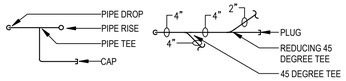
PLUMBING PIPING SYMBOLS

CW	DOMESTIC COLD WATER
H-CW	HARD COLD WATER
S-CW	SOFT COLD WATER
F-CW	FILTERED COLD WATER
RO	REVERSE OSMOSIS WATER
HW	HOT WATER
HW 140°	HOT WATER 140°
HWR	HOT WATER RECIRCULATION
HWR 140°	HOT WATER RECIRCULATION 140°
GV	GREASE VENT
GW	GREASE WASTE
IW	INDIRECT WASTE
OV	OIL VENT
OW	OIL WASTE
PD	PUMP DISCHARGE
V	SANITARY VENT
SAN	SANITARY SEWER
SHWR	SOLAR HOT WATER RETURN
SHWS	SOLAR HOT WATER SUPPLY
SD	STORM DRAINAGE
OSD	OVERFLOW STORM DRAINAGE
CD	CONDENSATE DRAINAGE
G	NATURAL GAS
PG	PROPANE GAS
CWV	COMBINATION WASTE & VENT
CA	COMPRESSED AIR



PIPE ACCESSORY TAGS

- DOM. WM — DOMESTIC WATER METER
- BALANCING — BALANCING VALVE
- SHUTOFF — 1/4 TURN BALL VALVE
- CHECK — CHECK VALVE
- TMV — 3-WAY MIXING VALVE
- 2" M-CNTRL — MOTORIZED CONTROL VALVE
- 2" 3-WAY CNTRL — 3 WAY MOTORIZED CONTROL VALVE
- 2" PRV — PRESSURE REDUCING VALVE
- 3/8" SOLENOID — REFRIGERANT SOLENOID VALVE
- 2" BUTTERFLY — BUTTERFLY VALVE

DRAIN TAGS

- FLOOR DRAIN — 4" FD — TYPE (SEE SCHEDULE) — 4" AD-6 — AREA DRAIN
- FLOOR DRAIN — 4" FD-3P — "P" - INDICATES PRIMER CONNECTION — 4" SD-29 — DECK DRAIN
- FLOOR SINK — 4" FS-4 — 4" SD-12 — FLOW CONTROL DRAIN
- HUB DRAIN — 4" FD-13 — 8 WFU — FIXTURE UNITS — 4" RD — STORM DRAIN
- ROOF AREA SERVED BY DRAIN — 6" SD-1 — 4000 SF — COMBINATION DRAINS

PLUMBING FIXTURE TAGS

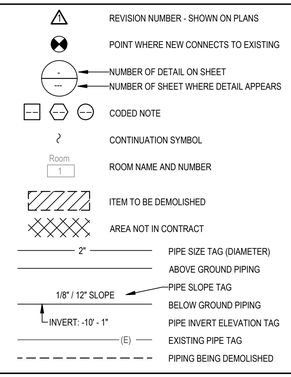
TYPE (SCHEDULE) → P-2A

2026-06-24 - 1/8" = 1'-0"

* NOTE *

ALL OF GENERAL NOTES ON THIS SHEET ARE TO BE APPLIED TO ALL OTHER DRAWINGS IN THIS SET.THE SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET MAY OR MAY NOT BE USED IN THIS SET OF DRAWINGS.

GENERAL MECHANICAL SYMBOLS



EQUIPMENT ABBREVIATIONS

AC	AIR CONDITIONING UNIT	EWH	ELECTRIC WATER HEATER
ACC	AIR COOLED CONDENSER	FCU	FAN COIL UNIT
ACCU	AIR COOLING CONDENSING UNIT	FP	FIRE PUMP
AHU	AIR HANDLING UNIT	GI	GREASE INTERCEPTOR
AS	AIR SEPARATOR	GRV	GRAVITY ROOF VENTILATOR
B	BOILER	HWP	HEATING WATER PUMP
CH	CHILLER	HX	HEAT EXCHANGER
CT	COOLING TOWER	HRU	HEAT RECOVERY UNIT
CUH	CABINET UNIT HEATER	PRV	POWER ROOF VENTILATOR
CWP	CONDENSER WATER PUMP	RE	RETURN/EXHAUST FAN
CHWP	CHILLED WATER PUMP	RTU	ROOFTOP UNIT
DBP	DOMESTIC WATER BOOSTER PUMP	SEP	SEWAGE EJECTOR PUMP
DC	DUCT MOUNTED COIL	SF	SUPPLY FAN
DCP	DOMESTIC WATER CIRCULATING PUMP	SP	SUMP PUMP
EF	EXHAUST FAN	UH	UNIT HEATER
EDC	ELECTRIC DUCT COIL	WH	WATER HEATER
ET	EXPANSION TANK		

ABBREVIATIONS

Ø	ROUND	LVR	LOUVER
ABV	ABOVE	LWT	LEAVING WATER TEMPERATURE
AC	AIR CONDITIONING	M/A	MIXED AIR
AD	AREA DRAIN	MAX	MAXIMUM
ADD	ADDENDUM	MBH	ONE THOUSAND BTU PER HOUR
AFF	ABOVE FINISHED FLOOR	MCF	ONE THOUSAND CUBIC FEET
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY	MD	MOTORIZED DAMPER
ALT	ALTERNATE	MECH	MECHANICAL
AP	ACCESS PANEL	MFR	MANUFACTURER
ARCH	ARCHITECT/ARCHITECTURAL	MIN	MINIMUM
BFF	BELOW FINISHED FLOOR	MISC	MISCELLANEOUS
BLW	BELOW	MTR	MOTOR
BTU	BRITISH THERMAL UNITS	MU/A	MAKE-UP/AIR
BTUH	BRITISH THERMAL UNITS PER HOUR	NC	NOISE CRITERIA
CAP	CAPACITY	NC	NORMALLY CLOSED
CB	CATCH BASIN	NIC	NOT IN CONTRACT
CFM	CUBIC FEET PER MINUTE	NO	NUMBER
CLG	CEILING	NO	NORMALLY OPEN
CO	CLEAN OUT	NTS	NOT TO SCALE
CW	COLD WATER	O	OXYGEN
D	DEGREE	O/A	OUTSIDE AIR
DB	DRY BULB	ORD	OVERFLOW ROOF DRAIN
DIA	DIAMETER	PD	PRESSURE DROP
DN	DOWN	PIV	POST INDICATOR VALVE
DW	DISTILLED WATER	PLBG	PLUMBING
EA	EACH	PRESS	PRESSURE
EAT	ENTERING AIR TEMPERATURE	PRV	PRESSURE REDUCING VALVE
ELEC	ELECTRICAL	PSI	POUNDS PER SQUARE INCH
EQUIP	EQUIPMENT	PSIG	POUNDS PER SQUARE INCH GAUGE
EWC	ELECTRIC WATER COOLER	PWR	POWER
EWT	ENTERING WATER TEMPERATURE	R	DUCT RISER
E/A	EXHAUST AIR	R/A	RETURN AIR
EXIST	EXISTING	RCP	RADIANT CEILING PANEL
F	DEGREES FAHRENHEIT	RD	ROOF DRAIN
FCO	FLOOR CLEAN OUT	REC	RECESSED
FD	FLOOR DRAIN	RED	REDUCER
FD	FIRE DAMPER	RH	RELATIVE HUMIDITY
FDV	FIRE DEPARTMENT VALVE	RL/A	RELIEF AIR
FL	FLOOR	RM	ROOM
FO	FUEL OIL	RPM	REVOLUTIONS PER MINUTE
FOV	FUEL OIL VENT	RW	RAIN WATER
FOR	FUEL OIL RETURN	SF	SQUARE FOOT
FOS	FUEL OIL SUPPLY	S/A	SUPPLY AIR
FPM	FEET PER MINUTE	SAN	SANITARY
FS	FLOOR SINK	SF	SQUARE FOOT
FT	FOOT/FEET	SD	SMOKE DAMPER
FTR	FIN TUBE RADIATION	SL	STORM LEADER
GAL	GALLON	SM	SURFACE MOUNT
GC	GENERAL CONTRACTOR	SP	STANDPIPE
GPM	GALLONS PER MINUTE	SP	STATIC PRESSURE
GW	GREASE WASTE	STM	STEAM
HB	HOSE BIB	T	THERMOSTAT
HP	HORSE POWER	TD	TEMPERATURE DROP
HS	HAND SINK	TDR	TRENCH DRAIN
HTG	HEATING	TEMP	TEMPERATURE
HTR	HEATER	TYP	TYPICAL
HW	HOT WATER	UG	UNDERGROUND
HYD	HYDRANT	VAC	VACUUM
ID	INDIRECT	V	VENT
IN	INCH	VAV	VARIABLE AIR VOLUME
INV	INVERT	VENT	VENTILATION
LB	POUND	VTR	VENT THROUGH ROOF
LB/HR	POUNDS PER HOUR	W	WASTE
LAT	LEAVING AIR TEMPERATURE	WB	WET BULB
LP	LOW PRESSURE	WCO	WALL CLEAN OUT
LPG	LIQUEFIED PETROLEUM GAS	WH	WALL HYDRANT

PLUMBING GENERAL NOTES

GENERAL REQUIREMENTS

1. ALL PLUMBING WORK SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES, ORDINANCES, AND AUTHORITIES HAVING JURISDICTION, INCLUDING THE VIRGINIA CONSTRUCTION CODE, VIRGINIA PLUMBING CODE, APPLICABLE ENERGY CODE, AND ALL OTHER APPLICABLE REQUIREMENTS.
2. INSTALL ALL PLUMBING EQUIPMENT, MATERIALS, AND APPURTENANCES IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN RECOMMENDATIONS AND INSTALLATION INSTRUCTIONS.
3. VERIFY EXISTING CONDITIONS AND DIMENSIONS IN THE FIELD PRIOR TO FABRICATION, ORDERING, OR INSTALLATION OF PIPING, EQUIPMENT, AND APPURTENANCES. REPORT DISCREPANCIES TO THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK.
4. EXISTING CONDITIONS INDICATED ON THE DRAWINGS ARE BASED ON AVAILABLE INFORMATION AND MAY NOT REPRESENT ACTUAL FIELD CONDITIONS. VERIFY CONDITIONS PRIOR TO INSTALLATION.
5. COORDINATE ALL WORK WITH THE OWNER'S OPERATIONS AND CONSTRUCTION PHASING REQUIREMENTS. PERFORM WORK IN OCCUPIED OR OPERATIONAL AREAS ONLY AT TIMES APPROVED BY THE OWNER.
6. PROVIDE ALL VALVES, SUPPORTS, HANGERS, OFFSETS, FITTINGS, TRANSITIONS, APPURTENANCES, AND ACCESSORIES REQUIRED FOR A COMPLETE AND OPERABLE SYSTEM WHETHER OR NOT SPECIFICALLY INDICATED.
7. COORDINATE ELECTRICAL CHARACTERISTICS AND REQUIREMENTS OF ALL PLUMBING EQUIPMENT WITH THE ELECTRICAL DRAWINGS PRIOR TO ORDERING EQUIPMENT OR SUBMITTING SHOP DRAWINGS. FURNISH EQUIPMENT WIRED FOR THE VOLTAGES AND ELECTRICAL CHARACTERISTICS INDICATED.

COORDINATION REQUIREMENTS

8. COORDINATE THE INSTALLATION OF ALL PLUMBING WORK WITH THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, FIRE PROTECTION, AND OTHER TRADES. PIPE ROUTING AND EQUIPMENT LOCATIONS ARE DIAGRAMMATIC UNLESS DIMENSIONED. PROVIDE REQUIRED OFFSETS AND COORDINATION FOR A COMPLETE INSTALLATION.
9. DO NOT CUT, NOTCH, DRILL, OR OTHERWISE ALTER STRUCTURAL MEMBERS WITHOUT WRITTEN APPROVAL FROM THE ARCHITECT/ENGINEER.
10. LOCATIONS OF PLUMBING FIXTURES, FLOOR DRAINS, ROOF DRAINS, OVERFLOW DRAINS, CLEANOUTS, AND EQUIPMENT CONNECTIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE UNLESS DIMENSIONED. COORDINATE EXACT LOCATIONS WITH ARCHITECTURAL FEATURES, EQUIPMENT, CASEWORK, STRUCTURE, AND OTHER WORK PRIOR TO INSTALLATION.
11. COORDINATE PLUMBING FIXTURE ROUGH-IN HEIGHTS, CLEARANCES, AND ACCESSORIES WITH ARCHITECTURAL ACCESSIBILITY REQUIREMENTS.
12. PROVIDE ACCESS PANELS AND ACCESS DOORS AS REQUIRED IN CEILINGS, WALLS, CHASES, AND OTHER CONSTRUCTION TO ALLOW ACCESS FOR SERVICE, MAINTENANCE, ADJUSTMENT, INSPECTION, AND OPERATION OF VALVES, TRAPS, CLEANOUTS, EQUIPMENT, AND APPURTENANCES.
13. COORDINATE ROOF DRAIN, OVERFLOW DRAIN, AND LEADER LOCATIONS WITH STRUCTURAL, ARCHITECTURAL, AND ROOFING REQUIREMENTS PRIOR TO INSTALLATION.

INSTALLATION REQUIREMENTS

14. SEAL ALL PENETRATIONS THROUGH WALLS, FLOORS, ROOFS, AND RATED ASSEMBLIES CAUSED BY PLUMBING WORK. PROVIDE FIRESTOPPING SYSTEMS AT RATED CONSTRUCTION IN ACCORDANCE WITH CODE AND LISTED ASSEMBLY REQUIREMENTS.
15. INSTALL ALL PIPING WITH ADEQUATE CLEARANCE FROM OTHER BUILDING SYSTEMS AND WITH PROPER ALLOWANCES FOR EXPANSION, CONTRACTION, SLOPE, AND SUPPORT.
16. INSTALL DRAIN, WASTE, AND VENT PIPING TRUE TO LINE AND GRADE WITH UNIFORM SLOPE AS REQUIRED BY CODE.
17. VERIFY UTILITY ENTRY POINTS, INVERT ELEVATIONS, AND REQUIRED EXCAVATION DEPTHS PRIOR TO ROUGH-IN. COORDINATE UNDERGROUND PIPING WITH STRUCTURE, FOUNDATIONS, SITE UTILITIES, AND OTHER UNDERGROUND UTILITIES PRIOR TO INSTALLATION.
18. INSTALL GREASE WASTE, ACID WASTE, AND OTHER SPECIAL WASTE SYSTEMS WITH MATERIALS, INTERCEPTORS, NEUTRALIZATION, AND APPURTENANCES REQUIRED BY CODE, THE DRAWINGS, AND EQUIPMENT REQUIREMENTS.
19. PROVIDE CLEANOUTS WHERE REQUIRED BY CODE AND AT LOCATIONS INDICATED ON THE DRAWINGS. COORDINATE CLEANOUT LOCATIONS WITH ARCHITECTURAL FINISHES AND PROVIDE WALL OR FLOOR ACCESS COVERS AS REQUIRED.
20. INSTALL WATER PIPING SYSTEMS COMPLETE WITH VALVES, UNIONS, DIELECTRIC FITTINGS, SUPPORTS, INSULATION, AND ACCESSORIES REQUIRED FOR PROPER OPERATION AND MAINTENANCE. PROVIDE ISOLATION VALVES AT EQUIPMENT AND BRANCH CONNECTIONS AS REQUIRED FOR SERVICE.
21. PROVIDE WATER HAMMER ARRESTORS AT QUICK-CLOSING VALVES AND EQUIPMENT. PROVIDE TRAP PRIMERS WHERE REQUIRED BY CODE OR INDICATED ON THE DRAWINGS.
22. PROVIDE PIPING INSULATION WHERE REQUIRED BY ENERGY CODE, CONDENSATION CONTROL, FREEZE PROTECTION, AND PROJECT SPECIFICATIONS.

TESTING AND CLOSEOUT

23. TEST ALL PLUMBING SYSTEMS AS REQUIRED BY CODE AND SPECIFICATIONS. REPAIR LEAKS AND DEFECTS AND RETEST UNTIL ACCEPTABLE RESULTS ARE OBTAINED.
24. IDENTIFY PIPING SYSTEMS WITH MARKERS, LABELS, AND FLOW DIRECTION ARROWS IN ACCORDANCE WITH CODE AND PROJECT SPECIFICATIONS. LABEL VALVES, SPECIALTIES, AND EQUIPMENT AS REQUIRED FOR OPERATION AND MAINTENANCE.
25. FLUSH, CLEAN, AND PLACE SYSTEMS IN OPERATION PRIOR TO SUBSTANTIAL COMPLETION. DISINFECT DOMESTIC WATER PIPING IN ACCORDANCE WITH APPLICABLE CODE, AUTHORITY REQUIREMENTS, AND PROJECT SPECIFICATIONS PRIOR TO PLACING THE SYSTEM INTO SERVICE.
26. PROVIDE ALL REQUIRED STARTUP, TESTING, CLOSEOUT, AND RECORD DOCUMENTATION AS SPECIFIED.

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DATE:
PERMIT SUBMISSION:
06.19.26

BENNETT'S CREEK
HEALTH & REHABILITATION CENTER
1931/1915 BRIDGE ROAD (HIGHWAY 17)
SUFFOLK, VIRGINIA

COMMONWEALTH OF VIRGINIA
MICHAEL THOMAS DENK
Lic. No. 402063288
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DRAWING NAME
PLUMBING SYMBOLS NOTES & ABBREVIATIONS

DAI PROJECT NO.
26032

P0.1

SECTION 22 0500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL
1.1 SUMMARY
A. This Section includes the following:
1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Plumbing demolition.
8. Equipment installation requirements common to equipment sections.
9. Concrete bases.
10. Supports and anchorages.
1.2 DEFINITIONS
A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.
C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
1.3 QUALITY ASSURANCE
A. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS
2.1 PIPE, TUBE, AND FITTINGS
A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.
B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
2.2 JOINING MATERIALS
A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.
F. Welding Filler Metals: Comply with AWS D10.12.
G. Solvent Cements for Joining Plastic Piping:
1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.
2.3 DIELECTRIC FITTINGS
A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
B. Insulating Material: Suitable for system fluid, pressure, and temperature.
C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
2.4 MECHANICAL SLEEVE SEALS
A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
C. Pressure Plates: Stainless steel. Include two for each sealing element.
D. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES
A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with set screws.
2.6 ESCUTCHEONS
A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
C. One-Piece, Cast-Brass Type: With set screw.
1. Finish: Polished chrome-plated.
D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
1. Finish: Polished chrome-plated.
2.7 GROUT
A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION
3.1 PLUMBING DEMOLITION
A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.
B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.
3.2 PIPING SYSTEMS - COMMON REQUIREMENTS
A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
F. Install piping to permit valve servicing.
G. Install piping at indicated slopes.
H. Install piping free of sags and bends.
I. Install fittings for changes in direction and branch connections.
J. Install piping to allow application of insulation.
K. Select system components with pressure rating equal to or greater than system operating pressure.
L. Install escutcheons for penetrations of walls, ceilings, and floors.
M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
Q. Verify final equipment locations for roughing-in.
R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
3.3 PIPING JOINT CONSTRUCTION
A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.
B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.
M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
3.4 PIPING CONNECTIONS
A. Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.
3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS
A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
D. Install equipment to allow right of way for piping installed at required slope.
3.6 CONCRETE BASES
A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete."
3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES
A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
C. Field Welding: Comply with AWS D1.1.
3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES
A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.
B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
C. Attach to substrates as required to support applied loads.
3.9 GROUTING
A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
B. Clean surfaces that will come into contact with grout.
C. Provide forms as required for placement of grout.
D. Avoid air entrapment during placement of grout.
E. Place grout, completely filling equipment bases.
F. Place grout on concrete bases and provide smooth bearing surface for equipment.
G. Place grout around anchors.
H. Cure placed grout.

