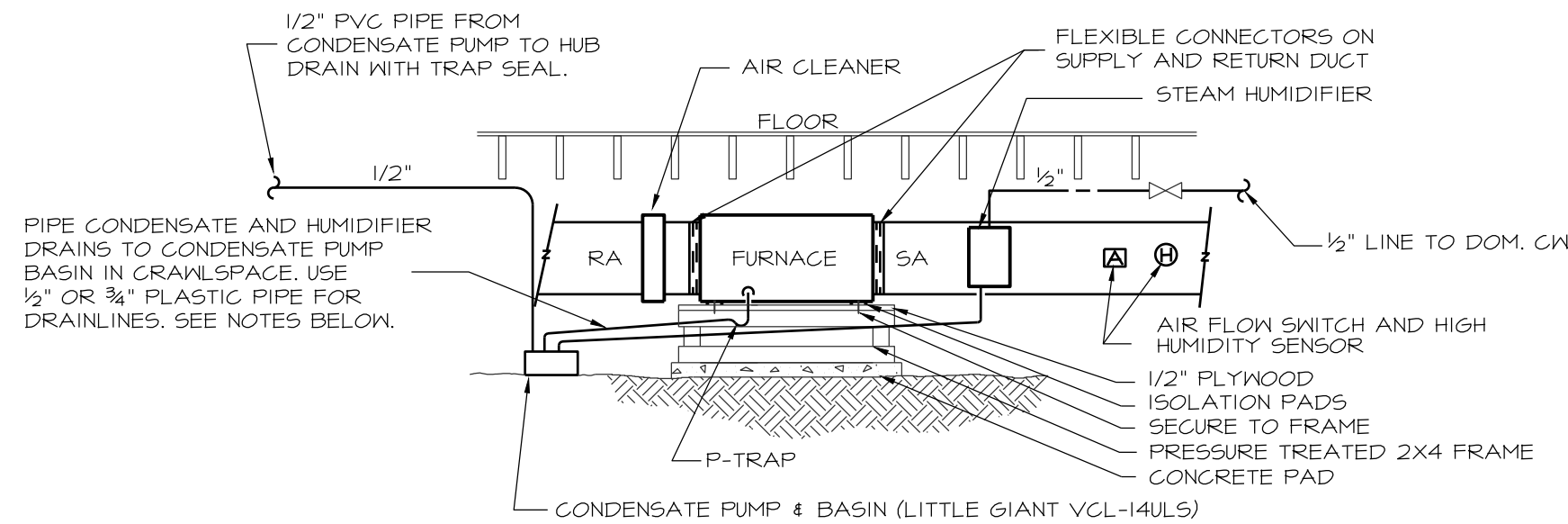


CRAWLSPACE ACCESS DETAIL

NO SCALE

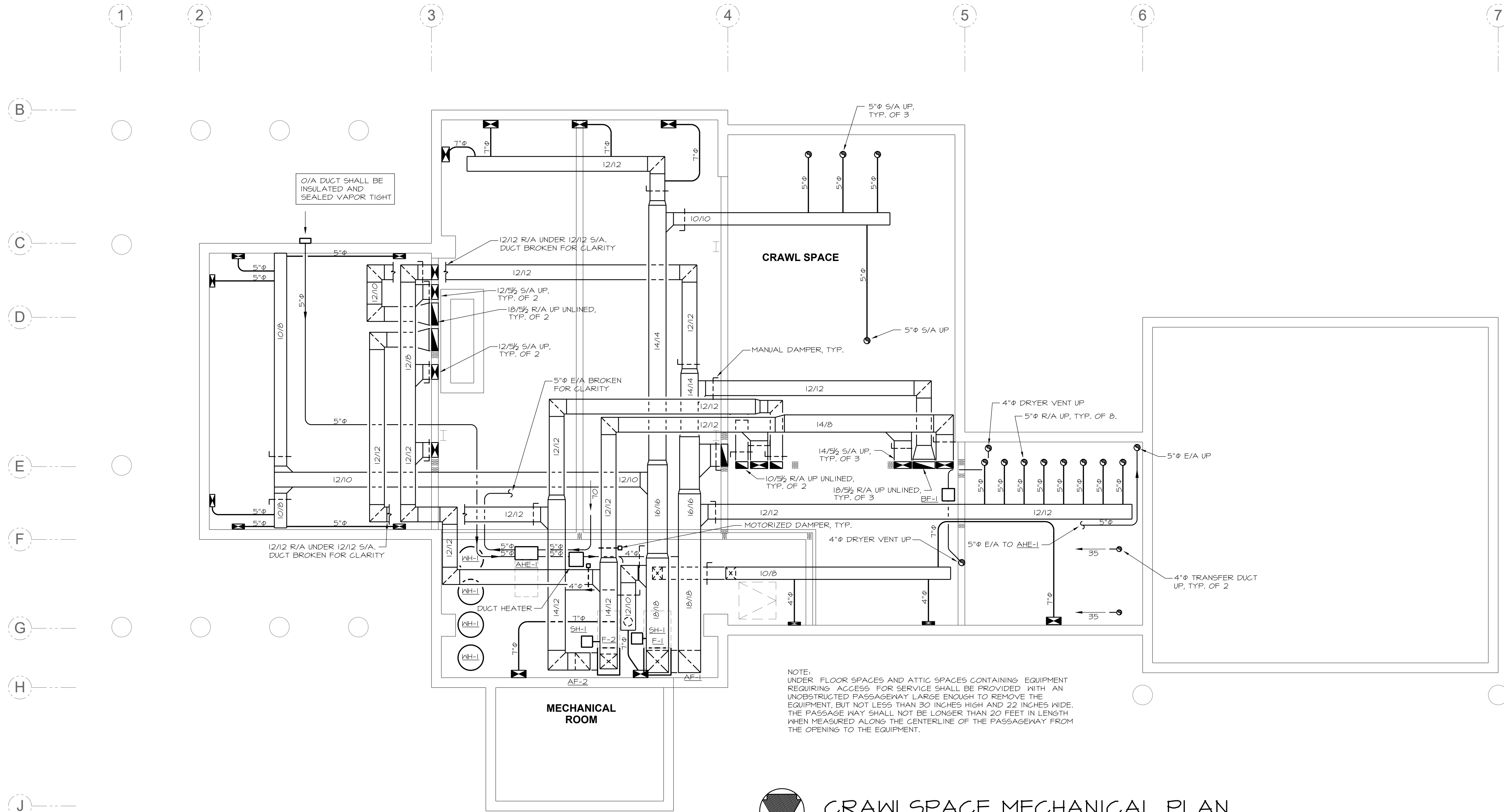
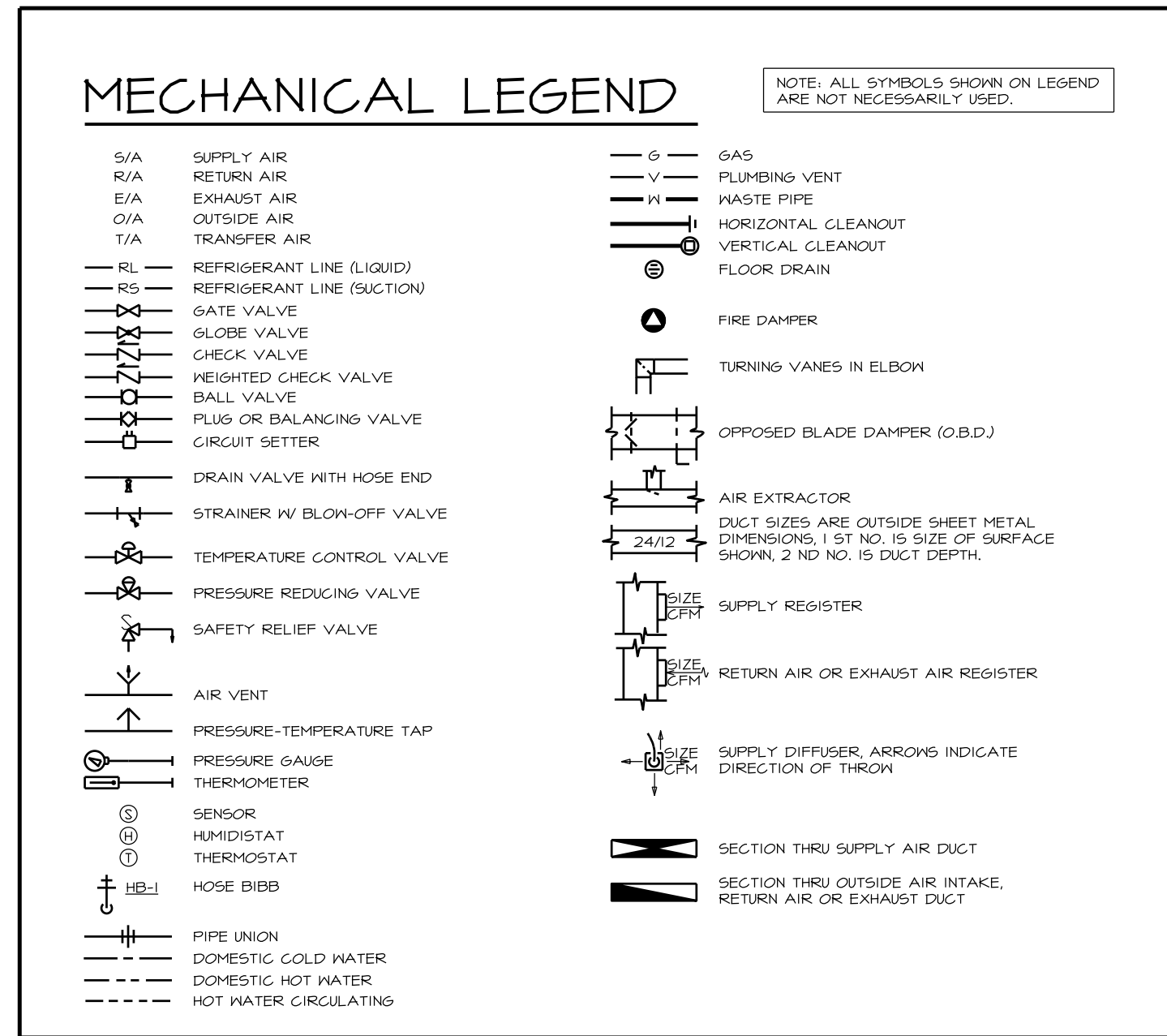


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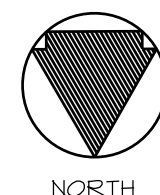
1. MOUNT FURNACE AS HIGH AS POSSIBLE IN CRAWLSPACE.
2. CONDENSATE AND DRAIN LINES SHALL BE ROUTED TO THE CONDENSATE PUMP BASIN. PUMP SHALL DISCHARGE IN HUB DRAIN WITH A TRAP SEAL.
3. CONDENSATE PUMP SHALL HAVE A FLOAT ARM AND SAFETY SWITCH. SAID SWITCH SHALL AUTOMATICALLY SHUT OFF ANY APPLIANCE PIPED TO PUMP IF THE PUMP BASIN REACHES CAPACITY.
4. REFER TO THE HUMIDIFIER INSTALLATION MANUAL FOR DETAILS ON HUMIDIFIER PIPING.
5. THE PLUMBING CONTRACTOR SHALL MAKE ALL WATER AND SEWER CONNECTIONS FOR THE HUMIDIFIER THAT CONNECT TO THE HOUSE WATER AND SEWER SYSTEM.
6. THE HEATING CONTRACTOR SHALL MOUNT THE HUMIDIFIER AND PROVIDE ALL CONTROL CONNECTIONS.
7. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL POWER WIRING. HUMIDIFIER IS DESIGNED FOR 240 V OPERATION.
8. LOCATE NOZZLE AT LEAST 4' FROM DUCT BENDS, ELBOWS OR ANY OTHER OBSTRUCTIONS. DUCT MUST BE UNLINED 2' FROM NOZZLE IN DOWNSTREAM DIRECTION.

CRAWLSPACE FURNACE DETAIL

NO SCALE



NOTE: UNDER FLOOR SPACES AND ATTIC SPACES CONTAINING EQUIPMENT REQUIRING ACCESS FOR SERVICE SHALL BE PROVIDED WITH AN UNOBSTRUCTED PASSAGEWAY LARGE ENOUGH TO REMOVE THE EQUIPMENT, BUT NOT LESS THAN 30 INCHES HIGH AND 22 INCHES WIDE. THE PASSAGEWAY SHALL NOT BE LONGER THAN 20 FEET IN LENGTH WHEN MEASURED ALONG THE CENTERLINE OF THE PASSAGEWAY FROM THE OPENING TO THE EQUIPMENT.



