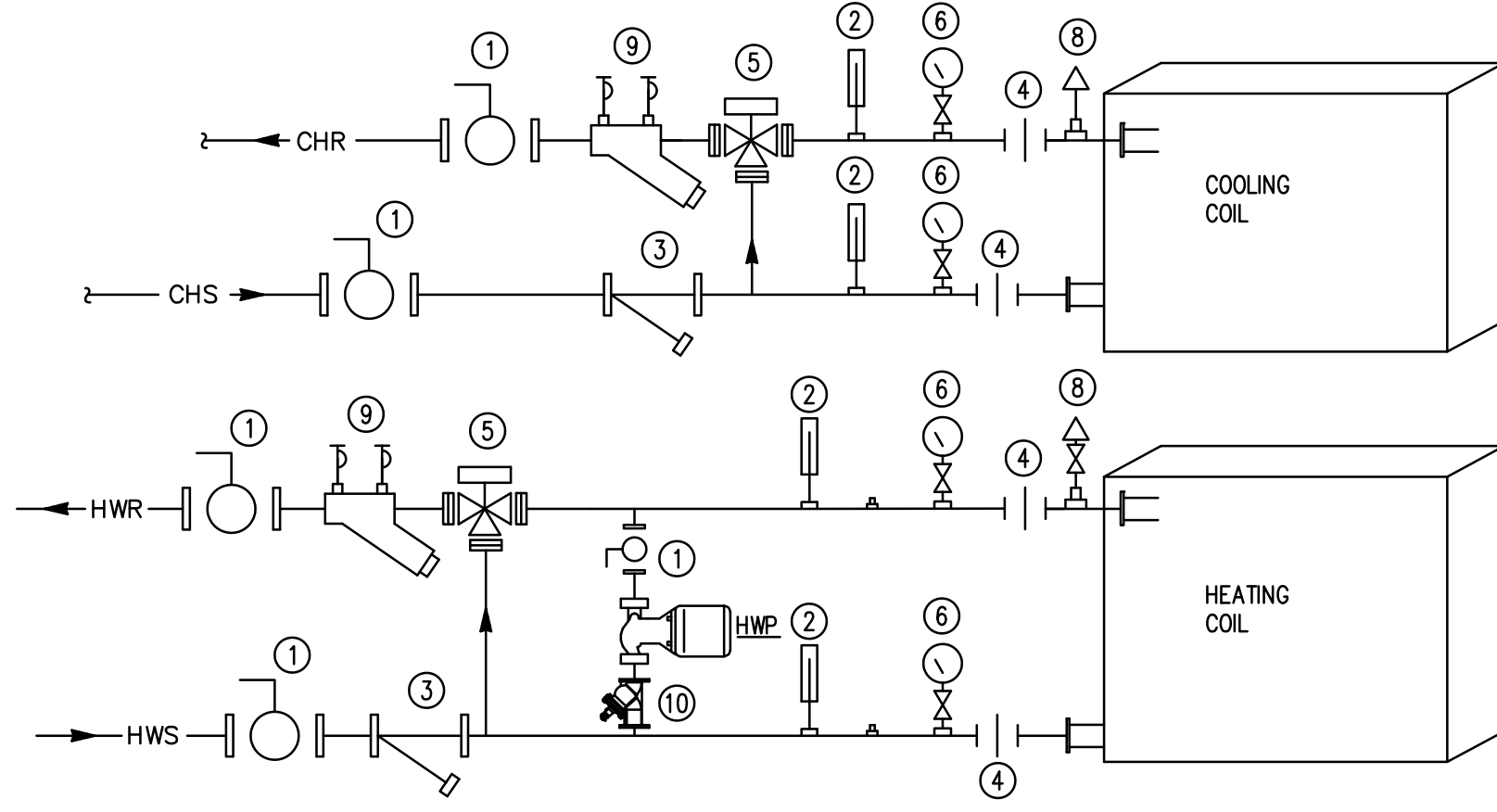
- NOTES:
1. PIPING TO ALL REHEAT COILS SHALL BE MINIMUM 3/4" UNLESS OTHERWISE NOTED.
  2. SEPARATE PIPING SPECIALTIES ARE SHOWN. MODULAR COMPONENTS ARE ACCEPTABLE.