END OF SECTION

SECTION 22 0513 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL
1.1 SUMMARY
A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.
1.2 COORDINATION
A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS
2.1 GENERAL MOTOR REQUIREMENTS
A. Comply with requirements in this Section except when stricter requirements are specified in plumbing equipment schedules or Sections.
B. Comply with NEMA MG 1 unless otherwise indicated.
2.2 MOTOR CHARACTERISTICS
A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
2.3 POLYPHASE MOTORS
A. Description: NEMA MG 1, Design B, medium induction motor.
B. Efficiency: Energy efficient, as defined in NEMA MG 1.
C. Service Factor: 1.15.
D. Multispeed Motors: Variable torque.
1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.
E. Rotor: Random-wound, squirrel cage.
F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
G. Temperature Rise: Match insulation rating.
H. Insulation: Class F.
I. Code Letter Designation:
1. Motors 15HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller than 15HP: Manufacturer's standard starting characteristic.
J. Enclosure Material: Cast iron for motor frame sizes 324Tand larger; rolled steel for motor frame sizes smaller than 324T.
2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS
A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
2.5 SINGLE-PHASE MOTORS
A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
1. Permanent-split capacitor.
2. Split phase.
3. Capacitor start, inductor run.
4. Capacitor start, capacitor run.
B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
D. Motors 1/20 HP and Smaller: Shaded-pole type.
E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 22 0516 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 - GENERAL
1.01 SUMMARY
A. Section Includes:
1. Metal-bellows expansion joints.
2. Pipe bends and loops.
3. Alignment guides and anchors.
1.02 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Delegated Design: Expansion fittings and loops for plumbing piping shall be delegated design. The selection, design, and installation of expansion fittings and loops for plumbing piping is dependent upon and shall be coordinated with piping material selection, building construction type, structural supports, seismic bracing, and installation and operational conditions.
1. Delegated-Design Submittal: For each anchor and alignment guide indicated to comply with performance requirements and design criteria, including analysis data.
2. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and bends.
3. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
4. Alignment Guide Details: Detail field assembly and attachment to building structure.
5. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.
C. Welding certificates.
D. Product certificates.
E. Maintenance data.
1.03 QUALITY ASSURANCE
A. Welding Qualifications: Qualify procedures and personnel according to the following:
1. Steel Shapes and Plates: AWS D1.1/D1.1M, latest edition adopted by AHJ, "Structural Welding Code - Steel."
2. Welding to Piping: ASME Boiler and Pressure Vessel Code: Section IX, latest edition adopted by AHJ.

PART 2 - PRODUCTS
2.01 EXPANSION JOINTS
A. Metal-Bellows Expansion Joints: ASTM F 1120, latest edition adopted by AHJ, circular-corrugated-bellows type with external tie rods.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Flexicraft Industries
b. Hyspan
c. Metraflex
d. Senior Flexonics
e. U.S. Bellows
2. Metal-Bellows Expansion Joints for Copper Piping: Single or multiple phosphor-bronze bellows, copper pipe end connections, and brass shroud.
3. Metal-Bellows Expansion Joints for Stainless-Steel Waterway: Single or multiple stainless-steel bellows, stainless-steel-pipe end connections, and steel shroud.
4. Metal-Bellows Expansion Joints for Steel Piping: Single or multiple stainless-steel bellows, steel pipe end connections, and carbon-steel shroud.
5. Minimum Pressure Rating: 150 psig, unless otherwise indicated.
a. Verify minimum pressure rating for installations in structures greater than 150 feet in height.
6. Configuration: Single-bellows type, unless otherwise indicated.
7. End Connections: Flanged.
2.02 ALIGNMENT GUIDES
A. Description: Steel, factory fabricated, with bolted two-section outer cylinder and base for alignment of piping and two-section guiding spider for bolting to pipe.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Carpenter & Paterson
b. Flexicraft Industries
c. Hyspan
d. Metraflex
e. Piping Technology & Products
2.03 MATERIALS FOR ANCHORS
A. Steel Shapes and Plates: ASTM A 36/A 36M, latest edition adopted by AHJ.
B. Bolts and Nuts: ASTM A 307, carbon-steel, hex head, unless otherwise indicated.
C. Washers: ASTM F 844, latest edition adopted by AHJ, steel, plain, flat washers.
D. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, and tension and shear capacities appropriate for application.
1. Stud: Threaded, zinc-coated carbon steel.
2. Expansion Plug: Zinc-coated steel.
3. Washer and Nut: Zinc-coated steel.
E. Concrete: Portland cement mix, 3000 psi minimum. Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for formwork, reinforcement, and concrete.
F. Grout: ASTM C 1107/C 1107M, latest edition adopted by AHJ, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink, nonmetallic grout; suitable for interior and exterior applications.
1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION
3.01 EXPANSION-JOINT INSTALLATION
A. Install manufactured, nonmetallic expansion joints according to FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
B. Install expansion joints of sizes matching size of piping in which they are installed.
C. Install alignment guides to allow expansion and to avoid end-loading and torsional stress.
3.02 PIPE BEND AND LOOP INSTALLATION
A. Install pipe bends and loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.
B. Attach pipe bends and loops to anchors.
1. Steel Anchors: Attach by welding. Comply with ASME B31.9, latest edition adopted by AHJ, and ASME Boiler and Pressure Vessel Code: Section IX, latest edition adopted by AHJ, "Welding and Brazing Qualifications."
2. Concrete Anchors: Attach by fasteners. Follow fastener manufacturer's written instructions.
3.03 SWING CONNECTIONS
A. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.
B. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.
C. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.
3.04 ALIGNMENT-GUIDE INSTALLATION
A. Install guides on piping adjoining pipe expansion fittings and loops.
B. Attach guides to pipe and secure to building structure.
3.05 ANCHOR INSTALLATION
A. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9, latest edition adopted by AHJ, and to prevent transfer of loading and stresses to connected equipment.
B. Fabricate and install steel anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9, latest edition adopted by AHJ, and AWS D1.1/D1.1M, latest edition adopted by AHJ.
C. Construct concrete anchors of poured-in-place concrete of dimensions indicated and include embedded fasteners.
D. Install pipe anchors according to expansion-joint manufacturer's written instructions if expansion joints are indicated.
E. Use grout to form flat bearing surfaces for expansion fittings, guides, and anchors installed on or in concrete.

END OF SECTION 220516

SECTION 22 0519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL
1.1 SUMMARY
A. Section Includes:
1. Thermometers.
2. Gages.
1.2 SUBMITTALS
A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS
2.1 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. H.O. Trerice Co.
2. Palmer Wahl Instruments, Inc.
3. Weiss Instruments, LLC.
4. Weksler.
B. Case: Die-cast aluminum or brass, 7 inches long.
C. Tube: Red or blue reading.
D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
E. Window: Glass.
F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.
H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.
2.2 BIMETALLIC-ACTUATED DIAL THERMOMETERS
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Ashcroft.
2. WIKA Instrument, LP.
3. H.O. Trerice Co.
4. REOTEMP Instruments.
5. Weiss Instruments, LLC.
B. Description: Direct-mounting, bimetallic-actuated dial thermometers complying with ASME B40.3.
C. Case: Dry type, stainless steel with 3-inch diameter.
D. Element: Bimetal coil.
E. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
F. Pointer: Red metal.
G. Window: Glass.
H. Ring: Stainless steel.
I. Connector: Adjustable angle type.
J. Stem: Metal, for thermowell installation and of length to suit installation.
K. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.
2.3 THERMOWELLS
A. Manufacturers: Same as manufacturer of thermometer being used.
B. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.
2.4 PRESSURE GAGES
A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Ashcroft.
2. WIKA Instrument, LP.
3. AMETEK U.S. Gauge.
4. H.O. Trerice Co.
5. NOSHOK, Inc.
B. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.
1. Case: Dry type, drawn steel or cast aluminum, 4-1/2-inch diameter.
2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
3. Pressure Connection: Brass, NPS 1/4, bottom-outlet type unless back-outlet type is indicated.
4. Movement: Mechanical, with link to pressure element and connection to pointer.
5. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
6. Pointer: Red metal.
7. Window: Glass.
8. Ring: Brass.
9. Accuracy: Grade A, plus or minus 1 percent of middle half.
10. Range for Fluids under Pressure: Two times operating pressure.
C. Pressure-Gage Fittings:
1. Valves: NPS 1/4 brass or stainless-steel needle type.
2. Snubbers: ASME B40.5, NPS 1/4 brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

PART 3 - EXECUTION
3.1 THERMOMETER APPLICATIONS
A. Install liquid-in-glass thermometers in the outlet of each domestic, hot-water storage tank.
B. Provide the following temperature ranges for thermometers:
1. Domestic Hot Water: 30 to 180 deg F, with 2-degree scale divisions.
2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions.
3.2 GAGE APPLICATIONS
A. Install dry-case-type pressure gages for discharge of each pressure-reducing valve.
B. Install dry liquid-filled-case-type pressure gages at suction and discharge of each pump.

3.3 INSTALLATIONS
A. Install direct-mounting thermometers and adjust vertical and tilted positions.
B. Install thermowells with socket extending to center of pipe and in vertical position in piping tees where thermometers are indicated.
C. Install direct-mounting pressure gages in piping tees with pressure gage located on pipe at most readable position.
D. Install needle-valve and snubber fitting in piping for each pressure gage.
E. Install thermometers and gages adjacent to machines and equipment to allow service and maintenance for thermometers, gages, machines, and equipment.
F. Adjust faces of thermometers and gages to proper angle for best visibility.

END OF SECTION

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DRAWING NAME
PLUMBING SPECIFICATIONS

DAI PROJECT NO.
26032

P0.2

2026-06-24 - 1/8" = 1'-0"

SECTION 22 0523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL
1.1 SUMMARY
A. Section Includes:
1. Brass ball valves.
2. Bronze ball valves.
3. Bronze swing check valves.
4. Bronze gate valves.
5. Bronze globe valves.
B. Related Sections:
1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
3. Division 33 water distribution piping Sections for general-duty and specialty valves for site construction piping.
1.2 SUBMITTALS
A. Product Data: For each type of valve indicated.
1.3 QUALITY ASSURANCE
A. ASME Compliance: ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
B. NSF Compliance: NSF 61 for valve materials for potable-water service.
PART 2 - PRODUCTS
2.1 GENERAL REQUIREMENTS FOR VALVES
A. Refer to valve schedule articles for applications of valves.
B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
C. Valve Sizes: Same as upstream piping unless otherwise indicated.
D. Valve Actuator Types:
1. Handwheel: For valves other than quarter-turn types.
2. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.
F. Valve-End Connections:
1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With threads according to ASME B1.20.1.
2.2 BRASS BALL VALVES
A. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a.
b. Milwaukee Valve Company.
c. NIBCO INC.
2. Description:
a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Forged brass.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Brass.
i. Ball: Chrome-plated brass.
j. Port: Full.
2.3 BRONZE BALL VALVES
A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a.
b. Milwaukee Valve Company.
c. NIBCO INC.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Bronze.
f. Ends: Threaded.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.
2.4 BRONZE SWING CHECK VALVES
A. Class 125, Bronze Swing Check Valves with Bronze Disc:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Milwaukee Valve Company.
b. NIBCO INC.
c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.
B. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Milwaukee Valve Company.
b. NIBCO INC.
c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
a. Standard: MSS SP-80, Type 4.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: PTFE or TFE.
2.5 BRONZE GATE VALVES
A. Class 125, NRS Bronze Gate Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Milwaukee Valve Company.
b. NIBCO INC.
c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.
B. Class 125, RS Bronze Gate Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Milwaukee Valve Company.
b. NIBCO INC.
c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
a. Standard: MSS SP-80, Type 2.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem: Bronze.
f. Disc: Solid wedge; bronze.
g. Packing: Asbestos free.
h. Handwheel: Malleable iron, bronze, or aluminum.
2.6 BRONZE GLOBE VALVES
A. Class 125, Bronze Globe Valves with Bronze Disc:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a.
b. Milwaukee Valve Company.
c. NIBCO INC.
d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded or solder joint.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.
PART 3 - EXECUTION
3.1 VALVE INSTALLATION
A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
B. Locate valves for easy access and provide separate support where necessary.
C. Install valves in horizontal piping with stem at or above center of pipe.
D. Install valves in position to allow full stem movement.
3.2 ADJUSTING
A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.
3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS
A. If valve applications are not indicated, use the following:
1. Shutoff Service: Ball or butterfly valves.
2. Throttling Service: Globe, ball, or butterfly valves.
3. Pump-Discharge Check Valves:
a. NPS 2 and Smaller: Bronze swing check valves with bronze disc.
b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring.
c. NPS 2-1/2 and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.
B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
C. Select valves, except wafer types, with the following end connections:
1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.
3.4 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE
A. Pipe NPS 2 and Smaller:
1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
2. Bronze Angle Valves: Class 125, bronze disc.
3. Ball Valves: Two piece, full port, brass or bronze with bronze trim.
4. Bronze Swing Check Valves: Class 125, bronze disc.
5. Bronze Gate Valves: Class 125, NRS.
6. Bronze Globe Valves: Class 125, bronze disc.
B. Pipe NPS 2-1/2 and Larger:
1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.
2. Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM seat, aluminum-bronze disc.
3. Iron Swing Check Valves: Class 125, nonmetallic-to-metal seats.
4. Iron Swing Check Valves with Closure Control: Class 125, lever and weight.
5. Iron Gate Valves: Class 125, NRS.
6. Iron Globe Valves: Class 125.

END OF SECTION

SECTION 22 0529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL
1.1 SUMMARY
A. This Section includes the following:
1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Equipment supports.
B. See Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
C. See Division 21 Section "Water-Based Fire-Suppression Systems" for pipe hangers for fire-suppression piping.
D. See Division 22 Section "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
1.2 DEFINITIONS
A. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."
1.3 PERFORMANCE REQUIREMENTS
A. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
C. Design seismic-restraint hangers and supports for piping and equipment.
1.4 SUBMITTALS
A. Product Data: For the following:
1. Steel pipe hangers and supports.
2. Thermal-hanger shield inserts.
3. Powder-actuated fastener systems.
B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
1. Trapeze pipe hangers. Include Product Data for components.
2. Metal framing systems. Include Product Data for components.
3. Equipment supports.
C. Welding certificates.
1.5 QUALITY ASSURANCE
A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.
PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
2.2 STEEL PIPE HANGERS AND SUPPORTS
A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
B. Available Manufacturers:
1. ERICO/Michigan Hanger Co.
2. Grinnell Corp.
3. National Pipe Hanger Corporation.
4. PHD Manufacturing, Inc.
5. PHS Industries, Inc.
C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.
2.3 TRAPEZE PIPE HANGERS
A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.
2.4 METAL FRAMING SYSTEMS
A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
B. Available Manufacturers:
1. ERICO/Michigan Hanger Co.; ERISTRUT Div.
2. GS Metals Corp.
3. Power-Strut Div.; Tyco International, Ltd.
4. Thomas & Betts Corporation.
5. Unistrut Corp.; Tyco International, Ltd.
C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
2.5 THERMAL-HANGER SHIELD INSERTS
A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.
B. Available Manufacturers:
1.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.
C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.
D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.
E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.
2.6 FASTENER SYSTEMS
A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
1. Available Manufacturers:
a. Hilti, Inc.
b. ITW Ramset/Red Head.
c. Masterset Fastening Systems, Inc.
d. MKT Fastening, LLC.
e. Powers Fasteners.
B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
1. Available Manufacturers:
a. B-Line Systems, Inc.; a division of Cooper Industries.
b. Empire Industries, Inc.
c. Hilti, Inc.
d. ITW Ramset/Red Head.
e. MKT Fastening, LLC.
f. Powers Fasteners.
2.7 EQUIPMENT SUPPORTS
A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.
2.8 MISCELLANEOUS MATERIALS
A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.
PART 3 - EXECUTION
3.1 HANGER AND SUPPORT APPLICATIONS
A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
E. Use padded hangers for piping that is subject to scratching.
F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
5. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
6. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
7. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
8. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
8. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
M. Comply with MMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
N. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
3.2 HANGER AND SUPPORT INSTALLATION
A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
E. Fastener System Installation:
1. Install powder-actuated fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
I. Install lateral bracing with pipe hangers and supports to prevent swaying.
J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
K. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.
M. Insulated Piping: Comply with the following:
1. Attach clamps and spacers to piping.
a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
4. Shield Dimensions for Pipe: Not less than the following:
a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
b. NPS 4: 12 inches long and 0.06 inch thick.
c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
5. Insert Material: Length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
3.3 EQUIPMENT SUPPORTS
A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
C. Provide lateral bracing, to prevent swaying, for equipment supports.
3.4 METAL FABRICATIONS
A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.
3.5 ADJUSTING
A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
3.6 PAINTING
A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 22 0553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL
1.1 SUMMARY
A. Section Includes:
1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
1.2 SUBMITTAL
A. Product Data: For each type of product indicated.
PART 2 - PRODUCTS
2.1 EQUIPMENT LABELS
A. Metal Labels for Equipment:
1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Letter Color: Black.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets or self-tapping screws.
B. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
2.2 WARNING SIGNS AND LABELS
A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
B. Letter Color: White.
C. Background Color: Red.
D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
H. Label Content: Include caution and warning information, plus emergency notification instructions.
2.3 PIPE LABELS
A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
PART 3 - EXECUTION
3.1 PREPARATION
A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.
3.2 EQUIPMENT LABEL INSTALLATION
A. Install or permanently fasten labels on each major item of mechanical equipment.
B. Locate equipment labels where accessible and visible.
3.3 PIPE LABEL INSTALLATION
A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. At each penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
B. Pipe Label Color Schedule:
1. Per ANSI A13.1 on OSHA color schemes.

END OF SECTION

SECTION 22 0700 - PLUMBING INSULATION

PART 1 - GENERAL
1.1 SUMMARY
A. Section Includes:
1. Insulation Materials:
a. Flexible elastomeric.
b. Mineral fiber.
2. Insulating cements.
3. Adhesives.
4. Mastics.
5. Sealants.
6. Factory-applied jackets.
7. Field-applied fabric-reinforcing mesh.
8. Field-applied jackets.
9. Tapes.
10. Securements.
11. Corner angles.
B. Related Sections include the following:
1. Division 23 Section "HVAC Insulation."
1.2 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings:
1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger..
2. Detail insulation application at pipe expansion joints for each type of insulation.
3. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Detail field application for each equipment type.
C. Field quality-control reports.
1.3 QUALITY ASSURANCE
A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
PART 2 - PRODUCTS
2.1 INSULATION MATERIALS
A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Aeroflex USA Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
G. Mineral-Fiber, Preformed Pipe Insulation:
1. Products: Subject to compliance with requirements, provide one of the following:
a. Knauf Insulation; 1000 Pipe Insulation.
b. Owens Corning; Fiberglas Pipe Insulation.
2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
2.2 ADHESIVES
A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Aeroflex USA Inc.; Aeroseal.
b. Armacell LCC; 520 Adhesive.
c. Foster Products Corporation, H. B. Fuller Company; 85-75.
C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. Products: Subject to compliance with requirements, provide the following:
a. Foster Products Corporation, H. B. Fuller Company; 85-20.
D. PVC Jacket Adhesive: Compatible with PVC jacket.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Dow Chemical Company (The); 739, Dow Silicone.
b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Speedline Corporation; Speedline Vinyl Adhesive.
2.3 SEALANTS
A. Joint Sealants:
1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, provide one of the following:
a. Foster Products Corporation, H. B. Fuller Company; 30-45.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.

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DATE:
PERMIT SUBMISSION:
06.19.26

BENNETT'S CREEK
HEALTH & REHABILITATION CENTER
1931/1915 BRIDGE ROAD (HIGHWAY 17)
SUFFOLK, VIRGINIA

COMMONWEALTH OF VIRGINIA
MICHAEL THOMAS DENK
Lic. No. 402063288
PROFESSIONAL ENGINEER

DRAWING NAME
PLUMBING SPECIFICATIONS

DAI PROJECT NO.
26032

P0.3

2026-06-24 - 1/8" = 1'-0"

5. Color: White.

2.4 FACTORY-APPLIED JACKETS
A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.5 FIELD-APPLIED JACKETS
A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Johns Manville; Zeston.
b. P.I.C. Plastics, Inc.; FG Series.
c. Proto PVC Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
5. Factory-fabricated tank heads and tank side panels.

2.6 TAPES
A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
b. Compac Corp.; 104 and 105.
c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
b. Compac Corp.; 110 and 111.
c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.7 CORNER ANGLES
A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

PART 3 - EXECUTION

3.1 PREPARATION
A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS
A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
E. Install multiple layers of insulation with longitudinal and end seams staggered.
F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
G. Keep insulation materials dry during application and finishing.
H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
I. Install insulation with least number of joints practical.
J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at [2 inches] [4 inches] o.c.
a. For below ambient services, apply vapor-barrier mastic over staples.
4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.3 PENETRATIONS
A. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
1. Comply with requirements in Division 07 Section "Penetration Firestopping"irestopping and fire-resistive joint sealers.

