

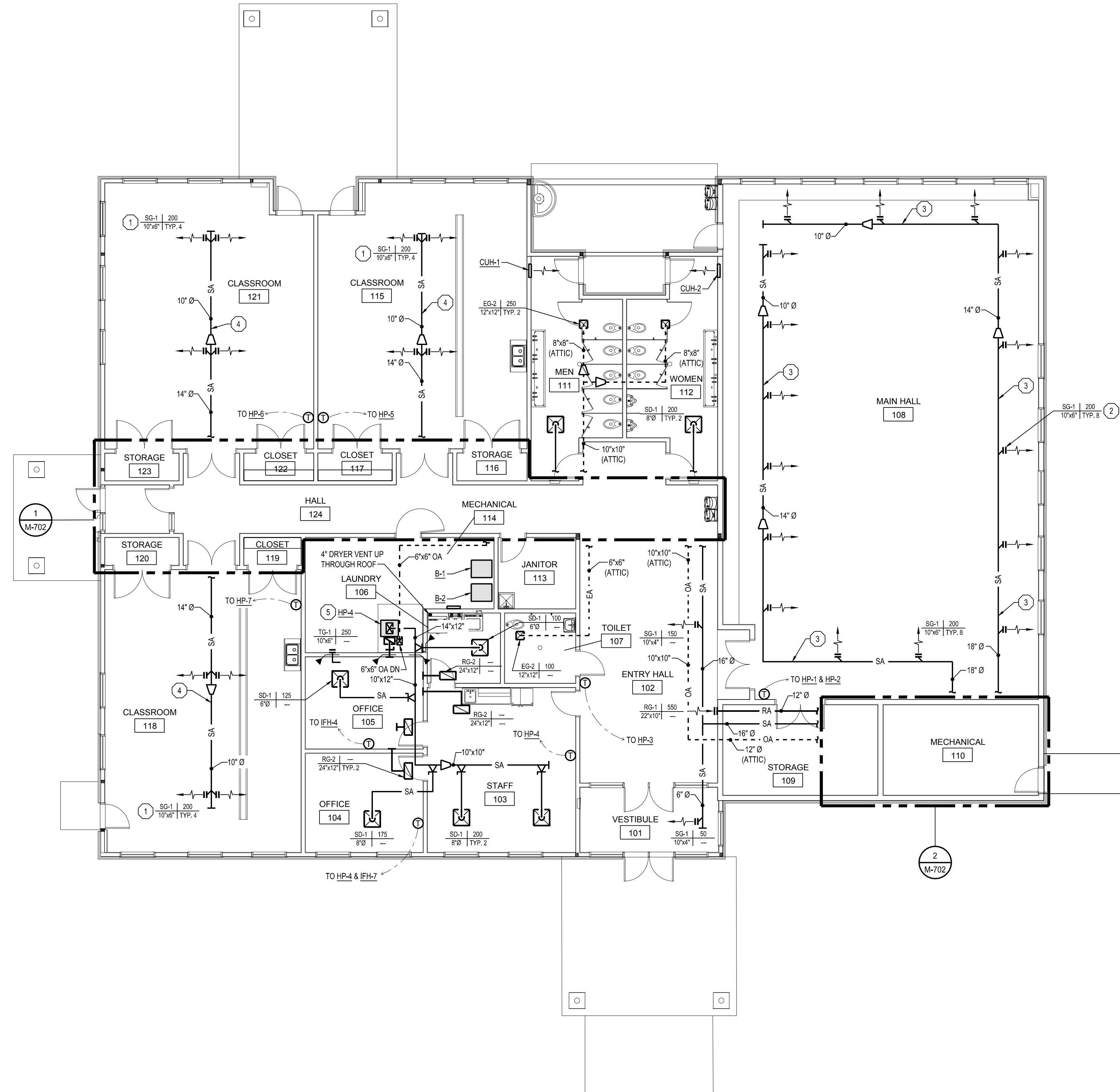


**GENERAL NOTES**

1. ALL ASSOCIATED ENERGY RECOVERY VENTILATOR DUCTWORK SHALL BE INSULATED.

**HVAC KEY NOTES**

1. INSTALL SUPPLY DIFFUSER ON A 22.5° ANGLE DOWN.
2. INSTALL SUPPLY DIFFUSER ON A 45° ANGLE DOWN.
3. INSTALL DUCTWORK TO MAINTAIN THE BOTTOM OF DUCT 14" AFF.
4. INSTALL DUCTWORK TO MAINTAIN THE BOTTOM OF DUCT 9" AFF.
5. INSTALL WATER SOURCE HEAT PUMP ON 4" CONCRETE PAD AT LOCATION SHOWN. LINE THE FIRST 10' OF SUPPLY AND RETURN DUCTWORK.



**FIRST FLOOR PLAN - HVAC NEW - PHASE 1**



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 CONSULTING ENGINEERS, INC.  
 CONSULTANT

**Forest Hills Nature Center**  
**New Nature Center**  
 1297 N Rich Rd, Alma, MI 48801  
 Seville Township, Gratiot County  
 Alma, Michigan 48801  
 PROJECT #24-43

DATE	DESCRIPTION
01/29/2008	Bidding and Plan Review

FIRST FLOOR PLAN - HVAC NEW - PHASE 1  
 SHEET TITLE

**M-400**  
 SHEET NUMBER



**PROPANE LOAD SUMMARY**

B-1 - 500 CFH  
 B-2 - 500 CFH  
 TOTAL = 1000 CFH

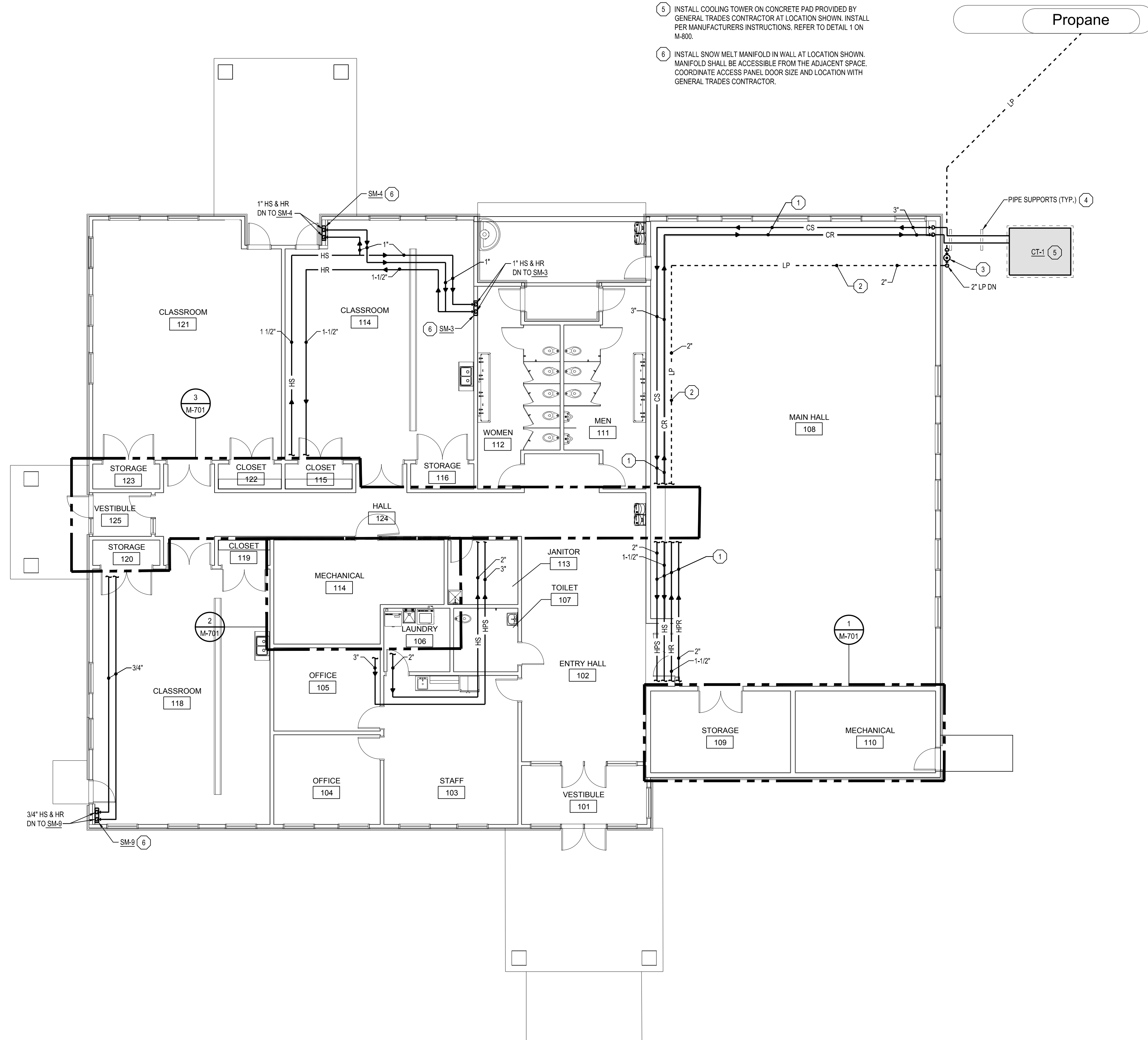
NOTE:  
 CONTRACTOR SHALL COORDINATE PROPANE TANK, REGULATOR,  
 AND ASSOCIATED PROPANE PIPING WITH PROPANE PROVIDER.

**ADD ALTERNATE**

- CONTRACTOR SHALL PROVIDE PRICING FOR DESIGN AND INSTALLATION OF GEOTHERMAL SYSTEM TO CONNECT ONTO THE SYSTEM.

**MECHANICAL KEY NOTES**

- ROUTE PIPING THROUGH SOFFIT. REFER TO ARCHITECTURAL DRAWINGS FOR SOFFIT SIZE AND ELEVATION.
- ROUTE PIPING BELOW FINISHED FLOOR.
- PROPANE PROVIDER SHALL PROVIDE AND INSTALL PROPANE TANK, REGULATOR, AND ASSOCIATED PIPING BETWEEN THE TANK AND REGULATOR.
- PIPE SUPPORTS BASED ON MIRO 5-RAH-8.
- INSTALL COOLING TOWER ON CONCRETE PAD PROVIDED BY GENERAL TRADES CONTRACTOR AT LOCATION SHOWN. INSTALL PER MANUFACTURERS INSTRUCTIONS. REFER TO DETAIL 1 ON M-800.
- INSTALL SNOW MELT MANIFOLD IN WALL AT LOCATION SHOWN. MANIFOLD SHALL BE ACCESSIBLE FROM THE ADJACENT SPACE. COORDINATE ACCESS PANEL DOOR SIZE AND LOCATION WITH GENERAL TRADES CONTRACTOR.



**FIRST FLOOR PLAN - PIPING NEW - PHASE 1**  
 SCALE: 1/8" = 1'-0"

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 Seville Township, Gratiot County  
 Alma, Michigan 48801  
 PROJECT #24-43

NO.	DATE	DESCRIPTION

FIRST FLOOR PLAN - PIPING NEW - PHASE 1  
 SHEET TITLE

**M-601**  
 SHEET NUMBER

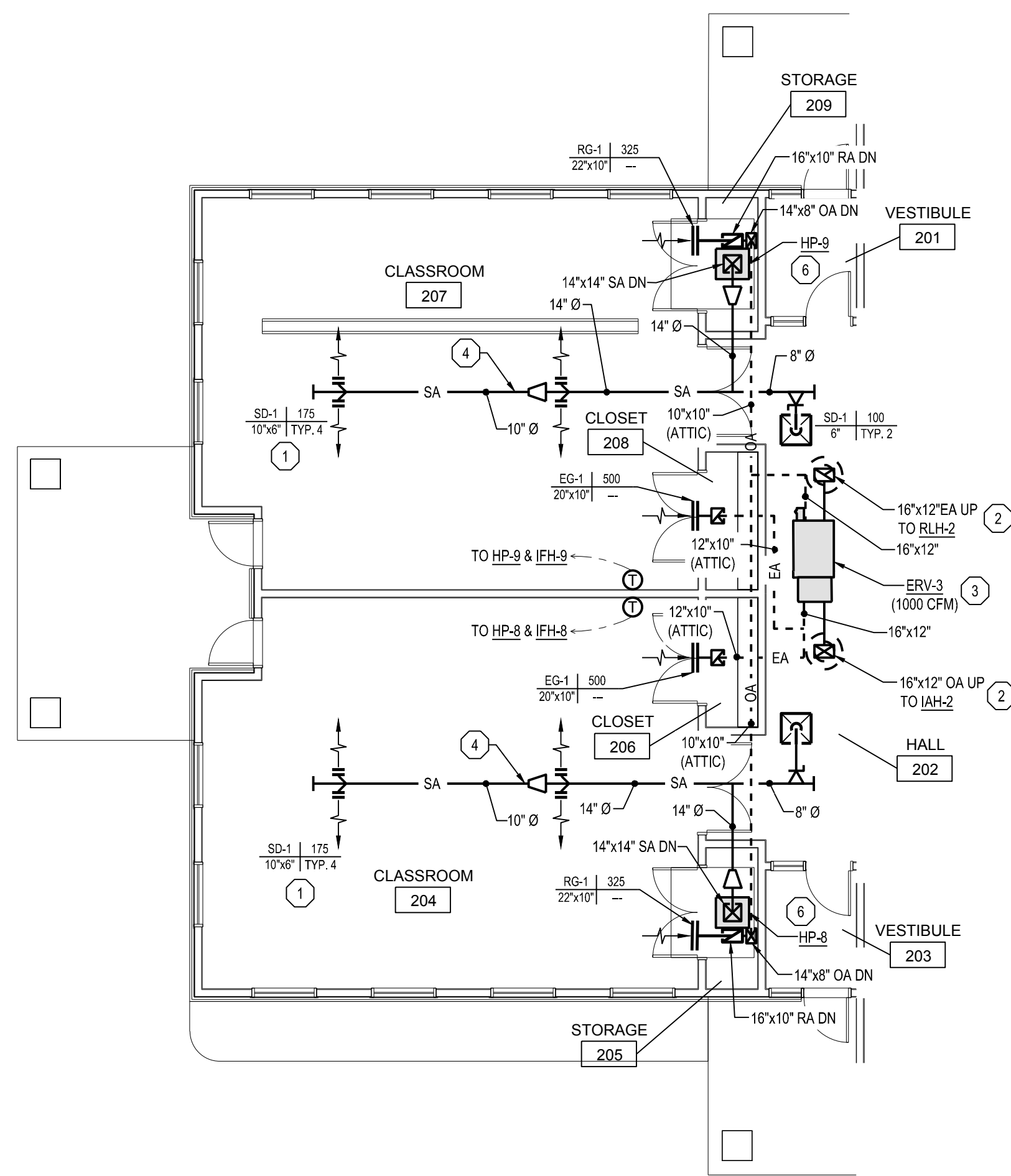
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**GENERAL NOTES**

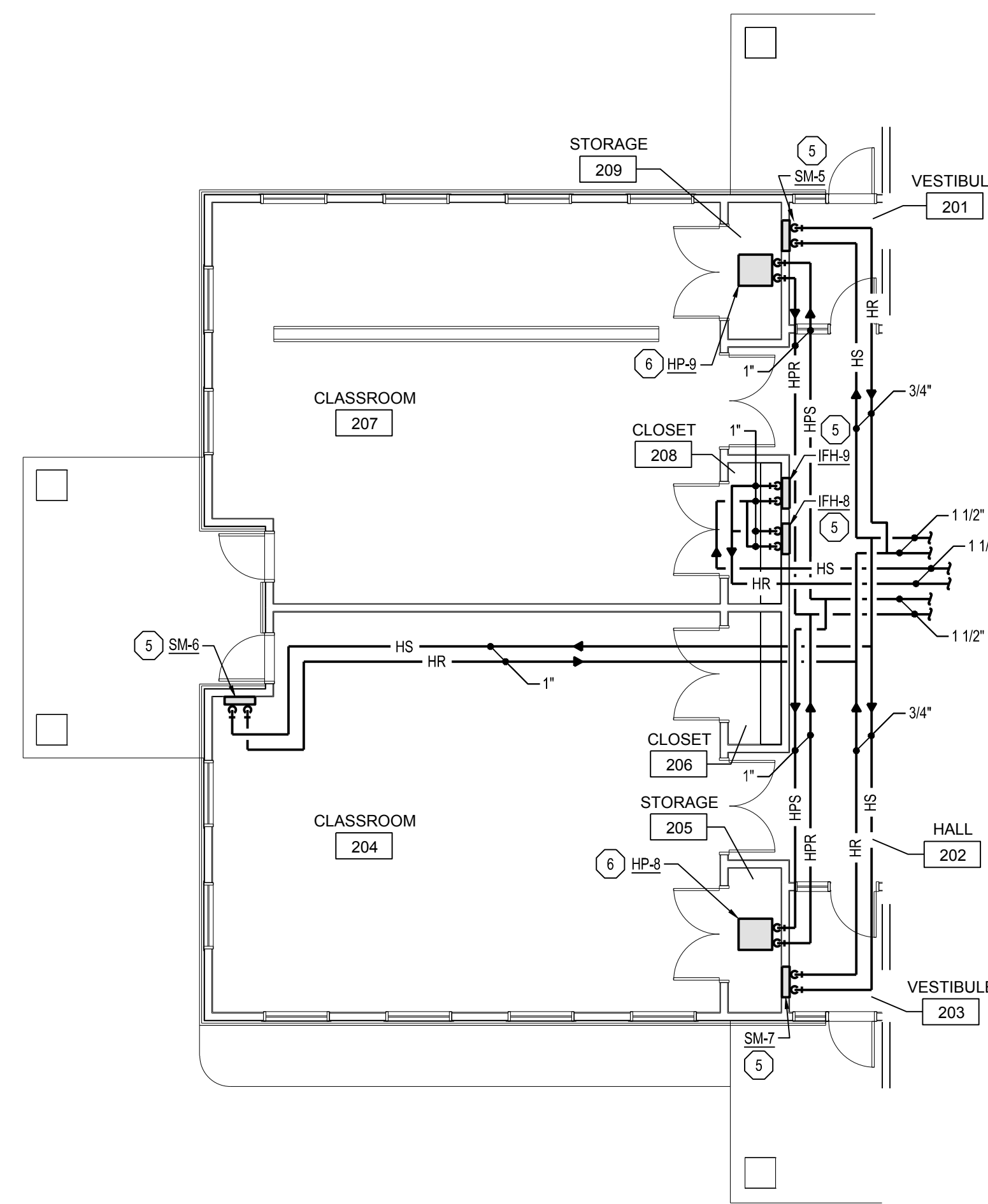
1. ALL ASSOCIATED ENERGY RECOVERY VENTILATOR DUCTWORK SHALL BE INSULATED.