**REHEAT COIL PIPING DETAIL**  
SCALE: NTS **6**



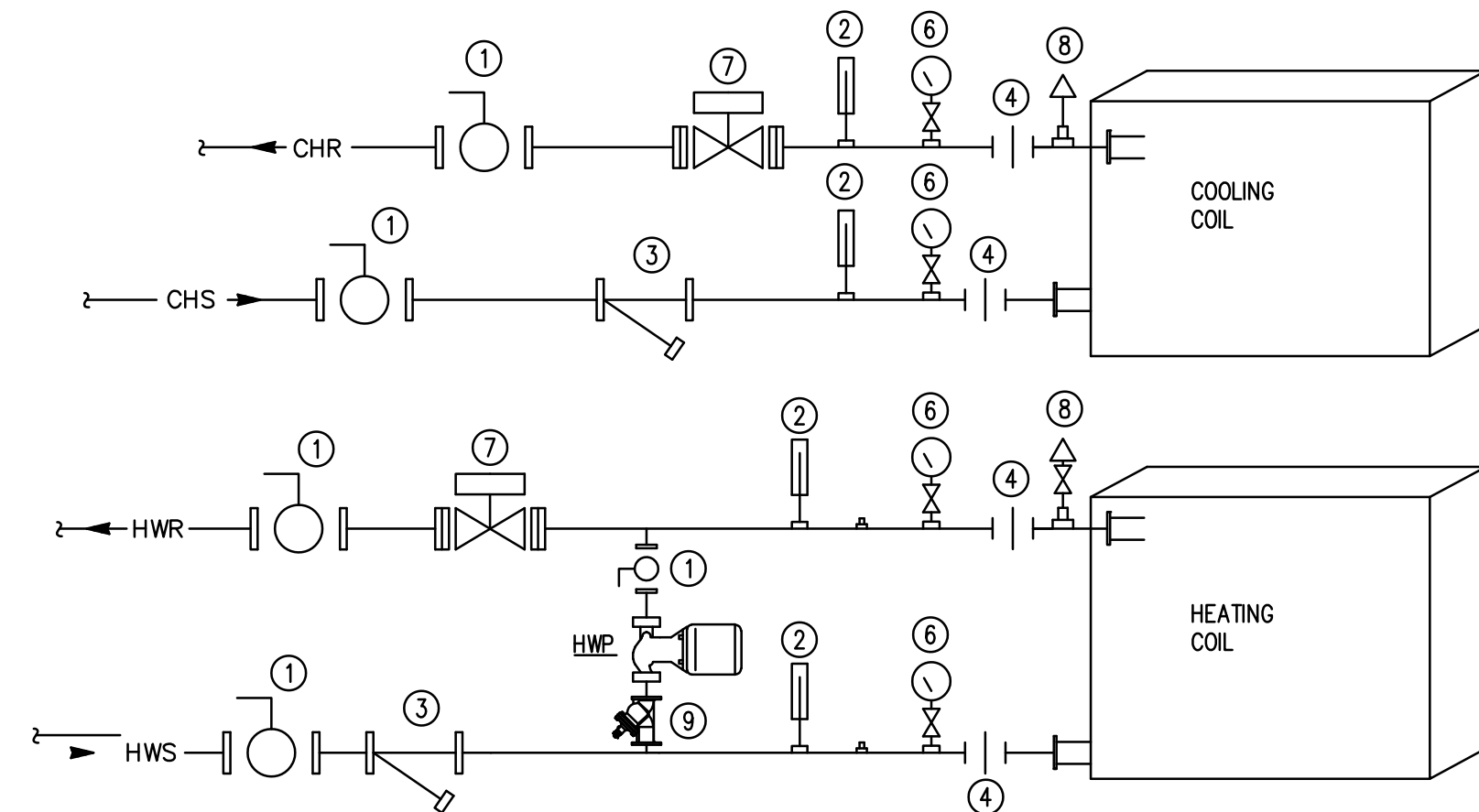
**2ND FLOOR EQUIPMENT ACCESS ROUTE**  
SCALE: NTS **7**