3.4 GENERAL PIPE INSULATION INSTALLATION
A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.5 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION
A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
C. Insulation Installation on Pipe Fittings and Elbows:
1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 MINERAL-FIBER INSULATION INSTALLATION
A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD-APPLIED JACKET INSTALLATION
A. Where FSK jackets are indicated, install as follows:
1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
C. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.8 PIPING INSULATION SCHEDULE, GENERAL
A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.9 INDOOR PIPING INSULATION SCHEDULE
1. SEE SCHEDULE ON DRAWING.

END OF SECTION

SECTION 22 1116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
2. Specialty valves.
3. Flexible connectors.
4. Escutcheons.
5. Sleeves and sleeve seals.
B. Related Section:
1. Division 33 Section "Facility Water Distribution Piping" for water-service piping and water meters outside the building from the source to the point where water-service piping enters the building.

1.2 SUBMITTALS
A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE
A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
B. Comply with NSF/ANSI 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS
A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
B. Refer to the drawings, schedules, and notes for applicable requirements.

2.2 COPPER TUBE AND FITTINGS
A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
5. Copper Pressure-Seal-Joint Fittings:
a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1) Apollo.
2) Elkhart.
3) Mueller Streamline.
4) NIBCO.
5) Viega.
b. NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
c. NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end.
B. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L water tube, annealed temper.
1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
2. Copper Pressure-Seal-Joint Fittings:
a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1) Apollo.
2) Elkhart.
3) Mueller Streamline.
4) NIBCO.
5) Viega.
b. NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
c. NPS 3 and NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end.

2.3 GALVANIZED-STEEL PIPE AND FITTINGS
A. Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B, Standard Weight. Include ends matching joining method.
1. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless steel pipe with threaded ends.
2. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
3. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface, and female threaded ends.
4. Flanges: ASME B16.1, Class 125, cast iron.

2.4 CPVC PIPING
A. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.

2.5 PEX-A PIPING
A. PEX-a Tubing: ASTM F876 and ASTM F877, SDR 9, crosslinked polyethylene tubing listed for potable water service.
1. Cold-Expansion Fittings: ASTM F1960, brass or polymer fittings with reinforcing rings or sleeves for use with PEX-a tubing.
2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Apollo
b. REHAU
c. Viega
d. Uponor
e. Zurn

2.6 PIPING JOINING MATERIALS
A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick, or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.
B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
C. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.
D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
E. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.
F. PEX-a Cold-Expansion Joining Materials: ASTM F1960 reinforcing rings or sleeves and brass or polymer fittings recommended by the PEX-a piping manufacturer for potable water service.
1. Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 SPECIALTY VALVES
A. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
B. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.

2.8 DIELECTRIC FITTINGS
A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
B. Dielectric Unions:
1. Description:
a. Pressure Rating: 150 psig at 180 deg F.
b. End Connections: Solder-joint copper alloy and threaded ferrous.
C. Dielectric Flanges:
1. Description:
a. Factory-fabricated, bolted, companion-flange assembly.
b. Pressure Rating: 150 psig.
c. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
D. Dielectric-Flange Kits:
1. Description:
a. Nonconducting materials for field assembly of companion flanges.
b. Pressure Rating: 150 psig.
c. Gasket: Neoprene or phenolic.
d. Bolt Sleeves: Phenolic or polyethylene.
e. Washers: Phenolic with steel backing washers.
E. Dielectric Couplings:
1. Description:
a. Galvanized-steel coupling.
b. Pressure Rating: 300 psig at 225 deg F.
c. End Connections: Female threaded.
d. Lining: Inert and noncorrosive, thermoplastic.
F. Dielectric Nipples:
1. Description:
a. Electroplated steel nipple complying with ASTM F1545.
b. Pressure Rating: 300 psig at 225 deg F.
c. End Connections: Male threaded or grooved.
d. Lining: Inert and noncorrosive, propylene.

2.9 FLEXIBLE CONNECTORS
A. Bronze braided flexible connectors: Corrugated bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
1. Working-Pressure Rating: Minimum 200 psig.
2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
B. Stainless-steel braided flexible connectors: Corrugated stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
1. Working-Pressure Rating: Minimum 200 psig.
2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

2.10 ESCUTCHEONS
A. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
B. One Piece, Cast Brass: Polished chrome-plated or plain brass finish with setscrews.
C. One Piece, Deep Pattern: Deep-drawn, box-shaped brass with chrome-plated finish.
D. One Piece, Stamped Steel: Chrome-plated finish with setscrew or spring clips.
E. Split Casting, Cast Brass: Polished chrome-plated or plain brass finish with concealed hinge and setscrew.
F. Split Plate, Stamped Steel: Chrome-plated finish with concealed hinge, setscrew or spring clips.
G. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
H. Split-Casting Floor Plates: Cast brass with concealed hinge.

2.11 SLEEVES
A. Cast-Iron Wall Pipes: Fabricated of cast iron, and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
B. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.
D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with setscrews.

2.12 SLEEVE SEALS
A. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.13 GROUT
A. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
B. Characteristics: Nonshrink; recommended for interior and exterior applications.
C. Design Mix: 5000-psi, 28-day compressive strength.
D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION
A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
C. Install ductile-iron piping under building slab with restrained joints according to applicable AWWA standards and manufacturer's written instructions.
D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
E. Install shutoff valve immediately upstream of each dielectric fitting.
F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
G. Install domestic water piping true to line and grade, without sags or offsets unless otherwise indicated.
H. Install seismic restraints on piping. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.
I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
L. Install piping adjacent to equipment and specialties to allow service and maintenance.
M. Install piping to permit valve servicing.
N. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
O. Install piping free of sags and bends.
P. Install fittings for changes in direction and branch connections.
Q. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
R. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.
S. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.
T. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.

3.2 JOINT CONSTRUCTION
A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
E. Soldered Joints: Apply ASTM B813 water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B828 or CDA's "Copper Tube Handbook."
F. Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
G. PEX-a Cold-Expansion Joints: Join PEX-a tubing and fittings with cold-expansion fittings and reinforcing rings or sleeves according to ASTM F1960 and manufacturer's written instructions.
H. Flanged Joints: Select appropriate nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE INSTALLATION
A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.
C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.
D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller and butterfly valves for piping NPS 2-1/2 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.

3.4 DIELECTRIC FITTING INSTALLATION
A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings or nipples.
C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
D. Dielectric Fittings for NPS 5 to NPS 6: Use dielectric flange kits.

3.5 FLEXIBLE CONNECTOR INSTALLATION
A. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.
B. Install bronze-hose flexible connectors in copper domestic water tubing.
C. Install stainless-steel-hose flexible connectors in steel domestic water piping.

3.6 HANGER AND SUPPORT INSTALLATION
A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:
a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
3. Base of Vertical Piping: MSS Type 52, spring hangers.
B. Support vertical piping and tubing at base and at each floor.
C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
6. NPS 6: 10 feet with 5/8-inch rod.
E. Install supports for vertical copper tubing every 10 feet.
F. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2: 108 inches with 3/8-inch rod.
3. NPS 2: 10 feet with 3/8-inch rod.
4. NPS 2-1/2: 11 feet with 1/2-inch rod.
5. NPS 3 and NPS 3-1/2: 12 feet with 1/2-inch rod.
6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
7. NPS 6: 12 feet with 3/4-inch rod.
G. Install supports for vertical steel piping every 15 feet.
H. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
I. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller and every 72 inches for NPS 1-1/4 and larger.
J. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS
A. Drawings indicate general arrangement of piping, fittings, and specialties.
B. Install piping adjacent to equipment and machines to allow service and maintenance.
C. Connect domestic water piping to existing water service. Use transition fitting to join dissimilar piping materials.
D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.8 ESCUTCHEON INSTALLATION
A. Install escutcheons for penetrations of walls, ceilings, and floors.
B. Escutcheons for New Piping:
1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
2. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
3. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish.
4. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish.
5. Bare Piping in Equipment Rooms: One piece, cast brass.
6. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.

3.9 SLEEVE INSTALLATION
A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
B. Sleeves are not required for core-drilled holes.
C. Permanent sleeves are not required for holes formed by removable PE sleeves.
D. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
E. Install sleeves in new partitions, slabs, and walls as they are built.
F. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
G. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
H. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals specified in this Section.
I. Seal space outside of sleeves in concrete slabs and walls with grout.
J. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
K. Install sleeve materials according to the following applications:
1. Sleeves for Piping Passing through Concrete Floor Slabs: Steel pipe.
2. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe.
a. Extend sleeves 2 inches above finished floor level.
b. For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
3. Sleeves for Piping Passing through Gypsum-Board Partitions:
a. Steel pipe sleeves for pipes smaller than NPS 6.
b. Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
4. Sleeves for Piping Passing through Concrete Roof Slabs: Steel pipe.
5. Sleeves for Piping Passing through Exterior Concrete Walls:
a. Steel pipe sleeves for pipes smaller than NPS 6.
b. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

3.10 SLEEVE SEAL INSTALLATION
A. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.11 IDENTIFICATION
A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.
B. Label pressure piping with system operating pressure.

3.12 FIELD QUALITY CONTROL
A. Perform tests and inspections.
B. Piping Inspections:
1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
C. Piping Tests:
1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
4. Hydrostatically test piping at 50 psig above system operating pressure without exceeding the pressure rating of system materials. Isolate the test source and maintain test pressure for four hours. Leaks or pressure loss are unacceptable.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and for corrective action required.
D. Domestic water piping will be considered defective if it does not pass tests and inspections.
E. Prepare test and inspection reports.

3.13 CLEANING
A. Clean and disinfect potable domestic water piping as follows:
1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in applicable AWWA standards for potable water system disinfection or follow procedures described below:
a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill and isolate system according to either of the following:
1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Submit water samples in sterile containers as required by authorities having jurisdiction. Repeat disinfection procedures if testing indicates contamination.
B. Prepare and submit reports of purging and disinfecting activities.
C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.14 PIPING SCHEDULE
A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
1. REFER TO SCHEDULE ON DRAWINGS.

3.15 VALVE SCHEDULE
A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Memory-stop balancing valves.
4. Drain Duty: Hose-end drain valves.
B. Use check valves to maintain correct direction of domestic water flow to and from equipment.
C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION

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DRAWING NAME
PLUMBING SPECIFICATIONS

DAI PROJECT NO.
26032

P0.4

2026-06-24 - 1/8" = 1'-0"

SECTION 22 1119 - DOMESTIC WATER PIPING SPECIALITES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following domestic water piping specialties:
   1. Vacuum breakers.
   2. Backflow preventers.
   3. Water pressure-reducing valves.
   4. Balancing valves.
   5. Temperature-actuated water mixing valves.
   6. Strainers.
   7. Hose bibbs.
   8. Wall hydrants.
   9. Drain valves.
   10. Water hammer arresters.
   11. Trap-seal primer valves.

B. See Division 22 Section "Domestic Water Piping" for water meters.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. NSF Compliance:
   1. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Ames Co.
      b. Watts Industries, Inc.; Water Products Div.
      c. Zurn Plumbing Products Group; Wilkins Div.
   3. Standard: ASSE 1001.
   4. Size: NPS 1/4 to NPS 3, as required to match connected piping.
   5. Body: Bronze.
   6. Inlet and Outlet Connections: Threaded.
   7. Finish: Chrome plated.

B. Hose-Connection Vacuum Breakers:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Watts Industries, Inc.; Water Products Div.
      b. Woodford Manufacturing Company.
      c. Zurn Plumbing Products Group; Light Commercial Operation.
      d. Zurn Plumbing Products Group; Wilkins Div.
   3. Standard: ASSE 1001.
   4. Body: Bronze, nonremovable, with manual drain.
   5. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
   6. Finish: Chrome or nickel plated.

2.2 BACKFLOW PREVENTERS

A. Intermediate Atmospheric-Vent Backflow Preventers:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Watts Industries, Inc.; Water Products Div.
      b. Zurn Plumbing Products Group; Wilkins Div.
   3. Standard: ASSE 1012.
   4. Operation: Continuous-pressure applications.
   5. Size: NPS 1/2 NPS 3/4.
   6. Body: Bronze.
   7. End Connections: Union, solder joint.
   8. Finish: Rough bronze.

B. Reduced-Pressure-Principle Backflow Preventers:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Watts Industries, Inc.; Water Products Div.
      b. Zurn Plumbing Products Group; Wilkins Div.
   2. Standard: ASSE 1013.
   3. Operation: Continuous-pressure applications.
   4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
   5. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
   6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
   7. Configuration: Designed for horizontal, straight through flow.
   8. Accessories:
      a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
      b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

2.3 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   3.
      a. Watts Industries, Inc.; Water Products Div.
      b. Zurn Plumbing Products Group; Wilkins Div.
   4. Standard: ASSE 1003.
   5. Pressure Rating: Initial working pressure of 150 psig.
   6. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
   7. Valves for Booster Heater Water Supply: Include integral bypass.
   8. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

2.4 BALANCING VALVES

A. Memory-Stop Balancing Valves:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Hammond Valve.
      b. Milwaukee Valve Company.
      c. NIBCO INC.
   3. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.
   4. Pressure Rating: 400-psig minimum CWP.
   5. Size: NPS 2 or smaller.
   6. Body: Copper alloy.
   7. Port: Standard or full port.
   8. Ball: Chrome-plated brass.
   9. Seats and Seals: Replaceable.
   10. End Connections: Solder joint or threaded.
   11. Handle: Vinyl-covered steel with memory-setting device.

2.5 HOSE BIBBS

A. Hose Bibbs:
   1. Standard: ASME A112.18.1 for sediment faucets.
   2. Body Material: Bronze.
   3. Seat: Bronze, replaceable.
   4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
   5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
   6. Pressure Rating: 125 psig.
   7. Vacuum Breaker: Integral, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
   8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
   9. Finish for Finished Rooms: Chrome or nickel plated.
   10. Operation for Equipment Rooms: Wheel handle or operating key.
   11. Operation for Service Areas: Operating key.
   12. Operation for Finished Rooms: Wheel handle.
   13. Include operating key with each operating-key hose bibb.
   14. Include wall flange with each chrome or nickel-plated hose bibb.

2.6 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Josam Company.
      b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
      c. Watts Drainage Products Inc.
      d. Woodford Manufacturing Company.
      e. Zurn Plumbing Products Group; Light Commercial Operation.
      f. Zurn Plumbing Products Group; Specification Drainage Operation.
   3. Standard: ASME A112.21.3M for concealed outlet, self-draining wall hydrants.
   4. Pressure Rating: 125 psig.
   5. Operation: Loose key.
   6. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
   7. Inlet: NPS 3/4 or NPS 1.
   8. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
   9. Box: Deep, flush mounting with cover.
   10. Box and Cover Finish: Polished nickel bronze.
   11. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
   12. Nozzle and Wall-Plate Finish: Polished nickel bronze.
   13. Operating Key: One with each wall hydrant.

2.7 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:
   1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
   2. Pressure Rating: 400-psig minimum CWP.
   3. Size: NPS 3/4.
   4. Body: Copper alloy.
   5. Ball: Chrome-plated brass.
   6. Seats and Seals: Replaceable.
   7. Handle: Vinyl-covered steel.
   8. Inlet: Threaded or solder joint.
   9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.8 WATER HAMMER ARRESTERS

A. Water Hammer Arresters:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. AMTROL, Inc.
      b. Josam Company.
      c. MIFAB, Inc.
      d. PPP Inc.
      e. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
      f. Tyler Pipe; Wade Div.
      g. Watts Drainage Products Inc.
      h. Zurn Plumbing Products Group; Specification Drainage Operation.
   3. Standard: ASSE 1010 or PDI-WH 201.
   4. Type: Copper tube with piston.
   5. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.9 TRAP-SEAL PRIMER VALVES

A. Supply-Type, Trap-Seal Primer Valves:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. MIFAB, Inc.
      b. PPP Inc.
      c. Sioux Chief Manufacturing Company, Inc.
      d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
      e. Watts Industries, Inc.; Water Products Div.
   3. Standard: ASSE 1018.
   4. Pressure Rating: 125 psig minimum.
   5. Body: Bronze.
   6. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
   7. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
   8. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
   1. Locate backflow preventers in same room as connected equipment or system.
   2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
   3. Do not install bypass piping around backflow preventers.

C. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
   1. Install thermometers and water regulators if specified.
   2. Install cabinet-type units recessed in or surface mounted on wall as specified.

F. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve, and pump.

G. Install water hammer arresters in water piping according to PDI-WH 201.

H. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

I. Piping Installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

J. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
   1. Intermediate atmospheric-vent backflow preventers.
   2. Reduced-pressure-principle backflow preventers.
   3. Double-check backflow-prevention assemblies.
   4. Water pressure-reducing valves.
   5. Primary, thermostatic, water mixing valves.
   6. Supply-type, trap-seal primer valves.

K. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:
   1. Test each reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.3 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION

SECTION 22 1316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following soil and waste, sanitary drainage and vent piping inside the building:
   1. Pipe, tube, and fittings.
   2. Special pipe fittings.

1.2 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated: Soil, Waste, and Vent Piping: 10-foot head of water.

1.3 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Hub-and-Spigot, Cast-Iron Pipe and Fittings: ASTM A 74, Service class.
   1. Gaskets: ASTM C 564, rubber.

B. Hubless Cast-Iron Pipe and Fittings: ASTM A 888 or CISPI 301.
   1. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
      a. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
      b. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.

C. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
   1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought-copper, solder-joint fittings.

D. Solid-Wall PVC Pipe: ASTM D 2665, solid-wall drain, waste, and vent.
   1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
   2. Solvent Cement and Adhesive Primer:
      a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Special pipe fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.

B. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

C. Aboveground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
   1. Service class, hub-and-spigot, cast-iron soil pipe and fittings; gaskets; and compression joints.
   2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
      a. Equivalent couplings manufactured by Husky, MG are acceptable.
   3. Copper DWV tube, copper drainage fittings, and soldered joints.
   4. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

D. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
   1. Service class, hub-and-spigot, cast-iron soil pipe and fittings; gaskets; and compression joints.
   2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
      a. Equivalent couplings manufactured by Husky, MG are acceptable.
   3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

E. Underground, soil and waste Piping NPS 5 and larger shall be any of the following:
   1. Service class, cast-iron soil pipe and fittings; gaskets; and compression joints.
   2. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
      a. Equivalent couplings manufactured by Husky, MG are acceptable.

3.2 PIPING INSTALLATION

A. Sanitary sewer piping outside the building is specified in Division 22 Section "Facility Sanitary Sewers."

B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."

C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

D. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

E. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 22 Section "Common Work Results for Plumbing."

F. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

G. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

H. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

I. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
   1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
   2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
   3. Vent Piping: 1/2 percent down toward vertical fixture vent or toward vent stack.

J. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
   1. Gasketed Joints: Make with rubber gasket matching class of pipe and fittings.
   2. Hubless Joints: Make with rubber gasket and sleeve or clamp.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

D. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
   1. Vertical Piping: MSS Type 8 or Type 42, clamps.
   2. Individual, Straight, Horizontal Piping Runs: According to the following:
      a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
      b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
      c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
   3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
   4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
   2. NPS 3: 60 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
   4. NPS 6: 60 inches with 3/4-inch rod.
   5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/4: 84 inches with 3/8-inch rod.
   2. NPS 1-1/2: 108 inches with 3/8-inch rod.
   3. NPS 2: 10 feet with 3/8-inch rod.
   4. NPS 2-1/2: 11 feet with 1/2-inch rod.
   5. NPS 3: 12 feet with 1/2-inch rod.
   6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
   7. NPS 6: 12 feet with 3/4-inch rod.

I. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/4: 72 inches with 3/8-inch rod.
   2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
   3. NPS 2-1/2: 108 inches with 1/2-inch rod.
   4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
   5. NPS 6: 10 feet with 5/8-inch rod.