**HVAC KEY NOTES**

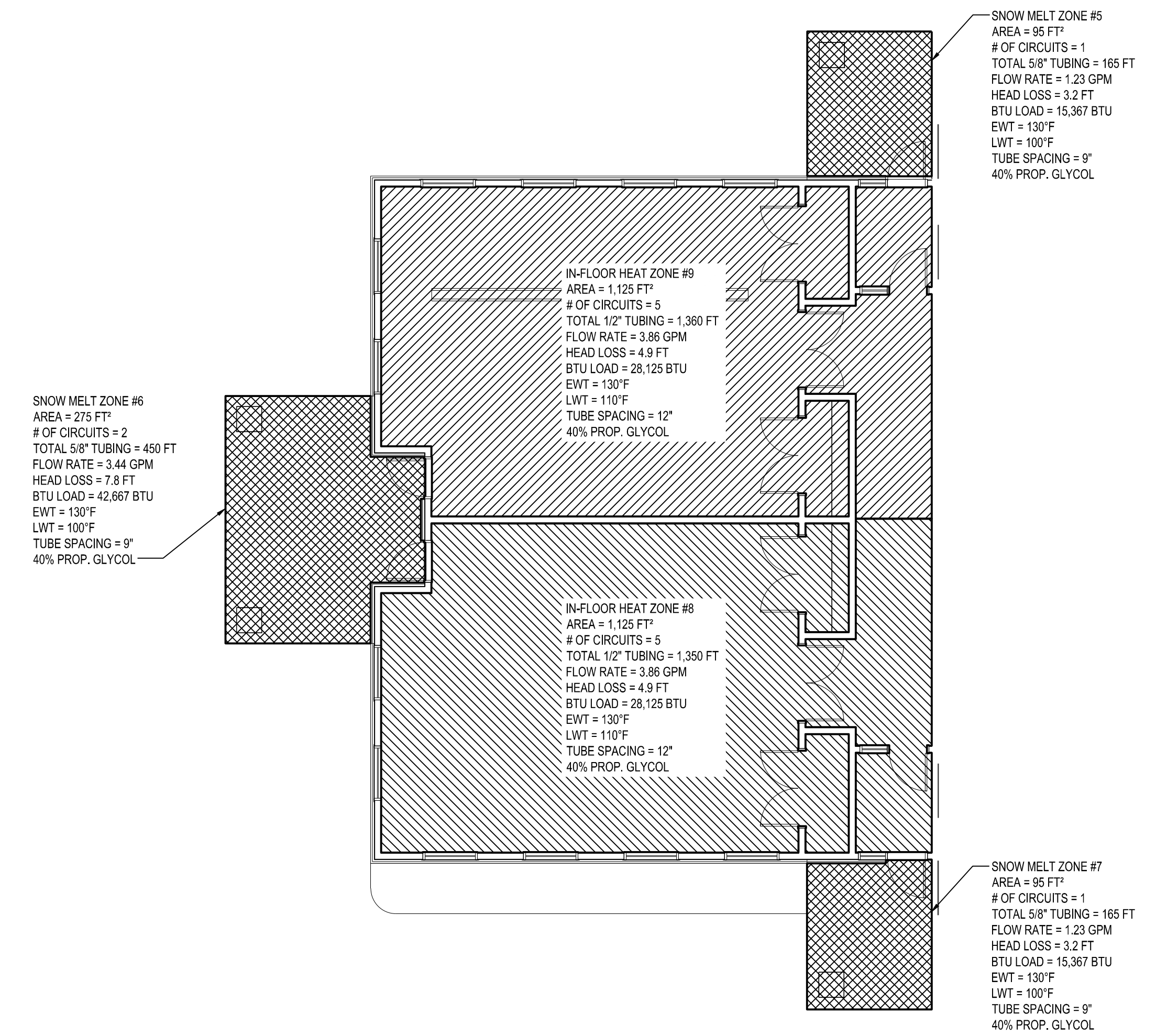
1. INSTALL SUPPLY DIFFUSER ON A 22.5° ANGLE DOWN.
2. INSTALL INTAKE/RELIEF AIR HOODS AND ASSOCIATED CURB ON ROOF AT LOCATION SHOWN. INTAKE AIR HOOD SHALL BE INSTALLED AT LEAST 10' AWAY FROM BUILDING AND PLUMBING EXHAUST/VENT TERMINATIONS.
3. INSTALL ENERGY RECOVERY VENTILATOR IN ATTIC AT LOCATION SHOWN. ASSOCIATED OUTSIDE AIR AND EXHAUST DUCTWORK SHALL BE INSULATED AND ROUTED THROUGH THE ATTIC FROM THE ENERGY RECOVERY VENTILATOR TO THE ASSOCIATED EXHAUST GRILL/HEAT PUMP. COORDINATE THE INSTALLATION ATTIC ACCESS WITH GENERAL TRADES CONTRACTOR PRIOR TO CONSTRUCTION. COORDINATE THE UNIT SIZE AND CLEARANCES WITH THE GENERAL TRADES CONTRACTOR PRIOR TO THE TRUSSES BEING ORDERED TO CONFIRM THERE IS ADEQUATE SPACE AND SUPPORT FOR THE UNIT WITHIN THE TRUSS WEBBING.
4. INSTALL DUCTWORK TO MAINTAIN THE BOTTOM OF DUCT 9" AFF.
5. INSTALL INFLOOR HEAT/SNOW MELT MANIFOLD IN WALL AT LOCATION SHOWN. MANIFOLD SHALL BE ACCESSIBLE FROM THE ADJACENT HALL/VESTIBULE. COORDINATE ACCESS PANEL/DOOR SIZE AND LOCATION WITH GENERAL TRADES CONTRACTOR.
6. INSTALL WATER SOURCE HEAT PUMP AT LOCATION SHOWN. LINE THE FIRST 10' OF SUPPLY AND RETURN DUCTWORK. PROVIDE AND INSTALL UNIT ON 3' TALL CUSTOM SUPPORT STAND BUILT OUT OF 1-1/2"x1-1/2" ANGLE IRON WELDED TOGETHER. SUPPORT STAND SHALL NOT INTERFERE WITH UNIT ACCESS OR DUCT/PIPE CONNECTIONS. CONNECT ONTO ASSOCIATED HEAT PUMP SUPPLY AND RETURN PIPING. ROUTE CONDENSATE TO NEAREST OUTLET BOX. INSTALL PER THE MANUFACTURERS INSTALLATION INSTRUCTIONS.



**FIRST FLOOR PLAN - HVAC NEW - PHASE 2**  
SCALE: 1/8" = 1'-0"



**FIRST FLOOR PLAN - MECHANICAL PIPING NEW - PHASE 2**  
SCALE: 1/8" = 1'-0"

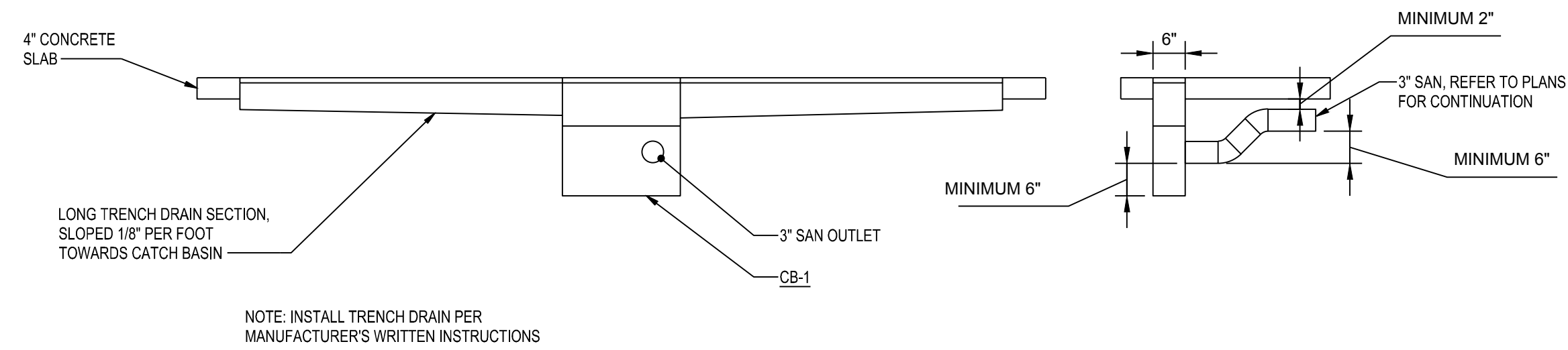


**BELOW FLOOR PLAN - MECHANICAL PIPING NEW - PHASE 2**  
SCALE: 1/8" = 1'-0"

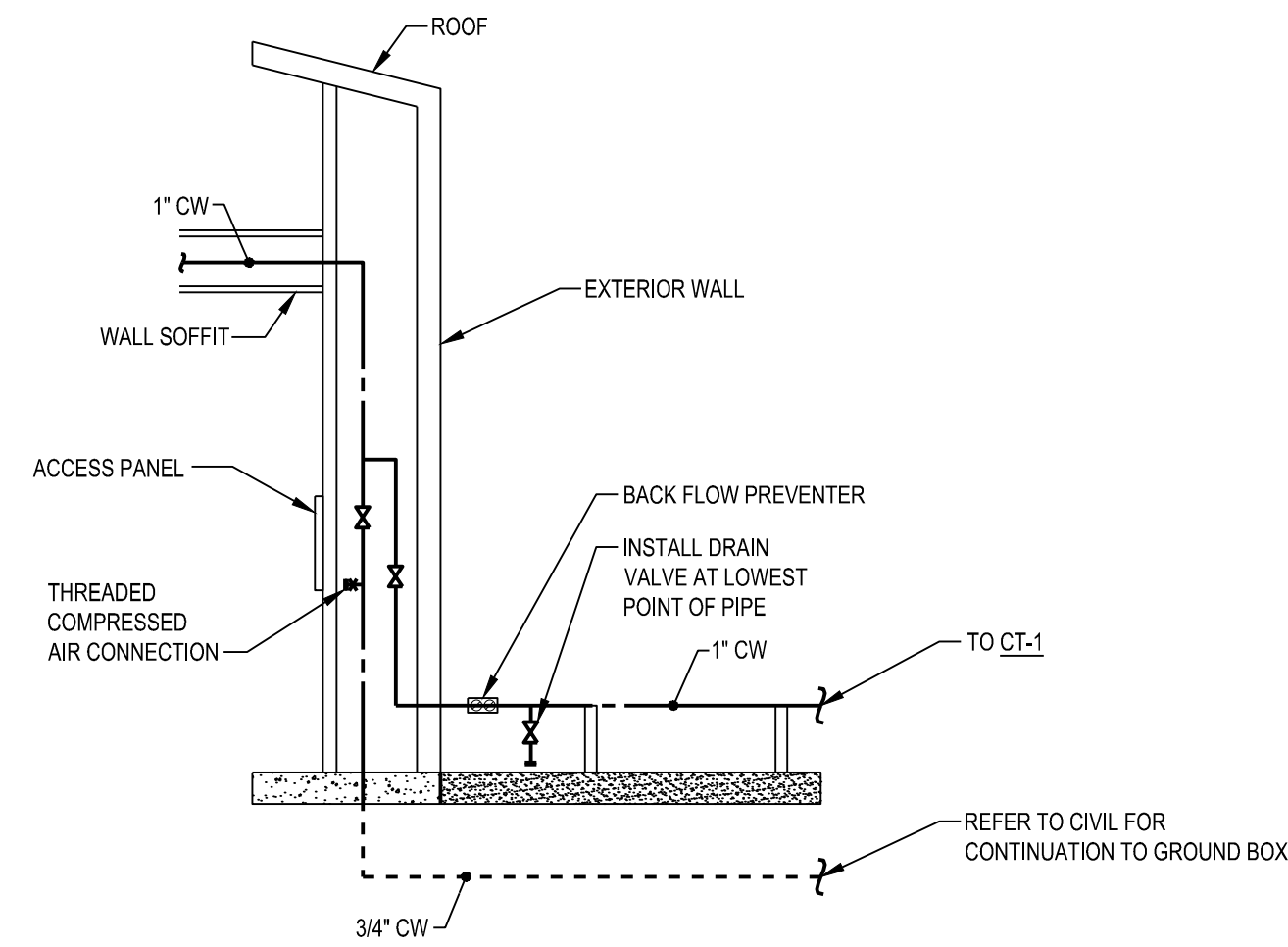
NO.	DATE	DESCRIPTION

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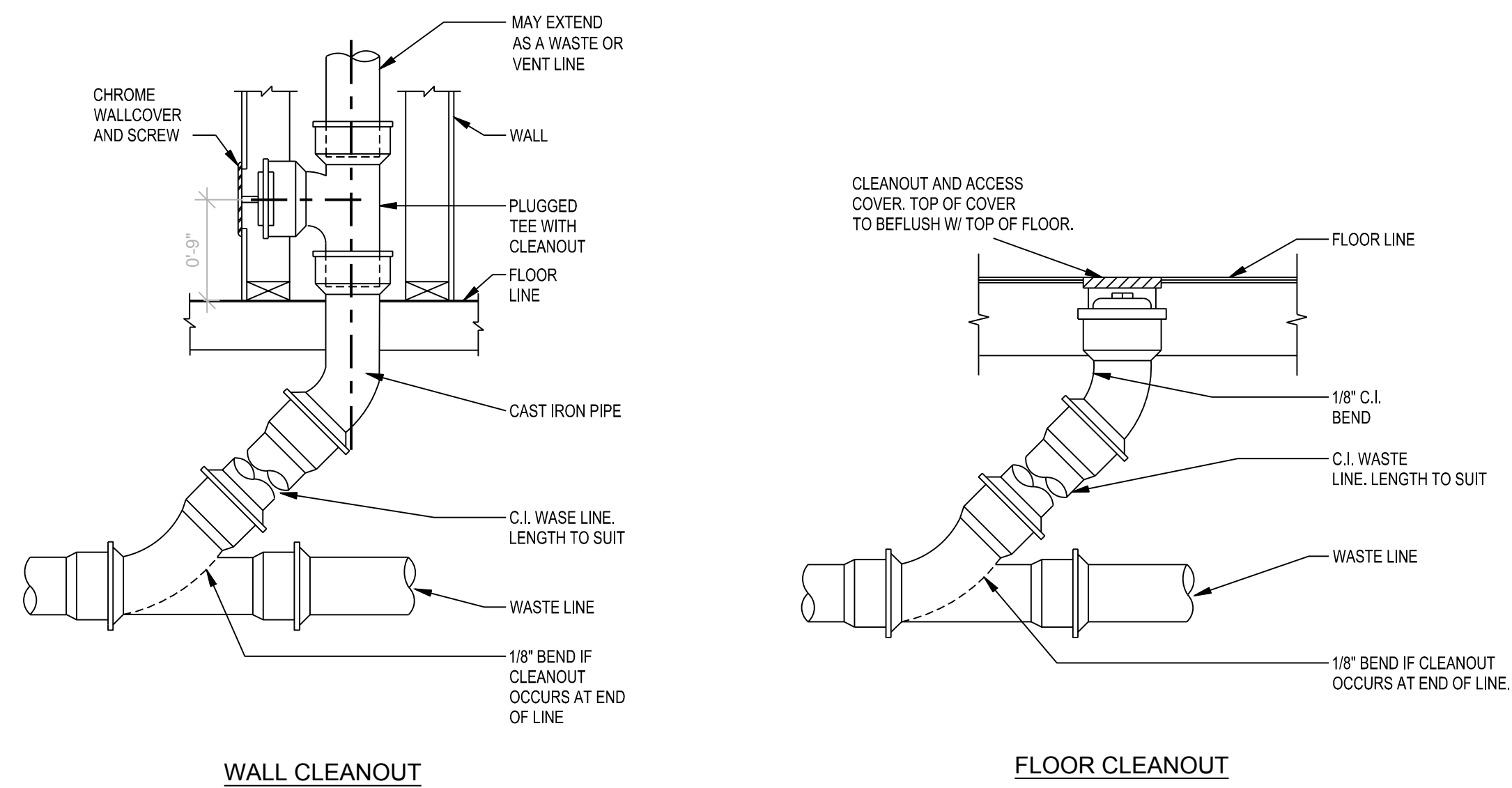




**4 TRENCH DRAIN & CATCH BASIN DETAIL**  
SCALE: NTS



**3 COLD WATER TO COOLING TOWER AND GREENHOUSE DETAIL**  
SCALE: NTS



**2 CLEANOUT DETAIL**  
SCALE: NTS

**PLUMBING ABBREVIATIONS**

AD	AREA DRAIN	NTS	NOT TO SCALE
ASR	AUTOMATIC SPRINKLER RISER	ORD	OVERFLOW ROOF DRAIN
BFS	BELOW FLOOR SLAB	OXY	OXYGEN
BWV	BACK WATER VALVE	P	PUMP
CB	CATCH BASIN	PD	PRESSURE DROP
CI	CAST IRON	PVC	POLY-VINYL-CHLORIDE
CO	CLEAN OUT	RC	RAIN CONDUCTOR
CV	CONTROL VALVE	RD	ROUGH-IN ROOF DRAIN
DF	DRINKING FOUNTAIN	REQ'D	REQUIRED
DIA	DIAMETER	SAN	SANITARY
DN	DOWN	SHWR	SHOWER
DWH	DOMESTIC WATER HEATER	SK	SINK
E.T.C.	ELECTRICAL TRADES CONTRACTOR	SP	STAND PIPE
EWC	ELECTRIC WATER COOLER	SQ. FT.	SQUARE FEET
EXIST	EXISTING	SS	SERVICE SINK
FD	FLOOR DRAIN	ST	STORM
FC	FINAL CONNECTIONS	S&W	STOP & WASTE
FDC	FIRE DEPT. CONNECTION	STR	STRAINER
FF	FINISH FLOOR	SV	STACKED VENT
FHV	FIRE HOSE VALVE	TYP.	TYPICAL
FT	FEET	UR	URINAL
GAL	GALLON	VB	VACUUM BREAKER
GD	GARBAGE DISPOSAL	VS	VENT STACK
GI	GREASE INTERCEPTOR	V.F.D	VARIABLE FREQUENCY DRIVE
GPH	GALLONS PER HOUR	VTR	VENT THRU ROOF
GPM	GALLONS PER MINUTE	W	WASTE
HB	HOSE BIB	WB	WET BULB
HD	HEAD (FT)	WC	WATER CLOSET
HP	HORSE POWER	WH	WALL HYDRANT
ID	INSIDE DIAMETER	WS	WASTE STACK
I.E.	INVERT ELEVATION	W&V	WASTE AND VENT
LAV	LAVATORY	X-CW	EXIST. CW PIPING ITEM
LT	LAUNDRY TRAY		EXISTING
MA	MEDICAL AIR		
MAX	MAXIMUM		
MGC	MEDICAL GAS CONSOLE		
MH	MAN HOLE		
MIN	MINIMUM		
MOP	MOP SINK		
MS	MOP SINK		
M.T.C.	MECHANICAL TRADES CONTRACTOR		