- NOTES:
1. SEPARATE PIPING SPECIALTIES ARE SHOWN. MODULAR COMPONENTS ARE ACCEPTABLE.
  2. HOT WATER COIL REIRC. PIPING = 1-1/2"

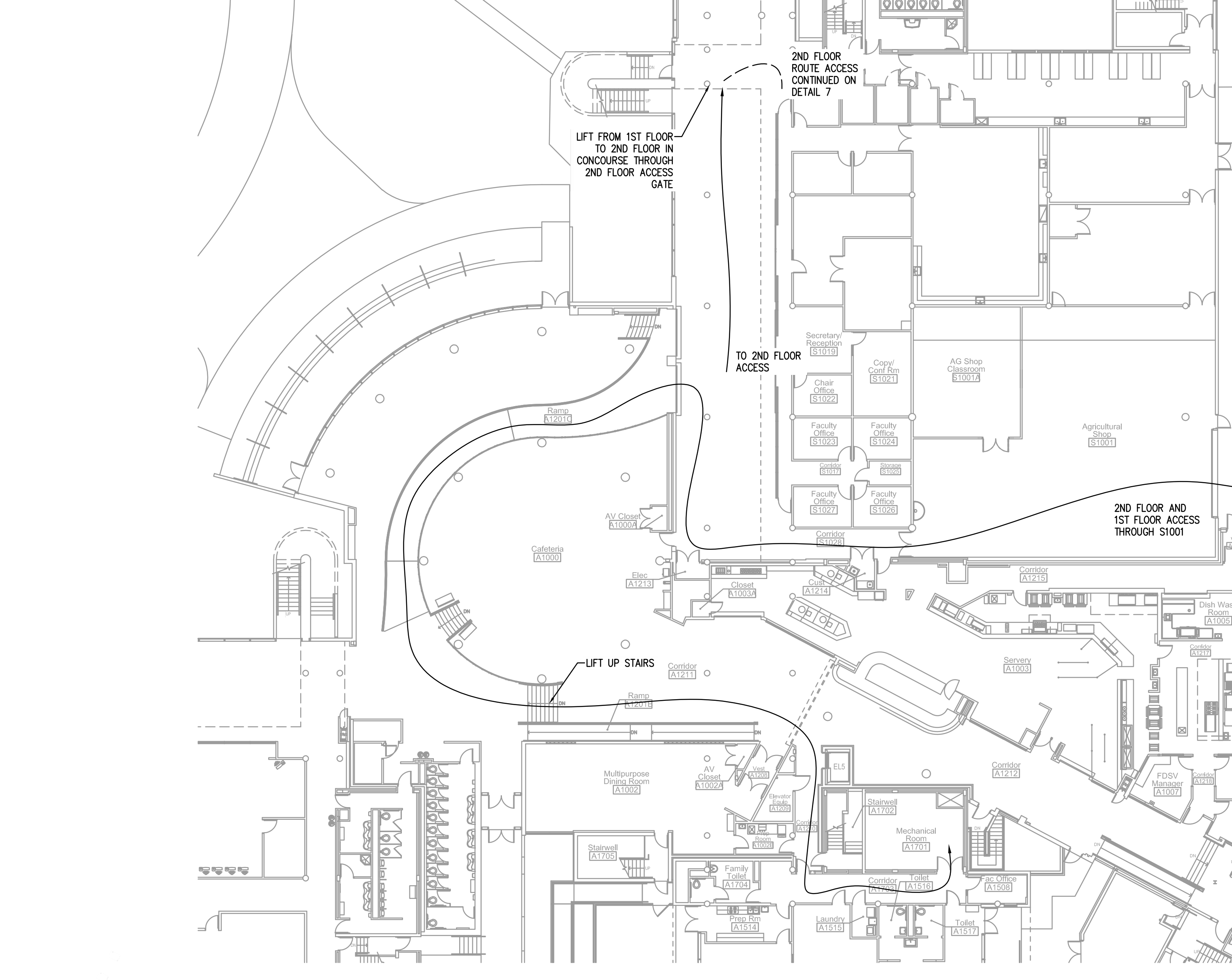


**AHU-23 COIL PIPING DETAIL**  
SCALE: NTS **2**

- NOTES:
1. SEPARATE PIPING SPECIALTIES ARE SHOWN. MODULAR COMPONENTS ARE ACCEPTABLE.
  2. AHU-22 HOT WATER COIL REIRC. PIPING = 1-1/4"
  3. ALTERNATE NO. 1: AHU-18 HOT WATER COIL REIRC. PIPING = 1-1/2"



**AHU-18, AHU-22 COIL PIPING DETAIL**  
SCALE: NTS **3**



**1ST FLOOR EQUIPMENT ACCESS ROUTE**  
SCALE: NTS **4**

## AIR HANDLING UNIT SCHEDULE

MARK	AIR FLOW (CFM)	MINIMUM OA (CFM)	COOLING						HEATING						SUPPLY FAN (HP)	EXTERNAL STATIC PRESS (IN WG)	ELECTRICAL		MODEL	NOTES	
			ENT AIR TEMP (db / wb °F)	LVG AIR TEMP (db / wb °F)	EWI / LWT (°F)	SENS CAP (MBH)	TOTAL CAP (MBH)	WATER FLOW RATE (GPM)	WATER PRES DROP (FT)	HEATING AIR FLOW (CFM)	TOTAL CAP (MBH)	EAT / LAT (°F)	EWI / LWT (°F)	WATER FLOW RATE (GPM)			WATER PRES DROP (FT)	V / PH / HZ			MCA
AHU-17	7,750	1,500	79.0 / 66.0	54.9 / 54.6	45.0 / 55.0	198.6	280.1	57	8.5	7,750	419.1	50 / 98	150 / 130	42.6	2.2	7.5	0.75	460 / 3 / 60	12.1	39MN-17W	1, 2, 3