J. Install supports for vertical copper tubing every 10 feet.

K. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
   1. NPS 1-1/2 and NPS 2 : 48 inches with 3/8-inch rod.
   2. NPS 3 : 48 inches with 1/2-inch rod.
   3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
   4. NPS 6: 48 inches with 3/4-inch rod.

L. Install supports for vertical PVC piping every 48 inches.

M. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

B. Connect drainage and vent piping to the following:
   1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Sanitary Waste Piping Specialties."
   2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
   3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Sanitary Waste Piping Specialties."
   4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.6 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
   1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction.
   1. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
   2. Prepare reports for tests and required corrective action.

3.7 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.8 PROTECTION

A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION

SECTION 22 4000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Faucets for lavatories, bathtub/showers, showers, and sinks.
   2. Toilet seats.
   3. Protective shielding guards.
   4. Fixture supports.
   5. Water closets.
   6. Lavatories.
   7. Individual showers.
   8. Service sinks.
   9. Laundry trays.

1.2 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

C. FRP: Fiberglass-reinforced plastic.

D. PMMA: Polymethyl methacrylate (acrylic) plastic.

E. PVC: Polyvinyl chloride plastic.

F. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"[; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"] for plumbing fixtures for people with disabilities.

C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
   1. Enameled, Cast-Iron Fixtures: ASME A112.19.1.
   2. Plastic Laundry Trays: CSA B45.5/IAPMO Z124.
   3. Plastic Shower Enclosures: CSA B45.5/IAPMO Z124.
   4. Plastic Sinks: CSA B45.5/IAPMO Z124.
   5. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4.
   6. Slip-Resistant Bathing Surfaces: Provide manufacturers slip-resistant bathing surface meeting applicable code requirements.
   7. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
   8. Stainless-Steel Residential Sinks: ASME A112.19.3.
   9. Vitreous-China Fixtures: ASME A112.19.2.
   10. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
   11. Water-Closet, Flushometer Tank Trim: ASSE 1037.

G. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
   1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3.
   2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3.
   3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
   4. Faucets: ASME A112.18.1.
   5. Hose-Connection Vacuum Breakers: ASSE 1011.
   6. Hose-Coupling Threads: ASME B1.20.7.
   7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
   8. NSF Potable-Water Materials: NSF 61.
   9. Pipe Threads: ASME B1.20.1.
   10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
   11. Supply Fittings: ASME A112.18.1.
   12. Brass Waste Fittings: ASME A112.18.2.

H. Comply with the following applicable standards and other requirements specified for bathtub/shower and shower faucets:
   1. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3.
   2. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
   3. Faucets: ASME A112.18.1.
   4. Hand-Held Showers: ASSE 1014.
   5. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
   6. Hose-Coupling Threads: ASME B1.20.7.
   7. Manual-Control Antiscald Faucets: ASTM F 444.
   8. Pipe Threads: ASME B1.20.1.
   9. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
   10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
   11. Thermostatic-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.

I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
   1. Atmospheric Vacuum Breakers: ASSE 1001.
   2. Brass and Copper Supplies: ASME A112.18.1.
   3. Dishwasher Air-Gap Fittings: ASSE 1021.
   4. Manual-Operation Flushometers: ASSE 1037.
   5. Plastic Tubular Fittings: ASTM F 409.
   6. Brass Waste Fittings: ASME A112.18.2.
   7. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.

J. Comply with the following applicable standards and other requirements specified for miscellaneous components:
   1. Disposers: ASSE 1008 and UL 430.
   2. Dishwasher Air-Gap Fittings: ASSE 1021.
   3. Flexible Water Connectors: ASME A112.18.6.
   4. Grab Bars: ASTM F 446.
   5. Hose-Coupling Threads: ASME B1.20.7.
   6. Hot-Water Dispensers: ASSE 1023 and UL 499.
   7. Off-Floor Fixture Supports: ASME A112.6.1.
   8. Pipe Threads: ASME B1.20.1.
   9. Plastic Toilet Seats: ANSI Z124.5.
   10. Supply and Drain Protective Shielding Guards: ICC A117.1.

PART 2 - PRODUCTS

2.1 GENERAL

A. General
   1. Provide fixtures, faucets, fittings, and supports complying with standards specified in this Section and with requirements of the Plumbing Fixture Schedule.
   2. Configuration and Mounting: As scheduled; coordinate mounting type, rough-in, and supports with building construction.
   3. Operation and Performance: As scheduled; provide required flow rates, flush volumes, or capacities to comply with applicable code and project requirements.
   4. Materials and Finish: As scheduled; provide manufacturer's standard materials and finishes unless otherwise indicated.
   5. Trim and Accessories: Provide trim, fittings, and accessories as scheduled; coordinate with fixture requirements and accessibility needs.
   6. Supplies and Connections: Provide supplies, stops, and connections sized and configured to suit scheduled fixtures and rough-in conditions.

2.2 LAVATORY FAUCETS

A. Lavatory Faucets
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Standard.
      b. Delta Faucet Company.
      c. Kohler.
      d. Moen.
      e. Zurn.
   2. General
      a. Include coordinated controls, spout configuration, and flow rate to meet code and project requirements.
      b. Provide accessories, stops, and connections as required.

2.3 SHOWER FAUCETS

A. Shower Faucets
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Standard.
      b. Delta Faucet Company.
      c. Kohler.
      d. Moen.
      e. Zurn.
   2. General
      a. Provide shower mixing valves, heads, and accessories as scheduled.
      b. Include antiscald protection and flow control per applicable standards.
      c. Coordinate mounting, trim, and accessories with enclosure and accessibility requirements.

2.4 SINK FAUCETS

A. Sink Faucets
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Standard.
      b. Delta Faucet Company.
      c. Kohler.
      d. Moen.
      e. Zurn.
   2. General
      a. Provide sink faucets as indicated on the Plumbing Fixture Schedule.
      b. Coordinate configuration, mounting, and accessories with sink type.
      c. Provide backflow protection, flow rates, and connections as required.

2.5 TOILET SEATS

A. Toilet Seats
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Standard.
      b. Bemis.
      c. Church Seats.
      d. Kohler.
      e. TOTO.
   2. General
      a. Provide toilet seats as scheduled.
      b. Coordinate size, configuration, and mounting with water closet type.

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c. Provide material, durability class, and color as indicated.

2.6 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers, <Insert drawing designation>:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. McGuire.
   b. Dearborn Brass.
   c. Plumberex.
   d. Truebro.
   e. Zurn.
2. General
   a. Provide protective shielding guards for exposed supplies and traps at accessible fixtures.
   b. Comply with ADA and ICC A117.1 requirements.

2.7 FIXTURE SUPPORTS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Josam.
   2. MIFAB.
   3. Jay R. Smith.
   4. Watts.
   5. Zurn.

B. Water-Closet Supports
   1. Description: Combination carrier designed for accessible or standard mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

C. Urinal Supports
   1. Description: Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture for wall-mounting, urinal-type fixture. Include steel uprights with feet.
   2. Accessible-Fixture Support: Include rectangular steel uprights.

D. Lavatory Supports
   1. Description: Type II, lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
   2. Accessible-Fixture Support: Include rectangular steel uprights.

E. Sink Supports
   1. Description: Type I, sink carrier with exposed arms and tie rods for sink-type fixture. Include steel uprights with feet.

2.8 WATER CLOSETS

A. Water Closets
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Standard.
      b. Gerber.
      c. Kohler.
      d. Mansfield.
      e. TOTO.
   2. General
      a. Provide water closets as indicated on the Plumbing Fixture Schedule, including mounting, outlet, flushing method (tank/flushometer-tank/flushometer valve), and accessibility requirements.
   3. Configuration: As scheduled; coordinate close-coupled, one-piece, or other configuration with the Plumbing Fixture Schedule and rough-in requirements.
      a. Provide vitreous-china water closets complying with standards specified in this Section and with requirements of the Plumbing Fixture Schedule.
      b. Mounting and Outlet: As scheduled; coordinate floor- or wall-mounting, outlet type, and rough-in with piping layout and building construction.
      c. Flushing System and Water Use: As scheduled; provide flush volume and performance to comply with applicable codes and project performance criteria.
      d. Accessibility and Height: As scheduled; provide standard, accessible, juvenile/child heights where indicated and coordinate clearances.
      e. Trim, Actuation, and Seat: Provide trim/actuation and toilet seat as scheduled; coordinate actuator location for accessible compartments.
      f. Color/Finish: As scheduled; provide manufacturers standard color unless otherwise indicated.
   4. Supplies and Stops: Provide exposed supplies, control stops, and escutcheons as required for the scheduled fixture and specified piping; coordinate sizes and connection types with rough-in conditions.
   5. Configuration: Flushometer-valve water closet, as scheduled; coordinate fixture type, spud size, and rough-in with flushometer and piping.
      a. General: Provide vitreous-china flushometer-valve water closets complying with standards specified in this Section and with requirements of the Plumbing Fixture Schedule.
      b. Mounting, Outlet, and Spud: As scheduled; coordinate bowl configuration, outlet type, spud size, and rough-in with piping and flushometer trim.
      c. Flushing Performance and Water Use: As scheduled; provide flush volume to comply with applicable code and project requirements.
      d. Accessibility and Height: As scheduled; coordinate clearances and actuator location for accessible compartments.
      e. Color/Finish: As scheduled; provide manufacturers standard color unless otherwise indicated.
   6. Flushometer/Trim: As scheduled; coordinate flushometer type, actuation, and trim with fixture spud size and piping rough-in.
   7. Toilet Seat: As scheduled; provide seat type and features indicated on the Plumbing Fixture Schedule.

2.9 LAVATORIES

A. Lavatories
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Standard.
      b. Kohler.
      c. Mansfield.
      d. TOTO.
      e. Gerber.
   2. General
      a. Provide lavatories complying with applicable standards specified in this Section and with requirements of the Plumbing Fixture Schedule.
      b. Configuration and Mounting: As scheduled; coordinate mounting type (wall, wall-and-pedestal, or other) with wall construction and required supports.
      c. Faucet Drilling: As scheduled; coordinate number of holes, centers, and hole location with specified faucet and accessories.
      d. Color/Finish: As scheduled; provide manufacturers standard color unless otherwise indicated.
      e. Outlet and Overflow: Provide outlet size and overflow configuration as required for the scheduled fixture and specified drain/faucet trim; coordinate with waste and overflow fittings.
      f. Trim and Connections: Coordinate supplies, stops, trap, waste, and escutcheons with the Plumbing Fixture Schedule and Division 22 piping requirements; provide components sized to suit fixture outlet and rough-in conditions.
      g. Accessibility: Where indicated for accessible fixtures, provide required clearances and coordinate protective shielding guards and supports as specified.
      h. Drain Piping: Provide NPS 1-1/4 p-trap and NPS 1-1/4 tubular waste to wall; and wall escutcheon. Unless otherwise noted on schedule:
         1) Concealed drain piping and traps may be schedule 40 PVC.
         2) Exposed drain piping and traps shall be chrome plated brass.
         3) Omit P-trap if hair interceptor is required.
      i. Protective Shielding Guard(s): Provide for all exposed waste and supply piping on accessible fixtures.

2.10 INDIVIDUAL SHOWERS

A. Individual Showers
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Aquatic.
      b. Mustee.
      c. MAAX.
      d. Sterling.
      e. Swan.
   2. General
      a. Provide shower enclosures as scheduled.
      b. Coordinate size, material, drain location, and accessories with project requirements.
      c. Provide accessibility features where indicated.

2.11 SERVICE SINKS

A. Service Sinks
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Standard.
      b. Elkay.
      c. Kohler.
      d. Mansfield.
      e. TOTO.
   2. General
      a.
      b. Provide service sinks as scheduled.
      c. Coordinate mounting, faucet, drain, and supports with installation conditions.

2.12 LAUNDRY TRAYS

A. Laundry Trays
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Standard.
      b. Elkay.
      c. Kohler.
      d. Mustee.
      e. Swan.
   2. General
      a. Provide laundry trays as scheduled.
      b. Coordinate mounting, faucet, drain, and supports with project requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine rough-in conditions and substrates for compliance with requirements for installation tolerances, clearances, and accessibility. Do not proceed with installation until unsatisfactory conditions have been corrected.
   1. Verify rough-in dimensions and locations with approved fixture manufacturers prior to installation.

B. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

C. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
   1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
   2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
   3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

D. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.

E. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

F. Install wall-mounting fixtures with tubular waste piping attached to supports.

G. Install fixtures level and plumb according to roughing-in drawings.

H. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

I. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

J. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

K. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

L. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

M. Install toilet seats on water closets.

N. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

O. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

P. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

Q. Install shower flow-control fittings with specified maximum flow rates in shower arms.

R. Install traps on fixture outlets.
   1. Exception: Omit trap on fixtures with integral traps.
   2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

S. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.

T. Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Connect inlet hose to dishwasher and outlet hose to disposer.

U. Install hot-water dispensers in back top surface of sink or in countertop with spout over sink.

V. Install escutcheons at piping wall and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."

W. Set bathtubs and showers in leveling bed of cement grout. Grout is specified in Division 22 Section "Common Work Results for Plumbing."

X. Seal joints between fixtures and adjacent surfaces watertight using sanitary-type, mildew-resistant silicone sealant.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.

B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.4 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224000

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PLUMBING SPECIFICATIONS

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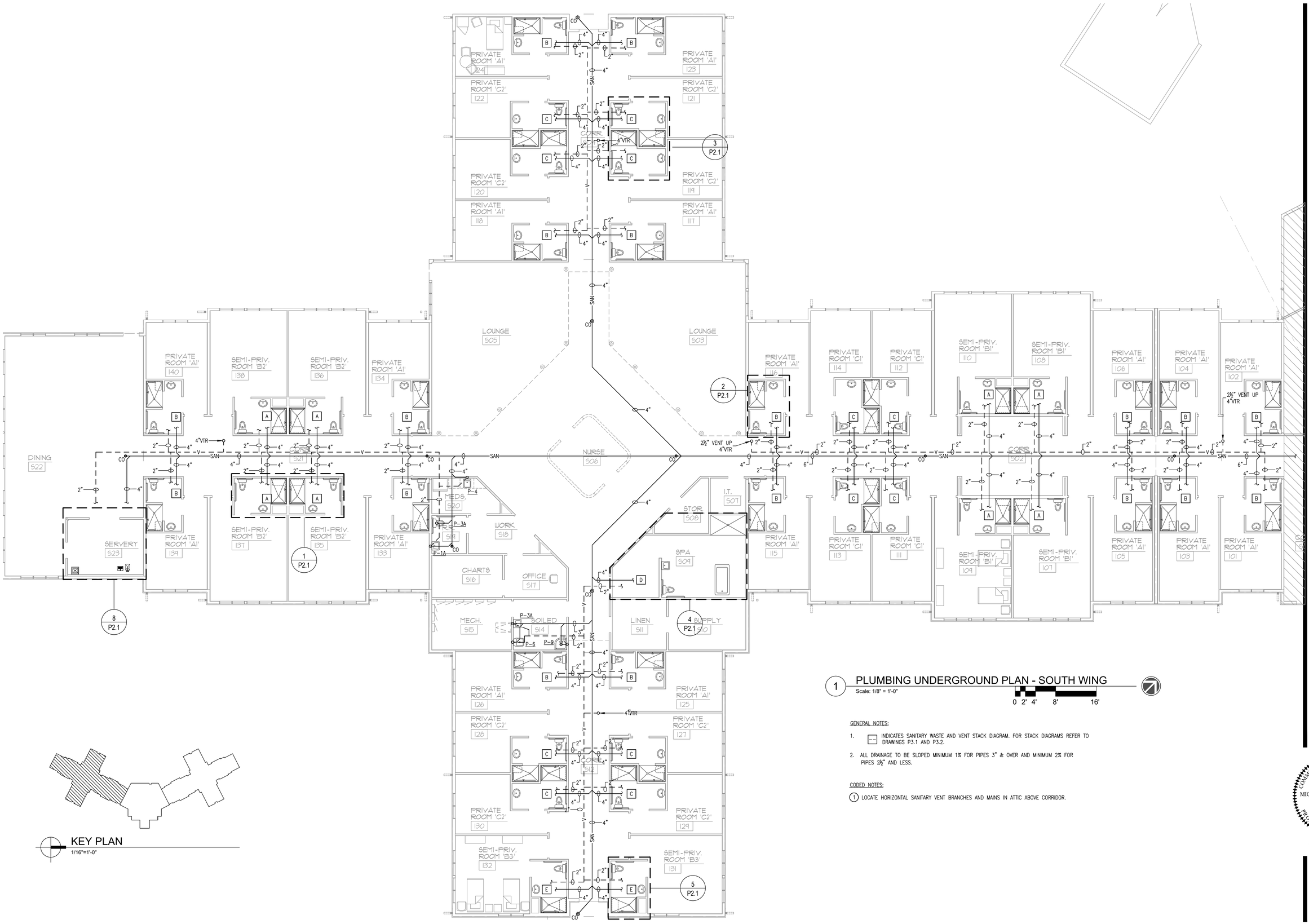

KEY PLAN
1/16"=1'-0"

1 PLUMBING UNDERGROUND PLAN - SOUTH WING

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

0 2' 4' 8' 16'

GENERAL NOTES:

1. INDICATES SANITARY WASTE AND VENT STACK DIAGRAM. FOR STACK DIAGRAMS REFER TO DRAWINGS P3.1 AND P3.2.
2. ALL DRAINAGE TO BE SLOPED MINIMUM 1% FOR PIPES 3" & OVER AND MINIMUM 2% FOR PIPES 2½" AND LESS.

CODED NOTES:

(1) LOCATE HORIZONTAL SANITARY VENT BRANCHES AND MAINS IN ATTIC ABOVE CORRIDOR.

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PLUMBING UNDERGROUND PLAN - SOUTH WING
DAI PROJECT NO.
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P1.1

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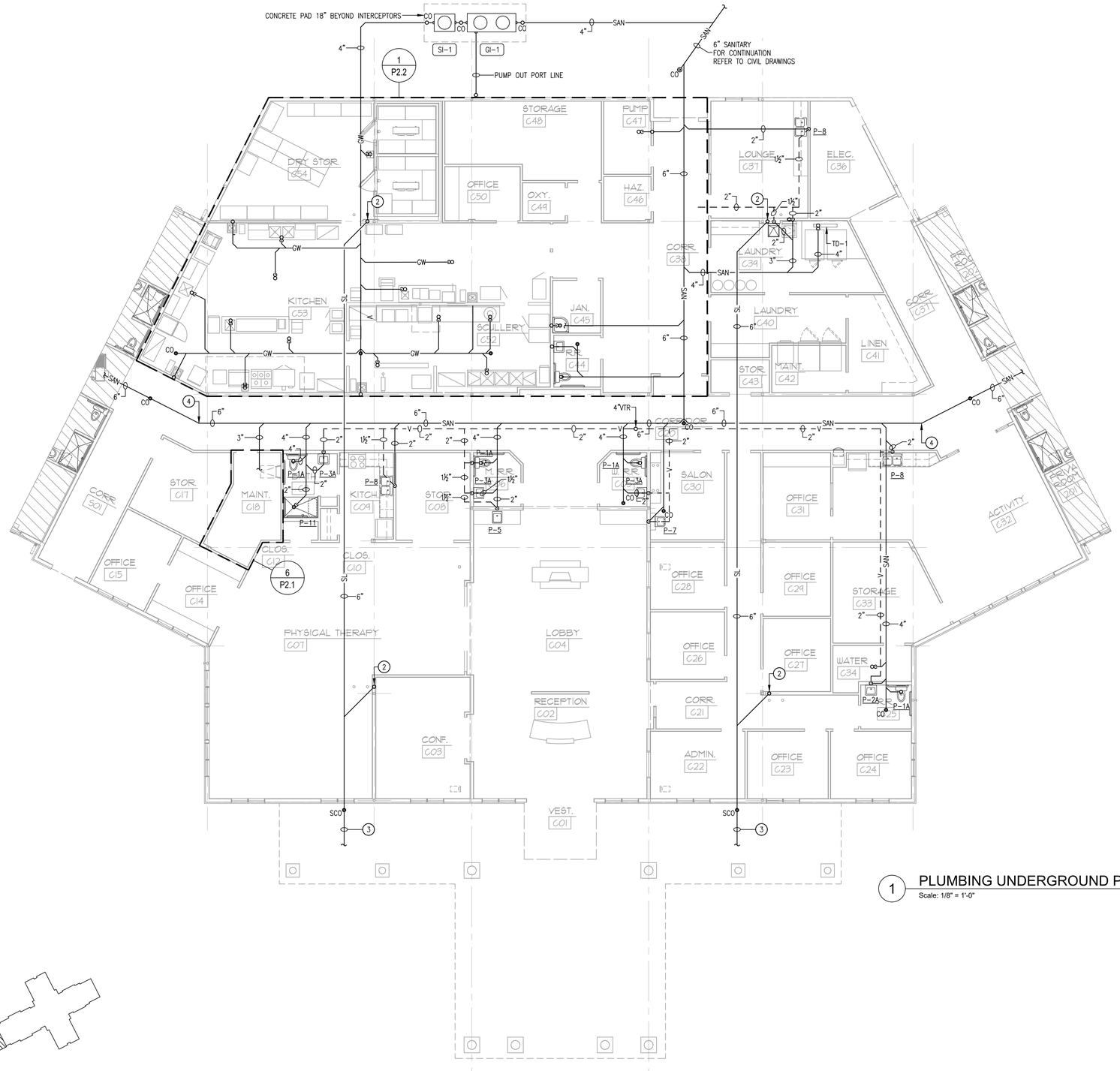


1 PLUMBING UNDERGROUND PLAN - CENTER

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

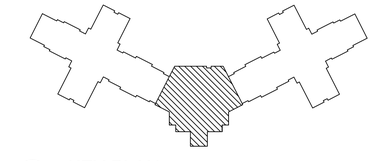
0 2' 4' 8' 16'

GENERAL NOTES:

1. ALL DRAINAGE TO BE SLOPED MINIMUM 1% FOR PIPES 3" & OVER AND MINIMUM 2% FOR PIPES 2½" AND LESS.

CODED NOTES:

1. SANITARY VENT TO BE LOCATED IN ATTIC ABOVE CORRIDOR PLENUM SPACE.
2. 4" STORM DRAIN DOWN IN WALL. PROVIDE WALL CLEAN-OUT AT BASE. INSULATE ALL HORIZONTAL STORM DRAINS.
3. 6" STORM DRAIN AT 2% SLOPE (OR 8" AT 1% SLOPE, 409 GPM LOAD) COORDINATE INVERT AND LOCATION WITH SITE CONTRACTOR. PROVIDE CLEANOUT TO GRADE AT BUILDING EXTERIOR.
4. FIELD ROLL 22.5-DEG BENDS TO ACHIEVE ALIGNMENT.