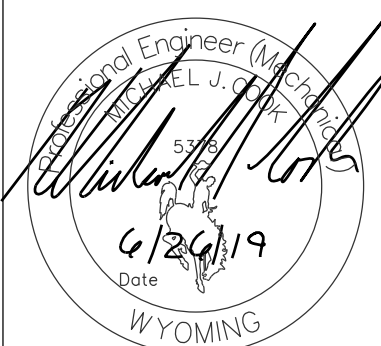
CRAWLSPACE MECHANICAL PLAN

SCALE 1/4" = 1'-0"

Richardson Residence
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Teton County, Wyoming

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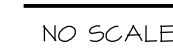
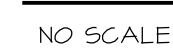
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6.28.19 Construction

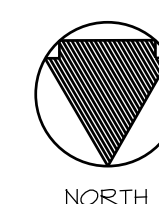
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M1.1

Crawlspace Mechanical Plan



NO SCALE



MAIN LEVEL MECHANICAL PLAN
SCALE 1/4" = 1'-0"

Sheet:

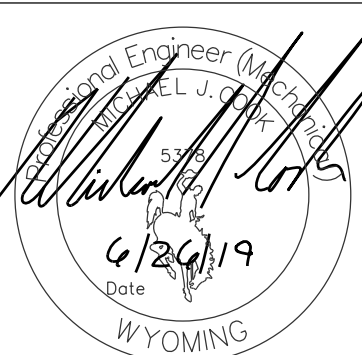
M1.2

Main Level Mechanical Plan

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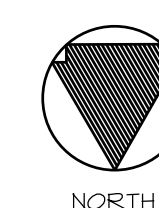
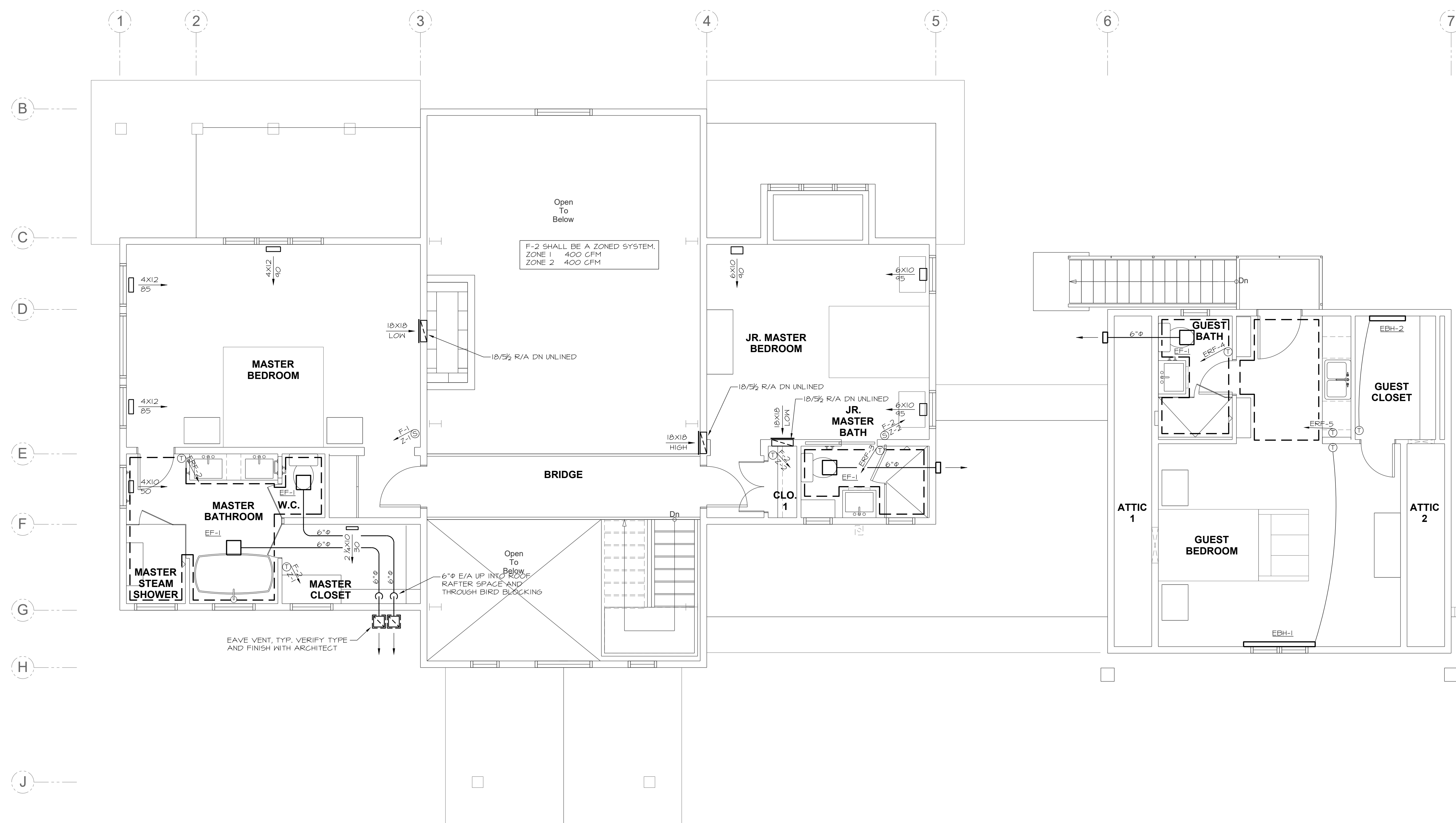
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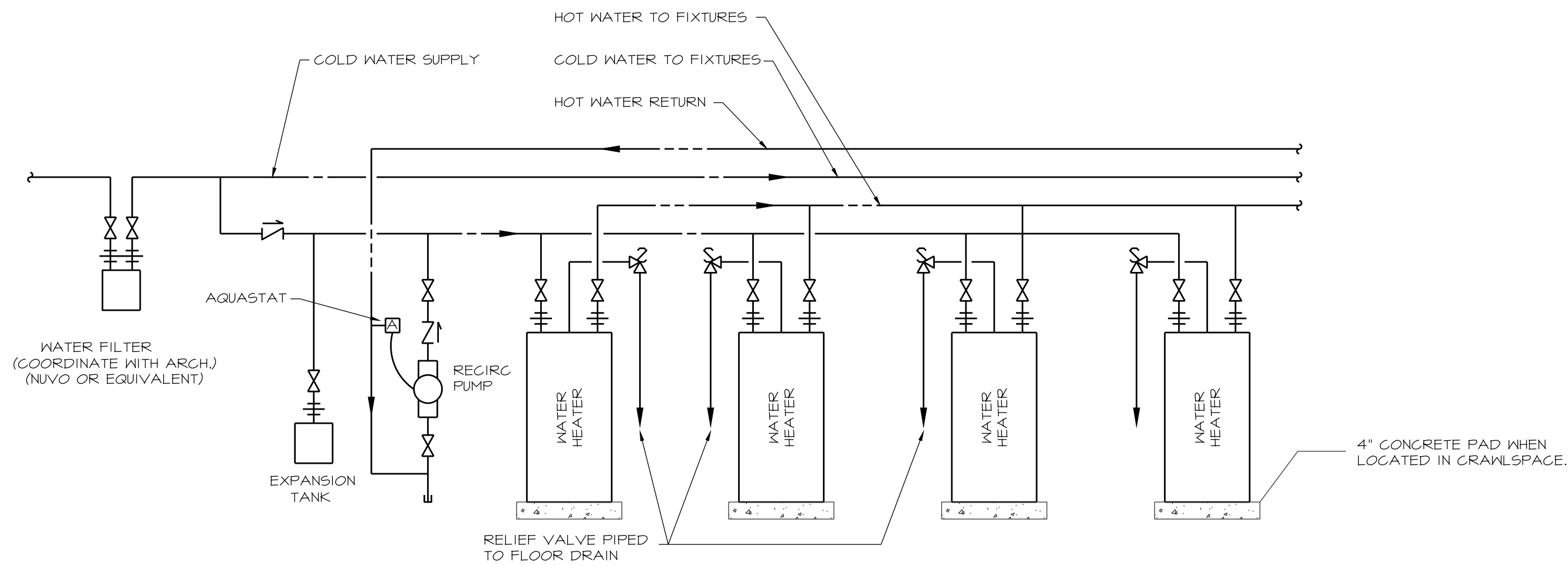
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M1.3