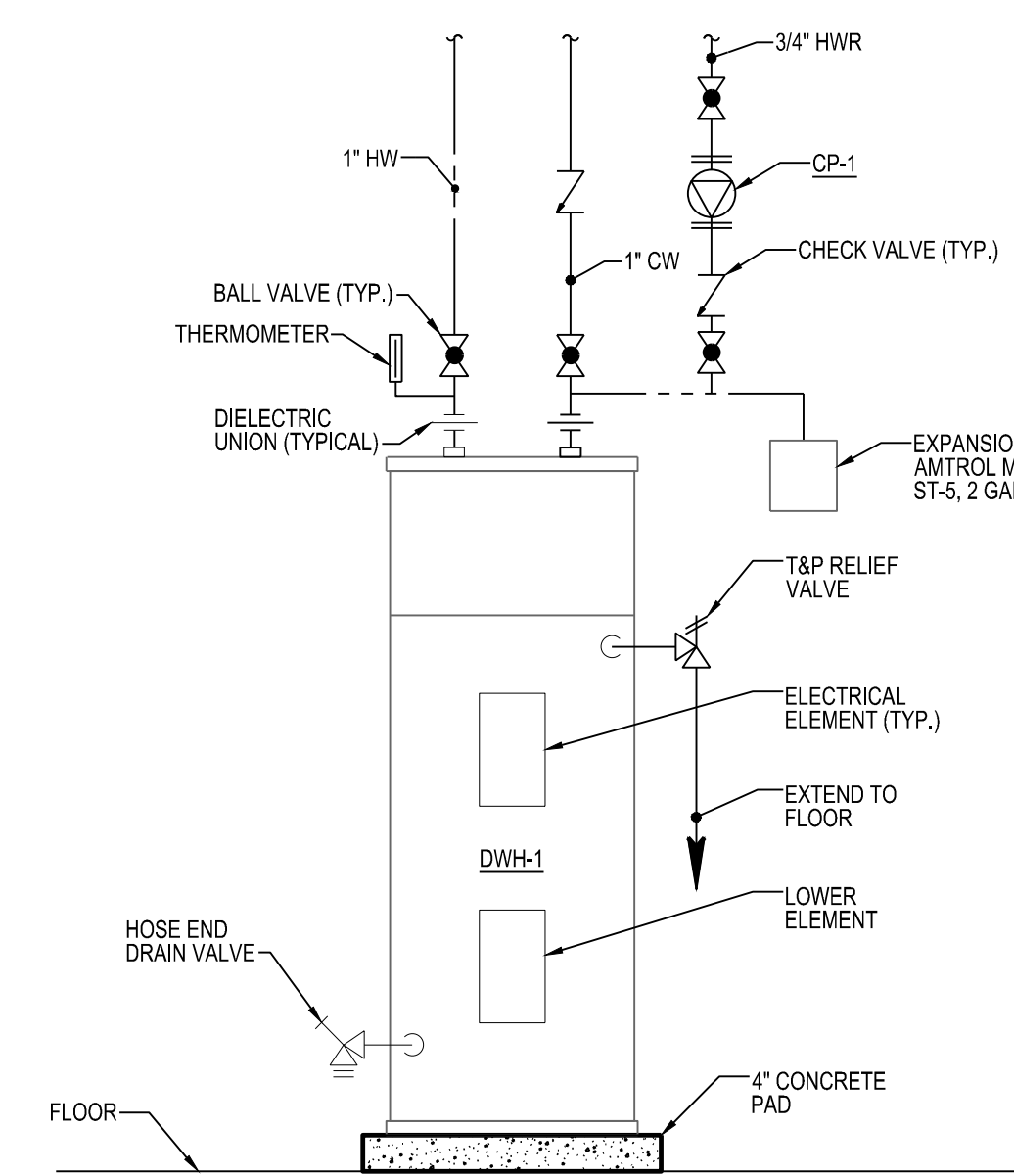
**GENERAL PLUMBING NOTES**

- ALL PLUMBING WORK SHALL CONFORM TO MICHIGAN PLUMBING CODE, LATEST APPLICABLE EDITION, AND ALL APPLICABLE LOCAL CODES.
- INSTALL ALL EQUIPMENT, MATERIALS, AND ACCESSORIES PER MANUFACTURERS WRITTEN INSTRUCTIONS.
- INSTALL ISOLATION BALL VALVES @ ALL FIXTURE WATER SUPPLY LINES.
- SITE CONTRACTOR TO RUN UTILITIES TO 5'-0" FROM BUILDING LINE.
- ALL INVERT ELEVATIONS ARE BASED ON A FINISH FLOOR LEVEL OF 100'-0". ALL INVERTS, STATED OR NOT, NEW OR EXISTING, SHALL BE COORDINATED IN THE FIELD. VERIFY EXISTING INVERTS PRIOR TO STARTING WORK.
- ALL ELEVATIONS SHOWN ARE INVERTS OF PIPING. THE SLEEVES SHALL BE COORDINATED WITH THESE ELEVATIONS.
- ALL PIPE SIZES SHOWN ARE SERVICE SIZE. SIZE SLEEVES FOR 1" CLEAR SPACE BETWEEN PIPE AND SLEEVE FOR INSTALLATION OF MECHANICAL SEAL.
- CONTRACTOR TO VERIFY LOCATIONS OF EXISTING UNDERGROUND UTILITIES BEFORE BEGINNING WORK.
- FIELD VERIFY LOCATIONS OF EXISTING PIPING THAT MAY CONFLICT WITH NEW CONSTRUCTION AND RELOCATE AS NEEDED.
- MECHANICAL SEALS REQUIRED FOR BELOW GRADE WALL PENETRATIONS. ALL WALL AND SLAB PENETRATIONS OF MASONRY OR CONCRETE CONSTRUCTION SHALL BE SLEEVED.
- ALL FLOOR DRAINS TO BE EQUIPPED WITH CODE APPROVED TRAP SEALS, UNLESS OTHERWISE NOTED.
- 2% SLOPE FOR ALL SANITARY PIPING 2-1/2" OR LESS IN DIAMETER. 1% SLOPE FOR ALL SANITARY PIPING 3" OR MORE IN DIAMETER.
- PROVIDE SHOCK STOPS FOR EVERY PLUMBING GROUP. PROVIDE SHOCK ABSORBER IN THE DOMESTIC COLD AND HOT WATER PIPING. SHOCK ABSORBERS TO BE LOCATED IN AN ACCESSIBLE LOCATION.
- PROVIDE AIR ELIMINATION DEVICES FOR EACH PLUMBING SYSTEM.
- THE CONTRACTOR SHALL FIELD VERIFY THE SIZES, LOCATION, ELEVATIONS, AND DETAILS OF ALL EXISTING CONDITIONS THAT MAY AFFECT THE WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF ALL EQUIPMENT AND MATERIALS IN A "NEW" CONDITION DURING CONSTRUCTION.
- ALL WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS AND SUBCONTRACTORS AS REQUIRED BY LAW.
- DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CODES AND REGULATIONS ENFORCED BY LOCAL BUILDING OFFICIALS.
- IF THERE IS CONFLICTING INFORMATION IN THE PLANS OR SPECIFICATIONS THE MORE STRINGENT AND GREATER COST ITEM SHALL BE USED.
- DRAWINGS INDICATE REQUIRED SIZES AND POINTS OF TERMINATION OF PIPES AND SUGGESTED ROUTES. IT IS NOT INTENTION OF DRAWINGS TO INDICATE ALL NECESSARY OFFSETS. INSTALL WORK IN MANNER TO CONFORM TO STRUCTURE, AVOID OBSTRUCTIONS, PRESERVE HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. DO NOT SCALE FROM DRAWINGS.
- ANY INFORMATION FOUND ON THE DRAWINGS AND NOT IN THE SPECIFICATIONS, OR FOUND IN SPECIFICATIONS AND NOT IN THE DRAWINGS, SHALL BE CONSTRUED AS TO BE INCLUDED IN BOTH THE SPECIFICATIONS AND THE DRAWINGS. ANY CONFLICT BETWEEN THE PLANS AND THE SPECIFICATIONS WILL BE INTERPRETED BY THE ARCHITECT. IN THE EVENT OF CONFLICT, FOR THE PURPOSE OF BIDDING, THE CONTRACTOR SHALL PRESUME THE MOST EXPENSIVE COMBINATION OF QUALITY AND QUANTITY OF WORK SHALL PREVAIL.
- PIPING LAYOUT IS SCHEMATIC. EXACT LOCATION OF PIPING AND EQUIPMENT SHALL BE COORDINATED WITH BUILDING STRUCTURE, EQUIPMENT FURNISHED, ARCHITECTURAL DRAWINGS AND ALL OTHER TRADES PRIOR TO INSTALLATION. ANY CONTRACTOR INSTALLING WORK WITHOUT PRIOR COORDINATION SHALL RELOCATE HIS WORK AT HIS EXPENSE TO ALLOW PROPER INSTALLATION OF ANY AND ALL TRADES WORK.

**PLUMBING SYMBOLS LEGEND**

<b>PLUMBING PIPING</b>	<b>PLUMBING VALVES</b>	<b>PLUMBING EQUIPMENT</b>
— CW — COLD WATER	— GATE VALVE	→ FLOW DIRECTION
- - CW - - COLD WATER BELOW FINISH SLAB	— GAS COCK	— PIPING DROP
— HW — HOT WATER	— CHECK VALVE	— PIPING RISE
- - HW - - HOT WATER BELOW FINISH SLAB	— BALANCE COCK	— FLOOR CLEANOUT
— HWR — HOT WATER RETURN	— CIRCUIT SETTER	— INLINE PIPING DROP
- - HWR - - HOT WATER RETURN BELOW FINISH SLAB	— TWO-WAY CONTROL VALVE	— INLINE PIPING RISE
— FP — FIRE PROTECTION	— THREE-WAY CONTROL VALVE	— PIPING TEE
— G — GAS (NATURAL)	— GLOBE VALVE	— PIPING ELBOW
— LP — GAS (LIQUID PETROLEUM)	— BALL VALVE	— INLINE CLEANOUT
— SAN — SANITARY WASTE	— OS&Y VALVE	— PLUMBING TRAP
— SAN — SANITARY WASTE BELOW FINISH SLAB	— SOLENOID VALVE	— THERMOMETER
— V — VENT PIPING	— EXPANSION VALVE WITH THERMOSTATIC BULB	— CONNECTION
- - V - - VENT PIPING BELOW FINISH SLAB	— PLUG VALVE	— PUMP
— SW — SOFTENED WATER	— BUTTERFLY VALVE	— UNION
- - SW - - SOFTENED WATER BELOW FINISH SLAB	— RELIEF VALVE	— PIPE ANCHOR
	— HOSE & DRAIN END VALVE	— PIPE GUIDE
	— PRESSURE RELIEF VALVE	— FLOOR DRAIN & FLOOR SINK
	— PRESSURE REDUCING VALVE	— BACK FLOW PREVENTER
	— TRIPLE DUTY VALVE	— FLANGE END CONNECTION
	— GAS PRESSURE REGULATOR	— WALL HYDRANT & HOSE BIB
	— STRAINER (BLOW-OFF)	— REGULAR & OVERFLOW RO
		— PIPE CAP
		— PIPE BREAK
		— WATER METER
		— GAS METER
		— PRESSURE GAUGE

- MISCELLANEOUS NOTES**
- POINT OF CONNECTION BETWEEN NEW AND EXISTING
  - ◆ POINT OF EXISTING TO REMAIN AND EXISTING TO BE REMOVED
  - (X) INDICATES PLAN NOTE
  - (X) INDICATES DEMOLITION NOTE
  - DETAIL BUBBLE
  - XX DETAIL NUMBER
  - XXXX PAGE LOCATION INDICATES
  - ↔ DIRECTION OF DETAIL SECTION



**1 WATER HEATER DETAIL**  
SCALE: NTS

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Alma, Michigan 48801  
PROJECT #24-43

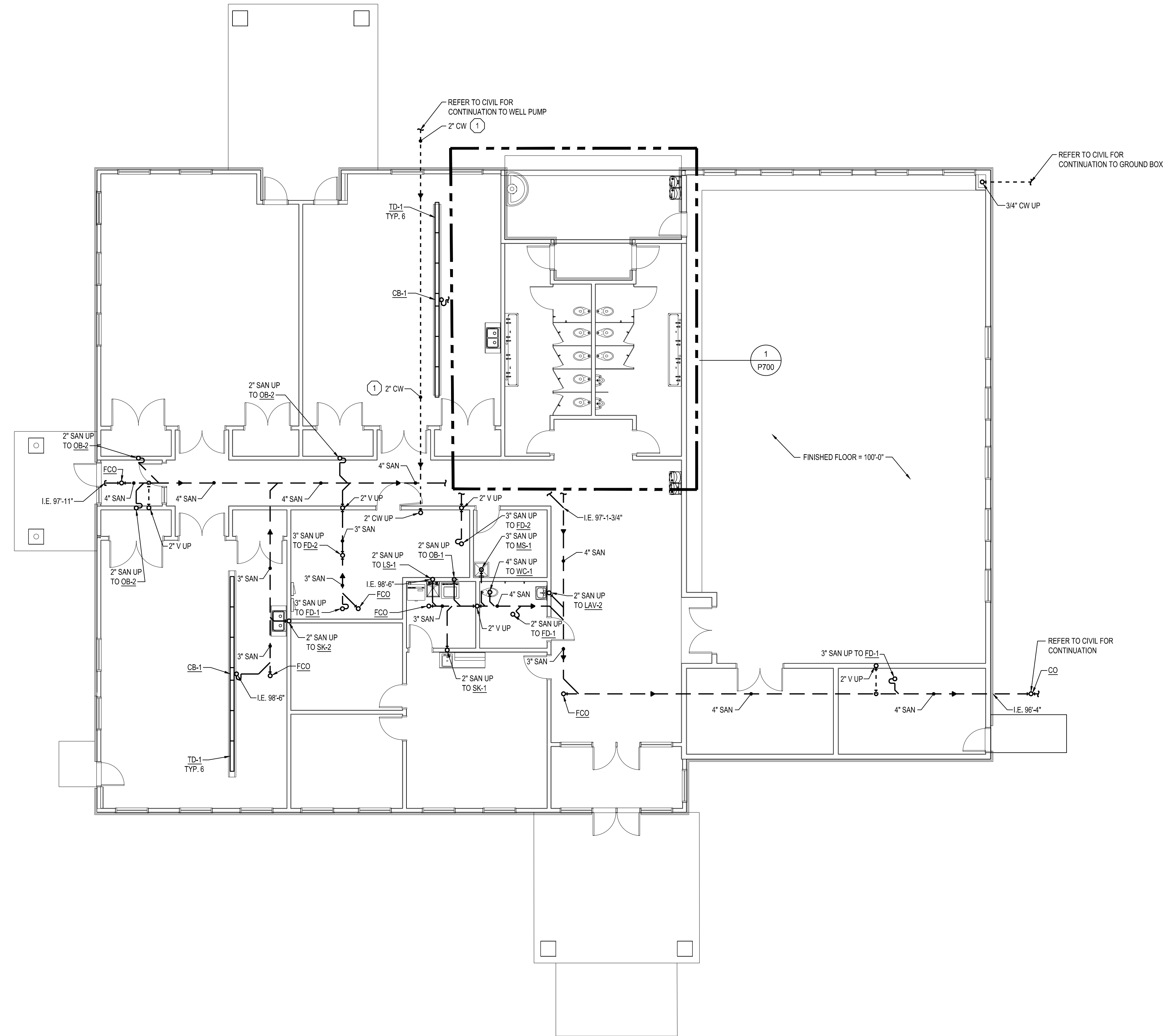
NO.	DATE	DESCRIPTION
1	01/24/2008	Bidding and Plan Review
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PLUMBING SYMBOLS, NOTES, AND ABBREVIATIONS  
SHEET TITLE

P-100  
SHEET NUMBER

**PLUMBING KEY NOTES**

① PIPING PROVIDED AND INSTALLED BY WELL PROVIDER.



**BELOW FLOOR PLAN - PLUMBING NEW - PHASE 1**  
 SCALE: 1/8" = 1'-0"

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**Forest Hills Nature Center**  
**New Nature Center**  
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 Seville Township, Gratiot County  
 Alma, Michigan 48801  
 PROJECT #24-43

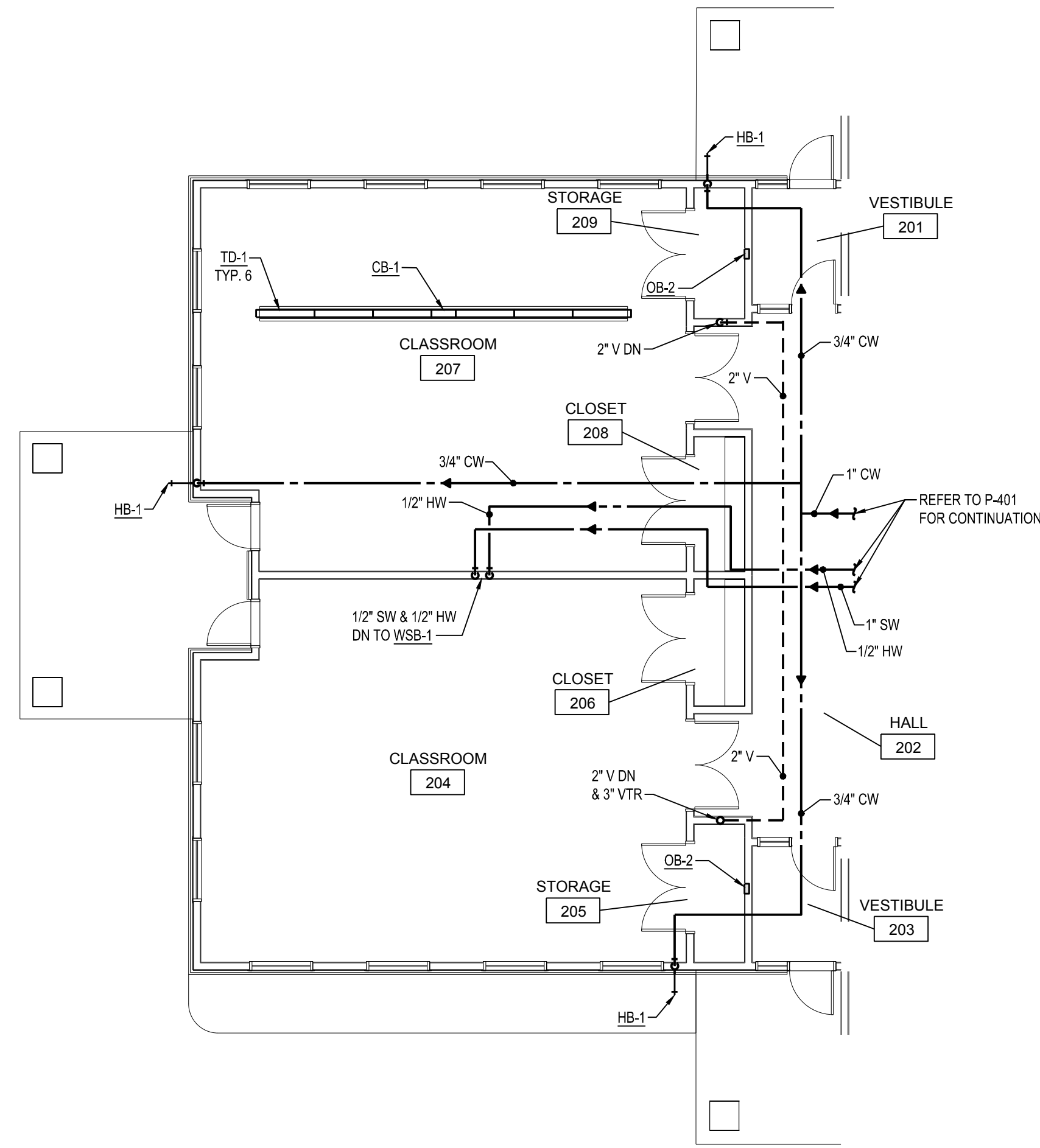
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**BELOW FLOOR PLAN - PLUMBING NEW - PHASE 1**  
 SHEET TITLE