KEY PLAN

1/16"=1'-0"

2026-06-24 - 1/8" = 1'-0"

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mail@dscarchitects.com

DATE:
PERMIT SUBMISSION:
06.19.26

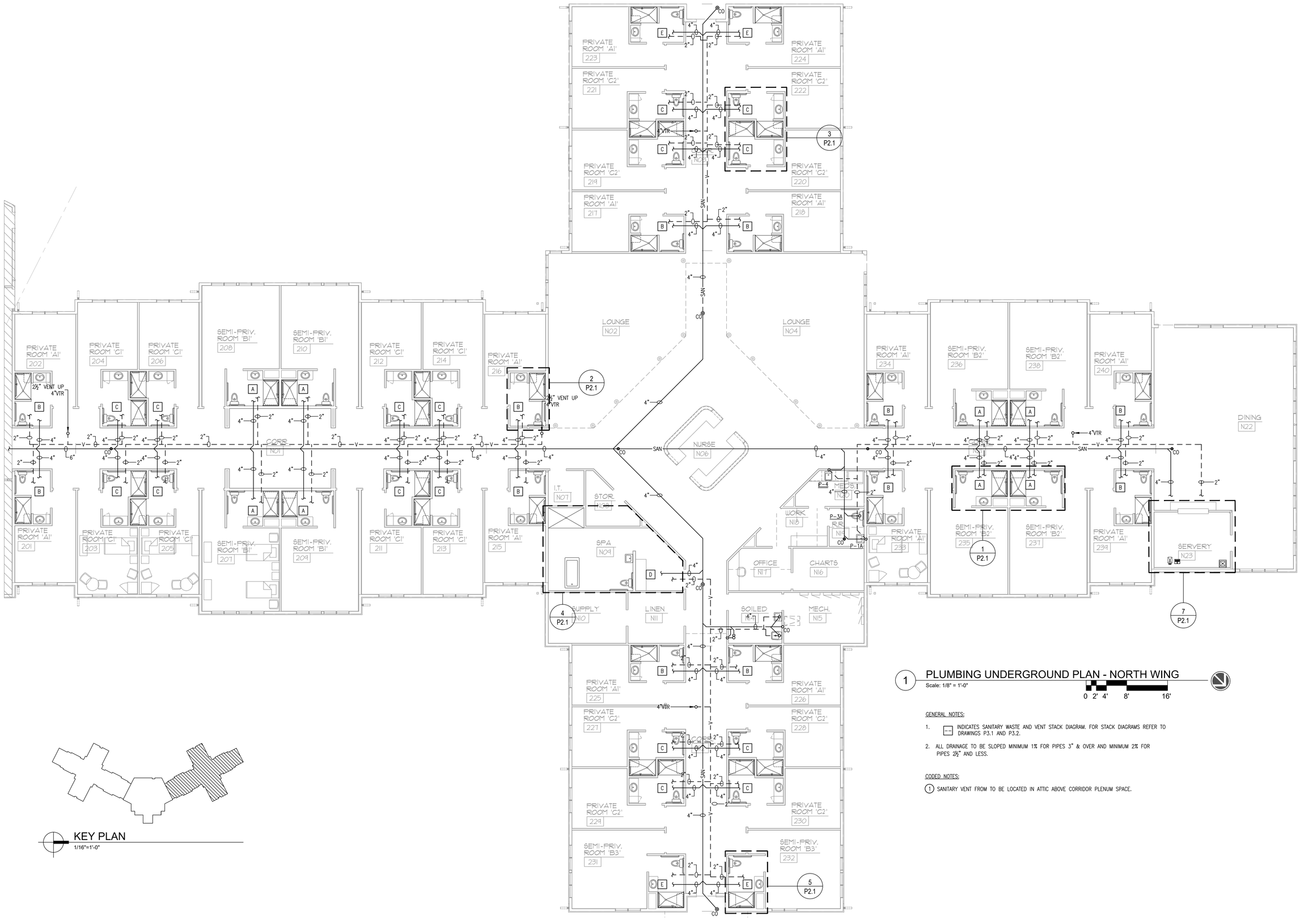
BENNETT'S CREEK
HEALTH & REHABILITATION CENTER
1931/1915 BRIDGE ROAD (HIGHWAY 17)
SUFFOLK, VIRGINIA

COMMONWEALTH OF VIRGINIA
MICHAEL THOMAS DENK
Lic. No. 402063288
PROFESSIONAL ENGINEER

DRAWING NAME
PLUMBING UNDERGROUND PLAN - CENTER

DAI PROJECT NO.
26032

P1.2



KEY PLAN
1/16"=1'-0"

1 PLUMBING UNDERGROUND PLAN - NORTH WING

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

0 2' 4' 8' 16'

GENERAL NOTES:

1. [--] INDICATES SANITARY WASTE AND VENT STACK DIAGRAM. FOR STACK DIAGRAMS REFER TO DRAWINGS P3.1 AND P3.2.
2. ALL DRAINAGE TO BE SLOPED MINIMUM 1% FOR PIPES 3" & OVER AND MINIMUM 2% FOR PIPES 2½" AND LESS.

CODED NOTES:

(1) SANITARY VENT FROM TO BE LOCATED IN ATTIC ABOVE CORRIDOR PLENUM SPACE.

2026-06-24 - 1/8" = 1'-0"

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BENNETT'S CREEK
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1931/1975 BRIDGE ROAD (HIGHWAY 17)
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Lic. No. 402063288
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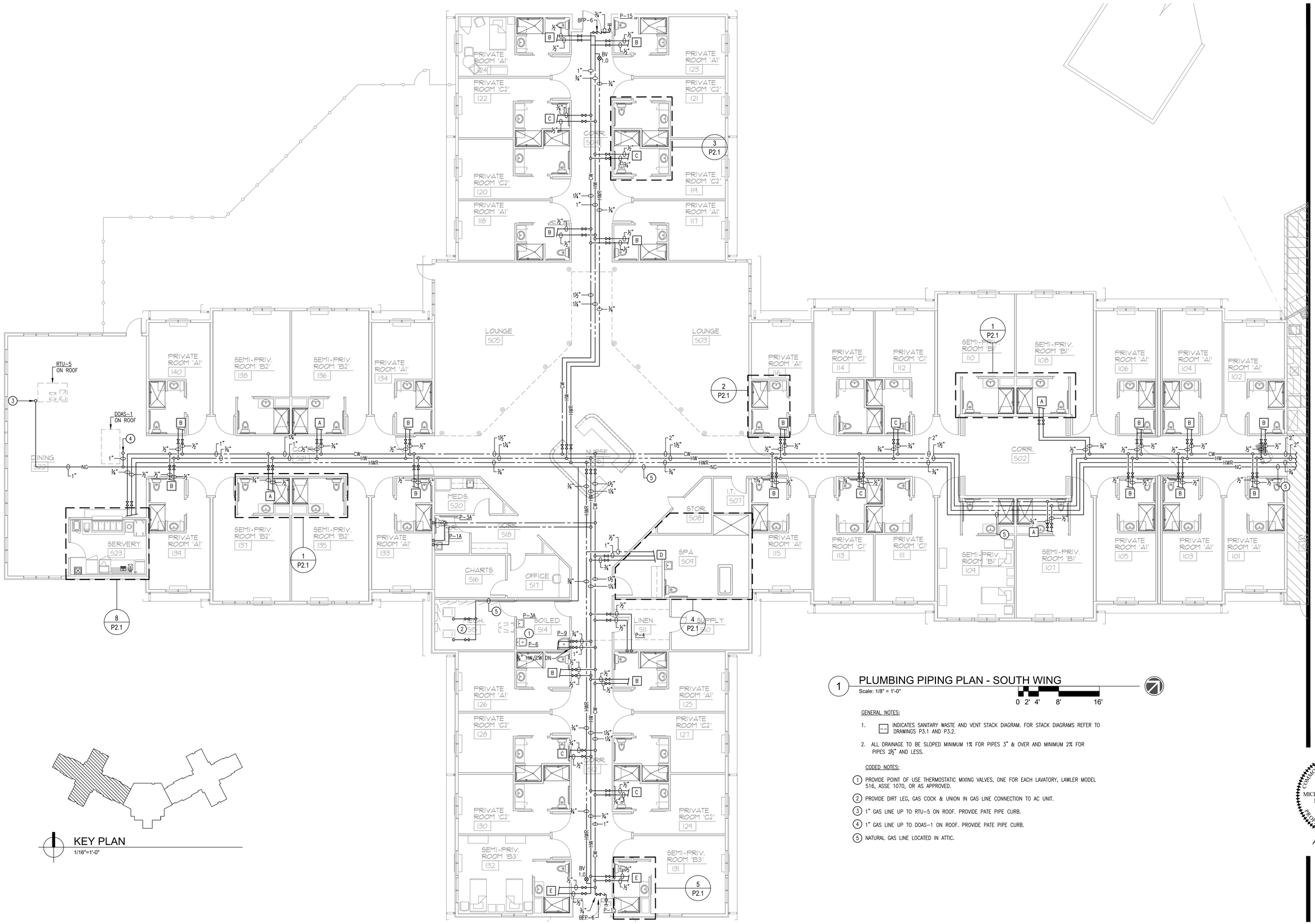
DRAWING NAME
PLUMBING UNDERGROUND PLAN - NORTH WING
DAI PROJECT NO.
26032

P1.3



KEY PLAN
1/16"=1'-0"

1 PLUMBING PIPING PLAN - SOUTH WING

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

0 2' 4' 8' 16'

GENERAL NOTES:

1. INDICATES SANITARY WASTE AND VENT STACK DIAGRAM. FOR STACK DIAGRAMS REFER TO DRAWINGS P3.1 AND P3.2.
2. ALL DRAINAGE TO BE SLOPED MINIMUM 1% FOR PIPES 3" & OVER AND MINIMUM 2% FOR PIPES 2½" AND LESS.

CODED NOTES:

1. PROVIDE POINT OF USE THERMOSTATIC MIXING VALVES, ONE FOR EACH LAVATORY, LAWLER MODEL 516, ASSE 1070, OR AS APPROVED.
2. PROVIDE DIRT LEG, GAS COCK & UNION IN GAS LINE CONNECTION TO AC UNIT.
3. 1" GAS LINE UP TO RTU-5 ON ROOF. PROVIDE PATE PIPE CURB.
4. 1" GAS LINE UP TO DOAS-1 ON ROOF. PROVIDE PATE PIPE CURB.
5. NATURAL GAS LINE LOCATED IN ATTIC.

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SUFFOLK, VIRGINIA

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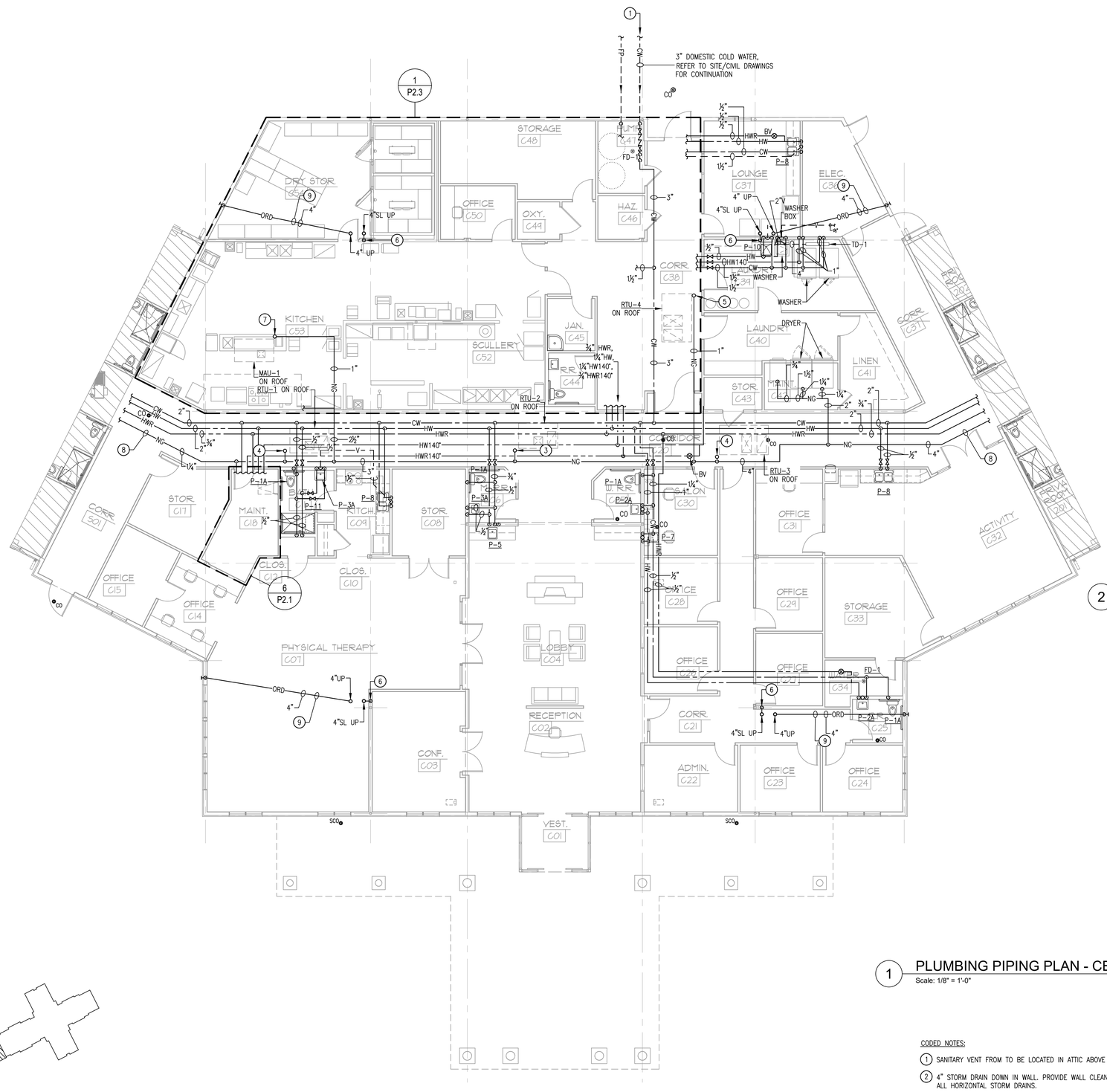
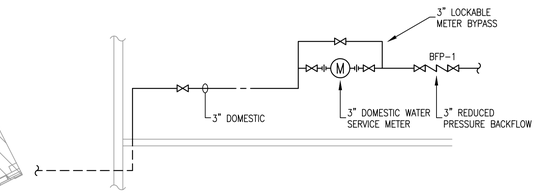
DRAWING NAME
PLUMBING PIPING PLAN - SOUTH WING

DAI PROJECT NO.
26032

P1.4

2026-06-24 - 1/8" = 1'-0"





2 WATER SERVICE DETAIL
Scale: NTS

GENERAL NOTES:

1. FOR PLUMBING LEGEND, ABBREVIATIONS AND GENERAL NOTES REFER TO DRAWING P0.1.
2. PROVIDE POINT OF USE THERMOSTATIC MIXING VALVES, ONE FOR EACH LAVATORY, LAWLER MODEL 516, ASSE 1070, OR AS APPROVED.

CODED NOTES:

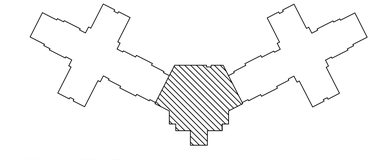
1. DOMESTIC WATER METER & CITY APPROVED BACKFLOW PREVENTER IS LOCATED IN VAULT. FOR EXACT LOCATION REFER TO SITE/CIVIL DRAWINGS.
2. 3" CW UP THRU FLOOR SLAB. PROVIDE MAIN SHUT-OFF VALVE IN RISER.
3. 1" GAS LINE UP TO RTU-2 ON ROOF. PROVIDE PATE PIPE CURB.
4. 1¼" GAS LINE UP TO RTU-1 & RTU-3 ON ROOF. PROVIDE PATE PIPE CURB.
5. 1" GAS LINE UP TO RTU-4 ON ROOF. PROVIDE PATE PIPE CURB.
6. 4" STORM DRAIN DOWN IN WALL. PROVIDE WALL CLEAN-OUT AT BASE. INSULATE ALL HORIZONTAL STORM DRAINS.
7. 1" GAS LINE UP TO MAU-1 ON ROOF. PROVIDE PATE PIPE CURB.
8. NATURAL GAS LINE LOCATED IN ATTIC.
9. OVERFLOW ROOF DRAIN AT ¼" SLOPE.

1 PLUMBING PIPING PLAN - CENTER
Scale: 1/8" = 1'-0"

0 2' 4' 8' 16'

CODED NOTES:

1. SANITARY VENT FROM TO BE LOCATED IN ATTIC ABOVE CORRIDOR PLENUM SPACE.
2. 4" STORM DRAIN DOWN IN WALL. PROVIDE WALL CLEAN-OUT AT BASE. INSULATE ALL HORIZONTAL STORM DRAINS.