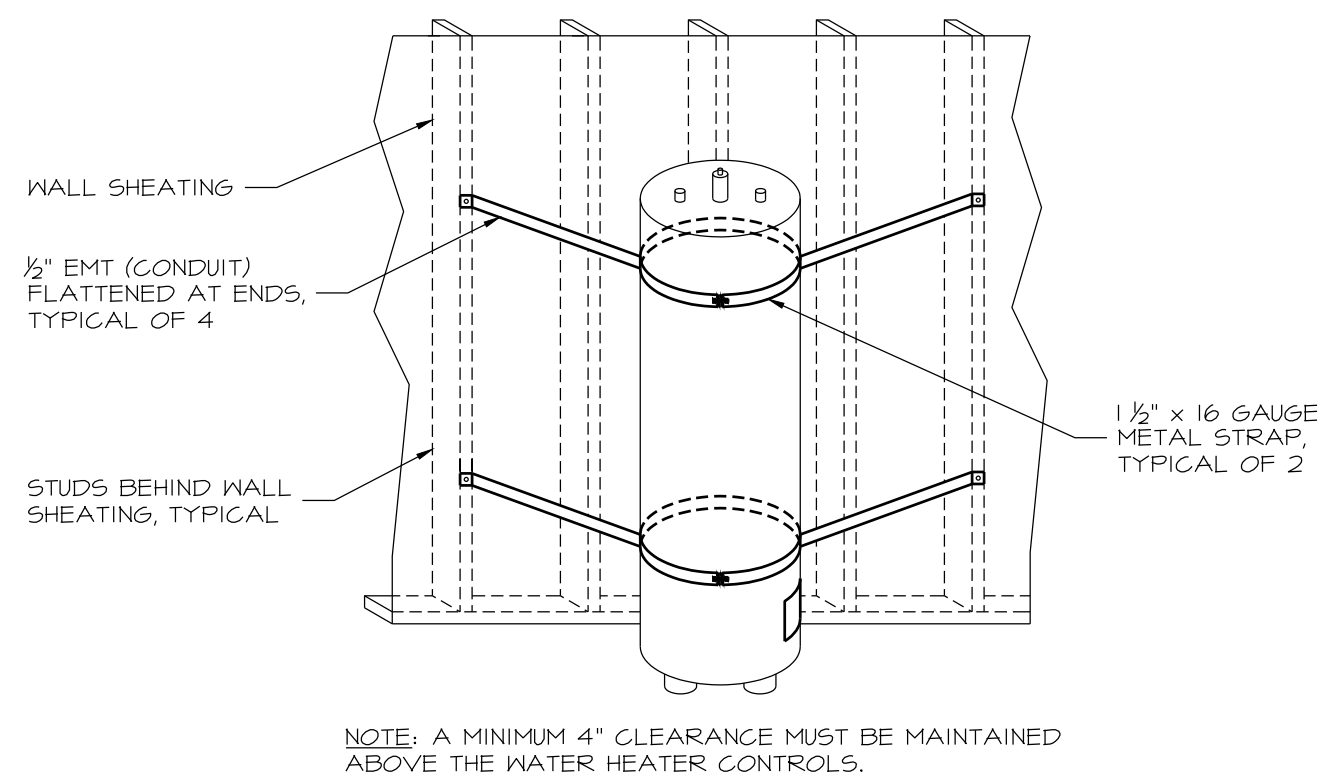
Upper Level Mechanical Plan



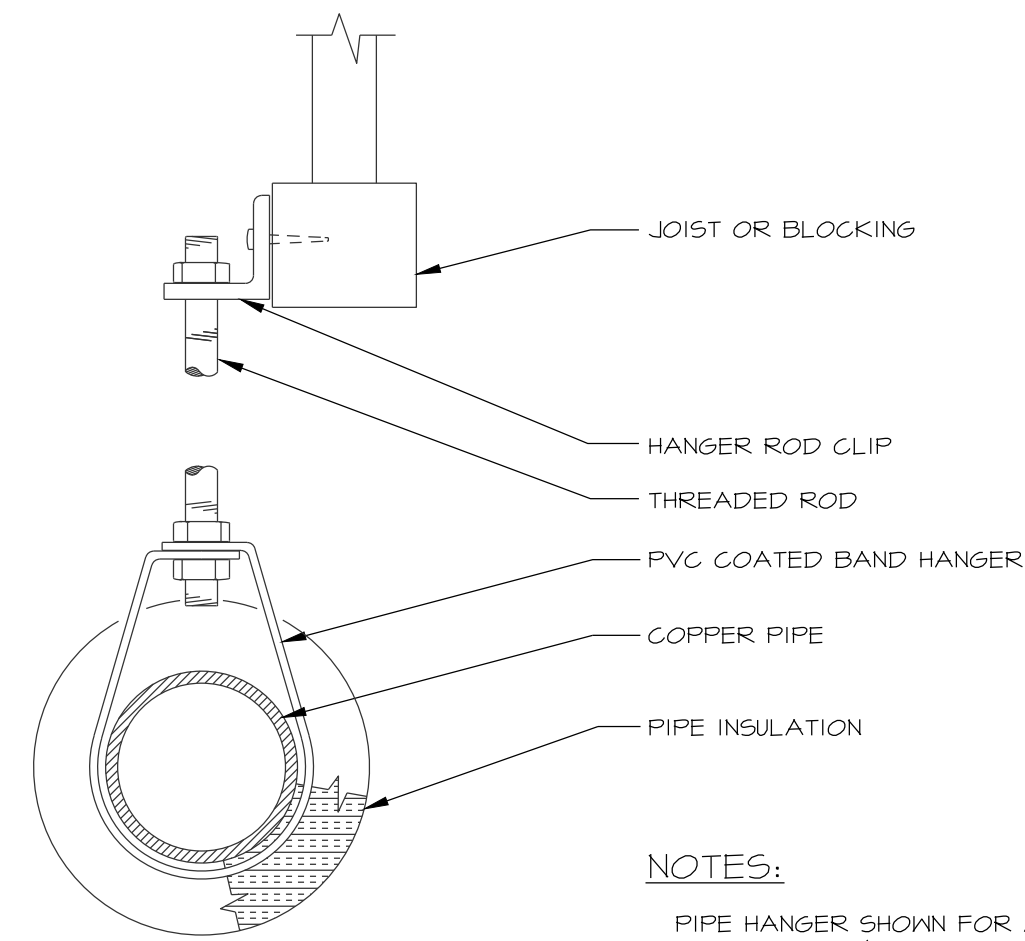
UPPER LEVEL MECHANICAL PLAN
SCALE 1/4" = 1'-0"



WATER HEATER DETAIL
NO SCALE

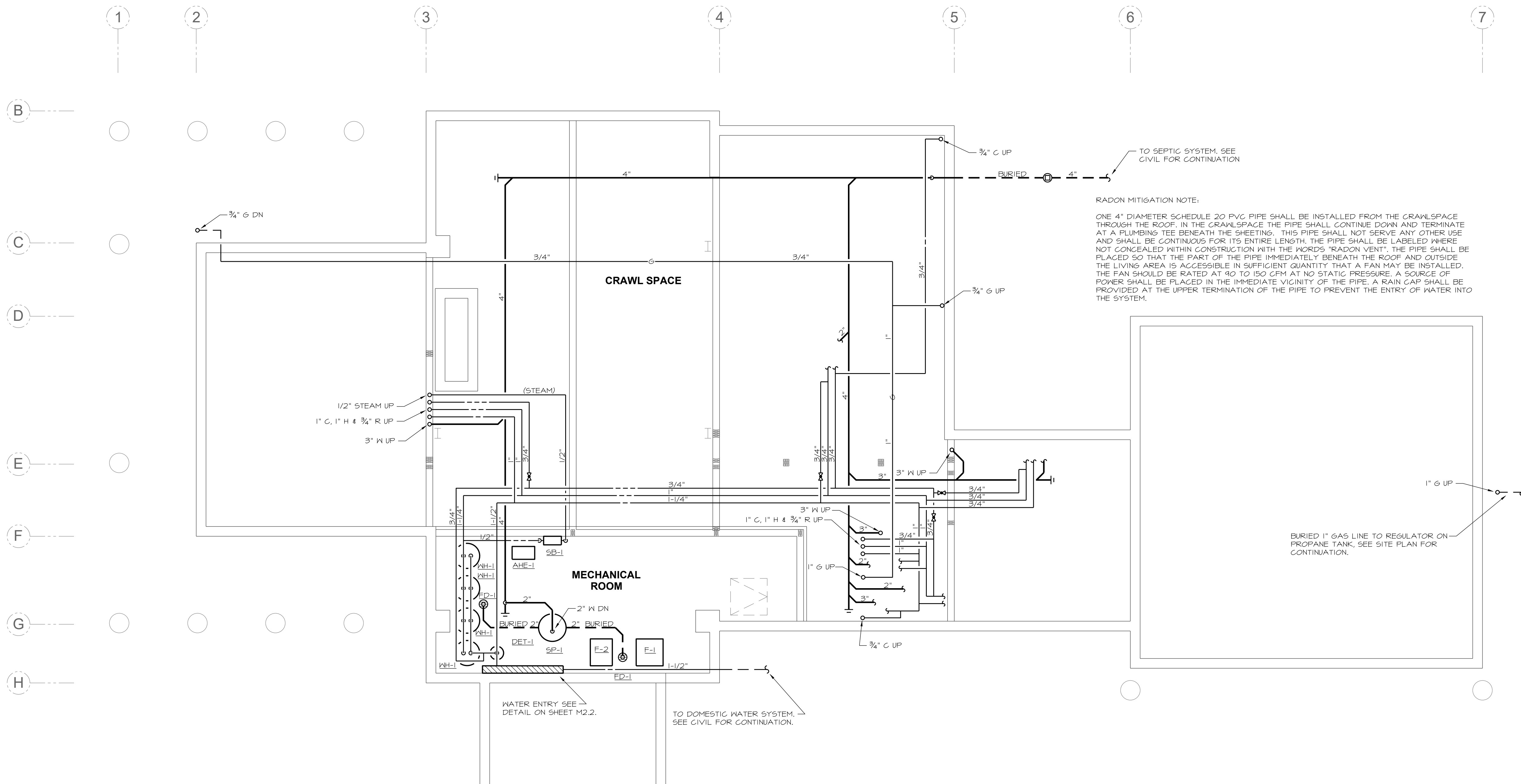


WATER HEATER SEISMIC SUPPORT DETAIL
NO SCALE

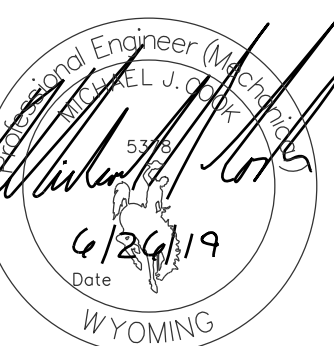


NOTES:
PIPE HANGER SHOWN FOR ALL PIPING 1/4" AND LARGER (DOMESTIC OR HEATING).
PIPE INSULATION ON CHILLED WATER PIPING SHALL BE CONTINUOUS THROUGH CHANNEL SUPPORT & PIPE CLAMP. INSTALL HIGH DENSITY INSULATION WITH PIPE SHIELD.

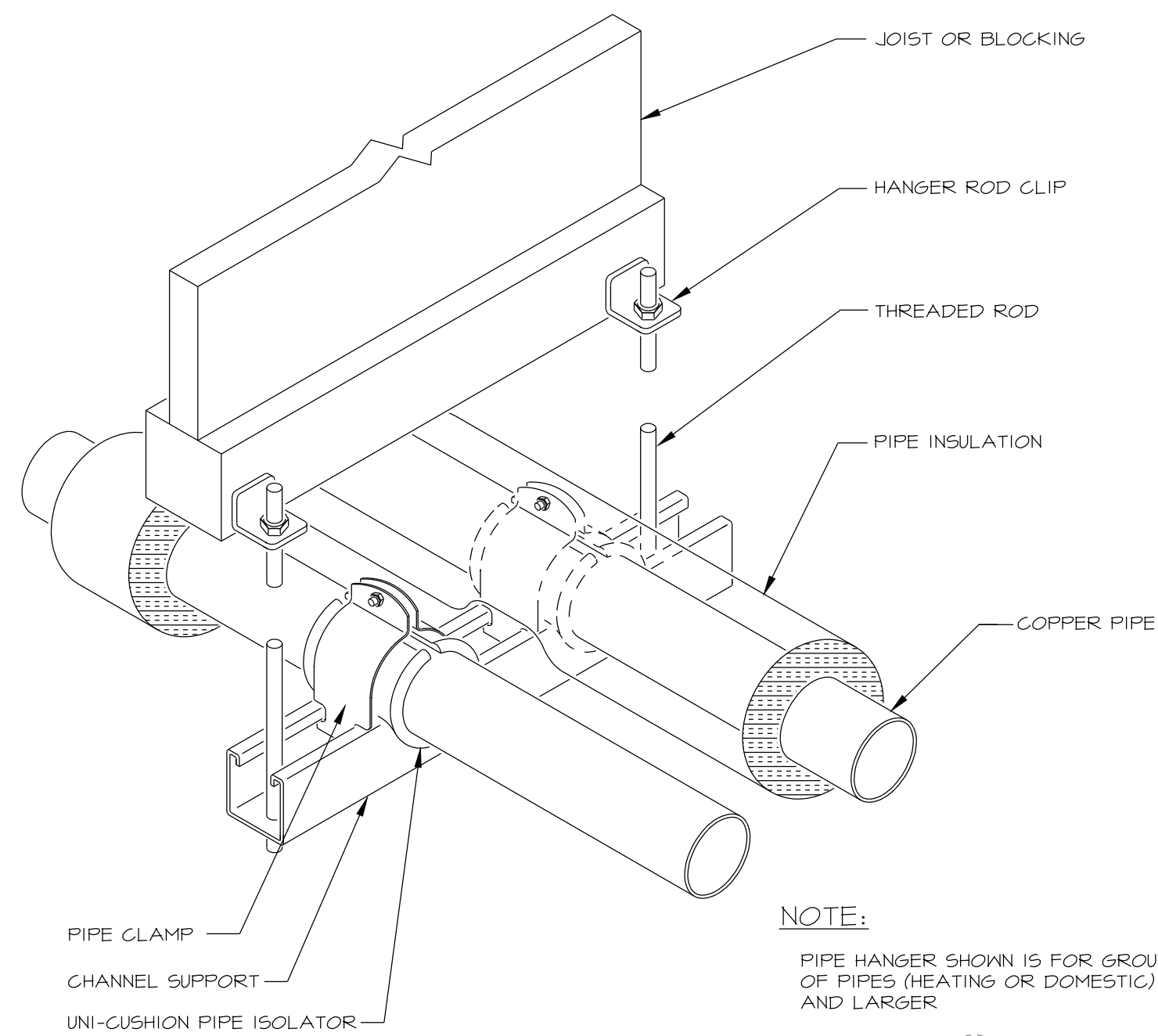
INDIVIDUAL PIPE HANGER
NO SCALE



CRAWLSPACE PLUMBING PLAN
SCALE 1/4" = 1'-0"