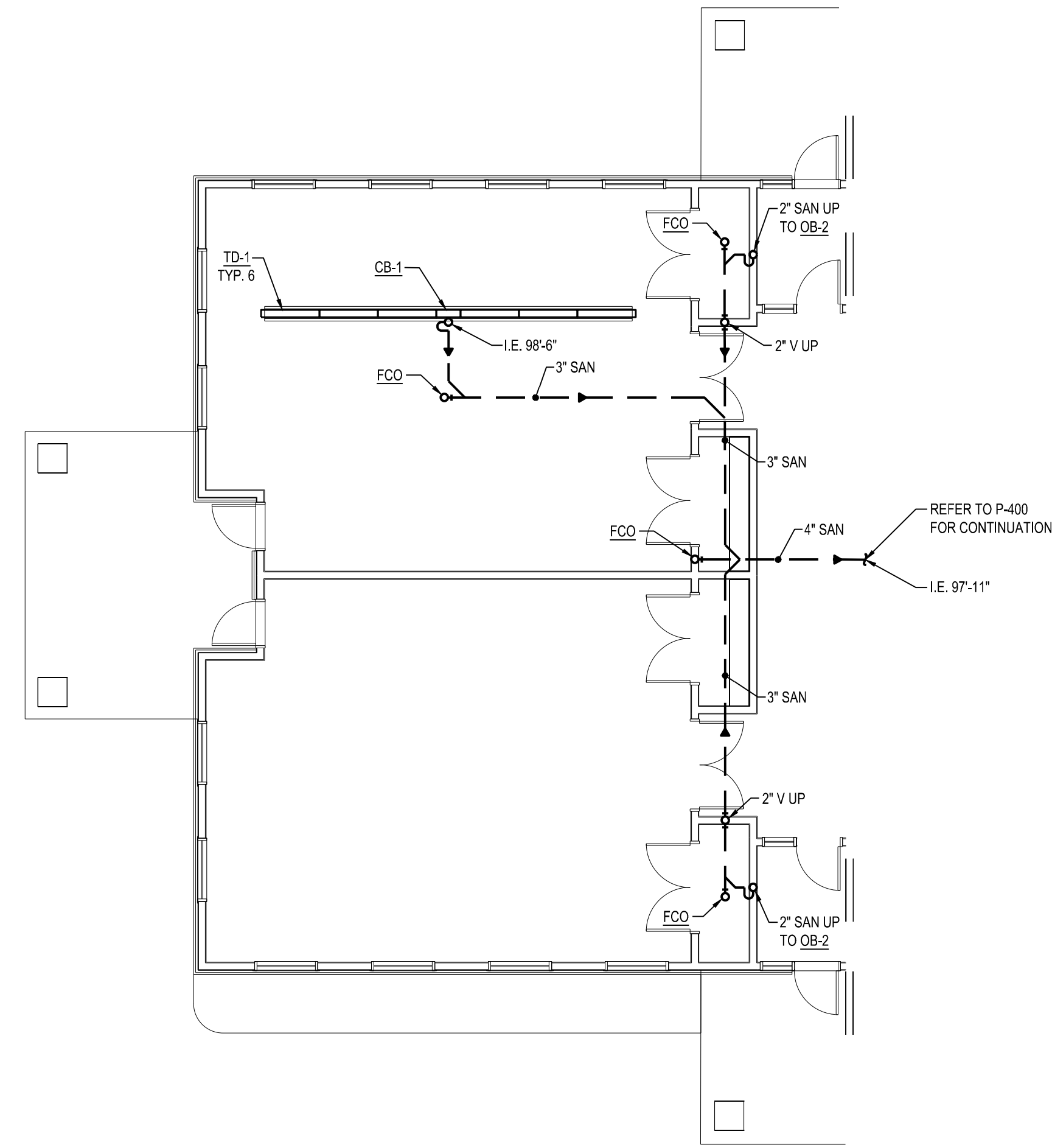
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**FLOOR PLAN - PLUMBING NEW - PHASE 2**  
 0 4 8 12 16 20  
 SCALE: 1/8" = 1'-0"



**BELOW FLOOR PLAN - PLUMBING NEW - PHASE 2**  
 0 4 8 12 16 20  
 SCALE: 1/8" = 1'-0"

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**New Nature Center**  
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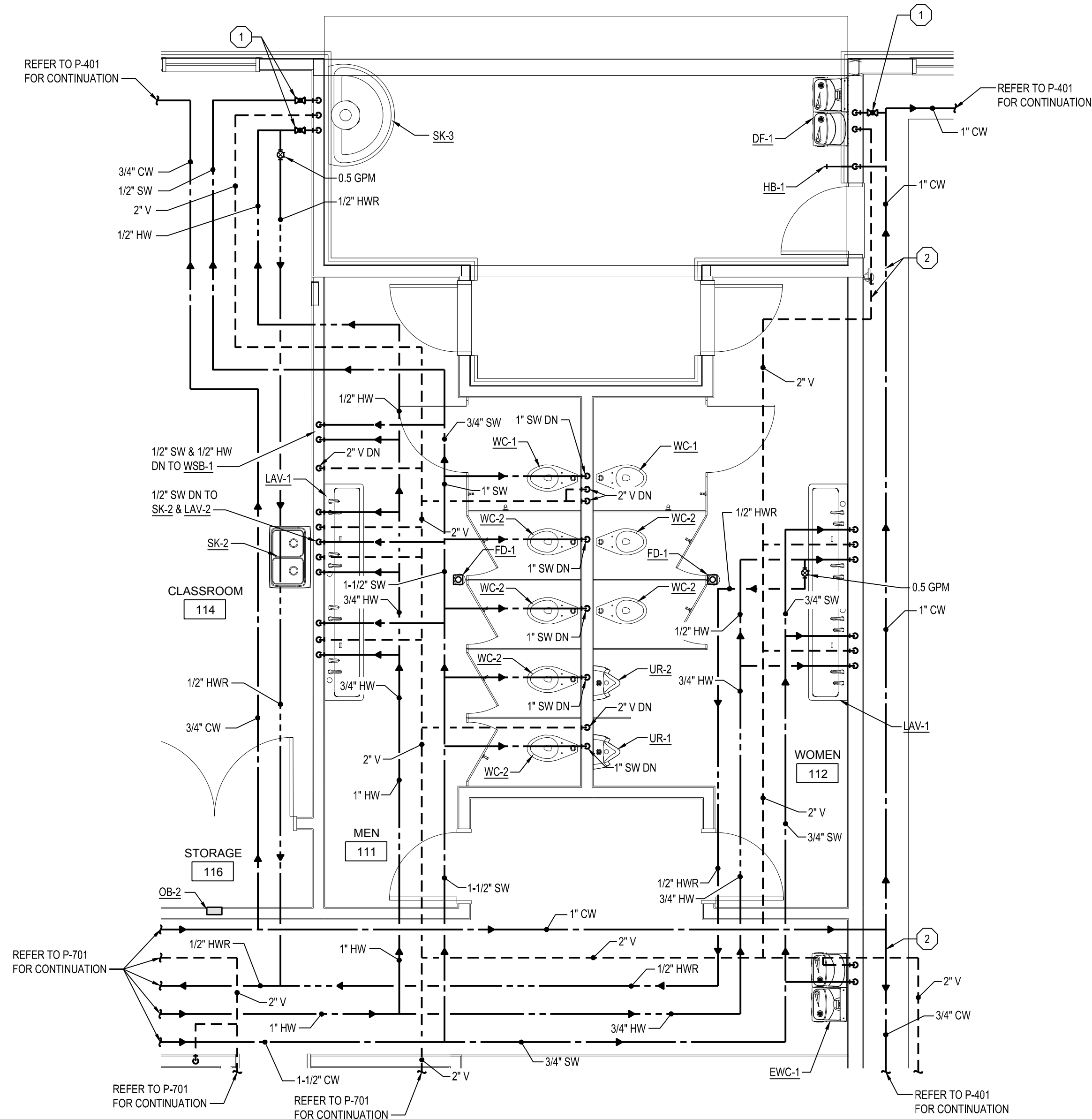
MARK	DATE	DESCRIPTION

**PHASE 2 FLOOR PLAN - PLUMBING NEW**  
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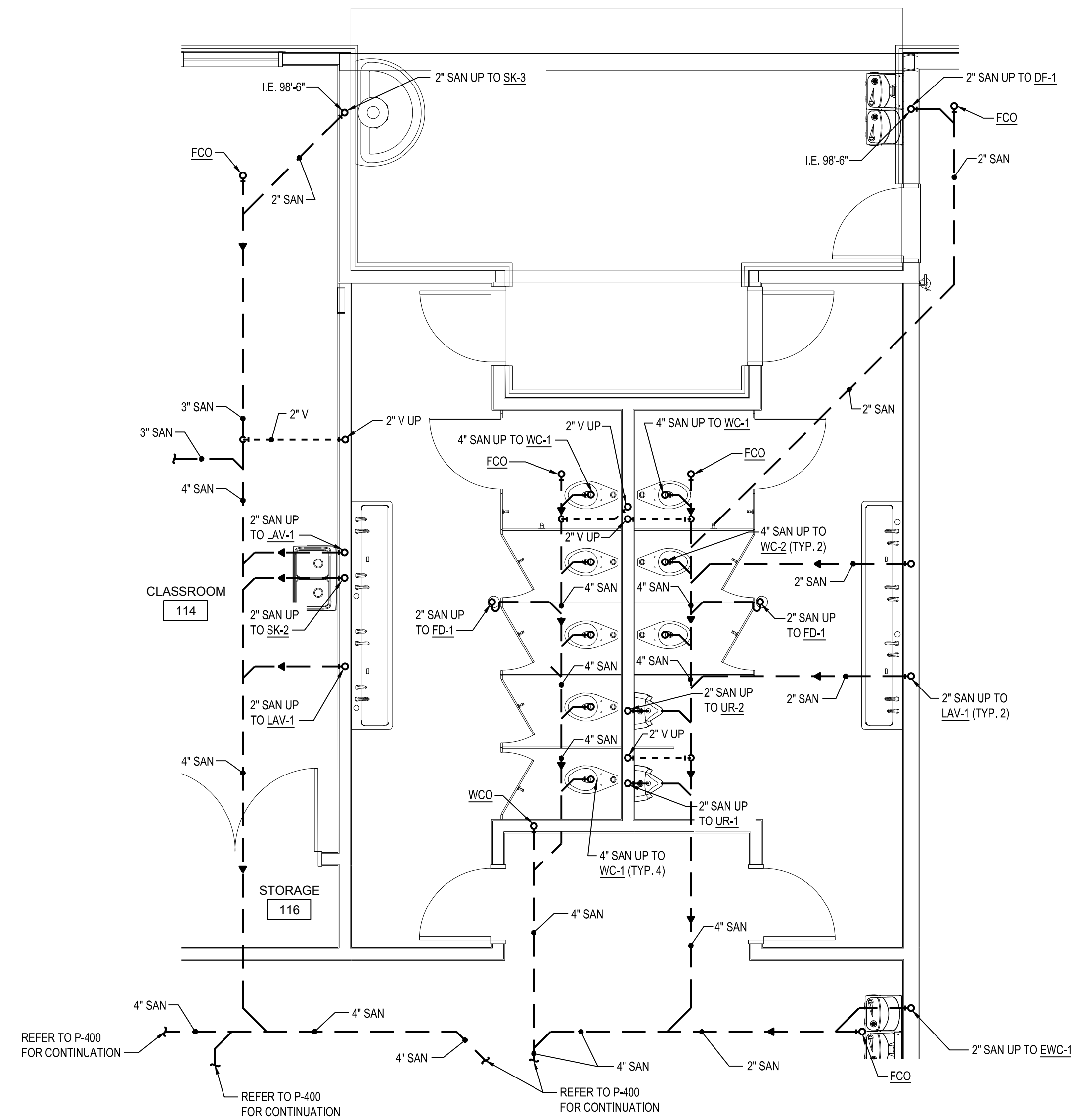
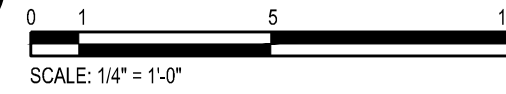
**P-402**  
 SHEET NUMBER

**PLUMBING KEY NOTES**

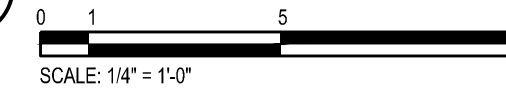
- 1 INSTALL SHUTOFF VALVE AT LOCATION SHOWN TO ALLOW FOR WINTERIZATION OF ASSOCIATED EXTERIOR PLUMBING FIXTURE. PROVIDE DRAINS TO LOW POINTS OF EXTERIOR PIPING.
- 2 ROUTE PIPING THROUGH SOFFIT. REFER TO ARCHITECTURAL DRAWINGS FOR SOFFIT SIZE AND ELEVATION.



**2 TOILET ROOM FLOOR PLAN ENLARGEMENT - PLUMBING NEW**



**1 TOILET ROOM BELOW FLOOR PLAN ENLARGEMENT - PLUMBING NEW**



PROJECT #24-43

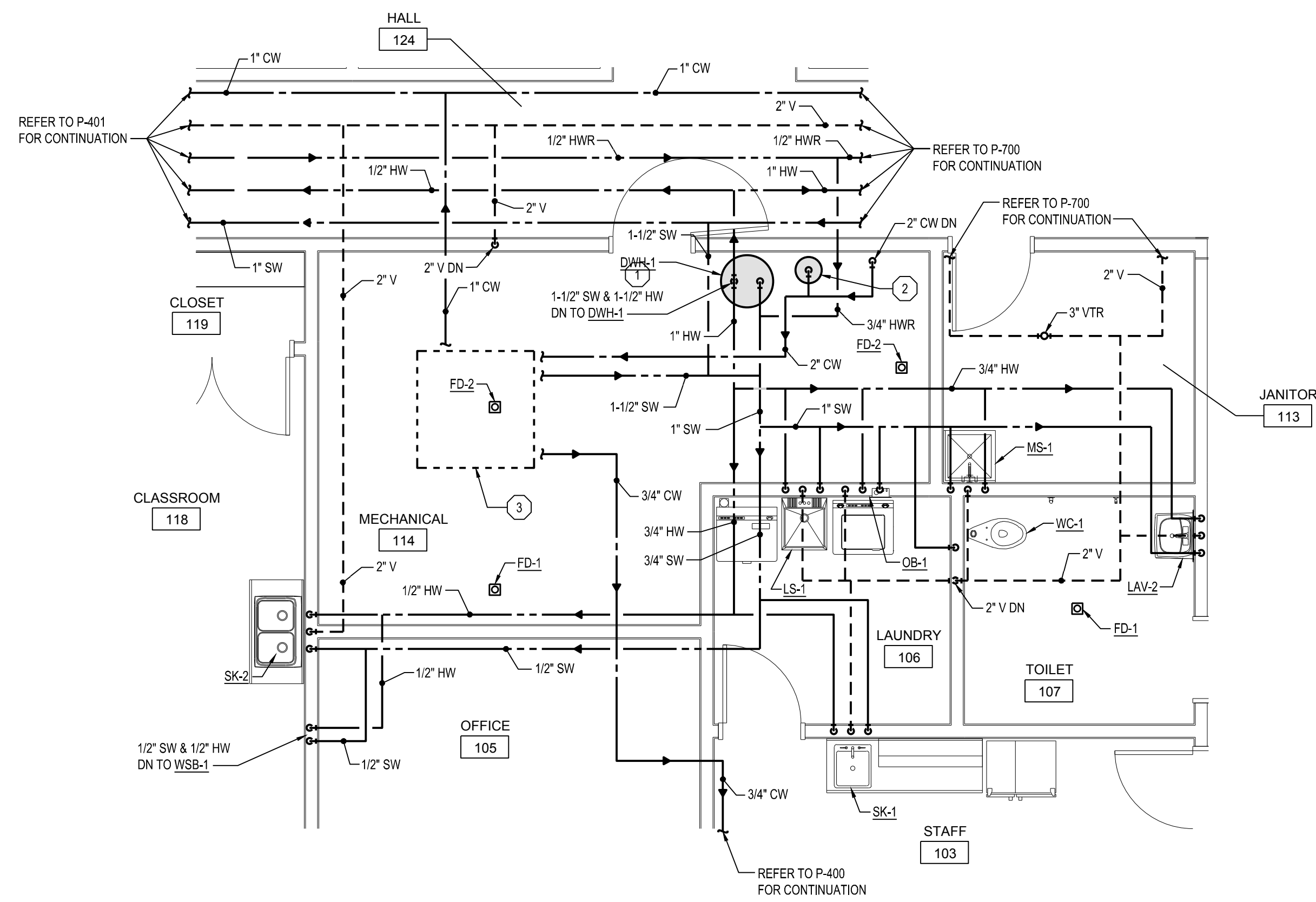
NO.	DATE	DESCRIPTION

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NO.	DATE	DESCRIPTION

**PLUMBING KEY NOTES**

- 1 INSTALL WATER HEATER ON 4" CONCRETE PAD AT LOCATION SHOWN. CONNECT TO HOT WATER AND COLD WATER PIPING.
- 2 PRESSURE TANK PROVIDED AND INSTALLED BY WELL PROVIDER. WELL PROVIDER IS RESPONSIBLE FOR ALL PIPING AND ACCESSORIES BETWEEN THE WELL AND PRESSURE TANK.
- 3 INSTALL WATER FILTER AND WATER SOFTENER AT LOCATION SHOWN. WATER FILTER AND WATER SOFTENER SELECTION BASIS OF DESIGN WILL BE PROVIDED IN UPCOMING ADDENDUM.



**MECHANICAL ROOM FLOOR PLAN ENLARGEMENT - PLUMBING NEW**  
 SCALE: 1/4" = 1'-0"





EXPANSION TANK SCHEDULE						
TAG	MODEL	LOCATION	TYPE	TANK VOLUME (GAL.)	ACCEPTABLE VOLUME (GAL.)	COMMENTS
XT-1	D-80	114 - MECHANICAL	DIAPHRAGM	45	36	1

**NOTES:**  
1. BASED ON BELL & GOSSETT

AIR SEPARATOR SCHEDULE							
TAG	MODEL	LOCATION	TYPE	MAX GPM	DESIGN FLOW	PRESSURE DROP (IN WC)	COMMENTS
AS-1	CRS-3F MAG	114 - MECHANICAL	COALESCING	138	85	0.59	1
AS-2	CRS-2-1/2" MAG	114 - MECHANICAL	COALESCING	196	62	0.66	1

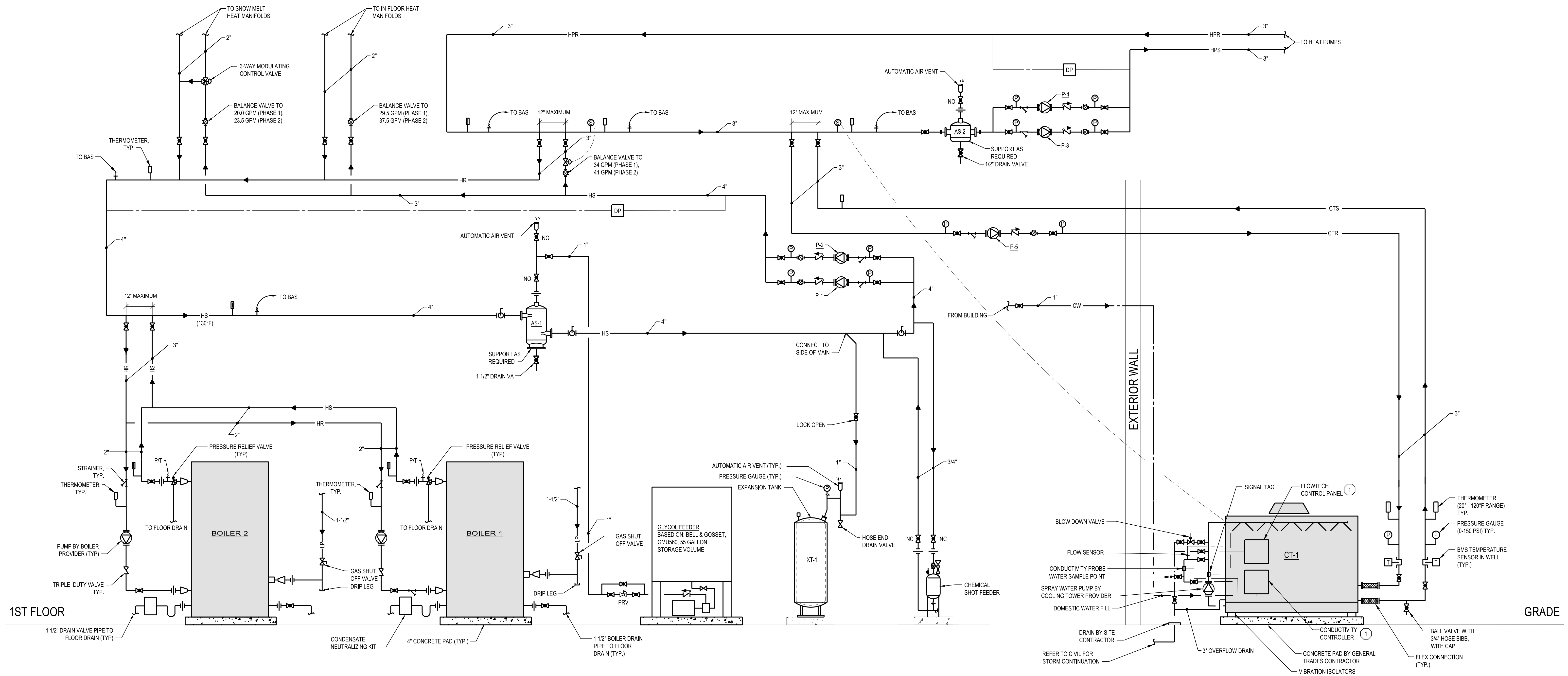
**NOTES:**  
1. BASED ON BELL & GOSSETT

**GENERAL NOTES**

- FILL SYSTEM WITH 40% PROPYLENE GLYCOL
- SYSTEM VOLUME = 650 GALLONS (APPROX.)