AHU-18	2,070	225 - 1,000	81.4 / 68.5	54.6 / 54.5	45.0 / 55.0	58.7	87.1	19	9.3	1,300	170.3	0 / 66	150 / 130	17.3	3.3	2	1.5	460 / 3 / 60	3.6	39MN-06W	1, 2, 3
AHU-22	6,755	520 - 1,170	78.4 / 67.0	54.3 / 54.3	45.0 / 54.4	179.9	254.9	59	9.6	5,075	185.0	52 / 95	150 / 120	12.5	0.4	7.5	1.5	460 / 3 / 60	13.8	39M-14W	1, 2
AHU-23	8,300	520 - 1,750	78.4 / 67.0	56.0 / 55.7	45.0 / 55.1	203.7	277.7	60	9.4	6,190	231.9	49 / 95	150 / 120	15.7	0.3	7.5	1.5	460 / 3 / 60	13.8	39M-17W	1, 2

NOTES:

1. MODEL BASED ON CARRIER.

2. COOLING COIL BASED ON 30% ETHYLENE GLYCOL.

3. ALTERNATE NO. 1

- NOTES:
1. MODEL BASED ON CARRIER.
  2. COOLING COIL BASED ON 30% ETHYLENE GLYCOL.
  3. ALTERNATE NO. 1

## FAN COIL UNIT SCHEDULE

MARK	AIR FLOW (CFM)	EXTERNAL S.P. (IN WG)	COOLING MODE						HEATING MODE						ELECTRICAL (V/PH/HZ)	MODEL	NOTES
			ENT AIR TEMP (db/wb)	LVG AIR TEMP (db/wb)	WATER FLOW RATE (GPM)	WPD (FT)	SENSIBLE CAP (MBH)	TOTAL CAP (MBH)	ROWS	ENT/LVG AIR TEMP (db)	ENT/LVG WATER TEMP	WATER FLOW RATE (GPM)	SENSIBLE CAP (MBH)	WPD (FT)			
FC-1	1,794	0.05	78 / 65	57.5 / 55.7	8	3.57	40.5	50.8	4	60.0 / 98.8	150 / 111.4	4	76.6	8.13	115/1/60	42DFA18KRAYAYER	1

- NOTES:
1. MODEL BASED ON CARRIER.