KEY PLAN
1/16"=1'-0"

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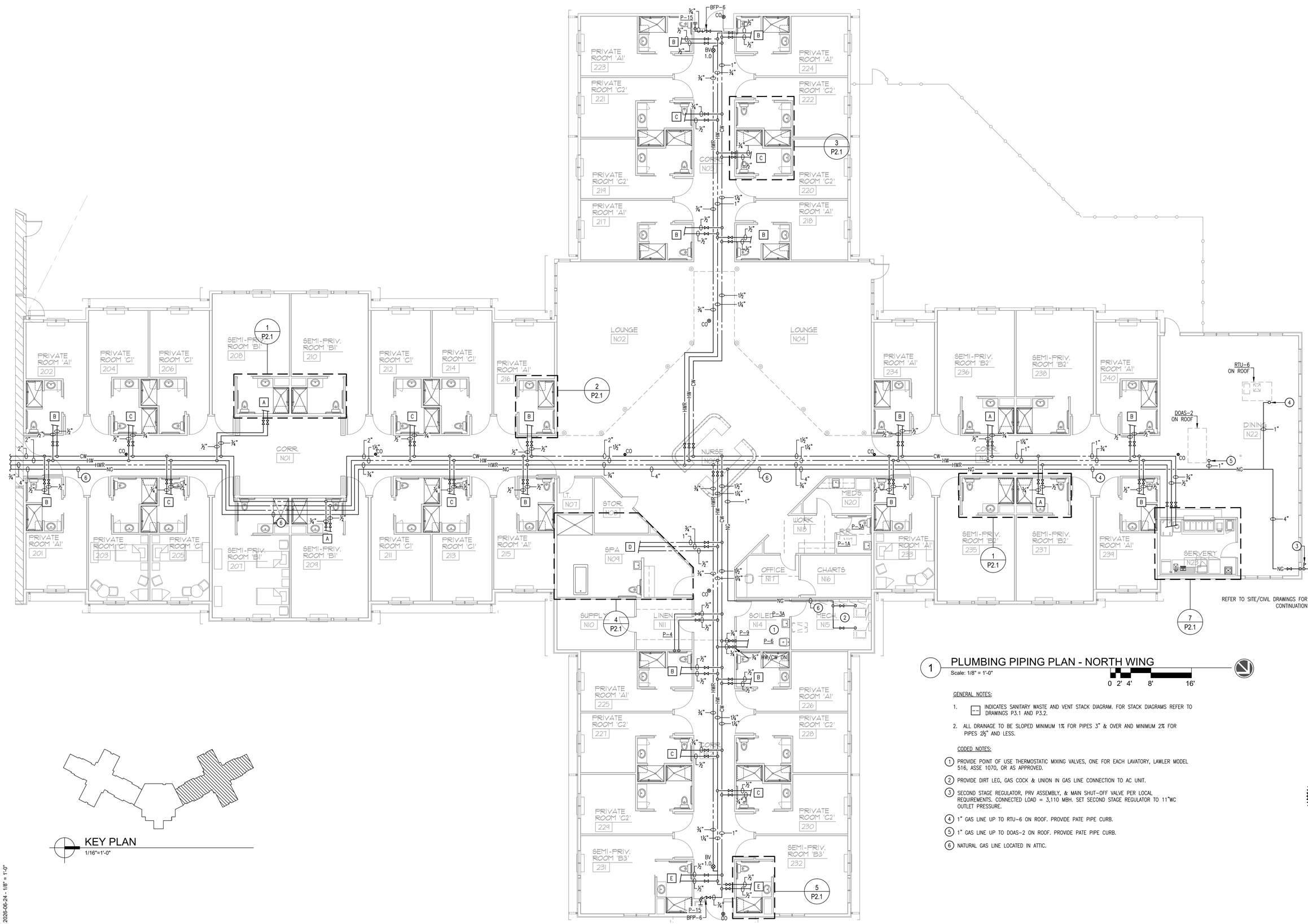
DRAWING NAME
PLUMBING PIPING PLAN - CENTER

DAI PROJECT NO.
26032

P1.5

2026-06-24 - 1/8" = 1'-0"



KEY PLAN
1/16"=1'-0"

1 PLUMBING PIPING PLAN - NORTH WING

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

0 2' 4' 8' 16'

GENERAL NOTES:

1. INDICATES SANITARY WASTE AND VENT STACK DIAGRAM. FOR STACK DIAGRAMS REFER TO DRAWINGS P3.1 AND P3.2.
2. ALL DRAINAGE TO BE SLOPED MINIMUM 1% FOR PIPES 3" & OVER AND MINIMUM 2% FOR PIPES 2½" AND LESS.

CODED NOTES:

1. PROVIDE POINT OF USE THERMOSTATIC MIXING VALVES, ONE FOR EACH LAVATORY, LAWLER MODEL 516, ASSE 1070, OR AS APPROVED.
2. PROVIDE DIRT LEG, GAS COCK & UNION IN GAS LINE CONNECTION TO AC UNIT.
3. SECOND STAGE REGULATOR, PRV ASSEMBLY, & MAIN SHUT-OFF VALVE PER LOCAL REQUIREMENTS. CONNECTED LOAD = 3,110 MBH. SET SECOND STAGE REGULATOR TO 11"WC OUTLET PRESSURE.
4. 1" GAS LINE UP TO RTU-6 ON ROOF. PROVIDE PATE PIPE CURB.
5. 1" GAS LINE UP TO DOAS-2 ON ROOF. PROVIDE PATE PIPE CURB.
6. NATURAL GAS LINE LOCATED IN ATTIC.

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BENNETT'S CREEK
HEALTH & REHABILITATION CENTER
1931/1915 BRIDGE ROAD (HIGHWAY 17)
SUFFOLK, VIRGINIA

COMMONWEALTH OF VIRGINIA
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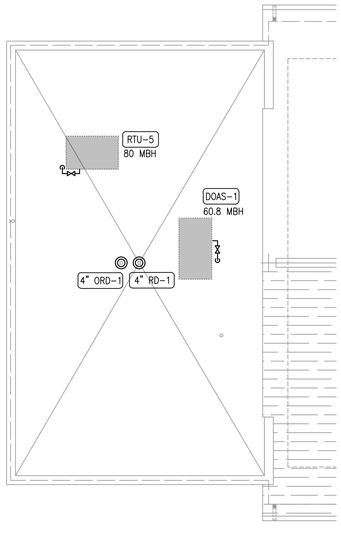
DRAWING NAME
PLUMBING PIPING PLAN - NORTH WING

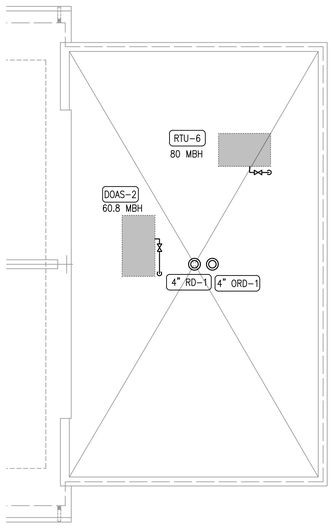
DAI PROJECT NO.
26032

P1.6

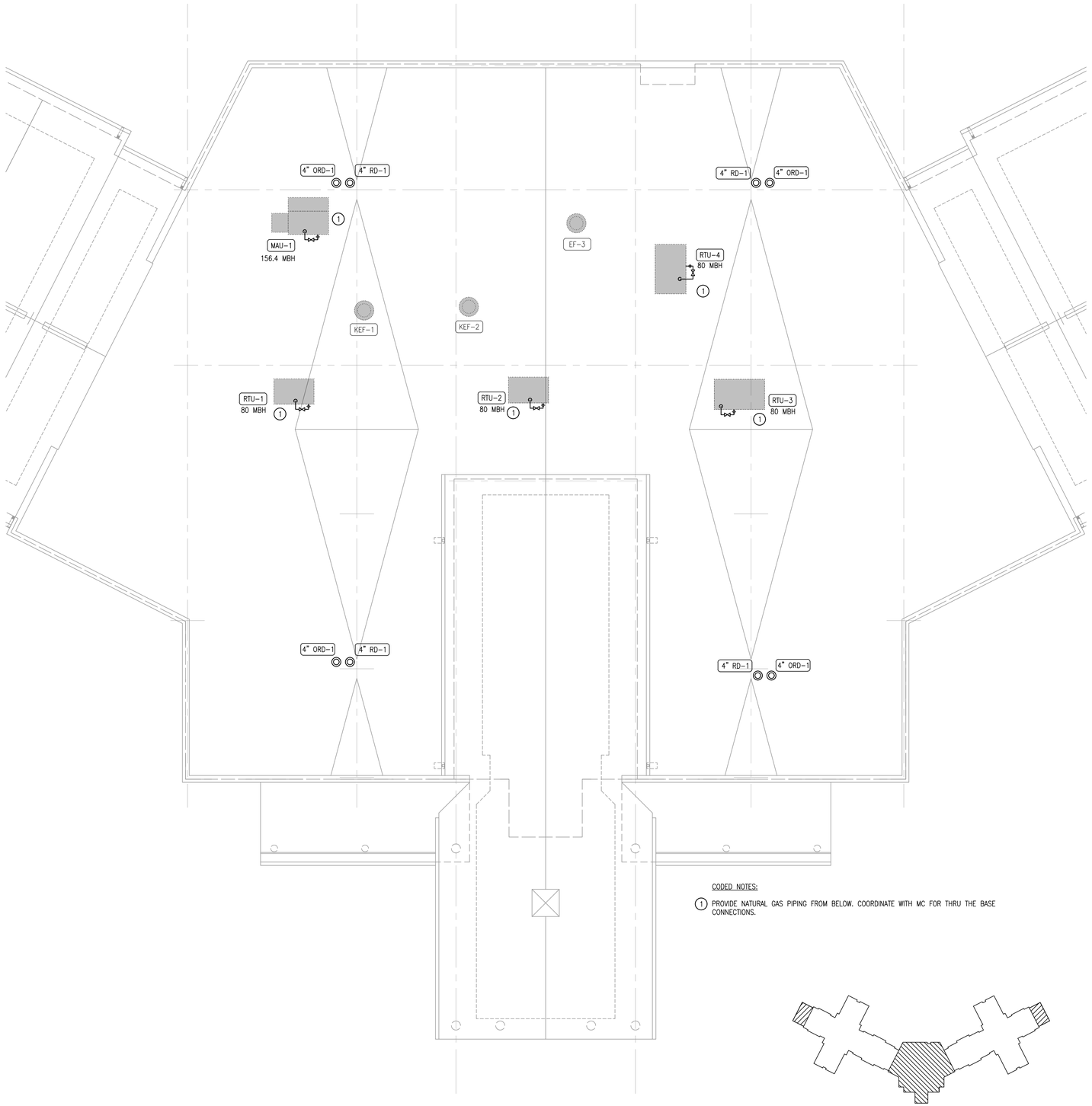
2026-06-24 - 1/8" = 1'-0"



2 PLUMBING ROOF PLAN - SOUTH WING
Scale: 1/8" = 1'-0"



3 PLUMBING ROOF PLAN - NORTH WING
Scale: 1/8" = 1'-0"



CODED NOTES:

1 PROVIDE NATURAL GAS PIPING FROM BELOW. COORDINATE WITH MC FOR THRU THE BASE CONNECTIONS.

1 PLUMBING ROOF PLAN - CENTER
Scale: 1/8" = 1'-0"

0 2' 4' 8' 16'

KEY PLAN

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SUFFOLK, VIRGINIA

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DRAWING NAME
PLUMBING ROOF PLANS

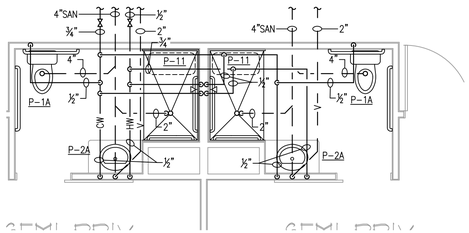
DAI PROJECT NO.
26032

P1.7

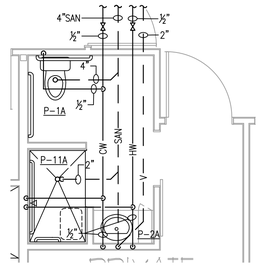
2026-06-24 - 1/8" = 1'-0"

GENERAL NOTES:

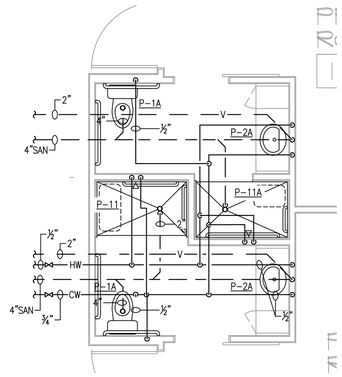
1. PROVIDE ASSE 1070 MIXING VALVE ON ALL HAND SINKS.
2. EXACT LOCATION OF FLOOR SINKS & DRAINS TO BE FIELD VERIFIED.
3. KITCHEN EQUIPMENT CONTRACTOR (KEC) SHALL FURNISH FAUCETS, BASKET WASTES, TWIST/LEVER WASTES, GAS HOSES, RESTRAINING CABLES, AND VACUUM BREAKER/SAFETY REGULATORS WITH THE NECESSARY COMPONENTS AND SUPPLY NIPPLES TO MAKE FINAL CONNECTIONS: INCLUDING THE INSTALLATION OF COMPONENTS NOT SHOWN OR SHIPPED LOOSE. REFER TO KEC DWGS. FOR FURTHER KITCHEN EQUIPMENT DETAILS.
4. PLUMBING CONTRACTOR SHALL VERIFY AND COORDINATE THE EXACT PLUMBING REQUIREMENTS FOR ALL NIC EQUIPMENT OUTSIDE THE KEC SCOPE PRIOR TO FINAL ROUGH-IN.
5. PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL PRESSURE REDUCING VALVES, FLOW CONTROLS, BACK FLOW PREVENTION, RPZ (REDUCED PRESSURE ZONE) VALVES, WATER HAMMER ARRESTOR, GATE VALVES, FOR WATER CONNECTIONS AS REQUIRED BY AUTHORITIES HAVING JURISDICTION.
6. PLUMBING CONTRACTOR SHALL PROVIDE ROUGH-INS, FIELD INTERCONNECTIONS (EXPOSED AND UNEXPOSED), AND FINAL CONNECTIONS TO ALL FOODSERVICE EQUIPMENT.



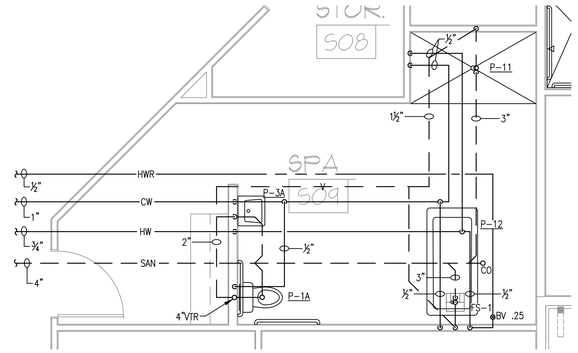
1 ENLARGED TOILET ROOM PLUMBING PLAN 'A'
Scale: 1/4"=1'-0"



2 ENLARGED TOILET ROOM PLUMBING PLAN 'B'
Scale: 1/4"=1'-0"

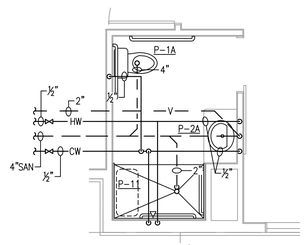


3 ENLARGED TOILET ROOM PLUMBING PLAN C'
Scale: 1/4"=1'-0"

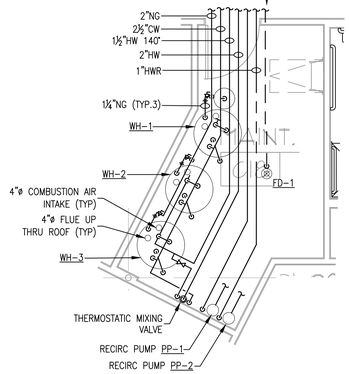


4 ENLARGED TOILET ROOM PLUMBING PLAN 'D'
Scale: 1/4"=1'-0"

CODED NOTES:
1. THERAPY TUB PROVIDED BY OWNER.

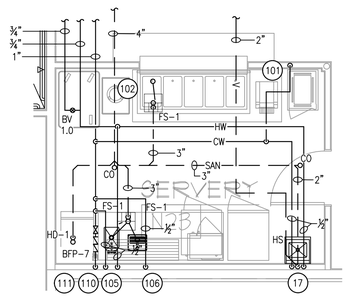


5 ENLARGED TOILET ROOM PLUMBING PLAN 'E'
Scale: 1/4"=1'-0"

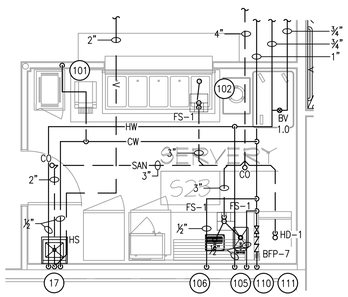


6 ENLARGED MECHANICAL ROOM
Scale: 1/4"=1'-0"

NOTES:
1. RUN 4"ø FLUE & 4"ø COMBUSTION AIR UP THRU ROOF. TERMINATE ABOVE ROOF PER MANUFACTURER RECOMMENDATIONS.



7 ENLARGED SERVERY PLAN - NORTH WING
Scale: 1/4"=1'-0"



8 ENLARGED SERVERY PLAN - SOUTH WING
Scale: 1/4"=1'-0"

SERVERY CONNECTION SCHEDULE

MARK	QTY	SERVICE	CW	HW	HW (140°)	SANITARY DIRECT	SANITARY INDIRECT	VENT	GAS SIZE	BTUH	REMARKS
17	2	HAND SINK	1/2"	1/2"	--	1-1/2"	--	1-1/2"	--	--	--
101	2	SERVING COUNTER W/FAUCET	1/2"	--	--	--	1"	--	--	--	1.
102	2	HOT FOOD WELL UNIT, DROP-IN	--	--	--	--	1"	--	--	--	1.
105	2	BEVERAGE COUNTER	1/2"	1/2"	--	--	1-1/2"	--	--	--	1.
106	2	GLASS FILLER	1/2"	--	--	--	1-1/4"	--	--	--	1.
110	2	ICE MAKER, CUBE STYLE	1/2"	--	--	--	3/8"&3/4"	--	--	--	1.
111	2	ICE BIN	1/2"	--	--	--	3/4"	--	--	--	1.

REMARKS:
1. TO FS.