**PLUMBING KEY NOTES**

- CONTRACTOR SHALL INSTALL FLOWTECH TREATMENT SYSTEM FTO SERIES ON CT-1. CONTRACTOR SHALL INSTALL ALL ASSOCIATED CONTROL PANELS, CONDUCTIVITY CONTROLLERS, MOTORIZED BLOWDOWN VALVES, PIPING, CONTROL WIRING, AND ACCESSORIES FOR COMPLETE AND OPERABLE FLOWTECH WATER TREATMENT SYSTEM. PIPING MUST BE SLOPED AS NECESSARY TO ALLOW DRAINING AND PREVENT STANDING WATER.



**1 MECHANICAL PIPING DIAGRAM**  
SCALE: NTS

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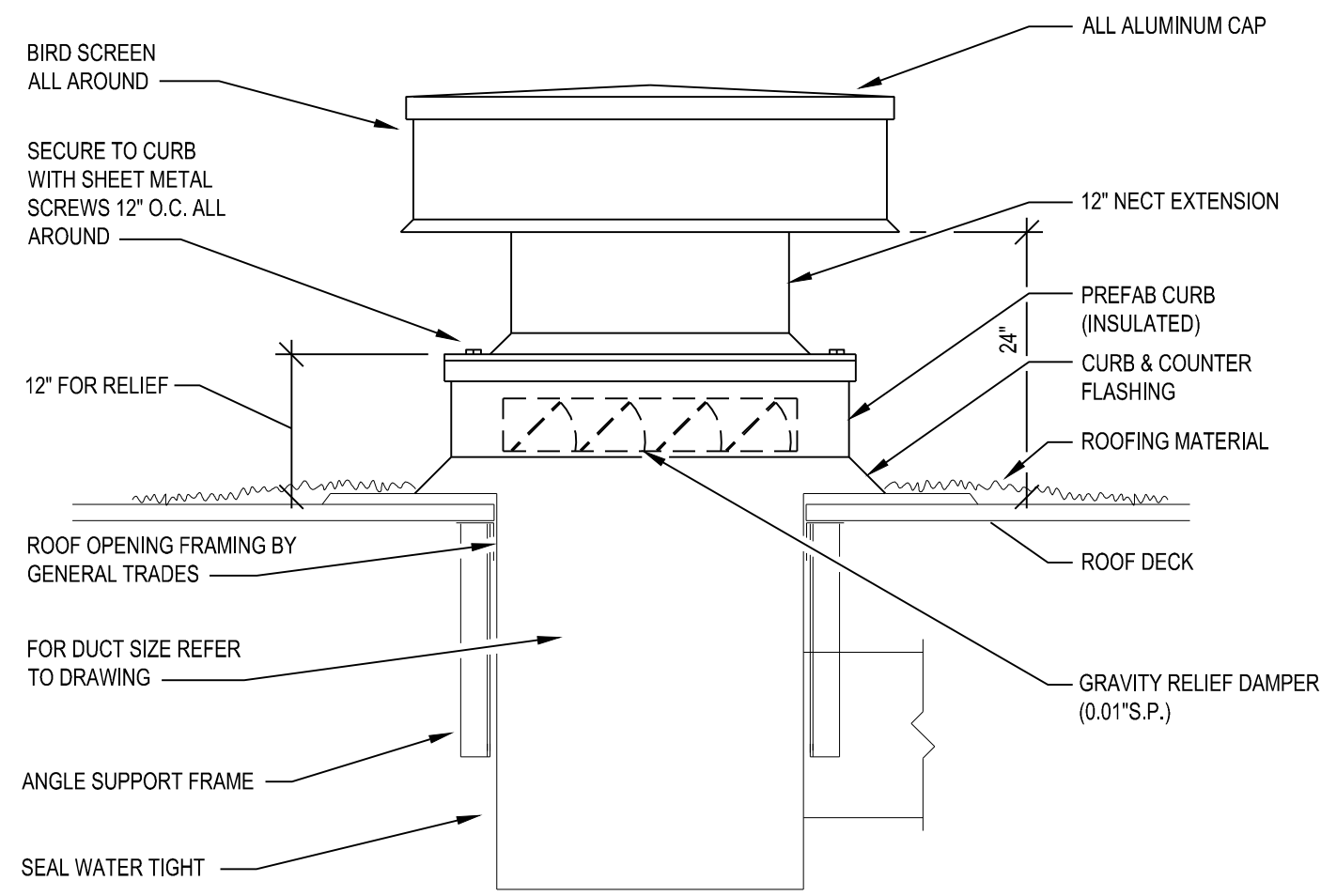
MATRIX  
CONSULTING ENGINEERS, INC.  
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Forest Hills Nature Center  
New Nature Center  
1297 N Rich Rd, Alma, MI 48801  
Seville Township, Gratiot County  
Alma, Michigan 48801  
PROJECT #24-43

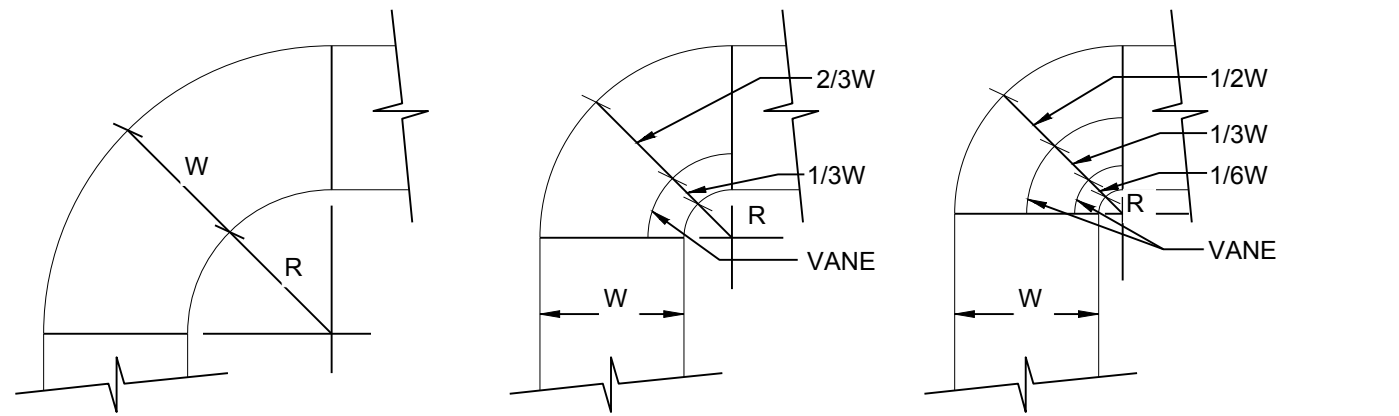
NO.	DATE	DESCRIPTION
1	01/24/2008	Bidding and Plan Review
2		
3		
4		
5		
6		
7		
8		
9		
10		

MECHANICAL HYDRONIC DETAIL  
SHEET TITLE

M-800  
SHEET NUMBER

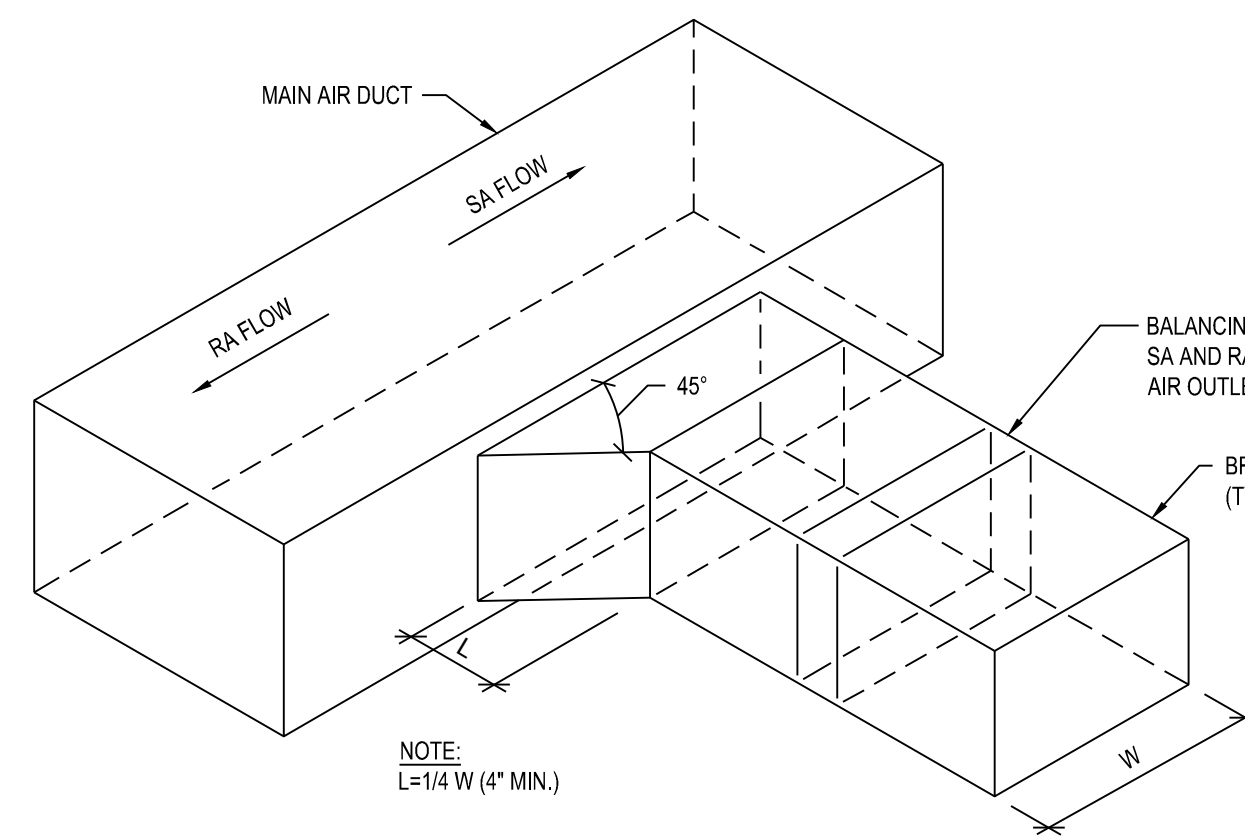


**12 ROOF HOOD DETAIL**  
SCALE: NTS

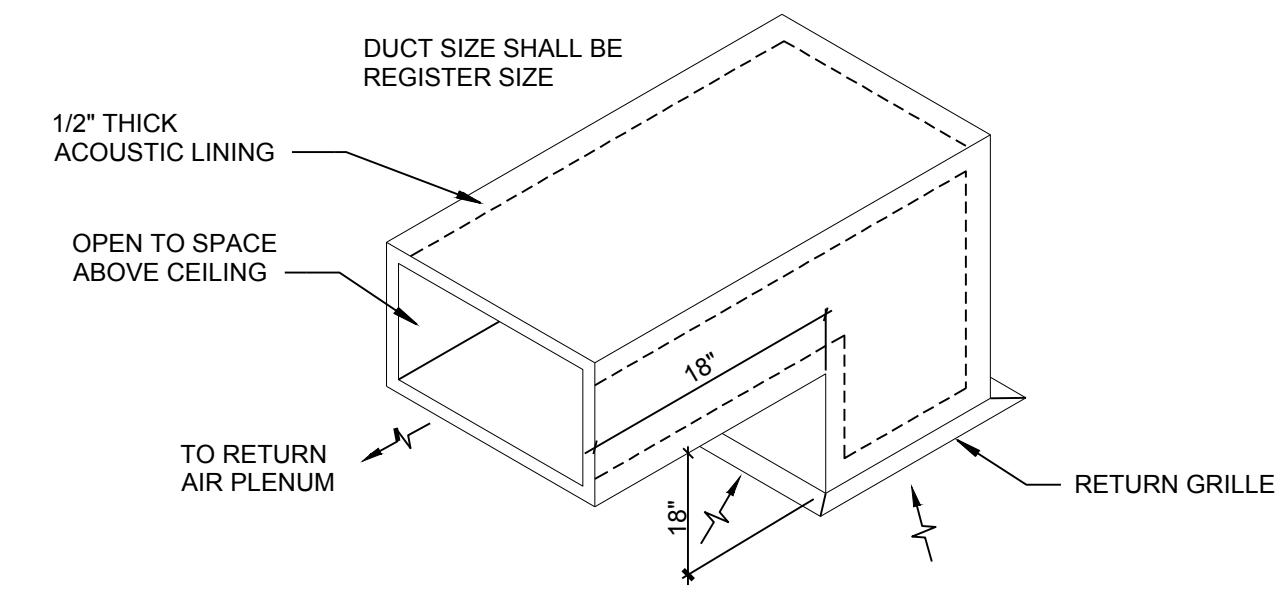


NOTES:  
 1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.  
 2. ALL STANDARD RADIUS ELBOWS SHOWN ON PLANS MAY BE MADE SHORT RADIUS ELBOWS.  
 3. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

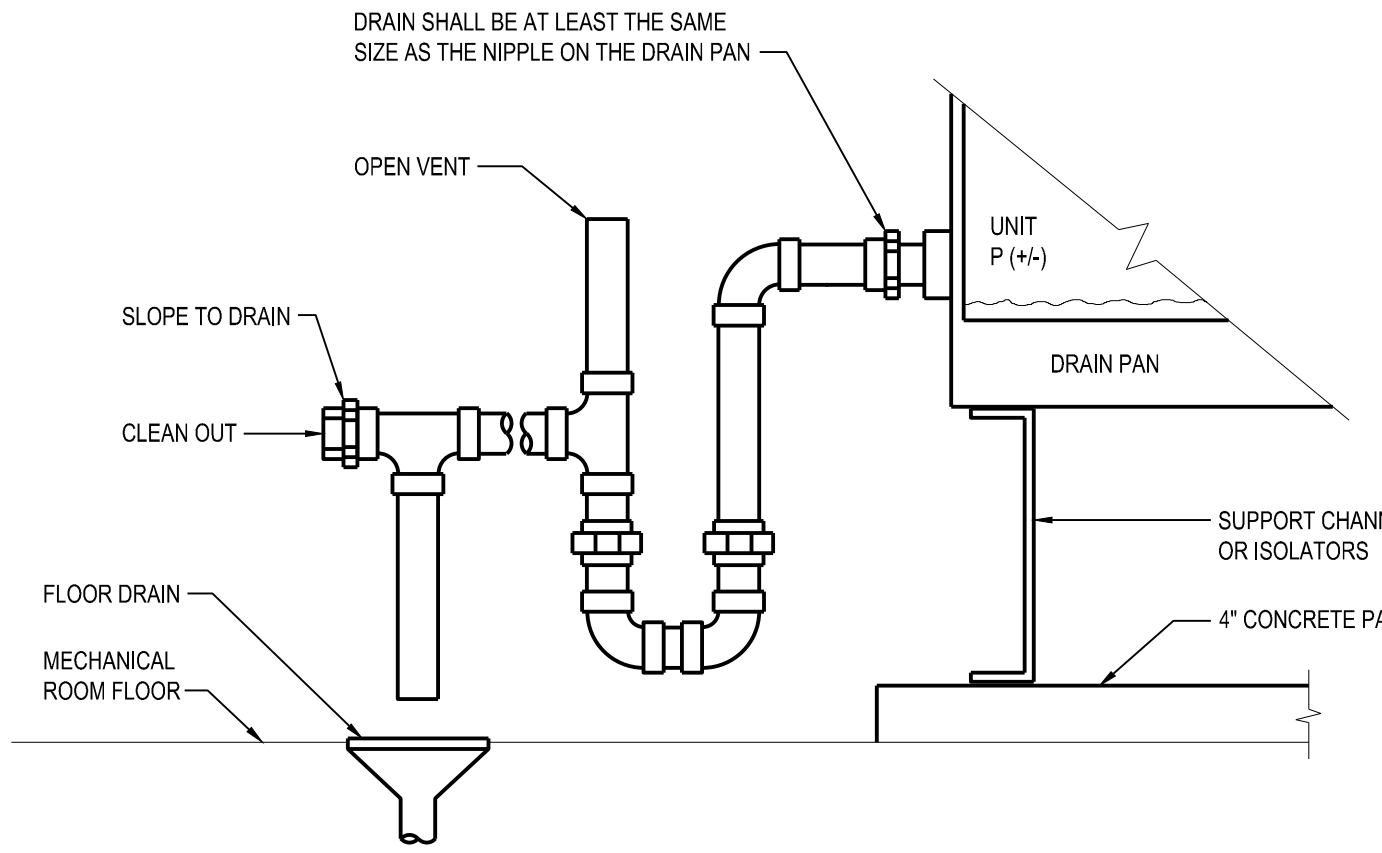
**11 DUCT FITTING DETAIL - TYPICAL DUCT RADIUS**  
SCALE: NTS