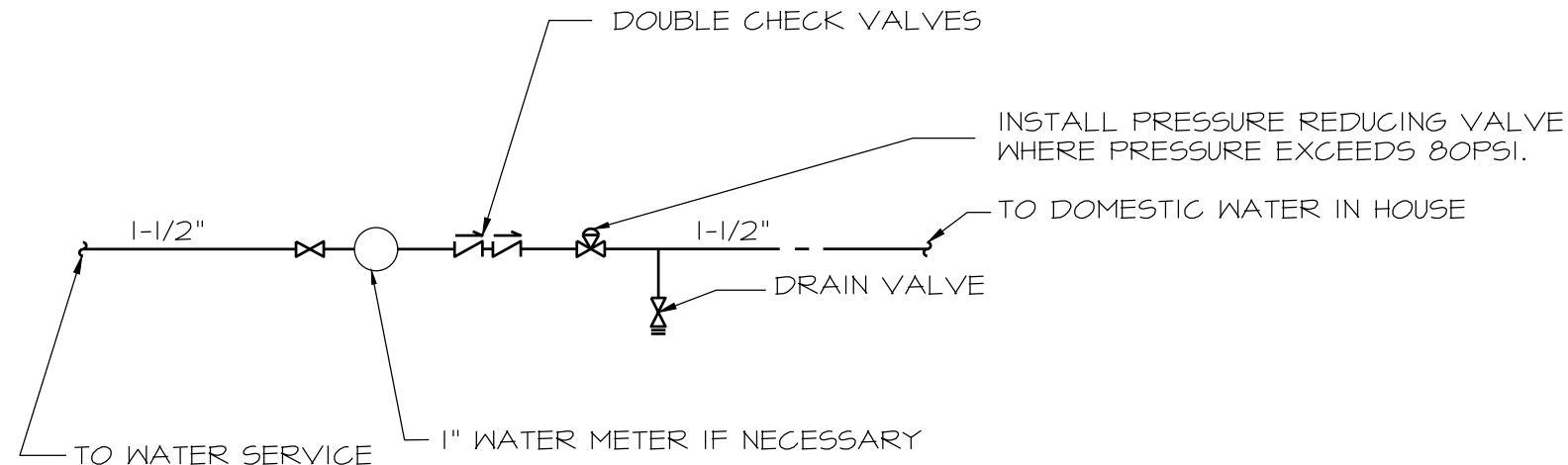
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MULTIPLE PIPE HANGER

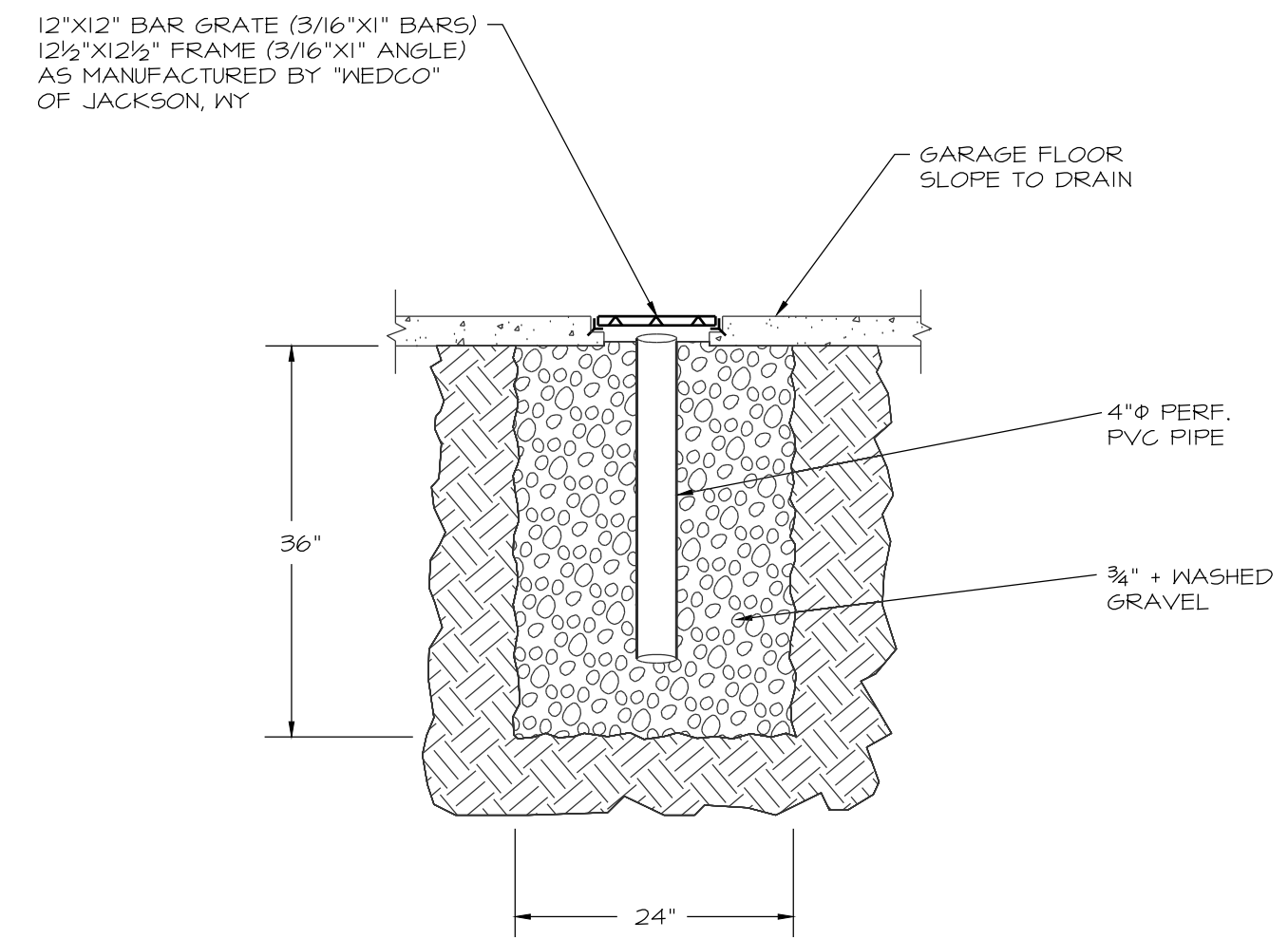
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NOTE:
PIPE HANGER SHOWN IS FOR GROUPS OF
OF PIPES (HEATING OR DOMESTIC) 1/4"Ø
AND LARGER



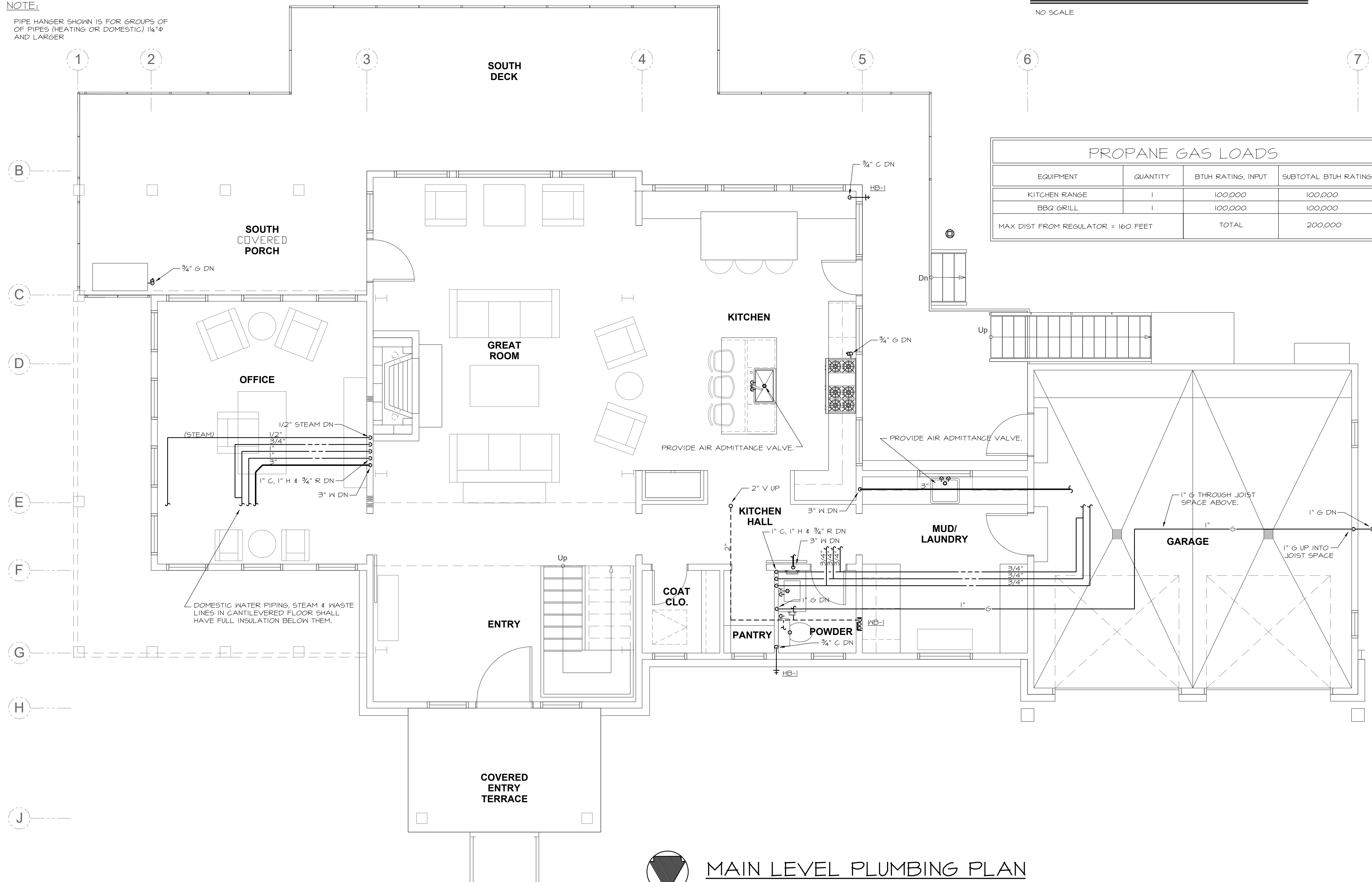
WATER SERVICE PIPING SCHEMATIC

NO SCALE

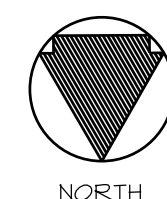


GARAGE FLOOR DRAIN DETAIL

NO SCALE



PROPANE GAS LOADS			
EQUIPMENT	QUANTITY	BTUH RATING, INPUT	SUBTOTAL BTUH RATING
KITCHEN RANGE	1	100,000	100,000
BBQ GRILL	1	100,000	100,000
MAX DIST FROM REGULATOR = 160 FEET		TOTAL	200,000

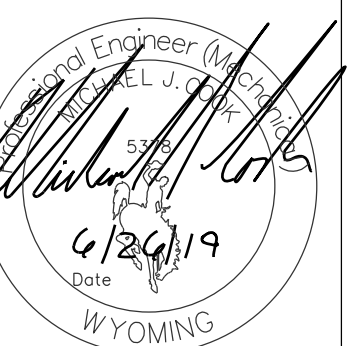


MAIN LEVEL PLUMBING PLAN
SCALE 1/4" = 1'-0"