## VARIABLE AIR VOLUME BOX SCHEDULE

MARK	AIR FLOW (CFM)	MIN AIR FLOW (CFM)	INLET SIZE (IN)	REHEAT COIL						ROWS / FPI	CAPACITY (MBH)	MODEL	NOTES
				AIR FLOW (CFM)	MAX APD (IN WG)	EAT / LAT (°F)	WATER (GPM)	EWI / LWT (°F)	MAX WPD (FT)				
VAV-18A	990	330	10	500	0.29	55 / 95	3.1	150 / 135.6	0.61	2 / 10	21.7	DESV	1, 3
VAV-18B	1080	360	14	800	0.11	55 / 95	2.8	150 / 124.9	0.36	2 / 10	34.7	DESV	1, 3
VAV-22A	860	260	10	650	0.26	55 / 95	3.7	150 / 134.6	0.89	2 / 12	28.2	DESV	1
VAV-22B	2500	750	16	1875	0.31	55 / 95	6.4	150 / 133.7	0.67	2 / 10	51.2	DESV	1
VAV-22C	150	120	06	150	0.16	55 / 95	2.8	150 / 141	0.88	2 / 10	12.6	DESV	1
VAV-22D	2040	610	16	1530	0.26	55 / 95	7.7	150 / 132.4	0.95	2 / 12	66.4	DESV	1, 2
VAV-22E	615	170	10	500	0.12	55 / 95	2	150 / 131.3	0.3	2 / 10	18.7	DESV	1, 2
VAV-22F	400	120	08	300	0.19	55 / 95	3.3	150 / 142	1.16	2 / 10	13	DESV	1
VAV-23A	1085	230	12	780	0.2	55 / 94	4.2	150 / 134.5	1.33	2 / 10	32.2	DESV	1, 2
VAV-23B	910	280	10	690	0.29	55 / 95	4.5	150 / 136.6	1.28	2 / 12	29.9	DESV	1
VAV-23C	1775	350	16	1340	0.16	55 / 90	4.5	150 / 127.1	0.35	2 / 10	50.9	DESV	1, 2
VAV-23D	1800	540	16	1350	0.18	55 / 90	4.6	150 / 127.3	0.36	2 / 10	51.3	DESV	1
VAV-23E	910	280	10	690	0.29	55 / 95	4.5	150 / 136.6	1.28	2 / 12	29.9	DESV	1
VAV-23F	1290	390	14	970	0.14	55 / 95	4.6	150 / 131.2	0.89	2 / 10	42.1	DESV	1, 2
VAV-23G	515	106	08	390	0.18	55 / 95	3.3	150 / 138.7	1.53	2 / 10	16.9	DESV	1, 2