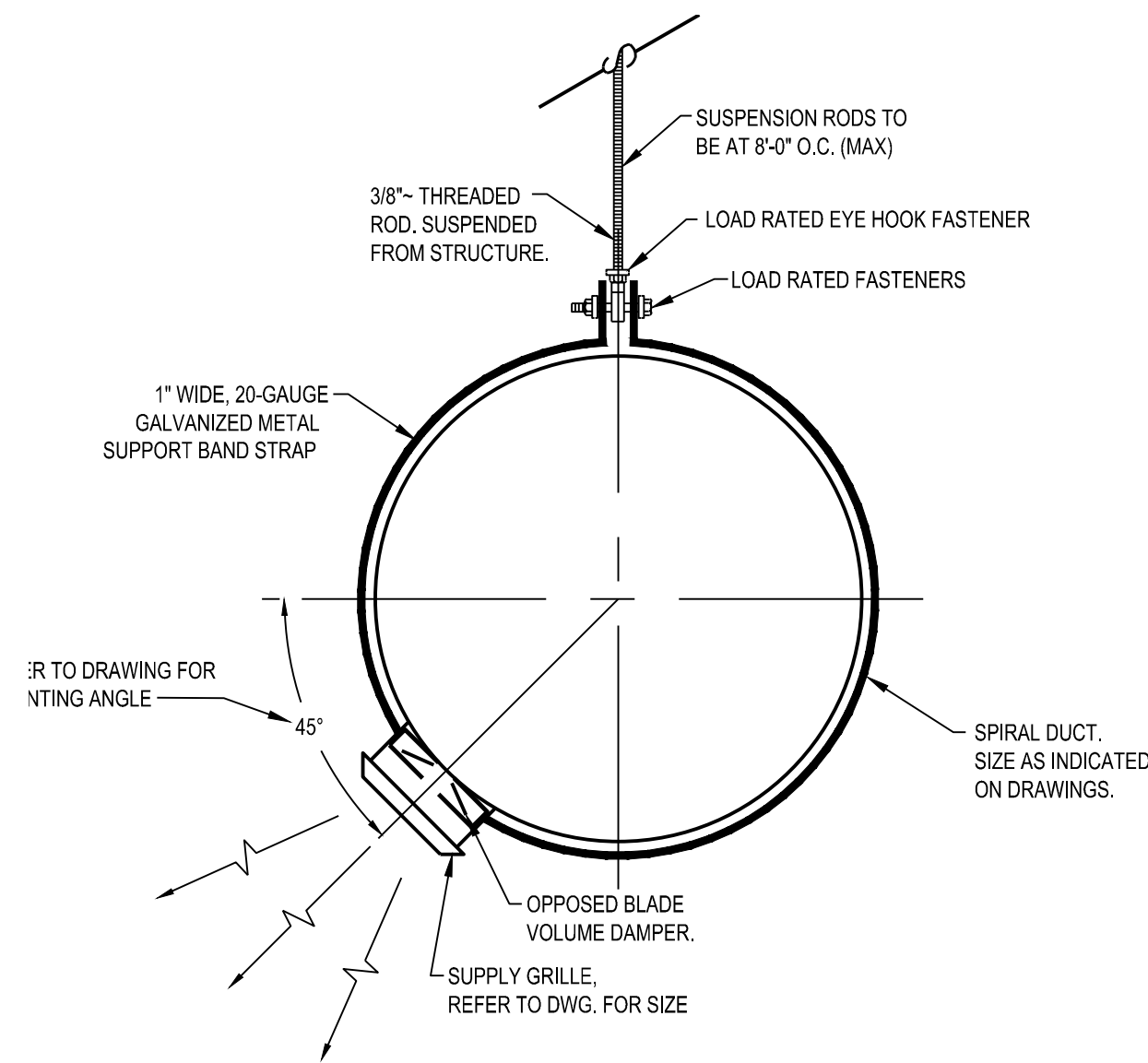
**10 SARA DUCT CONNECTION DETAIL**  
SCALE: NTS



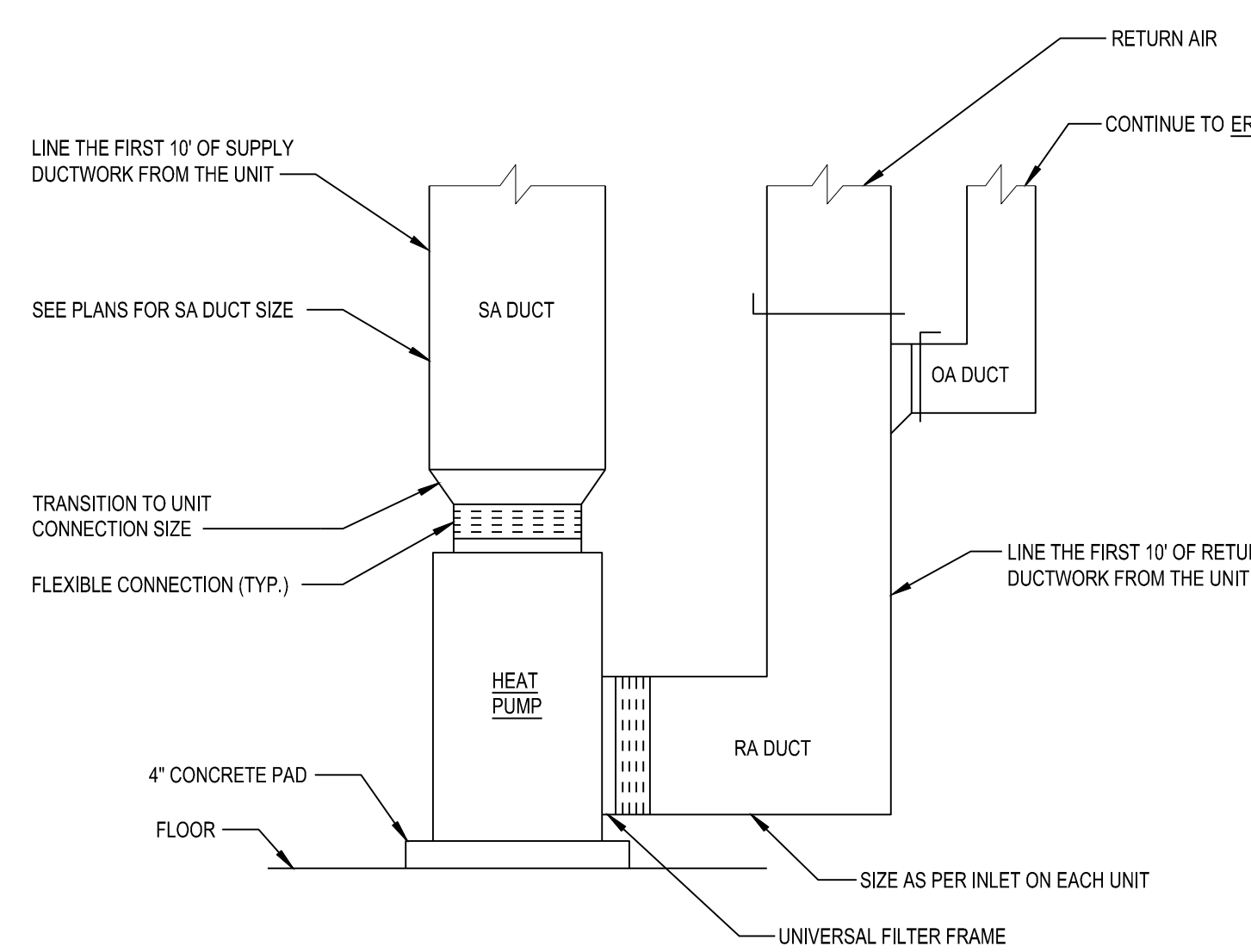
**9 RETURN GRILLE BOOT DETAIL**  
SCALE: NTS



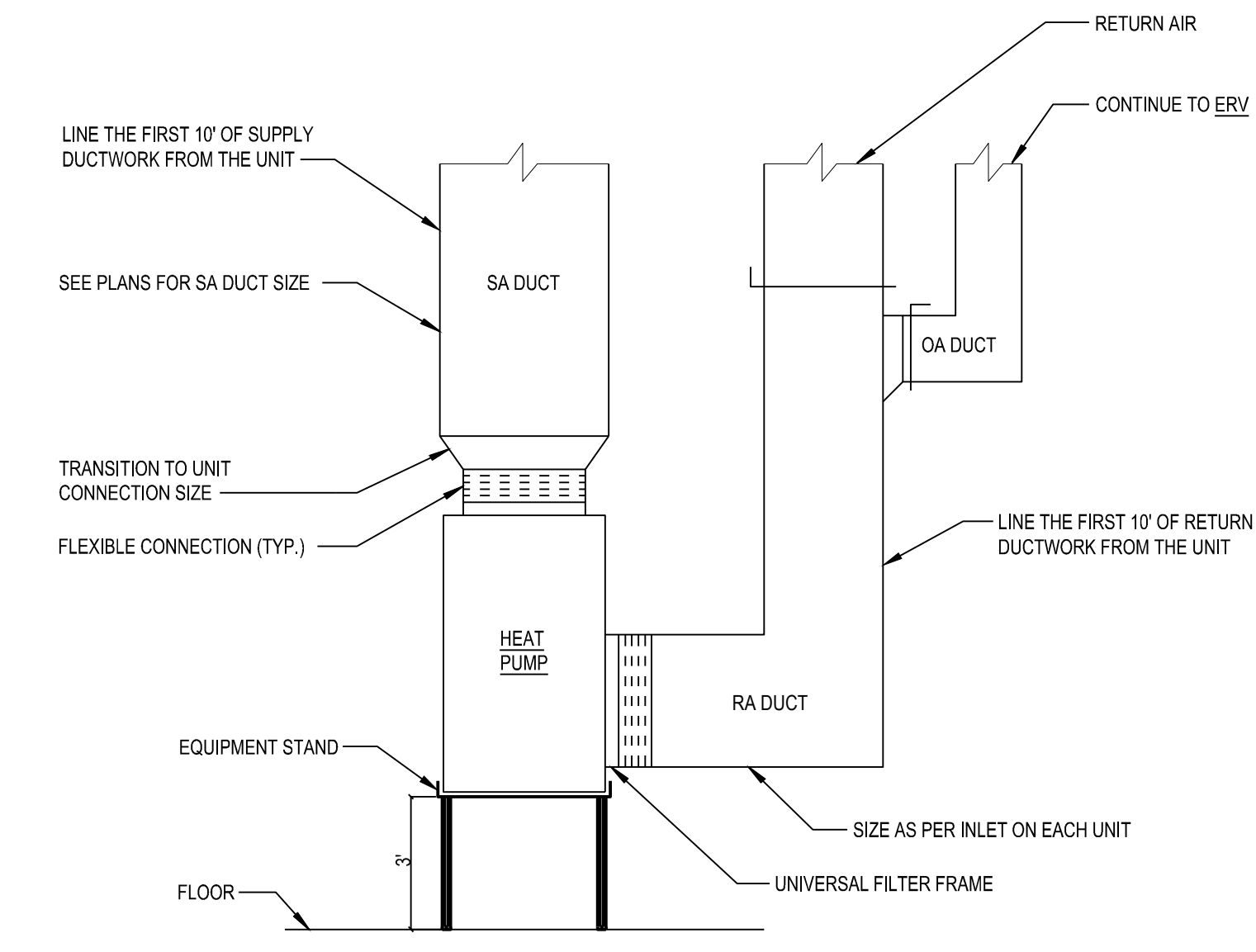
**8 CONDENSATE TRAP DETAIL**  
SCALE: NTS



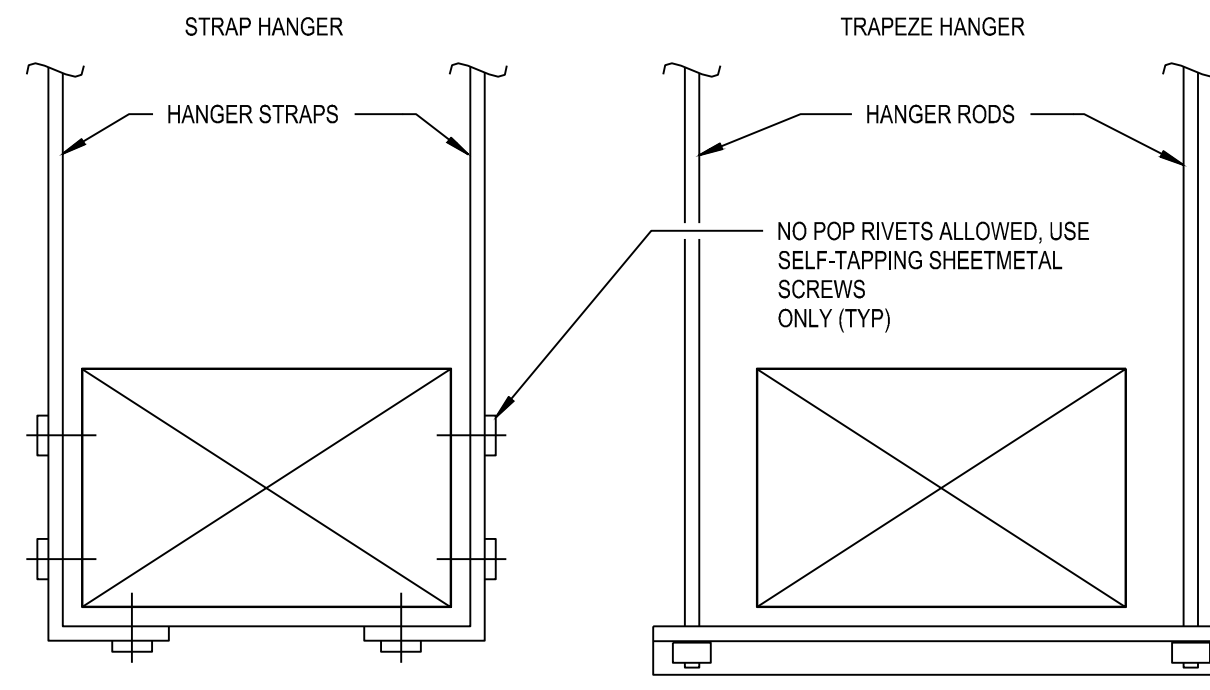
**7 EXPOSED SPIRAL DUCT AND DIFFUSER DETAIL**  
SCALE: NTS