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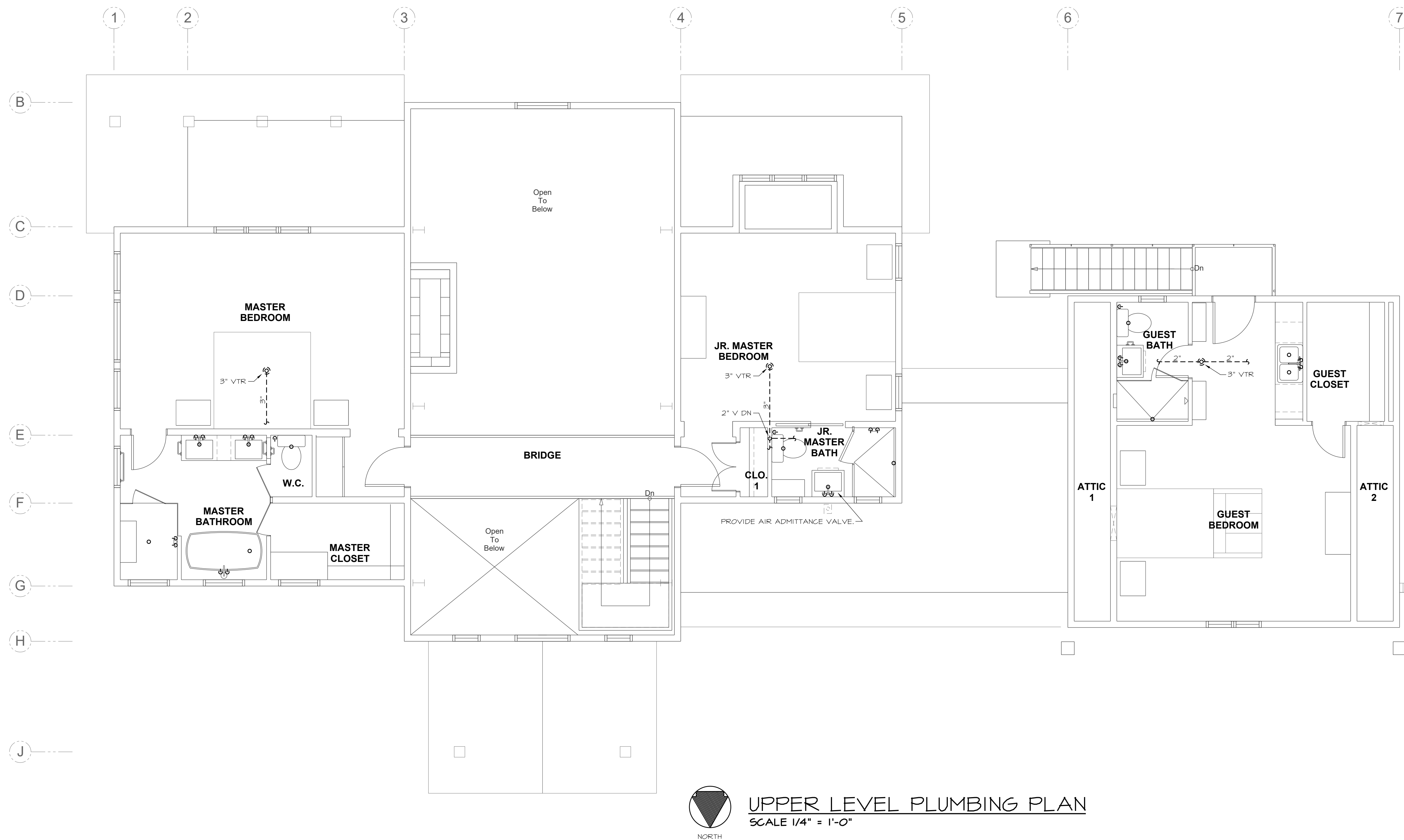
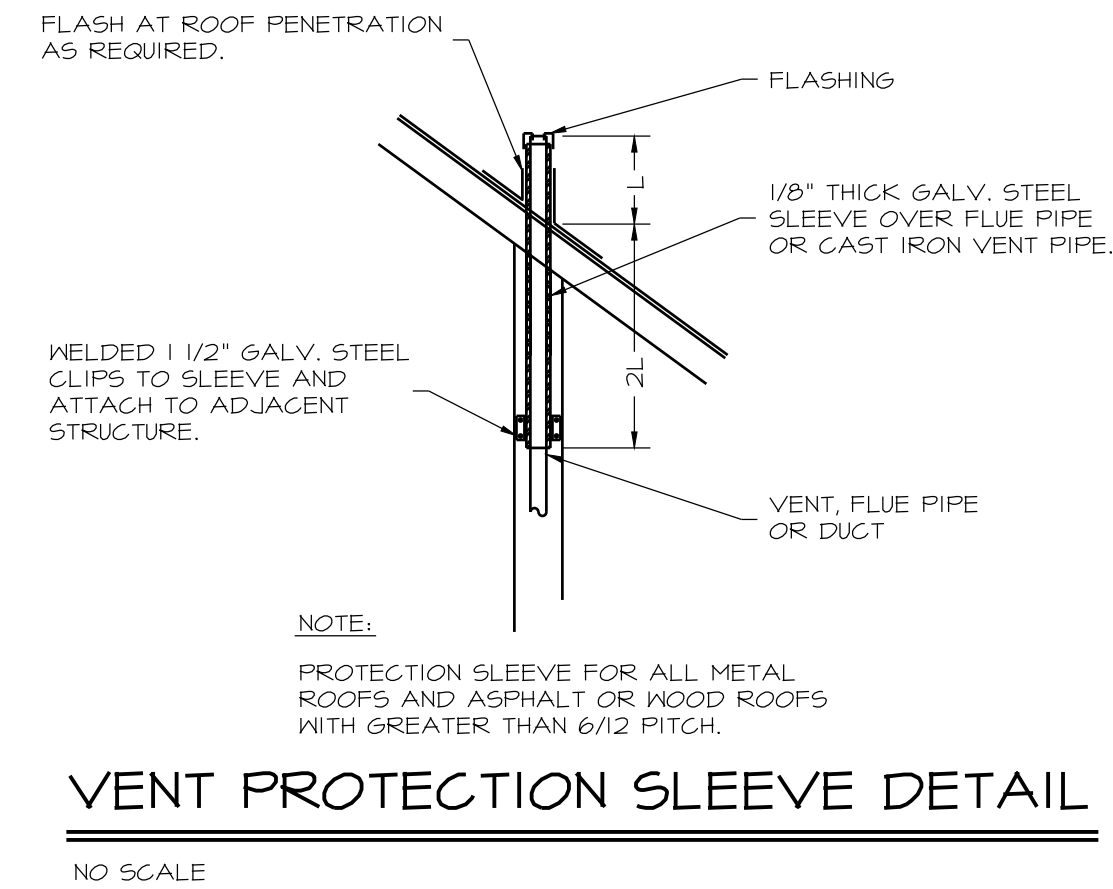
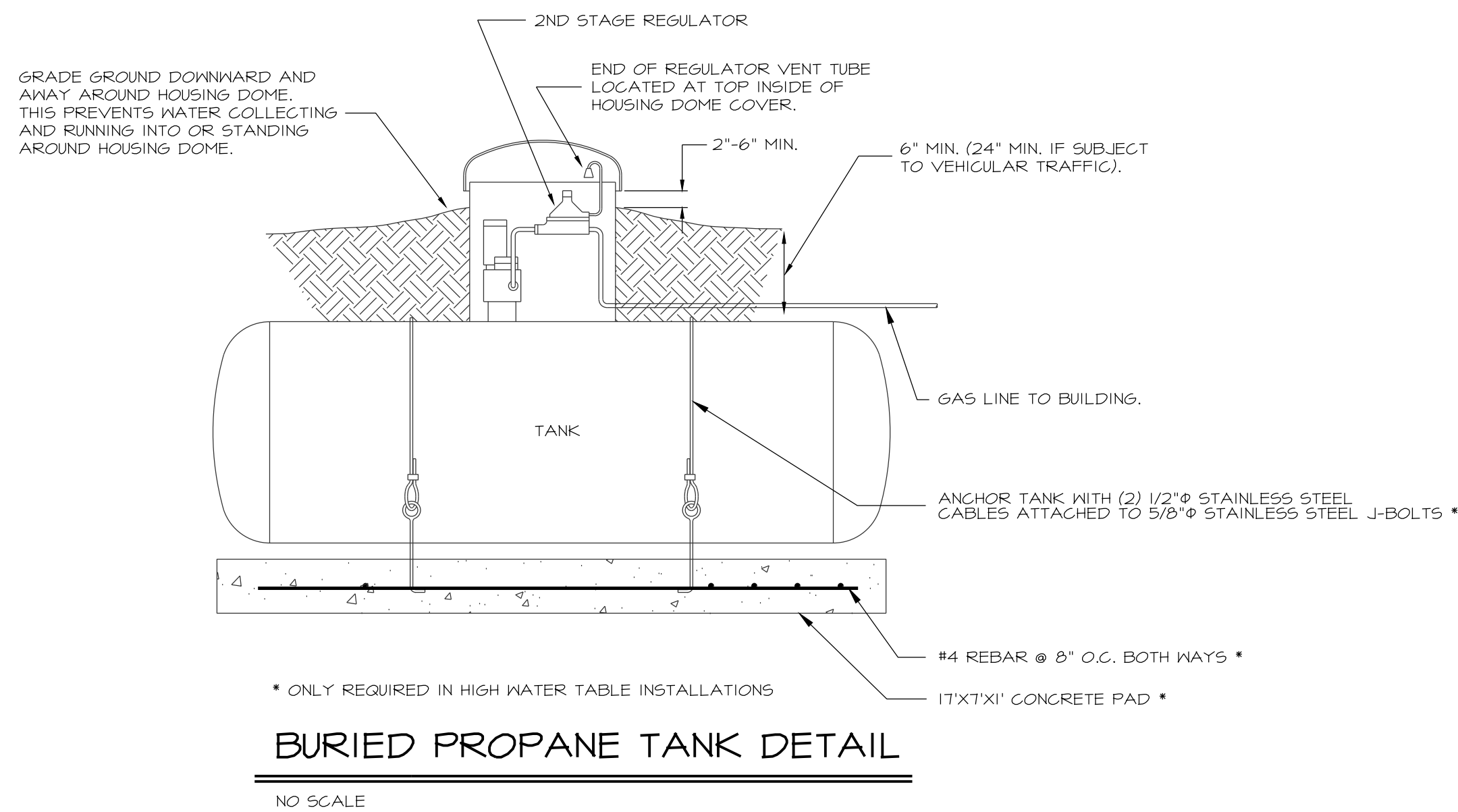
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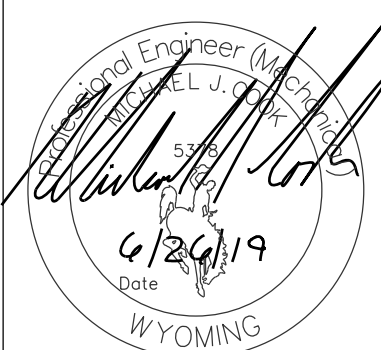
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M2.2
Main Level Plumbing Plan



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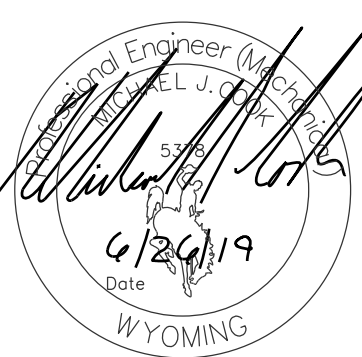
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6.28.19	Construction

Sheet:

M2.3

Upper Level Plumbing Plan



Date/Revision:

11.16.18 SD Set

5.10.19 Permit Set

6.28.19 Construction

Sheet:

M3.2

Mechanical Specifications

1.06 DELIVERY, STORAGE AND HANDLING:
PROVIDE FOR PROPER STORAGE OF ALL MATERIALS AND EQUIPMENT AND ASSUME RESPONSIBILITY FOR LOSSES DUE TO ANY CAUSE. COVER AND STORE ALL MATERIALS, EQUIPMENT AND MATERIALS OUT OF THE ELEMENTS AND OFF OF THE GROUND; ANY RUSTED OR WEATHER DAMAGED ITEM WILL NOT BE PERMITTED TO BE USED.

1.07 PRODUCT OPTIONS AND SUBSTITUTIONS:
A. PRIOR TO BIDDING,
1. MATERIALS OR PRODUCTS SPECIFIED BY NAME OR MANUFACTURER, BRAND OR TRADE NAME SHALL BE FURNISHED UNDER THE CONTRACT UNLESS CHANGED BY AN ADDENDUM OR A CONTRACT MODIFICATION. WHERE TWO OR MORE MATERIALS ARE NAMED, THE CHOICE OF THESE SHALL BE OPTIONAL WITH THE CONTRACTOR.

2. ACTION FOR SUBSTITUTIONS SPECIFIED HEREIN WILL BE GIVEN ONLY AFTER THE RECEIPT OF COMPLETE DATA SHOWING PERFORMANCE, PHYSICAL DIMENSIONS AND MATERIAL CONSTRUCTION. ONE COPY OF ALL DISCRIMINATIVE DATA SHALL BE SUBMITTED TO THE MECHANICAL ENGINEER'S OFFICE.

3. MATERIAL AND EQUIPMENT SPECIFIED IS USED AS A BASIS OF STANDARD, AND WHILE NOT SPECIFICALLY MENTIONED, MATERIAL GAUGES, HEIGHTS, APPEARANCE AND SPACE REQUIREMENTS MUST BE MET BY ANY SUBSTITUTIONS.

1.08 CLEANING:
A. CLEAR AWAY ALL DEBRIS, SURPLUS MATERIALS, ETC., RESULTING FROM MECHANICAL CONTRACTOR'S WORK OR OPERATIONS, LEAVING THE JOB AND EQUIPMENT IN A CLEAN CONDITION. THIS INCLUDES ATTIC AND CRAWLSPACE.

B. ALL SURFACES OF ALL COILS, FANS, AIR UNITS, AIR FILTERS, ETC., SHALL BE THOROUGHLY CLEAN OR WASHED IF REQUIRED. ALL PLUMBING FIXTURES SHALL BE THOROUGHLY CLEANED OF ALL FOREIGN MATTER, INCLUDING STICKERS. CLEAN ALL ITEMS FURNISHED SUCH AS FLOOR DRAINS, PUMPS, MOTORS, TRAPS, ETC., LEAVING THE ENTIRE INSTALLATION IN A FIRST-CLASS CONDITION.