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BENNETT'S CREEK
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COMMONWEALTH OF VIRGINIA
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Lic. No. 402063288
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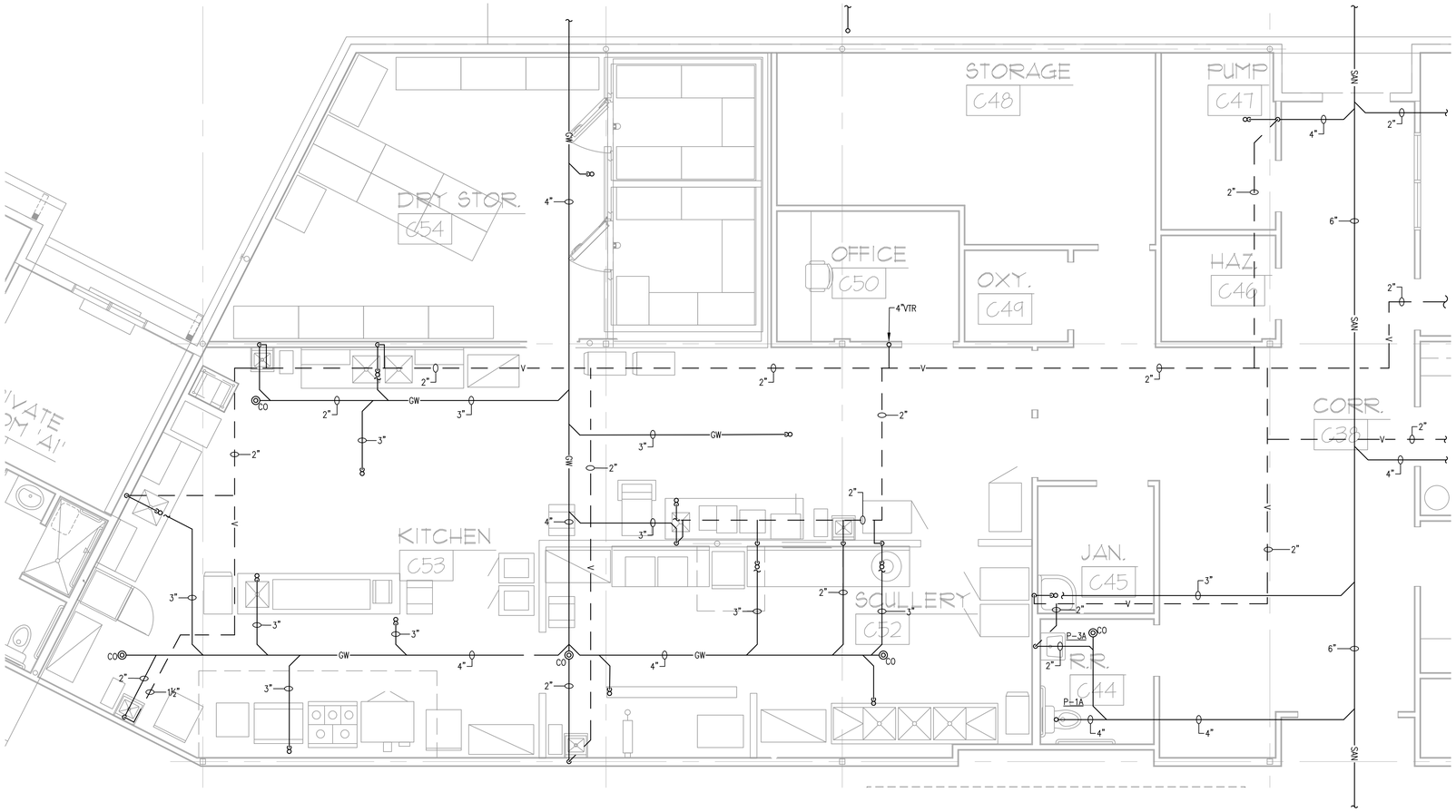
DRAWING NAME
ENLARGED PLUMBING PLANS

DAI PROJECT NO.
26032

P2.1

2026-06-24 - 1/4" = 1'-0"



2 ENLARGED UNDERGROUND PLAN

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

GENERAL NOTES:

1. PROVIDE ASSE 1070 MIXING VALVE ON ALL HAND SINKS.
2. EXACT LOCATION OF FLOOR SINKS & DRAINS TO BE FIELD VERIFIED.
3. KITCHEN EQUIPMENT CONTRACTOR (KEC) SHALL FURNISH FAUCETS, BASKET WASTES, TWIST/LEVER WASTES, GAS HOSES, RESTRAINING CABLES, AND VACUUM BREAKER/SAFETY REGULATORS WITH THE NECESSARY COMPONENTS AND SUPPLY NIPPLES TO MAKE FINAL CONNECTIONS; INCLUDING THE INSTALLATION OF COMPONENTS NOT SHOWN OR SHIPPED LOOSE. REFER TO KEC DWGS. FOR FURTHER KITCHEN EQUIPMENT DETAILS.
4. PLUMBING CONTRACTOR SHALL VERIFY AND COORDINATE THE EXACT PLUMBING REQUIREMENTS FOR ALL NIC EQUIPMENT OUTSIDE THE KEC SCOPE PRIOR TO FINAL ROUGH-IN.
5. PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL PRESSURE REDUCING VALVES, FLOW CONTROLS, BACK FLOW PREVENTION, RPZ (REDUCED PRESSURE ZONE) VALVES, WATER HAMMER ARRESTOR, GATE VALVES, FOR WATER CONNECTIONS AS REQUIRED BY AUTHORITIES HAVING JURISDICTION.
6. PLUMBING CONTRACTOR SHALL PROVIDE ROUGH-INS, FIELD INTERCONNECTIONS (EXPOSED AND UNEXPOSED), AND FINAL CONNECTIONS TO ALL FOODSERVICE EQUIPMENT.

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1931/1915 BRIDGE ROAD (HIGHWAY 17)
SUFFOLK, VIRGINIA

COMMONWEALTH OF VIRGINIA
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Lic. No. 402063288
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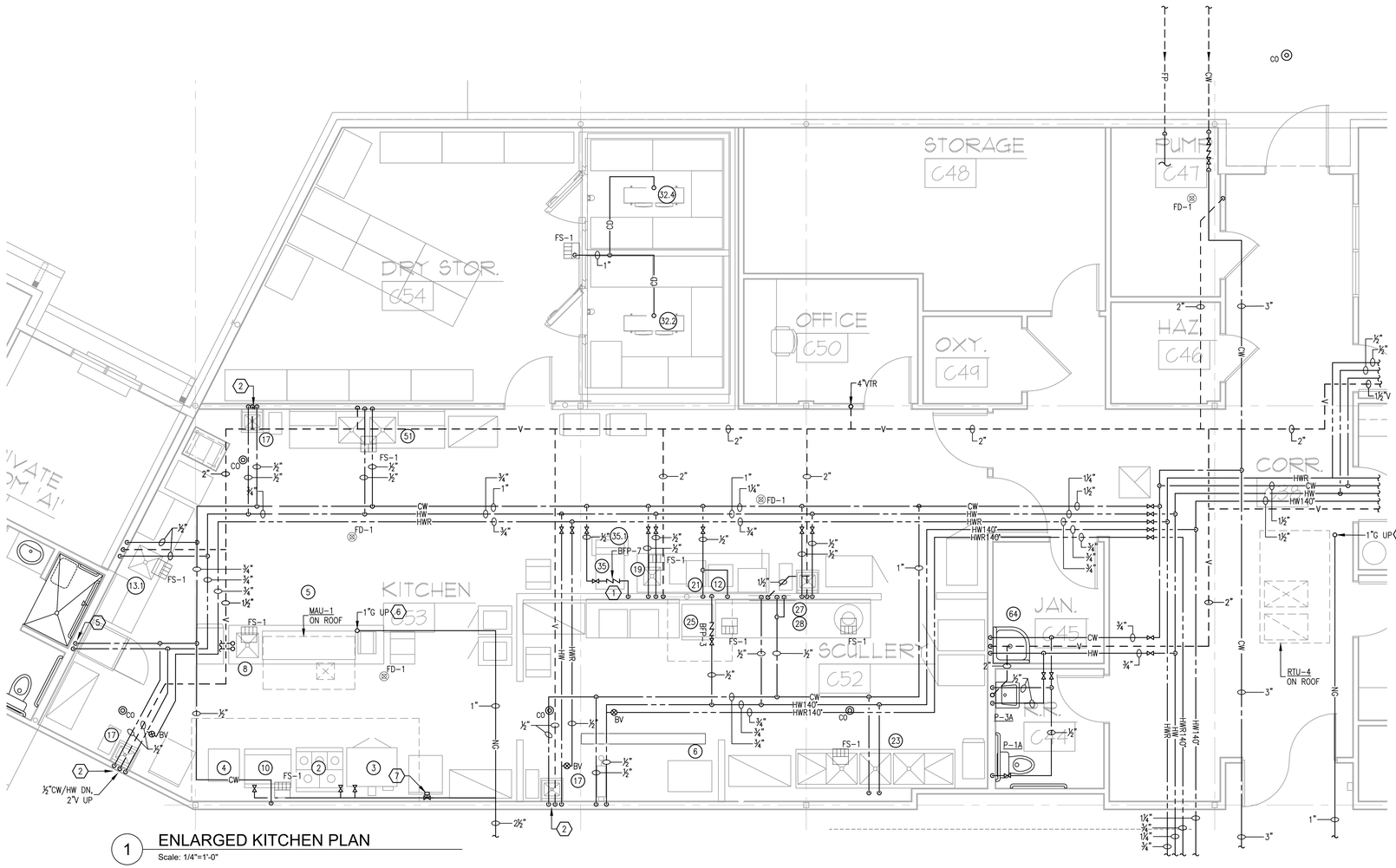
DRAWING NAME
ENLARGED KITCHEN UNDERGROUND PLAN
DAI PROJECT NO.
26032

P2.2

2026-06-24 - 1/4" = 1'-0"



1 ENLARGED KITCHEN PLAN

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

KITCHEN AREA CONNECTION SCHEDULE

MARK	QTY	SERVICE	CW	HW	HW (140°)	SANITARY DIRECT	SANITARY INDIRECT	VENT	GAS SIZE	BTUH	REMARKS
2	1	RANGE, RESTAURANT, GAS	--	--	--	--	--	--	3/4"	224,000	--
3	1	CONNECTION OVEN	--	--	--	--	--	--	3/4"	140,000	--
4	1	STEAMER, ATMOSPHERIC CONNECTED	1/2"	--	--	--	3/4"	--	--	--	1.
5	1	MAU SUPPLY FAN	1/2"	--	--	--	1"	--	1/2"	163,700	2.
6	1	FLOOR TROUGH	--	--	--	4"	--	--	--	--	--
8	1	S.S. WORK TABLE W/SINK	1/2"	1/2"	--	--	1-1/2"	--	--	--	1.
10	2	GRIDDLE, GAS, COUNTERTOP	1/2"	--	--	--	--	--	3/4"	60,000	1.
12	1	COFFEE BREWER	1/2"	--	--	--	--	--	--	--	1.
13	2	S.S. WORK TABLE W/SINK	1/2"	1/2"	--	--	1-1/2"	--	--	--	1.
17	4	HAND SINK	1/2"	1/2"	--	1-1/2"	--	1-1/2"	--	--	--
19	1	BEVERAGE TABLE	--	--	--	--	1-1/2"	--	--	--	1.

REMARKS:
1. TO FS.
2. MAKE UP AIR UNIT.

KITCHEN AREA CONNECTION SCHEDULE

MARK	QTY	SERVICE	CW	HW	HW (140°)	SANITARY DIRECT	SANITARY INDIRECT	VENT	GAS SIZE	BTUH	REMARKS
21	1	JUICE DISPENSER	1/2"	--	--	--	--	--	--	--	1.
22	1	TEA BREWER	1/2"	--	--	--	--	--	--	--	1.
23	1	3-COMPARTMENT SINK	(2)1/2"	(2)1/2"	--	--	(3)1-1/2"	1-1/2"	--	--	1.
25	1	DISH MACHINE	1/2"	--	--	2"	--	--	--	--	1.
27	1	DISPOSER	1/2"	--	--	2"	--	--	--	--	1.
28	1	PRE-RINSE FAUCET ASSY.	1/2"	1/2"	--	--	--	--	--	--	1.
32.2	1	WALK-IN COOLER EVAPORATOR	--	--	--	--	3/4"	--	--	--	1.
32.4	1	WALK-IN FREEZER EVAPORATOR	--	--	--	--	3/4"	--	--	--	1.
35	1	ICE MACHINE, CUBE-STYLE	1/2"	--	--	--	3/8"	--	--	--	1.
35.1	1	ICE BIN	--	--	--	--	3/4"	--	--	--	1.
51	1	S/S WORKTABLE	1/2"	1/2"	--	--	--	1-1/2"	--	--	1.
64	1	MOP SINK	1/2"	1/2"	--	2"	--	1-1/2"	--	--	1.

GENERAL NOTES:

1. PROVIDE ASSE 1070 MIXING VALVE ON ALL HAND SINKS.
2. EXACT LOCATION OF FLOOR SINKS & DRAINS TO BE FIELD VERIFIED.
3. KITCHEN EQUIPMENT CONTRACTOR (KEC) SHALL FURNISH FAUCETS, BASKET WASTES, TWIST/LEVER WASTES, GAS HOSES, RESTRAINING CABLES, AND VACUUM BREAKER/SAFETY REGULATORS WITH THE NECESSARY COMPONENTS AND SUPPLY NIPPLES TO MAKE FINAL CONNECTIONS: INCLUDING THE INSTALLATION OF COMPONENTS NOT SHOWN OR SHIPPED LOOSE. REFER TO KEC DWGS. FOR FURTHER KITCHEN EQUIPMENT DETAILS.
4. PLUMBING CONTRACTOR SHALL VERIFY AND COORDINATE THE EXACT PLUMBING REQUIREMENTS FOR ALL NIC EQUIPMENT OUTSIDE THE KEC SCOPE PRIOR TO FINAL ROUGH-IN.
5. PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL PRESSURE REDUCING VALVES, FLOW CONTROLS, BACK FLOW PREVENTION, RPZ (REDUCED PRESSURE ZONE) VALVES, WATER HAMMER ARRESTOR, GATE VALVES, FOR WATER CONNECTIONS AS REQUIRED BY AUTHORITIES HAVING JURISDICTION.
6. PLUMBING CONTRACTOR SHALL PROVIDE ROUGH-INS, FIELD INTERCONNECTIONS (EXPOSED AND UNEXPOSED), AND FINAL CONNECTIONS TO ALL FOODSERVICE EQUIPMENT.

CODED NOTES:

1. RUN ½" CW TO ICE MAKER & PROVIDE SHUT-OFF VALVE & DOUBLE CHECK BLACK FLOW PREVENTER.
2. PROVIDE POINT-OF-USE THERMOSTATIC MIXING VALVE ASSE 1070, LAWLER 516 OR AS APPROVED. TYPICAL ALL HAND SINKS.
3. RUN ½" CW TO COFFEE MAKER, JUICE & BEVERAGE DISPENSER, & PROVIDE SHUT-OFF VALVE & DOUBLE CHECK BACK FLOW PREVENTER.
4. 2" GAS LINE DOWN ALONG WALL AT 1'-0"AFF. RUN GAS MANIFOLD ALONG WALL. CONNECT GAS LINES TO APPLIANCES WITH QUICK CONNECT FITTINGS AND GAS COCK. REFER TO KITCHEN EQUIPMENT SCHEDULE FOR SIZES.
5. ¾" HW & CW DOWN IN WALL. CONNECT ½" HW & CW TO HAND SINK AND ½" HW & CW DOWN THRU SLAB AND UNDER FLOOR TO STAINLESS STEEL SINK AT WORK TABLE.
6. FOR LOCATION OF EQUIPMENT ON ROOF SEE DRAWING M1.2.
7. SOLENOID GAS SHUT-OFF VALVE.

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06.19.26

BENNETT'S CREEK
HEALTH & REHABILITATION CENTER
1931/1915 BRIDGE ROAD (HIGHWAY 17)
SUFFOLK, VIRGINIA

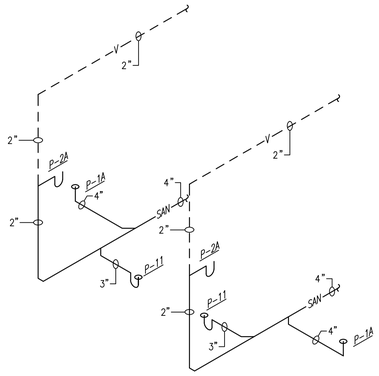
COMMONWEALTH OF VIRGINIA
MICHAEL THOMAS DENK
Lic. No. 402063288
PROFESSIONAL ENGINEER

DRAWING NAME
ENLARGED KITCHEN PIPING PLAN

DAI PROJECT NO.
26032

P2.3

2026-06-24 - 1/4" = 1'-0"



1 STACK DIAGRAM 'A'
NTS

2 STACK DIAGRAM 'B'
NTS

3 STACK DIAGRAM C'
NTS

4 STACK DIAGRAM 'D'
NTS

5 STACK DIAGRAM 'E'
NTS

6 SOUTH WING SERVERY STACK DIAGRAM
NTS

7 NORTH WING SERVERY STACK DIAGRAM
NTS

8 KITCHEN STACK DIAGRAM
NTS

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BENNETT'S CREEK
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SUFFOLK, VIRGINIA

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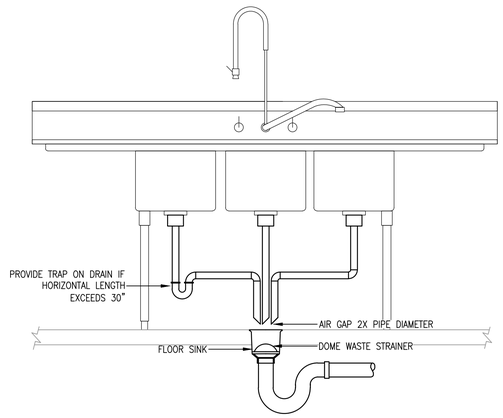
DRAWING NAME
PLUMBING ISOMETRICS

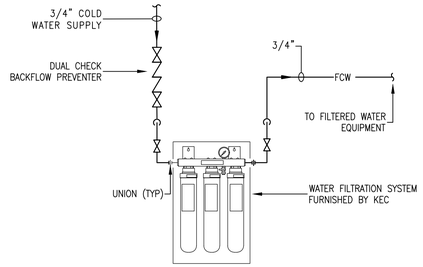
DAI PROJECT NO.
26032

P3.1

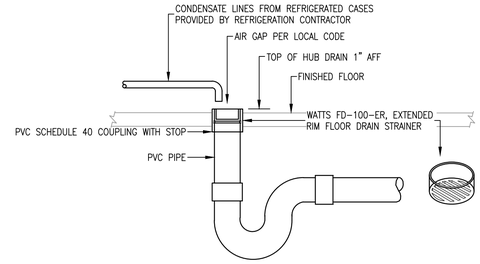
2026-06-24 - 1/4" = 1'-0"



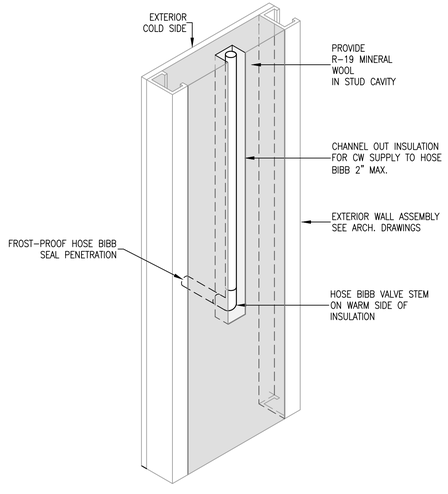
1 INDIRECTLY CONNECTED FOOD PREP SINK DETAIL
Scale: NTS



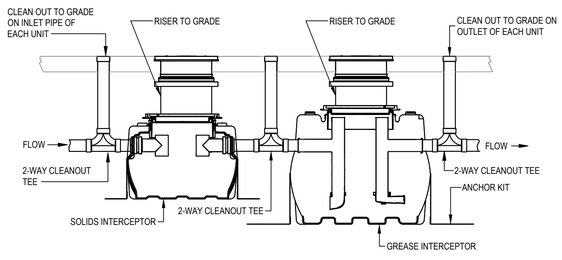
2 FOOD SERVICE WATER FILTER PIPING SCHEMATIC
Scale: NTS



3 COMBINATION WASTE & VENT CONDENSATE DRAIN
Scale: NTS

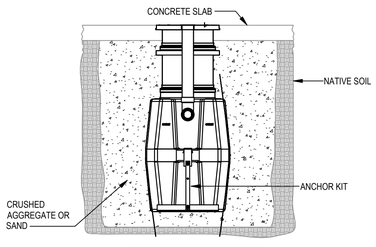


4 FROST-PROOF HOSE BIBB DETAIL
SCALE: NTS



SIDE VIEW DETAIL

FOR UNIT DETAILS REFER TO SPECIFICATION SHEET FOR SELECTED UNIT



EXCAVATION AND BACKFILL DETAIL

NOTES:

SCHIER OIL SEPARATORS ARE RATED AND MANUFACTURED WITH AN INTERNAL FLOW CONTROL SYSTEM ALREADY IN PLACE. THEY DO NOT REQUIRE AN EXTERNAL FLOW CONTROL SYSTEM OR AIR INTAKE VENT. SCHIER OIL SEPARATORS ARE NOT TO BE INSTALLED IN ANY OTHER MANNER EXCEPT AS SHOWN. CONSULT LOCAL CODES FOR SEPARATE TRAPPING REQUIREMENTS, CLEANOUT LOCATIONS AND ADDITIONAL INSTALLATION INSTRUCTIONS.

5 HYDROMECHANICAL GREASE INTERCEPTOR DETAIL
Scale: NTS

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DRAWING NAME
PLUMBING DIAGRAMS & DETAILS

DAI PROJECT NO.
26032

P5.1

2026-06-24 - 1/8" = 1'-0"

GREASE INTERCEPTOR SCHEDULE

MARK	LOCATION	SERVICE	MANUFACTURER	MODEL	TYPE	DESCRIPTION	COVER		FLOW	CAPACITY			INSTALLATION			PIPE CONNECTIONS				DIMENSIONS			REMARKS
							TYPE	DIA		LIQUID	GREASE	SOLIDS	LOCATION	UNIT DEPTH	EST RISER	INLET		OUTLET		LENGTH	WIDTH	HEIGHT	
																INVERT	SIZE	INVERT	SIZE				
GI-1	OUTDOOR	KITCHEN	SCHIER	GB-250	HYDROMECHANICAL INTERCEPTOR	POLYETHYLENE TANK BODY	COMPOSITE	24"	100 GPM	277 GAL	1,895 LBS	69 GAL	OUTDOORS	65"	21"	-36"	4"	-36"	4"	87"	33"	44"	1-8.
SI-1	OUTDOOR	KITCHEN	SCHIER	SI-75	SOLIDS INTERCEPTOR	POLYETHYLENE TANK BODY	COMPOSITE	24"	100 GPM	125 GAL	--	109 GAL	OUTDOORS	63"	16"	-27"	4"	-27"	4"	47"	33"	43"	1-8.