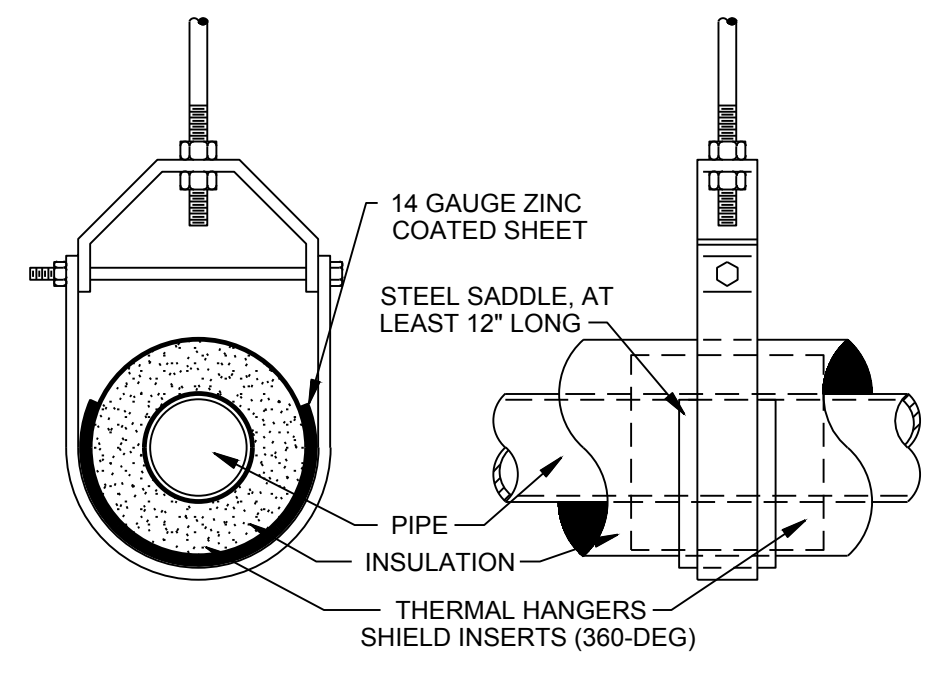
**6 WATER SOURCE HEAT PUMP ON CONCRETE PAD DETAIL**  
SCALE: NTS



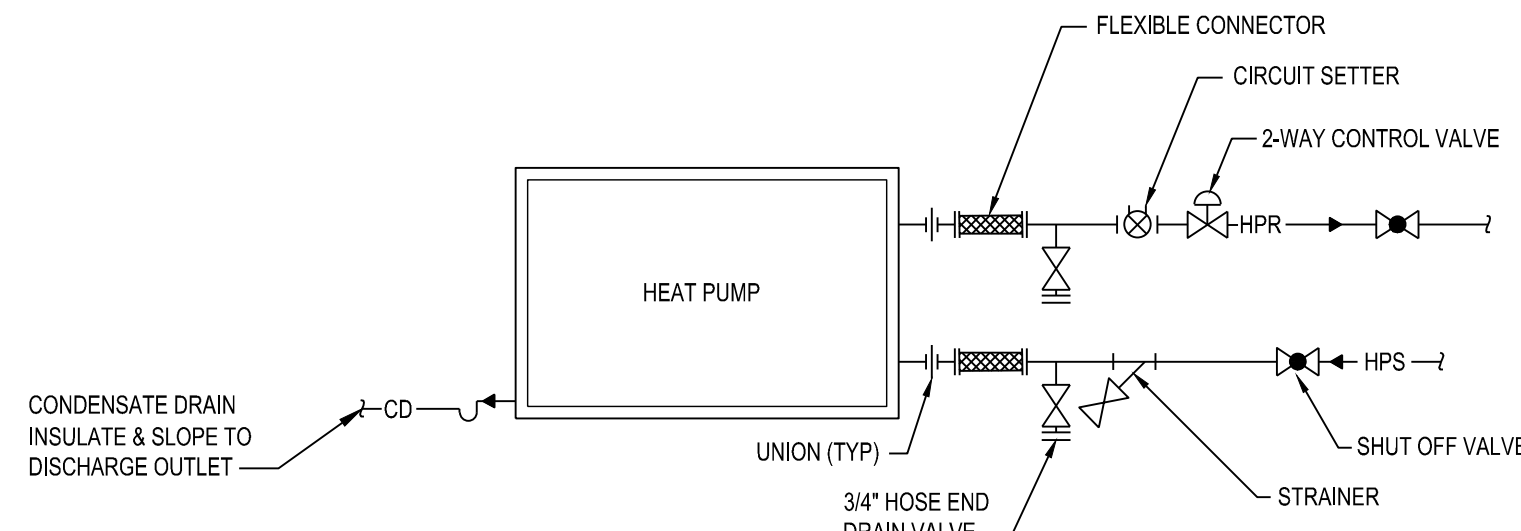
**5 WATER SOURCE HEAT PUMP ON STAND DUCTWORK DETAIL**  
SCALE: NTS



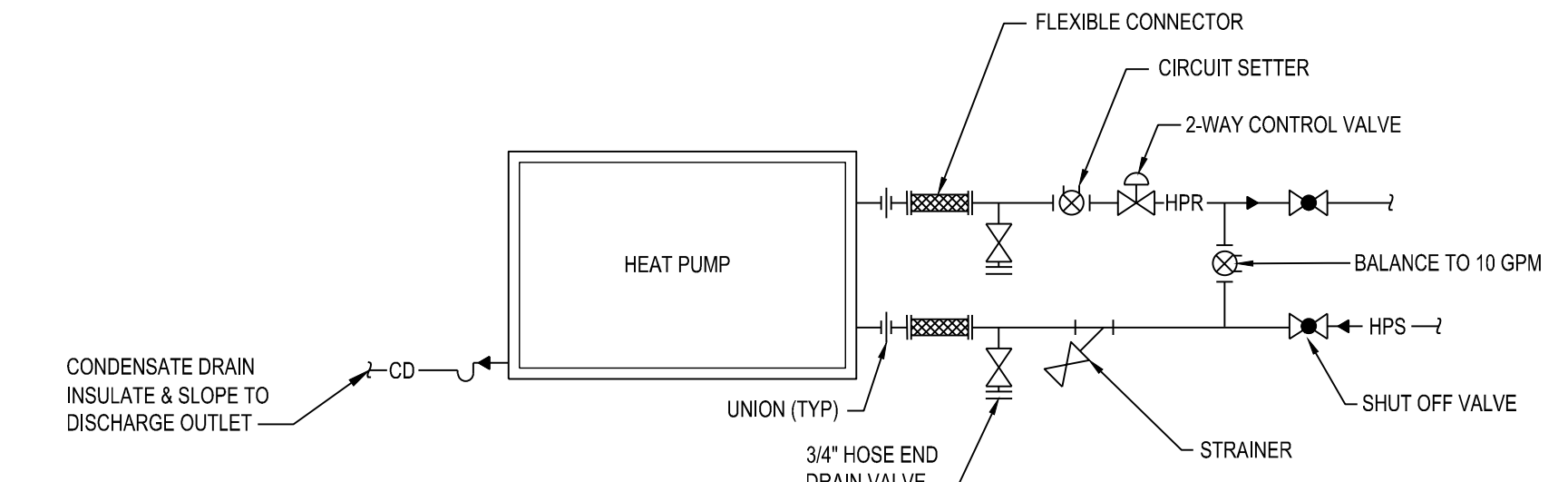
**4 DUCT HANGER DETAIL**  
SCALE: NTS



**3 INSULATED PIPE HANGER DETAIL**  
SCALE: NTS



**2 WATER SOURCE HEAT PUMP (HP-2 THRU HP-9) PIPING DIAGRAM DETAIL**  
SCALE: NTS



**1 WATER SOURCE HEAT PUMP (HP-1) PIPING DIAGRAM DETAIL**  
SCALE: NTS

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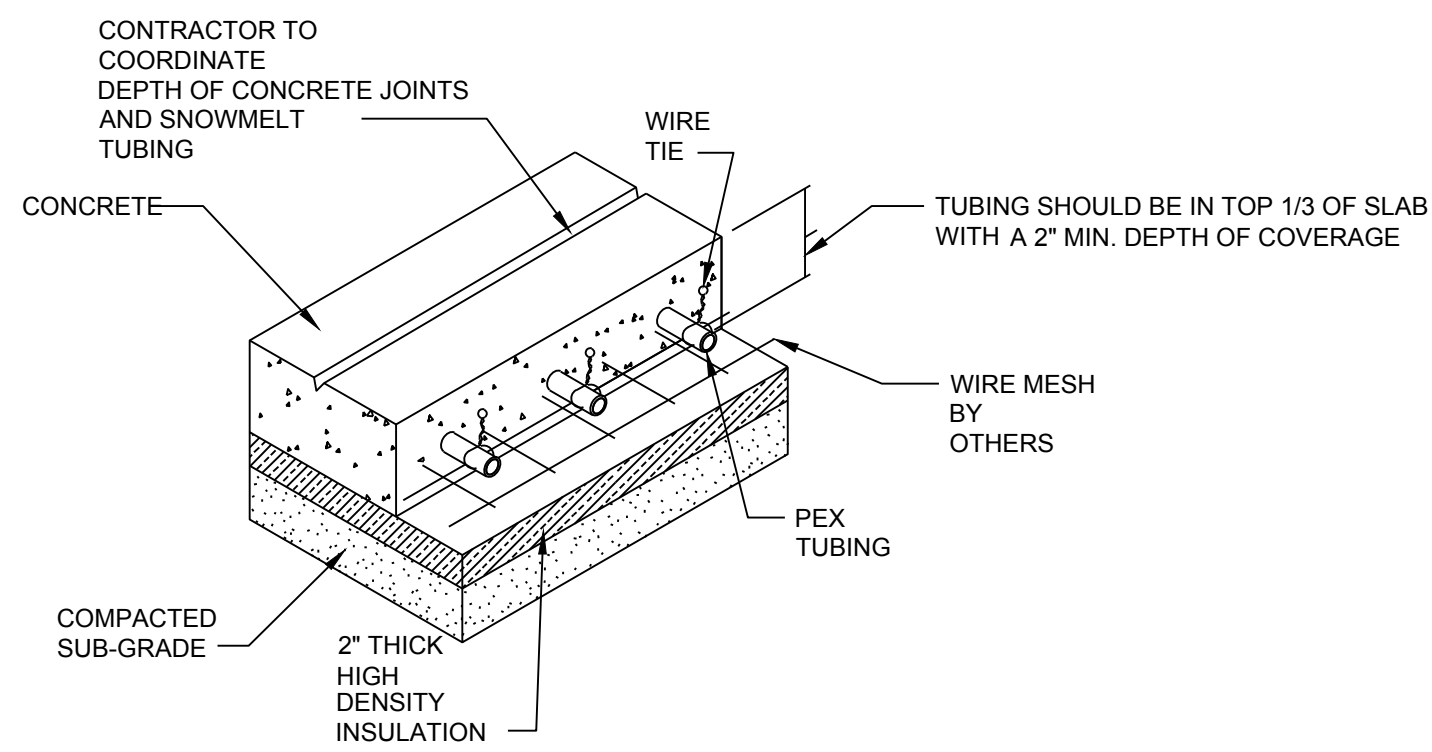
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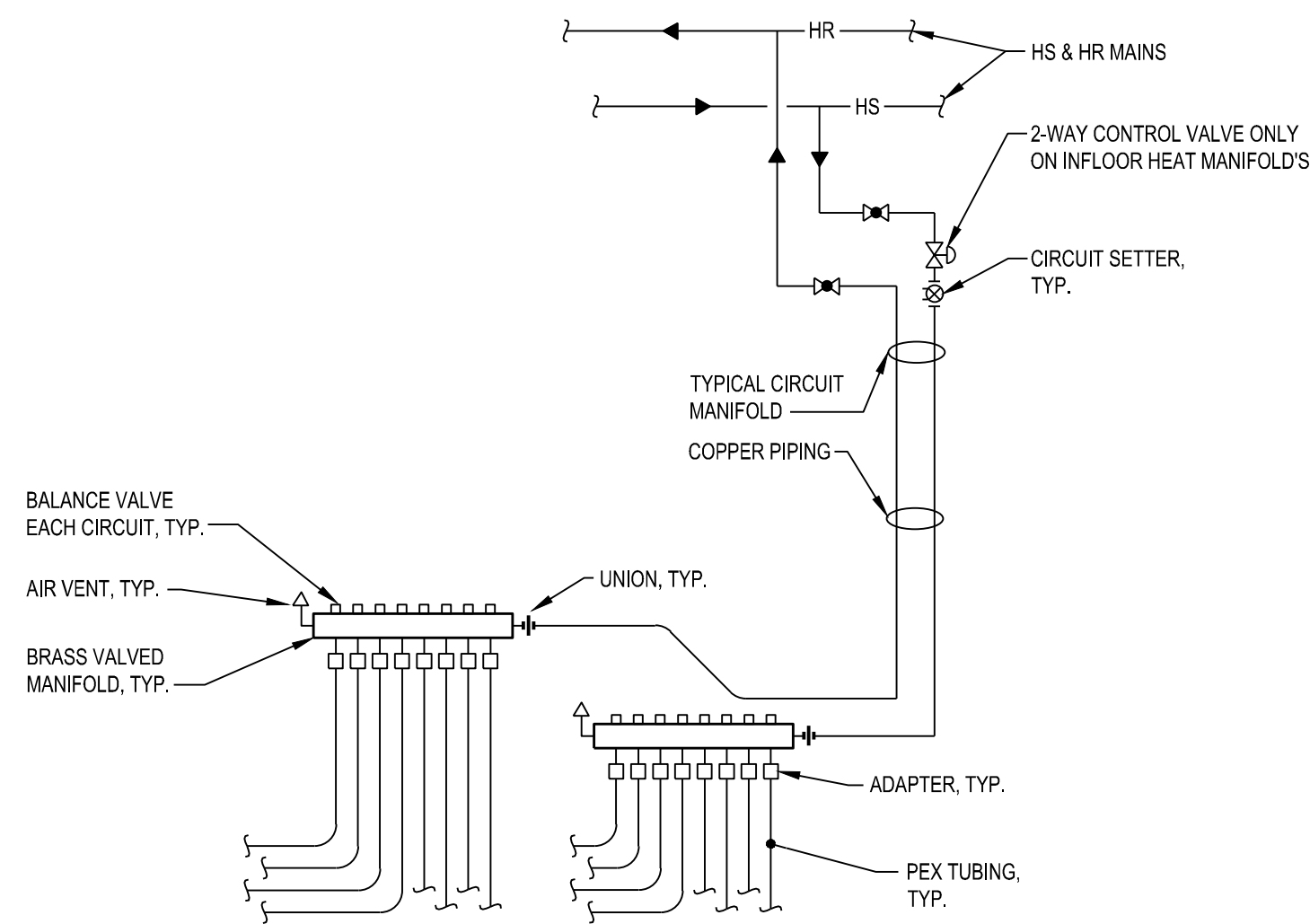
NO.	DATE	DESCRIPTION

MECHANICAL DETAILS  
SHEET TITLE

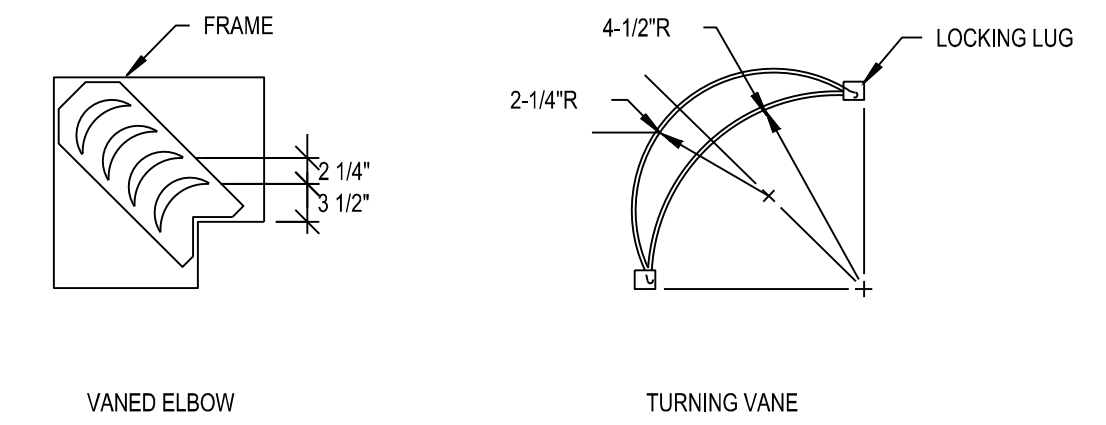
M-801  
SHEET NUMBER



**10** INFLOOR HEAT / SNOWMELT CONCRETE DETAIL  
SCALE: NTS

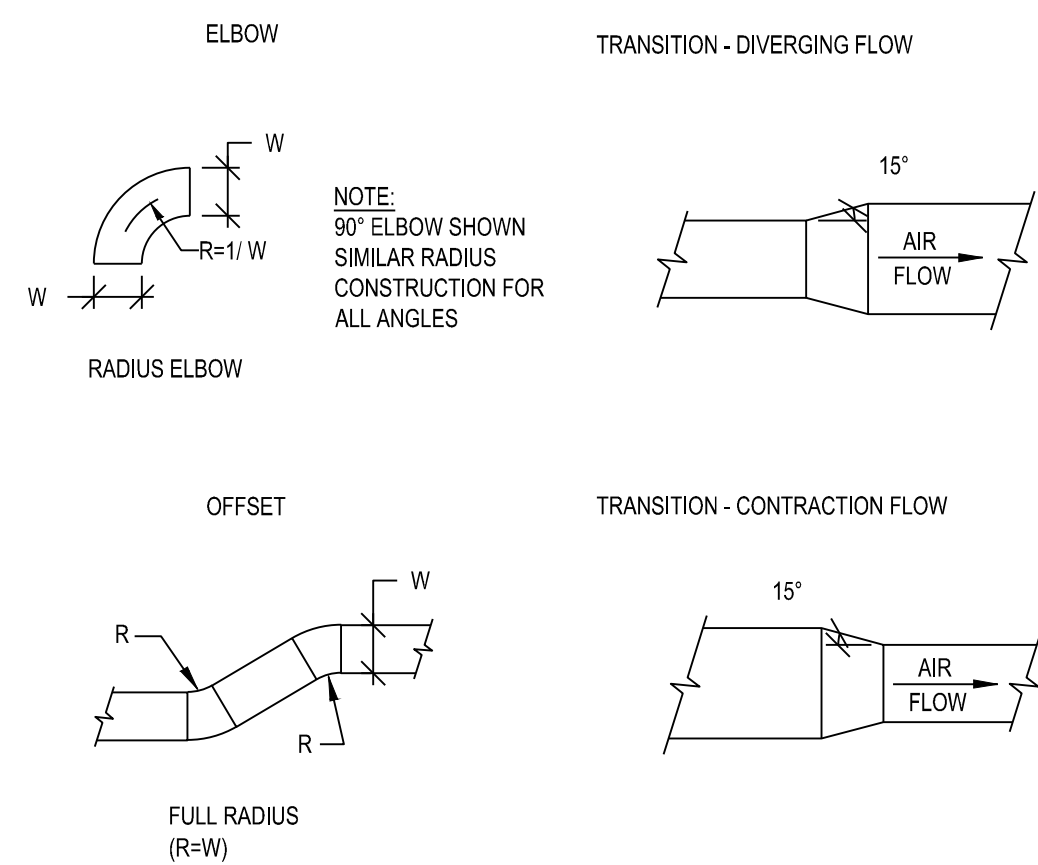


**9** INFLOOR HEAT / SNOW MELT MANIFOLD PIPING DIAGRAM  
SCALE: NTS

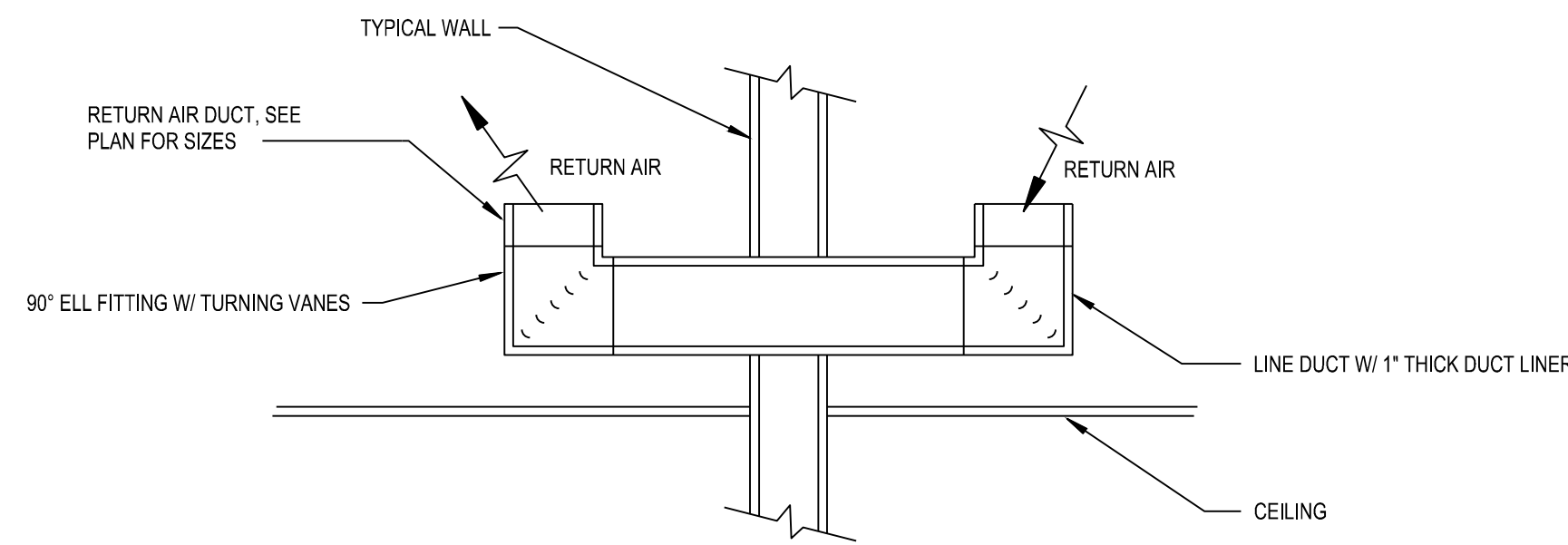


- NOTES:
1. LOCKING LUGS INTEGRAL WITH VANE
  2. MAXIMUM UNSUPPORTED VANE LENGTH 48"
  3. FRAMES - BOLTED OR RIVETED TO ELBOW
  4. VANES AND FRAMES - SAME GAUGE AS ELBOW