1.09 PROJECT RECORD DRAWING:
A. FILE AT THE JOB SITE ONE COPY OF DRAWINGS, SPECIFICATIONS, APPENDIX, CHANGE ORDERS, FIELD ORDERS AND OTHER MODIFICATIONS TO CONTRACT DOCUMENTS.

B. DO NOT USE PROJECT RECORD DOCUMENTS FOR CONSTRUCTION PURPOSES.

C. LEGIBLY MARK WITH RED PENCIL FIELD CHANGES, REFERENCED TO PERMANENT AND ACCESSIBLE FEATURES OF THE SITE OR BUILDING AS APPLICABLE. DO NOT CONCEAL ANY WORK UNTIL REQUIRED INFORMATION IS RECORDED.

1.10 OPERATION AND MAINTENANCE DATA:
A. PREPARE A TYPED AND HARD BOUND COPY OF OPERATING AND MAINTENANCE MANUAL TO ANYTHING FOR APPROVED PRIOR TO SCHEDULING ANY SYSTEM DEMONSTRATION FOR THE OWNER. BOOK SHALL BE ARRANGED IN SEQUENCE TO MATCH THE EQUIPMENT SCHEDULES INCLUDED IN THE SPECIFICATIONS.

B. THE BOOKS SHALL CONTAIN, BUT NOT BE LIMITED TO, THE FOLLOWING GENERAL ITEMS; EACH ITEM SHALL BE PROVIDED WITH A SEPARATE INDEX TAB:

1. PRODUCT DATA ON EACH PIECE OF EQUIPMENT INSTALLED IDENTIFIED BY DRAWING CODE NUMBERS AS THEY APPEAR ON THE DRAWINGS AND IN THE SPECIFICATIONS. DATA SHOULD INCLUDE THE FOLLOWING INFORMATION: INSTALLATION INSTRUCTION SHEETS, SPARE PARTS LISTS, OPERATING MANUALS AND COMPLETE WIRING DIAGRAMS.

2. ALL WARRANTIES PROVIDED BY THE MANUFACTURER ON THEIR EQUIPMENT THAT RUN LONGER THAN THE ONE YEAR WARRANTY BY THE CONTRACTOR.

1.11 FINAL OBSERVATION:
A. WHEN THE CONTRACTOR NOTIFIES THE ARCHITECT THAT THE PROJECT IS READY FOR A FINAL OBSERVATION, THE ARCHITECT WILL VISIT THE JOB SITE AND WILL PREPARE A FINAL PUNCH LIST OF ALL THE ITEMS ON THE PROJECT THAT SHALL BE FINISHED OR CORRECTED BEFORE THE PROJECT CAN BE ACCEPTED.

B. WHEN THE CONTRACTOR NOTIFIES THE ARCHITECT THAT ALL ITEMS ON THE ABOVE PUNCH LIST HAVE BEEN COMPLETED AND CORRECTED, THE ARCHITECT WILL VISIT THE PROJECT TO ASCERTAIN THAT ALL THE ITEMS ON THE PUNCH LIST HAVE BEEN CORRECTED AND CAN BE ACCEPTED.

1.12 WARRANTIES:
A. ALL MATERIALS AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE SPECIFIED.

B. PROVIDE WARRANTY TO THE OWNER COVERING THE ENTIRE MECHANICAL WORK TO BE FREE FROM DEFECTIVE MATERIALS, EQUIPMENT AND WORKMANSHIP FOR A PERIOD OF ONE YEAR AFTER DATE OF ACCEPTANCE. DURING THIS PERIOD, PROVIDE LABOR AND MATERIALS AS REQUIRED TO REPAIR OR REPLACE DEFECTS AT NO ADDITIONAL COST TO THE OWNER. PROVIDE CERTIFICATES IN 0 4 H MANUALS FOR SUCH MATERIALS OR EQUIPMENT WHICH HAVE WARRANTIES IN EXCESS OF ONE YEAR.

C. THIS WARRANTY WILL BE SUPERSEDED BY WARRANTY MODIFICATIONS RESULTING FROM USE OF EQUIPMENT FOR CONSTRUCTION HEAT OR VENTILATION.

1.13 OPERATING INSTRUCTIONS:
A. THE MECHANICAL CONTRACTOR SHALL PROVIDE PERSONNEL FOR INITIAL STARTUP AND OPERATION OF THE MECHANICAL EQUIPMENT AND FOR A TRAINED RUN OF THE EQUIPMENT TO DEMONSTRATE THAT THE EQUIPMENT AND ASSOCIATED SYSTEMS ARE PROPERLY INSTALLED AND OPERATING AS INTENDED.

B. THE MECHANICAL CONTRACTOR SHALL INSTRUCT THE OWNER IN THE PROPER STARTUP, OPERATION, OBSERVATION AND MAINTENANCE OF ALL MECHANICAL EQUIPMENT INSTALLED UNDER THIS CONTRACT.

1.14 BALANCING
A. AT THE COMPLETION OF THE INSTALLATION, THE FORCED AIR SYSTEM AND HYDRONIC SYSTEM SHALL BE ADJUSTED AND BALANCED BY THE CONTRACTOR. ALL AIR BALANCING SHALL BE DONE AT DAMPERS IN BRANCH DUCTS AND SPIN FITTINGS FIRST, THEN AT THE SUPPLY REGISTERS. PROVIDE AIR QUANTITIES AS SHOWN ON THE DRAWINGS.

B. AIR AND WATER TESTING AND BALANCING SHALL NOT BEGIN UNTIL THE SYSTEM HAS BEEN COMPLETED AND IS IN FULL WORKING ORDER.

C. ADJUST ALL AIR AND WATER SYSTEMS WITHIN +5% TO -5% OF DESIGN FLOW RATES.

D. MARK FINAL SETTINGS OF VOLUME DAMPERS WITH PERMANENT MARKING WHEN BALANCING IS COMPLETE.

PART 2 - PRODUCTS
NOT APPLICABLE

PART 3 - EXECUTION
NOT APPLICABLE

END OF SECTION 15010

SECTION 15050
BASIC MATERIALS AND METHODS

1.01 WORK INCLUDED:
PIPE SUPPORTS
VALVES
PIPE INSTALLATION

PART 2 - PRODUCTS

2.01 EQUIPMENT MANUFACTURERS:
EQUIPMENT SUCH AS MOTORS, PUMPS, GAUGES, VALVES, ETC., SHALL BE OF ONE MANUFACTURER OR AVAILABLE THROUGH ONE MANUFACTURER TO FACILITATE EASE OF MAINTENANCE FOR THE OWNER.

2.2 ACCESS DOORS:
FURNISH ACCESS DOORS AT LOCATIONS WHERE REQUIRED FOR ACCESS TO CONCEALED VALVES, DAMPERS, CLEANOUTS, CONTROL DEVICES AND EQUIPMENT.

2.03 PIPE SUPPORTS AND HANGERS:
A. GENERAL: USE ADJUSTABLE PIPE HANGERS ON SUSPENDED PIPE. PROVIDE HANGERS TO SUPPORT THE SYSTEMS WITHOUT SAGGING, INCLUDING HANGERS AT EACH OFFSET OR CHANGE IN DIRECTION, AT ENDS OF BRANCHES OVER FIVE FEET IN LENGTH AND AT THE FOLLOWING MAXIMUM SPACINGS:

B. PIPE TYPE PIPE SIZE SPACING
STEEL PIPE 1/2" THROUGH 1-1/4" 8'-0"
COPPER PIPE 1/2" THROUGH 1-1/2" 6'-0"
CAST IRON 2" THROUGH 4" 1 EACH JOINT
PLASTIC PIPE 1/2" THROUGH 1-1/4" AND ABOVE 3'-0"

C. INDIVIDUAL HANGERS:
1. INDIVIDUAL HANGERS FOR COPPER PIPING, 1-1/4" AND LARGER SHALL BE COPPER PLATED OR PLASTIC COATED STEEL.

2. INDIVIDUAL HANGERS FOR STEEL PIPING 1-1/4" AND LARGER SHALL BE ZINC PLATED, ADJUSTABLE SWIVEL RING HANGERS.

3. INDIVIDUAL HANGERS FOR PIPING UP TO 1" SHALL BE SAME AS ABOVE OR MAY BE SILOUX STRAP PLASTIC TUBE HANGERS OR APPROVED EQUIVALENT.

D. TRAPEZE HANGERS:
1. PARALLEL RUNS OF PIPING MAY BE SUPPORTED ON TRAPEZE HANGERS. HANGERS SHALL BE SPACED FOR SMALLEST PIPE IN GROUP.

2. ALL STEEL PIPE SHALL HAVE STANDARD PIPE STRAPS AT EACH SUPPORT.

3. ALL COPPER PIPE SHALL REST ON NEOPRENE SLEEVES AND HAVE STANDARD PIPE STRAPS AT EACH SUPPORT.

E. VERTICAL SUPPORTS:
PROVIDE FRICTION-RESISTER CLAMPS, SUPPORTED AND BRACED. CLAMPS FOR COPPER PIPING SHALL BE PLASTIC COATED STEEL. SUPPORT CAST IRON SOIL PIPE AT NOT LESS THAN EVERY STORY HEIGHT AND AT ITS BASE. SUPPORT COPPER TUBING AT SIX FOOT ON CENTER.

2.04 VALVES:
A. PRESSURE RATINGS: UNLESS OTHERWISE INDICATED, USE VALVES SUITABLE FOR MINIMUM 125 PSIG AT 450 DEG. F AND 200 PSIG AT 250 DEG. F.

B. VALVE CONNECTIONS: PROVIDE VALVES SUITABLE TO CONNECT TO ADJOINING PIPING AS SPECIFIED FOR PIPE JOINTS. SOLDER OR SCREW TO SOLDER ADAPTERS FOR COPPER TUBING.

PART 3 - EXECUTION

3.01 PREPARATION:
BASE FINAL INSTALLATION OF MATERIALS AND EQUIPMENT ON JOB SITE DIMENSIONS AND CONDITIONS. JOB SITE DIMENSIONS SHALL TAKE PRECEDENCE OVER DRAWING DIMENSIONS. FIELD MEASURE CRITICAL DIMENSIONS AND DO NOT FABRICATE OR CUT MATERIALS TO LENGTH UNTIL SUCH MEASUREMENTS ARE MADE. FOR REQUIRED ACCURATE LOCATION OF ROUGH-INS AS REQUIRED FOR EQUIPMENT BEING SERVICED.

3.02 EXCAVATION AND BACKFILL:
A. THE CONTRACTOR SHALL DO ALL TRENCH AND PIT EXCAVATIONS AND BACKFILLING REQUIRED FOR WORK UNDER THIS SECTION OF THE SPECIFICATIONS. LINEWORK AND OUTSIDE THE BUILDING INCLUDING REPAIRS OF FINISHED SURFACES, ALL REQUIRED SHORING, BRACING, PUMPING AND ALL PROTECTION FOR SAFETY OF PERSONS AND PROPERTY. LOCAL OR STATE SAFETY CODES SHALL BE STRICTLY OBSERVED.

B. EXTREME CAUTION SHALL BE EXERCISED TO PREVENT DAMAGE TO INSTALLATION, WHEN SOFT MATERIALS SUCH AS COPPER TUBING ARE BEING BURIED.

3.03 VIBRATION ISOLATION:
PROVIDE VIBRATION ISOLATION FOR EACH AIR HANDLING UNIT BY MASON INDUSTRIES OR EQUIVALENT NEOPRENE VIBRATION ISOLATORS.

3.04 CUTTING AND PATCHING:
ALL PATCHING RESPONSIBLE FOR THE COST OF CUTTING AND PATCHING FOR WORK UNDER DIVISION 15.

3.05 PIPE AND DUCTWORK PENETRATIONS:
A. WHERE HORIZONTAL DUCTS AND PIPE PASS THROUGH WALLS, AND VERTICAL DUCTS AND PIPES PASS THROUGH FLOORS OR ROOFS, SEAL OFF VOID BETWEEN OPENING AND DUCTWORK INSIDE AND OUTSIDE THE BUILDING INCLUDING REPAIRS OF WALL BELOW GRADE SHALL BE SEALED WATERTIGHT. ALL PENETRATIONS OF EXTERIOR WALLS ABOVE GRADE SHALL BE SEALED WEATHER TIGHT.