- NOTES:
1. MODELS BASED ON TITUS.
  2. PROVIDE WITH BOTTOM CONTROL ENCLOSURE.
  3. ALTERNATE NO. 1

## PUMP SCHEDULE

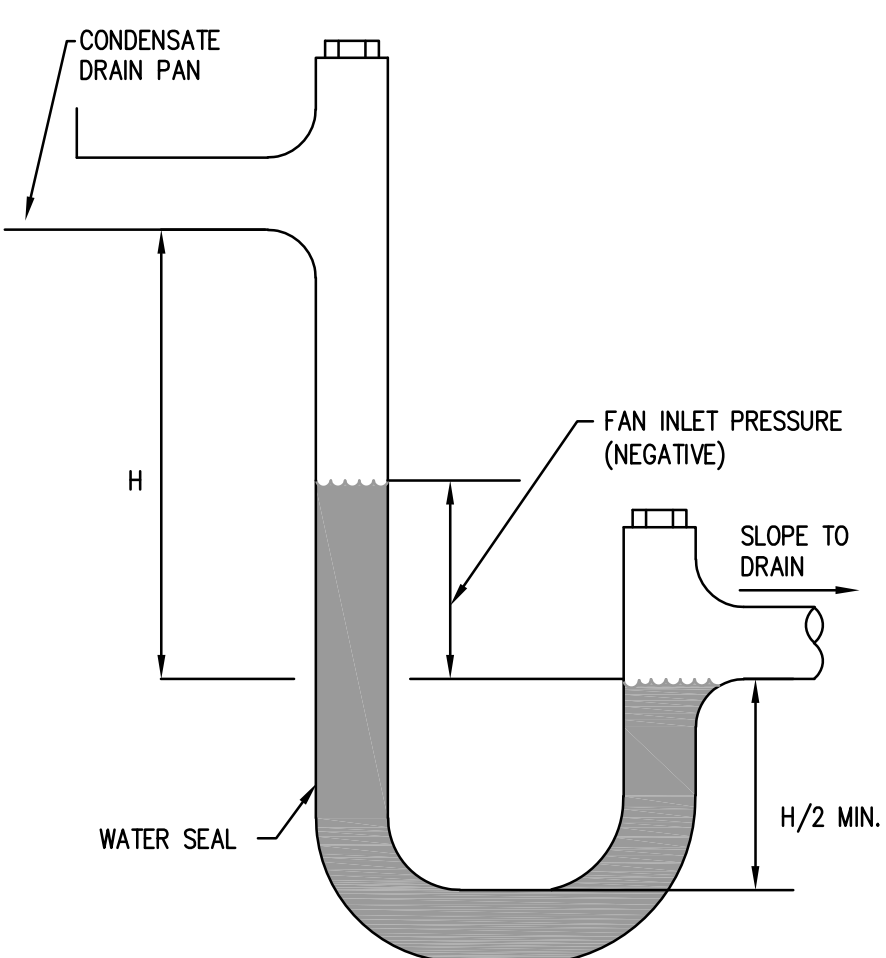
MARK	WATER FLOW RATE (GPM)	HEAD (FT)	TYPE	MOTOR POWER (HP)	ELECTRICAL (V / PH / HZ)	MOTOR SPEED (RPM)	SERVICE	MODEL	NOTES
HWP-17	15	10	INLINE	1/6	115/1/60	1725	AHU-17	SERIES-HV	1, 2
HWP-18	10	10	INLINE	1/6	115/1/60	1725	AHU-18	SERIES-HV	1, 2
HWP-22	7	10	INLINE	1/6	115/1/60	1725	AHU-22	SERIES-HV	1
HWP-23	7	10	INLINE	1/6	115/1/60	1725	AHU-23	SERIES-HV	1

- NOTES:
1. MODEL BASED ON BELL & GOSSETT.
  2. ALTERNATE NO. 1.

## ALTERNATE NO. 1: DIFFUSER SCHEDULE

MARK	MODEL	SIZE	NECK	DAMPER	MATERIAL	REMARKS
S-1	300RL	12 / 8	-	OBD	ST	1, 2
S-2	300RL	12 / 10	-	OBD	ST	1, 2
S-3	300RL	18 / 10	-	OBD	ST	1, 2
S-4	300RL	24 / 16	-	OBD	ST	1, 2
S-5	350RL	20 / 20	-	-	ST	1, 2

- NOTES:
1. MODEL BASED ON TITUS.
  2. ALTERNATE NO. 1



**COOLING COIL CONDENSATE TRAP DETAILS**  
SCALE: NTS **1**

26.201 DISCONNECT, PRESERVE, AND PROTECT EXISTING ELECTRICAL CONNECTION TO MECHANICAL EQUIPMENT. EXTEND AND RECONNECT EXISTING TO NEWLY INSTALLED MECHANICAL EQUIPMENT AS NECESSARY FOR A COMPLETE AND OPERATIONAL SYSTEM.

26.300 PROVIDE ELECTRICAL CONNECTION TO NEW AHU--22. PROVIDE NEW 20 AMPERE, 3 POLE FUSIBLE SWITCH IN PANEL PDPS FOR NEW AHU CONNECTION. SEE MECHANICAL EQUIPMENT CONNECTION FOR WIRING REQUIREMENTS.