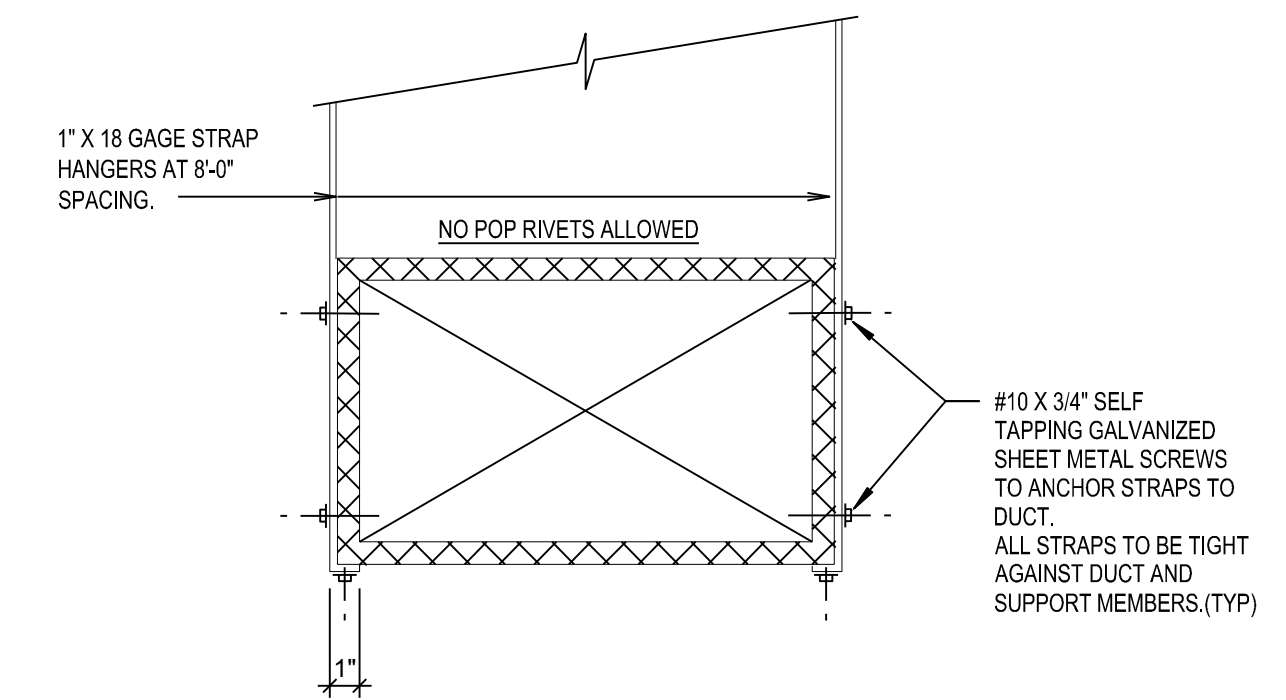
**8** TURNING VANES FOR SQUARE ELBOW DETAIL  
SCALE: NTS



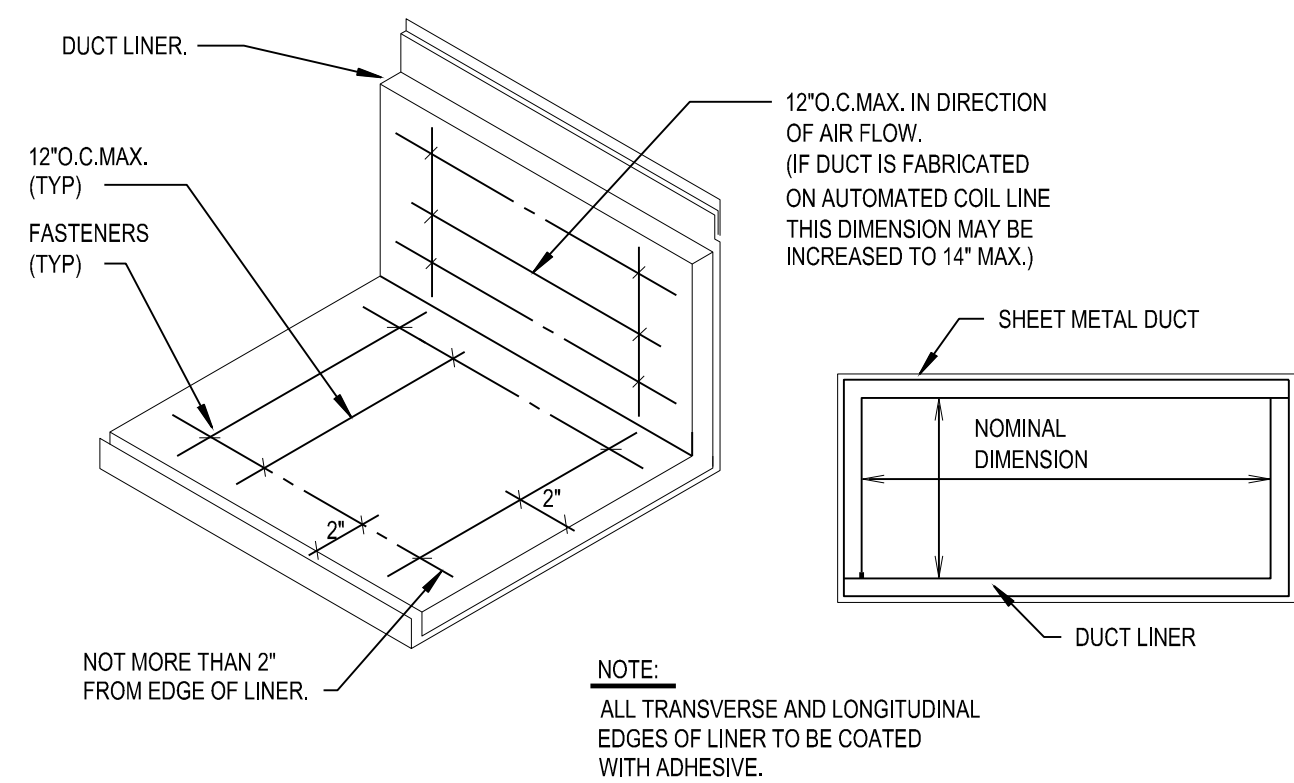
**7** RECTANGULAR TRANSITIONS, OFFSETS, AND ELBOWS  
SCALE: NTS



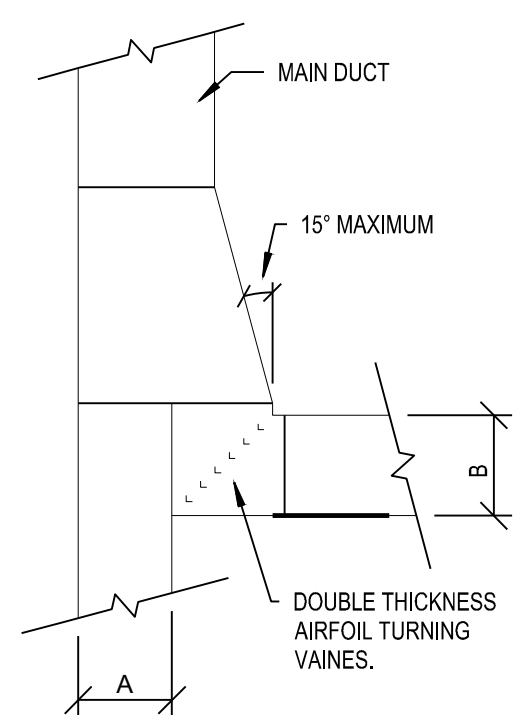
**6** RETURN AIR TRANSFER DUCT  
SCALE: NTS



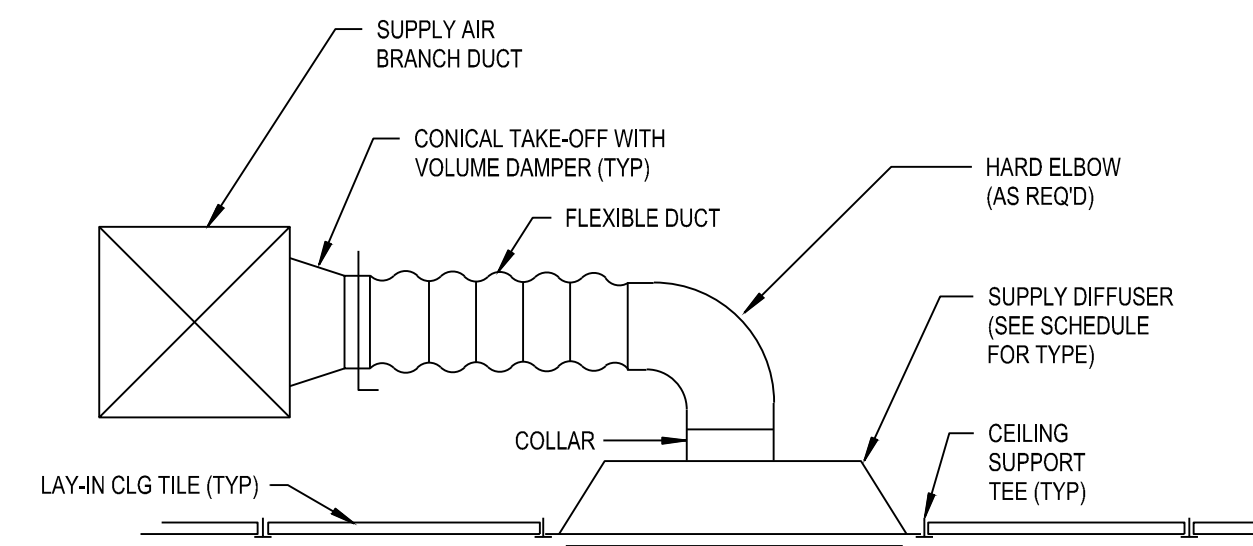
**5** TYPICAL DUCT STRAP HANGER DETAIL  
SCALE: NTS



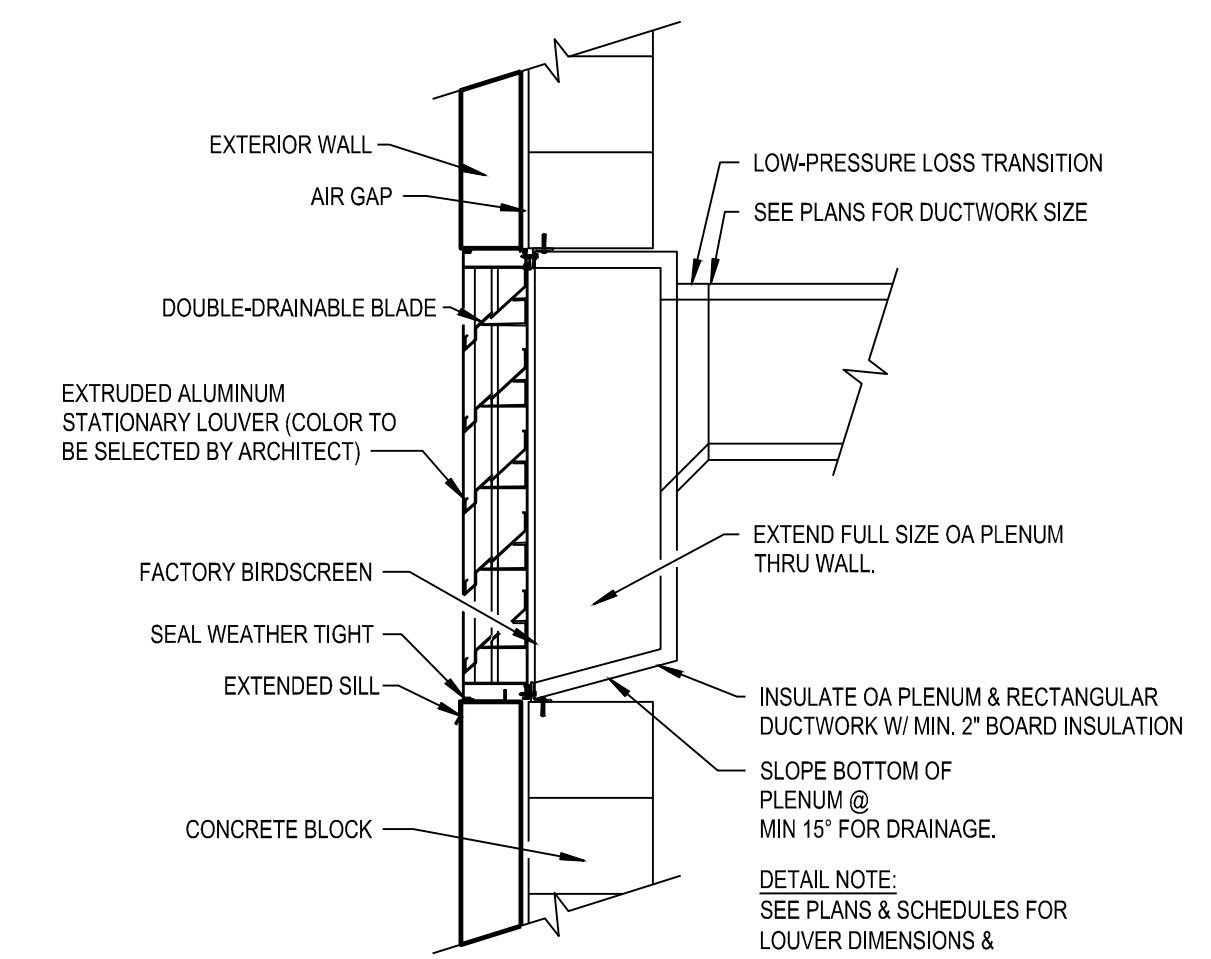
**4** TYPICAL DUCT LINER DETAIL  
SCALE: NTS



**3** DUCT FITTING DETAIL - WYE WITH TURNING VANES  
SCALE: NTS



**2** SUPPLY AIR DIFFUSER DETAIL  
SCALE: NTS



**1** OUTSIDE AIR LOUVER DETAIL  
SCALE: NTS

NO.	DATE	DESCRIPTION





PUMP SCHEDULE																	
MARK	LOCATION	SERVES	SERIES	MODEL	FLUID			PUMP				MOTOR				COMMENTS	
					TYPE	% CONC.	TEMP °F	GPM	HEAD (FT)	IMP. DIA.	% EFF	RPM	VOLT	PHASE	HP		VFD
P-1	114 - MECHANICAL	BOILER	E-90	2AAC	PROP. GLYCOL	40	130	106	45	3.875"	74.5	3359	240	1	2	EC	1,2,3
P-2	114 - MECHANICAL	BOILER	E-90	2AAC	PROP. GLYCOL	40	130	106	45	3.875"	74.5	3359	240	1	2	EC	1,2,3
P-3	114 - MECHANICAL	HEAT PUMP	E-90	1.5AB	PROP. GLYCOL	40	85	72	35	6.5"	54.9	1633	240	1	1.5	EC	1,2,3
P-4	114 - MECHANICAL	HEAT PUMP	E-90	1.5AB	PROP. GLYCOL	40	85	72	35	6.5"	54.9	1691	240	1	1.5	EC	1,2,3
P-5	114 - MECHANICAL	COOLING TOWER	E-90	1.5AB	PROP. GLYCOL	40	85	62	35	6.25"	55.5	1691	240	1	1.5	EC	1,2,3

**NOTES:**  
1. BASED ON BELL & GOSSETT  
2. VARIABLE SPEED  
3. CONSTANT VOLUME

ABBREVIATIONS  
EC - ELECTRICAL CONTRACTOR

LOUVER SCHEDULE												
TAG	FUNCTION	SERVES	MAKE/ MODEL	NECK SIZE		DEPTH	INLET FREE AREA (SQ FT)	CFM	PRESSURE DROP (" WC)	SCREEN	COMMENTS	
				WIDTH	HEIGHT							
L-1	INTAKE	ERV-2	ELF375DXH	24"	24"	4-1/2"	1.92	850	0.05	BIRD & INSECT	1,2	
L-2	EXHASUT	ERV-2	ELF375DXH	24"	18"	4-1/2"	1.32	850	0.04	BIRD & INSECT	1,2	

**NOTES:**  
1. BASED ON RUSKIN  
2. COORDINATE LOUVER FINISH WITH ARCHITECT PRIOR TO ORDERING

ENERGY RECOVERY VENTILATOR SCHEDULE																					
TAG	MODEL	SA CFM	SA E.S.P.	SA MOTOR, (QTY), HP	SA FILTERS	EA CFM	EA E.S.P.	EA MOTOR, (QTY), HP	EA FILTERS	SUMMER PERFORMANCE				WINTER PERFORMANCE			ELECTRICAL			COMMENTS	
										ERR	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	ERR	EAT (°F)	LAT (°F)	MCA	VOLTAGE		PHASE
ERV-1	HE3XJINH-S15VV---ANT---L	2150	1	1 @ 2HP	2" MERV 8	2150	1	1 @ 2HP	2" MERV 8	50.5	89.9	72.1	79.6	67.4	68.6	-10	45.5	24.3	240	1	1,2,3,4,5
ERV-2	HE15-JINH-S15AA---GNT---L	850	1	1 @ 770W	2" MERV 8	850	1	1 @ 770W	2" MERV 8	53.5	89.9	72.1	79.5	67.2	69.2	-10	45.7	7.7	240	1	1,2,3,4,5
ERV-3	HE15-JINH-S15AA---GNT---L	1000	1	1 @ 770W	2" MERV 8	1000	1	1 @ 770W	2" MERV 8	50.6	89.9	72.1	79.7	67.4	67.8	-10	44.7	7.7	240	1	1,2,3,4,5

**NOTES:**  
1. BASED ON RENEWARE  
2. FUSED DISCONNECT BY UNIT MANUFACTURER  
3. MOTOR STARTERS & CONTACTORS PROVIDED BY MANUFACTURER  
4. SINGLE WALL CASING  
5. PROVIDE MOTORIZED BACK DRAFT DAMPER ON OUTSIDE INLET AND EXHAUST OUTLET

ELECTRIC CABINET UNIT HEATER SCHEDULE										
TAG	MODEL	LOCATION	TYPE	BTUS	EAT °F	VOLTS	PHASE	WATTS	DISC. BY	COMMENTS
CUH-2	H3423T	112 - WOMEN	WALL	10239	70	240	1	3,000	MANU	1,2,3

**NOTES:**  
1. BASED ON MARKEL  
2. UNIT MOUNTED TAMPER PROOF THERMOSTAT  
3. RECESS INTO WALL

ROOF HOOD SCHEDULE										
TAG	FUNCTION	SERVICE	MAKE/ MODEL	THROAT SIZE	HEIGHT	INLET FREE AREA (SQ. FT.)	CFM	WEIGHT	SCREEN	COMMENTS
IAH-1	INTAKE	ERV-1	GRSI-24	24"	11"	5.02	2150	29	BIRD	1,2
IAH-2	INTAKE	ERV-3	GRSI-16	16"	11"	2.00	1000	16	BIRD	1,2
RLH-1	EXHAUST	ERV-1	GRSR-24	24"	11"	3.14	2150	29	BIRD	1,2
RPH-2	EXHAUST	ERV-3	GRSR-16	16"	11"	1.25	1000	16	BIRD	1,2

**NOTES:**  
1. BASED ON GREENHECK  
2. ROOF CURB

DIFFUSER, REGISTER, & GRILLE SCHEDULE										
TAG	MODEL	NECK SIZE	FACE SIZE	CFM RANGE (MIN-MAX.)	PATTERN	MOUNT	MATERIAL	COLOR	100 FPM THROW	NOTES
SD-1	SCD	6"	24x24	50-135	3 CONE / 4-WAY	LAY-IN	STEEL	WHITE	3'	1,2,3,4
SD-1	SCD	8"	24x24	140-245	3 CONE / 4-WAY	LAY-IN	STEEL	WHITE	5'	1,2,3,4
SG-1	SDGE	10x4	10x4	60-150	ADJ DBL DEFL	SURFACE	EXT AL BLDG	WHITE	4'-9"	1,2,3,4,5,6
SG-1	SDGE	10x6	10x6	155-340	ADJ DBL DEFL	SURFACE	EXT AL BLDG	WHITE	6'-12"	1,2,3,4,5,6
EG-1	530 SERIES	6x6	6x6	50	3/4 SPC - 45° DFL	SURFACE	STEEL	WHITE	-	1,2,3,4,6
EG-1	530 SERIES	12x10	12x10	275	3/4 SPC - 45° DFL	SURFACE	STEEL	WHITE	-	1,2,3,4,6
EG-1	530 SERIES	20x10	20x10	425-500	3/4 SPC - 45° DFL	SURFACE	STEEL	WHITE	-	1,2,3,4,6
EG-1	530 SERIES	24x14	24x14	850	3/4 SPC - 45° DFL	SURFACE	STEEL	WHITE	-	1,2,3,4,6
EG-2	80 SERIES	12x12	12x12	600	1/2x1/2x1/2 GRID	SURFACE	ALUMINUM	WHITE	-	1,2,3,4,6
RG-1	530 SERIES	22x10	22x10	550	3/4 SPC - 45° DFL	SURFACE	STEEL	WHITE	-	1,2,3,4,6
RG-1	530 SERIES	40x20	40x20	2,350	3/4 SPC - 45° DFL	SURFACE	STEEL	WHITE	-	1,2,3,4,6
RG-2	80 SERIES	24x12	24x12	1,000	1/2x1/2x1/2 GRID	LAY-IN	ALUMINUM	WHITE	-	1,2,3,4
TG-1	80 SERIES	10x6	10x6	250	1/2x1/2x1/2 GRID	SURFACE	ALUMINUM	WHITE	-	1,2,3,4,6

**NOTES:**  
1. BASED ON PRICE  
2. MAX. NC = 30  
3. MAX. APD - 0.10 INCHES  
4. SELECT BORDER TO MATCH ROOM FINISH SCHEDULE  
5. AIRFOIL BLADE / STEEL FRAME  
6. INTERGRAL DAMPER

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PROJECT #24-43  
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Alma, Michigan 48801

NO.	DATE	DESCRIPTION

MECHANICAL SCHEDULES  
SHEET TITLE

M-901  
SHEET NUMBER