B. WHEREVER ANY PIPE OR OTHER MATERIAL PENETRATES THROUGH FIRE-RESISTANT WALL, CEILING OR FLOOR, COMPLETELY SEAL VOIDS IN CONSTRUCTION WITH GROUT, PLASTER OR OTHER FIRE RESISTANT MATERIAL AS APPROVED BY AUTHORITY HAVING JURISDICTION. EMBED SEALING MATERIAL FULL THICKNESS OF MATERIAL BEING PENETRATED. SEALANTS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND SHALL HAVE BEEN TESTED AND CLASSIFIED BY UNDERWRITERS LABORATORIES.

3.06 FLASHINGS:
ALL FLASHINGS WILL BE DONE UNDER ROOFING DIVISION EXCEPT AS NOTED OR DETAIL ELSEWHERE IN THESE SPECIFICATIONS.

3.07 PIPE INSTALLATION:
A. INSTALL PIPING WITHOUT SPRINGING OR FORCING, AND TO CLEAR WINDOWS, DOORS AND OTHER OPENINGS. CUTTING OR OTHER WEAKENING OF THE BUILDING STRUCTURE TO FACILITATE PIPING INSTALLATION IS NOT PERMITTED. INSTALL VERTICAL RISERS PLUMB AND STRAIGHT. HORIZONTAL LINES PARALLEL WITH WALLS AND PARTITIONS. CONCEAL PIPING ABOVE CEILINGS AND WITHIN FURNISHING AND WALLS UNLESS OTHERWISE INDICATED.
B. ROUTE PIPING IN GENERAL LOCATIONS INDICATED IN AN ORDERLY MANNER AND TO MAINTAIN REQUIRED GRADE. COORDINATE WITH OTHER PIPING DUCTS AND EQUIPMENT MAKING NECESSARY OFFSETS TO ACCOMMODATE THE SAME. INSTALL PIPING TO CONSERVE HEADROOM AND INTERFERE AS LITTLE AS POSSIBLE WITH USE OF AVAILABLE SPACE. GROUP PIPING WHEREVER POSSIBLE AT COMMON ELEVATIONS. INSTALL CONCEALED PIPES CLOSE TO THE BUILDING STRUCTURE TO KEEP FURRING TO A MINIMUM.

3.08 INSTALLATION OF PIPE HANGERS:
ADEQUATELY SUPPORT PIPING FROM THE BUILDING STRUCTURE WITH ADJUSTABLE HANGERS TO MAINTAIN UNIFORM GRADING WHERE REQUIRED AND TO PREVENT SAGGING AND POCKETING. PROVIDE SUPPORTS BETWEEN PIPING AND BUILDING STRUCTURE WHERE NECESSARY TO PREVENT SHAKING.

3.09 VALVES:
A. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.

B. PROVIDE DRAIN VALVES AT MAIN SHUT OFF VALVES, LOW POINTS OF PIPING AND EQUIPMENT.

3.10 ACCESS DOORS:
FURNISH ACCESS DOORS IN ALL NON-REMOVABLE CEILINGS AND IN PARTITIONS AND WALLS WHERE NECESSARY TO MAINTAIN ACCESS TO PLUMBING CLEANOUTS, FIRST HANGERS AND OTHER ACCESSIBLE DEVICES. PROVIDE ACCESS DOORS REQUIRING ACCESS, SIZE THESE AS REQUIRED TO PROVIDE ADEQUATE ACCESS FOR SERVICE OR REPLACEMENT OF COMPONENTS.

3.11 PIPE TESTING:
A. TEST PIPING SYSTEMS PRIOR TO CONCEALMENT. ENSURE THAT THE TEST PRESSURE WHICH WOULD DAMAGE FIXTURES DOES NOT EXCEED SUCH UNITS BY VALVING THEM OFF OR OTHERWISE ISOLATING THEM DURING THE TEST. ALL TESTS MUST BE DONE TO THE SATISFACTION OF THE LOCAL AUTHORITY. THE MECHANICAL EQUIPMENT AND FOR A TRAINED RUN OF THE EQUIPMENT TO DEMONSTRATE THAT THE EQUIPMENT AND ASSOCIATED SYSTEMS ARE PROPERLY INSTALLED AND OPERATING AS INTENDED.
B. THE MECHANICAL CONTRACTOR SHALL INSTRUCT THE OWNER IN THE PROPER STARTUP, OPERATION, OBSERVATION AND MAINTENANCE OF ALL MECHANICAL EQUIPMENT INSTALLED UNDER THIS CONTRACT.

TEST ALL DRAIN, WASTE AND ROOF DRAIN LINES WITH STANDINGS WATER TEST OF TWELVE FEET OF HEAD, HOLD LONG ENOUGH TO VISUALLY INSPECT EACH JOINT.

C. TEST ALL GAS PIPING UNDER 60 PSIG AIR PRESSURE.

D. INSURE THAT ALL PIPING IS PROTECTED FROM FREEZING CONDITIONS WHERE HYDROSTATIC TESTS ARE REQUIRED. COORDINATE WITH THE ENGINEER IF HYDROSTATIC TESTS CANNOT BE CONDUCTED.

3.12 FLUSHING, CLEANING AND STERILIZING:
A. BEFORE FINAL CONNECTIONS ARE MADE IN THE PIPING SYSTEMS, ALL PIPING EXCEPT AS INDIVIDUALLY NOTED BELOW, SHALL BE BLOWN OUT WITH AIR AND THEN COMPLETELY WASHED OUT WITH CLEANING COMPOUNDS COMPATIBLE WITH FINAL FLUID TO AVOID CONTAMINATION. THE SYSTEMS SHALL THEN BE FLUSHED FOR THE COMPLETE REMOVAL OF ALL FOREIGN MATERIALS. FURNISH ALL TEMPORARY CONNECTIONS, VALVES, ETC., REQUIRED FOR THIS PURPOSE.

B. AFTER FLUSHING, STERILIZE THE DOMESTIC WATER SYSTEM WITH APPROVED CHLORINATING AGENTS TO POSITIVE DISPOSAL OF ALL BACTERIAL GROWTH. 24 HOURS OR 200PPM FOR 3 HOURS. AFTER MINIMUM CONTACT PERIOD, FLUSH THE SYSTEM WITH CLEAN WATER.

END OF SECTION 15050

SECTION 15250
PIPE AND DUCT INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED:
A. THIS SECTION OF THE SPECIFICATION CONTAINS ITEMS APPLICABLE ONLY TO PIPE AND DUCT INSULATION WORK. ALL INSULATION WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH APPLICABLE CODES AND ORDINANCES.

B. THE WORK COVERED BY THIS SPECIFICATION CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT, MATERIALS AND ACCESSORIES, AND OF PERFORMING ALL OPERATIONS NECESSARY FOR THE INSTALLATION OF THIS INSULATION FOR THE PLUMBING AND HEATING PIPING AND DUCTWORK. ALL INSULATION SHALL BE INSTALLED IN A WORKMANLIKE MANNER BY SKILLED WORKMEN REGULARLY ENGAGED IN THIS TYPE OF WORK.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND PRODUCTS:
IMCOA OR APPROVED EQUIVALENT FOR PIPING.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS:
A. DO NOT APPLY INSULATION BEFORE TESTING AND CLEANING OF SURFACES TO BE COVERED IS COMPLETED.

B. APPLY INSULATION TIGHTLY OVER CLEAN DRY SURFACES WITH SECTIONS OR EDGES FIRMLY BUTTED TOGETHER.

C. DUCTWORK INSULATION SHALL MEET THE REQUIREMENTS OF NFPA 90A I A TEST EDITION.

3.02 PIPING AND EQUIPMENT

A. DOMESTIC HOT AND COLD WATER PIPING, INSULATE ALL DOMESTIC HOT AND COLD WATER SUPPLY LINES AND CIRCULATING WATER LINES THROUGHOUT THE BUILDING WITH 1/2" THICK CLOSED CELL POLYURETHANE INSULATION SUCH AS IMCOA IMCOLOK OR EQUIVALENT. INSULATION SHALL HAVE UPPER TEMPERATURE LIMIT OF AT LEAST 210 DEG. F. FLAME SPREAD BY E84 OF 25 AND SMOKE DENSITY BY E84 OF 50. SEAL OFF ENDS OF PIPE INSULATION AT ALL VALVES, FITTINGS, ETC.

B. PIPING WITH HEAT TRACING: INSULATE ALL PIPES AND FITTINGS THE SAME AS HEATING WATER PIPING. INSULATION SHALL BE ONE SIZE LARGER THAN PIPE SIZE TO ALLOW FOR ADDITION OF HEAT TRACING.

C. PIPE EXPOSED TO WEATHER: INSULATE ALL PIPE "OUTDOORS" OR EXPOSED TO WEATHER THAT THIS SPECIFICATION CALLS FOR TO BE INSULATED WITH THE SAME THICKNESS AS CALLED FOR USING METAL JACKETED PIPE INSULATION TO PROVIDE A WEATHER PROOF SYSTEM. METAL JACKET SHALL BE .010 THICK. INSULATION SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

3.03 DUCT INSULATION:
INSULATE THE OUTSIDE OF ALL DUCTS WHEN CALLED FOR IN SECTION 15800 WITH 1-1/2" THICK ONE LB./CU.BIC FOOT, UL RATED, GLASS FIBER

INSULATION WITH FOIL-SCRM-KRAFT FACING. APPLY TO PROVIDE A CONTINUOUS VAPOR BARRIER. SEAL ALL JOINTS WITH 3" WIDE PRESSURE SENSITIVE ALUMINUM FOIL TAPE. ALL CUTS AND TEARS SHALL BE SEALED WITH STRIPS OF ALUMINUM FOIL TAPE.

END OF SECTION 15250

SECTION 15400
PLUMBING

PART 1 GENERAL

1.01 WORK INCLUDED:
A. FURNISH, INSTALL AND TEST ALL EQUIPMENT, PIPING AND PIPING SPECIALTIES AS SPECIFIED IN THIS SECTION AND/OR AS INDICATED ON THE DRAWINGS PERTAINING TO THIS DIVISION.

B. THE WORK COVERED IN THIS SECTION SHALL INCLUDE, BUT NOT BE LIMITED TO, FURNISHING AND INSTALLING THE FOLLOWING MATERIALS AND EQUIPMENT:

SANITARY SEWER SYSTEM
WATER DISTRIBUTION SYSTEM
PLUMBING FIXTURES
ROUGH-IN, SETTING AND CONNECTION
FLOOR DRAINS, HYDRANTS, ETC.

PART 2 PRODUCTS

2.01 WATER PIPING MATERIALS:
A. OUTSIDE BUILDING: ALL PIPE OUTSIDE THE BUILDING SHALL BE TYPE "K", SOFT DRAIN COPPER USING SILVER SOLDER (15% SILVER COMPOSITION AND BC-5 CLASSIFICATION), ASTM B260-62T. AN ACCEPTABLE ALTERNATE IS POLYETHYLENE SERVICE PIPE CONFORMING TO THE REQUIREMENTS OF ANNA SPECIFICATION C-401, "POLYETHYLENE (PE) PRESSURE PIPE, TUBING AND FITTINGS, 1/2 INCH THROUGH 3 INCH FOR WATER". TUBING SHALL BE CLASS 200 WITH SDR OF 1.3.

B. PIPING INSIDE BUILDING: ALL DOMESTIC COLD WATER AND HOT WATER PIPING WITHIN THE BUILDING ABOVE GRADE SHALL BE TYPE "L" HARD DRAIN COPPER PIPE WITH SMOOTH COPPER FITTINGS WITH 95-5 (TIN/ANTIMONY) OR CANFIELD 1008 MATERIALS SOLDER. ALL DOMESTIC COLD WATER AND HOT WATER PIPING BURIED BELOW SLAB ON GRADE SHALL BE TYPE "K" COPPER WITH NO JOINTS AND BE WRAPPED WITH FOAMED PLASTIC INSULATION.

C. VALVES AND SPECIALTY SCHEDULE:

1. GATE VALVES: BRONZE, CLASS 125, 200 PSI W.O.G. SCREENED OR SOLDER.

2. BALL VALVES: BRONZE, CLASS 125, CHROMIUM PLATED, BRASS BALL WITH TEFLOON SEALS AND ADJUSTABLE STEM PACKING AND STAINLESS STEEL HANDLE.

3. CHECK VALVES: BRONZE, CLASS 125, 200 PSI W.O.G. SCREENED OR SOLDER, HORIZONTAL SWING RENEWABLE DISC.

4. PRESSURE GAUGES: DIAL GAUGES SHALL BE 4-1/2" DIAL SIZE WITH GAUGE LINE VALVES AND PISTAIL. DANTON 101 OR APPROVED EQUIVALENT.