26.301 PROVIDE ELECTRICAL CONNECTION TO NEW AHU--23. PROVIDE NEW 20 AMPERE, 3 POLE FUSIBLE SWITCH IN PANEL PDPS FOR NEW AHU CONNECTION. SEE MECHANICAL EQUIPMENT CONNECTION FOR WIRING REQUIREMENTS.

26.305 PROVIDE ELECTRICAL CONNECTION TO NEW CONTROL PANEL. HOMERUN 2412, #1251/2" TO EXISTING SPARE 20 AMPERE, SINGLE POLE BREAKER IN NEW PUMP 24--29.

26.306 PROVIDE ELECTRICAL CONNECTION TO NEW PUMP HWP--22. SEE MECHANICAL EQUIPMENT CONNECTION FOR WIRING REQUIREMENTS.

26.307 PROVIDE ELECTRICAL CONNECTION TO NEW PUMP HWP--23. SEE MECHANICAL EQUIPMENT CONNECTION FOR WIRING REQUIREMENTS.

26.316 EXISTING PANEL 24: ILLINOIS SWITCHBOARD CORPORATION TYPE P2 PANELBOARD WITH SIEMENS TYPE BL BREAKERS.

28.001 LOCATE, DISCONNECT, PRESERVE AND PROTECT EXISTING WIRING FOR DUCT DETECTION AND SAFETY FAN SHUTDOWN IN AIR HANDLING UNITS TO BE REMOVED. DISCONNECT, PRESERVE AND PROTECT EXISTING DUCT SMOKE DETECTOR AND REMOTE TEST STATION. REINSTALL EXISTING DUCT DETECTOR IN NEW AIR HANDLING UNIT. REINSTALL EXISTING REMOTE TEST STATION. CONNECT EXISTING FIRE ALARM WIRING TO NEW DEVICES AND EQUIPMENT.



1. REFER TO DRAWING C100 FOR PROJECT GENERAL NOTES.
2. PERFORM SELECTIVE DEMOLITION AS NECESSARY TO ACHIEVE DESIGN INTENT. REMOVE ABANDONED BRANCH CIRCUITRY TO SOURCE OF SUPPLY.
3. PATCH ALL WALLS AFFECTED BY DEMOLITION AND REMODELING. CUT AND PATCH WALLS TO CONCEAL CONDUIT IN NEW CONSTRUCTION. REMODELING, CUT AND PATCH FLOOR AS NECESSARY FOR DEMOLITION OF FEDESTAL POWER AND DATA RECEPTACLES.
4. INTENT OF DRAWINGS: THESE DRAWINGS ARE INTENDED TO RELAY TO CONTRACTOR A DESIGN INTENT. INCLUDE IN BID ALL LABOR AND MATERIALS NECESSARY FOR A COMPLETE AND OPERATIONAL SYSTEM AS REASONABLY INFERRABLE, AS DETERMINED BY ARCHITECT, TO ACCOMPLISH THE INTENT OF THESE DRAWINGS.
5. REFER TO ARCHITECTURAL, MECHANICAL, PLUMBING, FIRE PROTECTION PLANS, SHOP DRAWINGS AND MANUFACTURERS INSTALLATION INSTRUCTIONS FOR ADDITIONAL INFORMATION ON EXACT POWER, WIRING & ROUGH-IN REQUIREMENTS AND LOCATIONS OF DEVICES.
6. COMPLETELY REMOVE ALL DISCONNECTED AND ABANDONED LOW VOLTAGE WIRING.
7. UNLESS NOTED OTHERWISE, ALL HOMERUNS SHALL CONSIST OF A MAXIMUM OF 3 CIRCUITS (PHASE A, B & C, 3 NEUTRALS & GROUND) IN 3/4". MINIMUM RISE SIZE SHALL BE #12 AWG. WIRE SIZE FOR RECEPTACLE HOMERUN CIRCUITS SHALL BE 3/12, 3/12 & 1/12C) PROVIDE LARGER SIZE WIRE FOR VOLTAGE DROP WHERE REQUIRED.







**MECHANICAL EQUIPMENT SCHEDULE** 2  
SCALE: NTS