5. THERMOMETERS: ADJUSTABLE ANGLE INDUSTRIAL THERMOMETER WITH BRASS CASE, RED-READING MERCURY AND SEPARABLE SOCKET. THERMOMETERS SHALL BE GRADUATED FROM PLUS 20 DEG. F TO 200 DEG. F. U.S. GAUGE OR APPROVED EQUIVALENT.

6. DIELECTRIC UNIONS AND FLANGES: UNIONS RATED FOR 250 PSI WITH GALVANIZED OR PLATED STEEL. THREADED END COPPER SOLDER END AND IMPERVIOUS ISOLATION GASKET APPROVED FOR USE ON GAS, OIL, AIR AND WATER LINES. FLANGES TO BE COMPLETE WITH INSULATED BOLT SHEAVES, WASHERS AND GASKETS.

7. STRAINERS: 250 LB. BRONZE OR CAST IRON "Y" TYPE SCREENED WITH STAINLESS STEEL SCREEN.

2.02 SOIL, WASTE AND VENT AND STORM DRAIN MATERIALS INSIDE BUILDING:

A. SCHEDULE 40 ABS DWV PLASTIC PIPE AND FITTINGS (ASTM D2661) OR SCHEDULE 40 PVC DWV PLASTIC PIPE AND FITTINGS (ASTM D2665). ALL PIPE AND FITTINGS SHALL BEAR NSF-DWV MARK AND SHALL BE JOINED WITH SOLVENT WELD JOINTS AS RECOMMENDED BY THE MANUFACTURER.

B. SERVICE WEIGHT HUBLESS CAST IRON WITH GASKET AND CLAMP FITTINGS.

C. CLEANOUTS: BRONZE PLUS CLEANOUT WITH NICKEL BRONZE FRAME IN FLOOR. PROVIDE GARRET CLEANOUT MARKER IN AREAS WITH GARPET. WALL CLEANOUTS SHALL HAVE STAINLESS STEEL COVER IN FINISHED AREAS. JOAM OR APPROVED EQUIVALENT.

2.03 BUILDING SANITARY AND STORM SEWER MATERIALS OUTSIDE THE BUILDING:
PVC GRAVITY SEWER PIPE COMPLYING WITH ASTM D-3034.

2.04 GAS PIPING MATERIALS:
A. ABOVE GRADE PIPING: SCHEDULE 40 BLACK STEEL WITH BLACK STEEL WELDABLE FITTINGS FOR PIPE 2" AND SMALLER. PIPING LARGER THAN 2" IN SIZE SHALL BE JOINED WITH BUTT WELDED FITTINGS. USE WELDED FITTINGS ON ALL PIPE IN ACCESSIBLE LOCATIONS.

B. BELOW GRADE PIPING: SCHEDULE 40 BLACK STEEL WITH BLACK STEEL WELDABLE FITTINGS FOR PIPE 2" AND SMALLER. PIPING LARGER THAN 2" IN SIZE SHALL BE PROVIDED WITH DRAINS AT LOW POINTS FOR COMPLETE DRAIN DOWN. DRAINS SHALL BE LOCATED IN ACCESSIBLE LOCATIONS. RUN PIPING AS DIRECT AS POSSIBLE TO REQUIRED CONNECTIONS.

C. GAS COCKS: CLASS 125, 175 LB. W.O.G. WORKING PRESSURE. BRONZE BOY SQUARE HEAD STRAIGHT WAX COCK OR BRONZE BOOBY BALL VALVE WITH REMOVABLE TAPERED CARTRIDGE ARRANGED FOR GAS SERVICE.

D. PROPANE TANK: PROVIDE BURIED 250 GALLON PROPANE TANK EQUIPPED WITH ALL VALVES, REGULATORS AND FITTINGS MEETING ALL CODE REQUIREMENTS.

2.05 FIXTURES AND EQUIPMENT:
SEE SCHEDULE ON DRAWINGS.

PART 3 EXECUTION

3.01 WATER PIPING:
A. WATER SERVICE:
1. PROVIDE NEW WATER SERVICE AS INDICATED ON THE PLANS. PROVIDE SHUTOFF VALVES AND VALVE BOX WHERE SHOWN.

2. PROVIDE PIPING OUTSIDE THE BUILDING WITH NOT LESS THAN SEVEN FEET OF COVER FROM FINISHED GRADE. SURROUND PIPE WITH 4" OF CLEAN SAND. PROVIDE 2" THICK BY 2" INSULATING BLUE BOARD OVER FULL LENGTH OF WATER SERVICE OUTSIDE OF BUILDING.

B. INSIDE BUILDING:
1. ALL PIPING SHALL BE PITCHED 1" IN 40 FEET INSOFAR AS POSSIBLE AND SHALL BE PROVIDED WITH DRAINS AT LOW POINTS FOR COMPLETE DRAIN DOWN. DRAINS SHALL BE LOCATED IN ACCESSIBLE LOCATIONS. RUN PIPING AS DIRECT AS POSSIBLE TO REQUIRED CONNECTIONS.

2. PROVIDE PLASTIC PIPE ISOLATORS AT FRAMING PENETRATIONS IN WALLS AND FLOORS.

C. VALVES AND FITTINGS:
1. GATE VALVES, PLUS VALVES OR BALL VALVES MAY BE USED FOR SHUT-OFF SERVICE. VALVES UTILIZING LEVER HANDLES SHALL BE INSTALLED TO ALLOW COMPLETE OPEN TO CLOSE VALVE OPERATION WITHOUT INTERFERENCE OF STRUCTURE, INSULATION, ETC.

2. BALL VALVES SHALL BE USED FOR BALANCING SERVICE.

3. INSTALL UNIONS AT ALL EQUIPMENT CONNECTIONS WHEN UNION TRIM IS NOT FURNISHED AS A STANDARD PART OF THE EQUIPMENT TRIM OR WHERE ITEMS CANNOT BE REMOVED FROM LINE WITHOUT UNIONS.

4. ISOLATE CONNECTIONS BETWEEN FERROUS PIPING AND NONFERROUS PIPING WITH DIELECTRIC UNIONS OR FITTINGS.

5. PROVIDE UNIONS AT CONNECTIONS TO FIXTURES AND EQUIPMENT INCLUDING VALVES WHEN UNION TRIM IS NOT FURNISHED AS A STANDARD PART OF THE EQUIPMENT TRIM OR WHERE ITEMS CANNOT BE REMOVED FROM LINE WITHOUT UNIONS.

6. DIELECTRIC UNIONS SHALL BE USED AT ALL CONNECTIONS OF FERROUS MATERIAL TO NON-FERROUS MATERIAL.

7. COUPLINGS CAN BE USED WHEREVER UNIONS ARE NOT REQUIRED.

8. PRESSURE GAUGES AND THERMOMETERS ARE TO BE USED WHEREVER SHOWN ON DRAWINGS AND SHALL BE LOCATED IN AN ACCESSIBLE POSITION.

3.02 SOIL, WASTE, VENT & STORM DRAIN PIPING INSIDE BUILDING:
A. SLOPE: MAIN LINES WITHIN THE BUILDING: PROVIDE A UNIFORM FALL OF NOT LESS THAN 1" IN 8 FEET. BRANCHES: PROVIDE A UNIFORM FALL OF NOT LESS THAN 1" IN 4 FEET FOR 3" AND SMALLER AND 1" IN 8 FEET FOR SIZES 4" AND LARGER.

B. FIXTURES: VENT IN ACCORDANCE WITH SOUND PLUMBING PRACTICE AND APPLICABLE CODES. DO NOT INSTALL VENTS WITHIN TWO FEET OF ROOF EDGE. COORDINATE EXACT LOCATION WITH ARCHITECT.

C. CLEANOUTS: PROVIDE CLEANOUTS IN SANITARY AND STORM SYSTEMS WHERE REQUIRED BY CODE OR AS INDICATED AT ALL BENDS, ANGLES AND NOT OVER 50 FEET APART FOR 4" AND SMALLER PIPING AND NOT OVER 100 FEET APART FOR LARGER PIPING. CLEANOUTS TO HAVE CHROME PLATED COVER PLATES FOR WALLS, SCORATED BRASS COVER FOR FLOOR.

D. ALL HORIZONTAL AND VERTICAL WASTE MAINS AND STORM DRAIN MAINS FROM UPPER FLOORS TO LOWER LEVEL SLAB OR CRAWLSPACE SHALL BE HUBLESS CAST IRON. HORIZONTAL MAINS SHALL INCLUDE ALL PIPING SERVING MORE THAN ONE PLUMBING FIXTURE, ALL TOILETS AND ALL STORM DRAIN LINES.

3.03 BUILDING SANITARY AND STORM SEWER PIPING OUTSIDE BUILDING:
1. CLEANOUTS: PROVIDE CLEANOUTS AT 100 FOOT INTERVALS.

B. FLUSHING AND CLEANING: FLUSH AND CLEAN SEWER LINES AND REMOVE DEBRIS BEFORE FINAL CONNECTION INTO THE EXISTING SEWER OR SEPTIC SYSTEM IS MADE.

3.04 GAS PIPING:

A. GENERAL:
1. ALL UNDERGROUND PIPE SHALL BE BURIED 24" MINIMUM AND SURROUNDED WITH 4" CLEAN SAND BEFORE BACKFILLING. ALL BURIED JOINTS SHALL BE LEFT EXPOSED UNTIL TESTING HAS BEEN COMPLETED.

2. FURNISH AND INSTALL ALL GAS PIPING FROM THE METER OR PROPANE TANK THROUGHOUT THE BUILDING AND CONNECT TO ALL EQUIPMENT REQUIRED.

B. BURIED PIPE COATINGS: BURIED PIPE TAPE WRAP SHALL BE MACHINE NEEDED. PROVIDE A 50% OVERLAP WRAP MINIMUM. PIPE SHALL BE COATED WITH PRIMER BEFORE WRAPPING. FITTINGS AND JOINTS SHALL BE DOUBLE WRAPPED. EXTEND FITTING AND JOINT WRAPPING NOT LESS THAN 6" PAST THE END OF THE FITTING OR JOINT ONTO THE PIPE SECTION. TEST PIPE, JOINTS AND FITTING PRIOR TO WRAPPING JOINTS AND FITTINGS.

C. PROVIDE LUBRICATED PLUS VALVES, 6" LONG CONDENSATE DIRT ROCKETS AND UNIONS AT EQUIPMENT CONNECTIONS.

D. TAKE BRANCHES FROM TOP OR SIDES OF HORIZONTAL PIPES, NOT FROM BOTTOM.

E. INSTALLATION, MATERIALS AND/OR EQUIPMENT NOT INDICATED ON THE DRAWINGS, SPECIFIED OR COVERED BY THE REQUIREMENTS OF UTILITY OF AGENCY HAVING JURISDICTION SHALL BE IN ACCORDANCE WITH NFPA MANUAL 54 "STANDARDS FOR INSTALLATION OF GAS PIPING AND GAS APPLIANCES IN BUILDINGS".

F. PRESSURE TESTING: SEE SECTION 15050.

3.05 FIXTURES AND EQUIPMENT:

A. FIXTURES:
1. INSTALL ALL FIXTURES AND/OR ROUGH IN ACCORDING TO THE FIXTURE SCHEDULE ON DRAWINGS. INSTALLING FIXTURES MAY REQUIRE LARGER PIPE SIZES THAN SHOWN ON THE FIXTURE CONNECTION SCHEDULE ON THE DRAWINGS. COORDINATE WITH THE FIXTURE MANUFACTURER.

2. ALL FIXTURES SHALL BE SECURED TO WALLS AND FLOOR OR COUNTER TOPS IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS IN AND SETTING REQUIREMENTS TO FORM A RIGID INSTALLATION.

3. ALL PIPE AT THE FIXTURES WHICH MAY BE EXPOSED TO VIEW SHALL BE BRASS CHROME FINISH, FINISHED WITH CHROME SIGHTGLASSES WHERE THEY PROJECT FROM WALLS AND FLOORS.

4. STOP VALVES SHALL BE FURNISHED AND INSTALLED AT ALL FIXTURES, FOR ALL EQUIPMENT AND AT ROUGH IN LOCATIONS.

5. INTEGRAL VACUUM BREAKERS SHALL BE PROVIDED AT ALL OUTLETS WITH HOSE CONNECTIONS.

6. INSTALL WATER, WASTE AND VENT LINES TO REFRIGERATOR