REMARKS

1. PROVIDE SCHIER SV-24 EFFLUENT SAMPLING PORT ON DOWNSTREAM SIDE OF GI-1.
2. IAPMO LISTED TO ASME A112.14.3 (TYPE D) AND CSA B481.1. UNIT DOES NOT REQUIRE FLOW CONTROL. UPC LABELED.
3. PROVIDE SCHIER PP3 (PUMP OUT PORT).
4. PROVIDE SCHIER FCR2 (FIELD CUT RISER) AND C24H2 (COMPOSITE COVERS), BOLTED 24" GAS/WATER TIGHT, TRAFFIC LOAD RATED FOR 16,000 LBS.
5. REMOVAL EFFICIENCY AT RATED CAPACITY OF 96.7%.
6. PROVIDE HIGH WATER ANCHOR KIT AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
7. MAXIMUM INLET TEMPERATURE SHALL NOT EXCEED 150°F.
8. GREASE INTERCEPTOR WILL USE OUTLET A.

GAS LOAD SUMMARY

MARK	EQUIPMENT	LOCATION	QTY	INPUT EACH BTUH	INPUT TOTAL BTUH
D-1	DRYER	LAUNDRY	1	165,000	165,000
D-2	DRYER	LAUNDRY	1	165,000	165,000
D-3	DRYER	LAUNDRY	1	22,500	22,500
DOAS-1	DEDICATED OUTDOOR AIR SYSTEM	SOUTH DINING	1	60,800	60,800
DOAS-2	DEDICATED OUTDOOR AIR SYSTEM	NORTH DINING	1	60,800	60,800
F-1	SPLIT SYSTEM AIR CONDITIONING UNIT	NORTH WING	1	80,000	80,000
F-2	SPLIT SYSTEM AIR CONDITIONING UNIT	NORTH WING	1	40,000	40,000
F-3	SPLIT SYSTEM AIR CONDITIONING UNIT	EAST WING	1	80,000	80,000
F-4	SPLIT SYSTEM AIR CONDITIONING UNIT	EAST WING	1	40,000	40,000
RTU-1	ROOFTOP UNIT	PHYSICAL THERAPY	1	80,000	80,000
RTU-2	ROOFTOP UNIT	LOBBY	1	80,000	80,000
RTU-3	ROOFTOP UNIT	OFFICES/ACTIVITY	1	80,000	80,000
RTU-4	ROOFTOP UNIT	KITCHEN, LAUNDRY	1	80,000	80,000
RTU-5	ROOFTOP UNIT	SOUTH DINING	1	80,000	80,000
RTU-6	ROOFTOP UNIT	NORTH DINING	1	80,000	80,000
MAU-1	MAKE-UP AIR UNIT	KITCHEN	1	156,400	156,400
WH-1	WATER HEATER	MAINTENANCE	1	399,900	399,900
WH-2	WATER HEATER	MAINTENANCE	1	399,900	399,900
WH-3	WATER HEATER	MAINTENANCE	1	399,900	399,900
--	KITCHEN	KITCHEN	--	561,400	561,400
TOTAL BTU					3,111,600

BACKFLOW PREVENTER SCHEDULE

TYPE	SIZE	DESCRIPTION	APPLICATION	HAZARD	STANDARD	MFG MODEL	REMARKS
BFP-1	3"	REDUCED PRESSURE ZONE ASSEMBLY	INCOMING SERVICE	HIGH	ASSE 1013	WATTS LF909	OS&Y
N/A	3/4"-1"	REDUCED PRESSURE ZONE ASSEMBLY	HVAC CROSS CONNECTION	HIGH	ASSE 1013	WATTS LF909	QUARTER TURN
BFP-3	3/4"-1"	REDUCED PRESSURE ZONE ASSEMBLY	DISH EQUIPMENT & COOKING EQUIPMENT	HIGH	ASSE 1013	WATTS LF909M1	QUARTER TURN
N/A	2"	REDUCED PRESSURE ZONE ASSEMBLY	COOLING TOWER MAKE-UP	HIGH	ASSE 1013	WATTS LF909M1	QUARTER TURN
N/A	3/8"	DUAL INLINE CHECK BACKFLOW PREVENTER	CARBONATED BEVERAGE & BEVERAGE DISPENSER	LOW	ASSE 1022	WATTS SD-3	--
BFP-6	3/4"	VACUUM BREAKER WALL HYDRANTS	WALL HYDRANTS FROST PROOF	HIGH	ASME 1019	WATTS HY-420	WITH HYDRANT
BFP-7	3/4"-2"	DOUBLE CHECK VALVE BACKFLOW PREVENTER	ICE MACHINES, POTABLE WATER FILTERS	LOW	ASSE 1015	WATTS LF7	QUARTER TURN

REMARKS:
1. PROVIDE BACKFLOW PREVENTER AT ALL CROSS-CONNECTIONS NOTED ABOVE AND AS OTHERWISE INDICATED ON DRAWINGS.

GAS WATER HEATER SCHEDULE

MARK	SERVICE	MANUFACTURER	MODEL	TYPE	STORAGE		GAS			INTAKE	VENT	WEIGHT	VOLT	PH	REMARKS
					RECOVERY	VOL	INPUT	OUTPUT	EFF.						
WH-1	FACILITY	LOCHINVAR	SWA400N	TANK	465 GPH	110 GAL	399,000	379,050	95%	4"	4"Ø	850 LBS	120	1	1-3.
WH-2	FACILITY	LOCHINVAR	SWA400N	TANK	465 GPH	110 GAL	399,000	379,050	95%	4"	4"Ø	850 LBS	120	1	1-3.
WH-3	FACILITY	LOCHINVAR	SWA400N	TANK	465 GPH	110 GAL	399,000	379,050	95%	4"	4"Ø	850 LBS	120	1	1-3.

REMARKS:
1. CONCENTRIC VENT KIT.
2. CONDENSATE NEUTRALIZATION KIT.
3. ASME CONSTRUCTION, ASME T&P, ZERO CLEARANCE TO COMBUSTIBLES.

FLOOR DRAIN SCHEDULE

MARK	TYPE	MANUFACTURER	MODEL	MATERIAL DESCRIPTION		SAN	VENT	DESCRIPTION
				DRAIN BODY	STRAINER			
FD-1	FLOOR DRAIN	ZURN	FD-2210-PV3	PVC	NICKEL BRONZE	3"	1-1/2"	PVC BODY, ADJUSTABLE NICKEL HEAD AND STRAINER, PROVIDE WITH OPTIONAL TRAP PRIMER CONNECTION WHERE REQUIRED.
FS-1	FLOOR SINK	ZURN	FS12-6-PV3	PVC	PVC	3"	1-1/2"	12" SQUARE, 6" DEEP PVC BODY, PVC DOME STRAINER FULL GRATE.
HD-1	HUB DRAIN	ZURN	FD-2210-PV3	PVC	NICKEL BRONZE	3"	1-1/2"	PVC BODY, ADJUSTABLE NICKEL HEAD AND STRAINER, PROVIDE WITH OPTIONAL TRAP PRIMER CONNECTION WHERE REQUIRED.
TD-1	TRENCH DRAIN	WATTS	LI-4-LT	STAINLESS STEEL	STAINLESS STEEL	4"	1-1/2"	REMOVABLE STAINLESS STEEL FILTER SCREENS, PERFORATED DOME BOTTOM STRAINER, 4" NO HUB BOTTOM OUTLET.
CO	CLEAN OUT	ZURN	CO-2449	PVC	NICKEL BRONZE	3"	1-1/2"	ZURN CO2530 STAINLESS STEEL ACCESS COVER.

ROOF DRAIN SCHEDULE

MARK	TYPE	MANUFACTURER	MODEL	MATERIAL DESCRIPTION		DESCRIPTION
				DRAIN BODY	STRAINER	
RD-1	ROOF DRAIN	WATTS	RD-100-F	EPOXY COATED CAST IRON	SELF-LOCKING POLYETHYLENE	EPOXY COATED CAST IRON ROOF DRAIN WITH FLASHING CLAMP, INTEGRAL GRAVEL STOP, HEAVY GAUGE ZINC PLATED STEEL DECK FLANGE WITH ADJUSTABLE EXTENSION.
ORD-1	OVERFLOW ROOF DRAIN	WATTS	RD-100-R	EPOXY COATED CAST IRON	SELF-LOCKING POLYETHYLENE	EPOXY COATED CAST IRON ROOF DRAIN WITH FLASHING CLAMP AND INTEGRAL 2" HIGH EXTERNAL WATER DAM.

PLUMBING INSULATION SCHEDULE

SERVICE	SIZE	THICKNESS	MATERIAL	JACKET
DOMESTIC COLD WATER (INSIDE)	4" AND LESS	1/2"	MINERAL FIBER	FACTORY - ASJ SSL
DOMESTIC HOT WATER	1-1/4" AND LESS	1"	MINERAL FIBER	FACTORY - ASJ SSL
DOMESTIC HOT WATER	1-1/2" AND LARGER	1-1/2"	MINERAL FIBER	FACTORY - ASJ SSL
PRIMARY STORM DRAINS (HORZ)	ALL SIZES	1"	MINERAL FIBER	FACTORY - ASJ SSL
SECONDARY STORM DRAINS	ALL SIZES	1"	MINERAL FIBER	FACTORY - ASJ SSL
CONDENSATE DRAINS	ALL SIZES	1/2"	FLEXIBLE ELASTOMERIC	N/A
HYDROPNEUMATIC TANKS	ALL SIZES	1"	FLEXIBLE ELASTOMERIC	N/A

ALL PLUMBING SYSTEMS NOTED ABOVE SHALL BE INSULATED AS INDICATED UNLESS NOTED OTHERWISE. REFER TO SPECIFICATION SECTION 220700 FOR ADDITIONAL REQUIREMENTS.

PLUMBING PIPE AND FITTING SCHEDULE

SERVICE	SIZE	PIPE MATERIAL	FITTINGS	JOINTS
DOMESTIC WATER	4" AND LESS	TYPE L COPPER	WROUGHT COPPER	SOLDERED
DOMESTIC WATER	2 " AND LESS	TYPE L COPPER	WROUGHT COPPER	PRESS
DOMESTIC WATER	2 " AND LESS	PEX	ENGINEERED POLYMER	COLD EXPANSION WITH RING
SANITARY DWV ABOVEGROUND	4" AND LESS	PVC DWV	PVC DWV SOCKET	SOLVENT WELD
SANITARY DWV ABOVEGROUND	4" AND LESS	SCHEDULE 40 CAST-IRON	NO-HUB CAST-IRON	STANDARD NO-HUB
SANITARY DWV ABOVEGROUND	6" AND LARGER	SCHEDULE 40 CAST-IRON	NO-HUB CAST-IRON	HEAVY DUTY NO-HUB
SANITARY DWV UNDERGROUND	6" AND LESS	PVC DWV	PVC DWV SOCKET	SOLVENT WELD
LP GAS	2-1/2" AND LESS	SCHEDULE 40 BLACK STEEL	MALLEABLE IRON	THREADED
LP GAS	3" AND LARGER	SCHEDULE 40 BLACK STEEL	WROUGHT STEEL	WELDED

PVC AND PEX PIPING SHALL NOT BE USED WITHIN A RETURN AIR PLENUM.

DOMESTIC CIRCULATING PUMP SCHEDULE

MARK	LOCATION	SERVICE	TEMP	TYPE OF PUMP	MANUFACTURER & MODEL NO.	GPM	HEAD (FT)	POWER	HP	RPM	REMARKS
PP-1	MAINTENANCE	LOW-TEMP HOT WATER	230 °F	WET ROTOR CIRCULATOR	BELL & GOSSETT HV SERIES	6	10	120V / 1	FRAC	VAR	1,2
PP-2	MAINTENANCE	LOW-TEMP HOT WATER	230 °F	WET ROTOR CIRCULATOR	BELL & GOSSETT 100 SERIES	4	8	120V / 1	FRAC	VAR	1,2

REMARKS:
1. POTABLE WATER, NSF, LEAD FREE BRONZE.
2. ECM MOTOR, FIXED SPEED, ADJUSTABLE SPEED CONTROL, 70 WATT.

EXPANSION TANK SCHEDULE

MARK	LOCATION	SERVICE	FLUID	VOLUME	ACCEPTANCE VOLUME	MANUFACTURER MODEL	REMARKS
ET-1	MAINTENANCE	HOT WATER	POTABLE WATER	21	18.9	ELBI DTS-80	1,2
--	--	--	-- --	-- --	-- --	-- --	--

REMARKS:
1. ASME RATED, 150PSI MAWP.
2. DIAPHRAGM TYPE, BUTYL-FDA APPROVED.

FIXTURE CONNECTION SCHEDULE

MARK	FIXTURE	SUPPLIES		WASTE		REMARKS
		HW	CW	SAN	VENT	
P-1A	WATER CLOSET FLUSH TANK	--	1/2"	4"	2"	--
P-2A	LAVATORY INTEGRAL	1/2"	1/2"	1-1/2"	1-1/4"	--
P-3A	LAVATORY WALL MOUNT	1/2"	1/2"	1-1/2"	1-1/4"	--
P-4	SINK COUNTERTOP	1/2"	1/2"	1-1/2"	1-1/4"	--
P-5	SINK UNDER MOUNT	1/2"	1/2"	1-1/2"	1-1/4"	--
P-6	CLINIC SERVICE SINK	1/2"	1-1/2"	2"	2"	--
P-7	SINK SHAMPOO BOWL	1/2"	1/2"	1-1/2"	1-1/4"	--
P-8	SINK COUNTERTOP	1/2"	1/2"	1-1/2"	1-1/4"	--
P-9	MOP BASIN	1/2"	1/2"	3"	1-1/2"	--
P-10	LAUNDRY TUB	1/2"	1/2"	1-1/2"	1-1/4"	--
P-11	SHOWER STALL	1/2"	1/2"	2"	1-1/4"	--
P-12	WHIRLPOOL BATH	1/2"	1/2"	2"	1-1/4"	--
P-13	ELECTRIC WATER COOLER	--	1/2"	1-1/2"	1-1/4"	--
P-14	WASHER BOX	3/4"	1/2"	2"	--	--
P-15	HOSE BIBB	--	3/4"	--	--	--

FIXTURE SPECIFICATIONS

P-1A WATER CLOSET, FLUSH TANK: AMERICAN STANDARD 'CADET' RIGHT HEIGHT #2998.012 ELONGATED TOILET 1.6 GPF VITREOUS CHINA, FLOOR MOUNTED W/CLOSED COUPLED TANK AND ELONGATED BOWL WITH "RISE AND SHINE" PLASTIC OPEN FRONT SEAT AND COVER, #5325.024 FLUSH CONTROL LEVER ON WIDE SIDE OF TOILET (AWAY FROM WALL).

P-2A LAVATORY, INTEGRAL: LAVATORY PROVIDED WITH COUNTERTOP. PROVIDE MOEN FAUCET #8800 (0.5) GPM FLOW, GRID STRAINER AND TRAP. INTEGRAL BOWL BY OTHERS.

P-3A LAVATORY, WALL MOUNT: AMERICAN STANDARD 'LUCERNE' #0355.012, 4" CENTERS WITH MOEN SINGLE LEVEL FAUCET MOEN 8430F05, 0.5 GPM, GRID STRAINER, WALL HANGER, 3/8" ANGLE SUPPLY COCKS AND RISERS. MOUNT AT ADA REQUIRED HEIGHT.

P-4 SINK, COUNTERTOP: ELKAY #ELU1317, SINGLE BOWL 20 GAUGE STAINLESS STEEL SINK, OVERALL SIZE 13" x 16½", MOEN 8278 FAUCET, 0.5 GPM FLOW, WRIST-BLADE HANDLES, GRID STRAINER.

P-5 SINK, UNDER MOUNT: ELKAY ELUHAD161655, SINGLE BOWL 18 GAUGE UNDER MOUNT STAINLESS STEEL SINK, INNER BOWL SIZE 18.5"x18.5", INSIDE BOWL SIZE 16" x 16" x 5.5" DEEP. PROVIDE WITH MOEN 8278 GOOSENECK TWO HANDLE FAUCET, GRID STRAINER, & P-TRAP.

P-6 CLINIC SERVICE SINK: AMERICAN STANDARD #9504.010 CLINIC SERVICE SINK. PROVIDE WITH SLOAN ROYAL #17HYVO FLUSHOMETER, #7880.024 BED PAN WASHER ASSEMBLY. MOUNT ON 10" HIGH CONCRETE BASE.

P-7 SINK, SHAMPOO BOWL: COLLINS SQUARE PORCELAIN SHAMPOO BOWL W/570 SINGLE HANDLE FAUCET, SPRAY HOSE, VACUUM BREAKER, DRAIN ASSEMBLY AND MOUNTING BRACKET. 19"W x 20"D x 10" H TRADITIONAL SIDEWALL BOWL.

P-8 SINK, COUNTERTOP: ELKAY #ELUH3118, DOUBLE BOWL 20 GAUGE STAINLESS STEEL, UNDERMOUNT, 30" x 18" OVERALL. 13½" x 16" x 7⅝" INSIDE EACH BOWL WITH MOEN 8701 SINGLE LEVER FAUCET WITH 9" SPOUT AND GRID STRAINER.

P-9 MOP BASIN: FIAT MSB-2424, MOLDED STONE BOWL MOP BASIN, 3" P-TRAP AND DRAIN, NO. 832-AA HOSE AND HOSE BRACKET, #830-AA CHROME PLATED FAUCET WITH VACUUM BREAKER PAIL HOOK, HOSE THREAD AND WALL BRACE.

P-10 LAUNDRY TUB: FIAT FL-1 FLOOR MOUNTED MOLDED STONE SINK, WHITE WITH STEEL ANGLE LEGS, DELTA 2121 DECK MOUNTED FAUCET WITH LEVER HANDLES, HOSE THREADED SWING SPOUT, GRID STRAINER WITH 1½" TAILPIECE AND ADJUSTABLE P-TRAP, ⅜" ANGLE SUPPLY COCKS AND RISERS.

P-11 SHOWER STALL: AKER OP-6036 ROLL-IN SHOWER, 62½"L x 39⅞"W x 78½"H, ADA COMPLIANT (WITHOUT SEAT), CHROME PRESSURE BALANCE MIXING VALVE, HAND HELD SHOWER, CHROME 24" SLIDE BAR AND 60" FLEXIBLE HOSE. CHROME CURTAIN ROD, SOAP DISH, BRASS DRAIN WITH MEMBRANE CLAMP AND STAINLESS STEEL STRAINER, AND SEATS.

P-12 WHIRLPOOL BATH: WHIRLPOOL BATHING UNIT AND ALL ASSOCIATED FITTINGS, EQUIPMENT AND ACCESSORIES SUPPLIED BY OWNER AND INSTALLED BY PLUMBING CONTRACTOR. VERIFY REQUIREMENTS.

P-13 ELECTRIC WATER COOLER: HALSEY TAYLOR #OVL-II ER-Q, TWO-LEVEL BARRIER FREE OVAL, 7.5 GPM CAPACITY, ½ HP COMPRESSOR, 4.5 FLA, COLOR BY ARCHITECT.

P-14 WASHER BOX: ZURN #WM2961-34 RECESSED PLASTIC BOX, DRAIN OUTLET, HOT AND COLD WATER CONNECTIONS.

P-15 HOSE BIBB: ZURN #1345 FROST PROOF HOSE BIBB WITH VACUUM BREAKER, STANDARD MALE HOSE THREADS.

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DATE:
PERMIT SUBMISSION:
06.19.26

BENNETT'S CREEK
HEALTH & REHABILITATION CENTER
1931/1915 BRIDGE ROAD (HIGHWAY 17)
SUFFOLK, VIRGINIA

COMMONWEALTH OF VIRGINIA
MICHAEL THOMAS DENK
Lic. No. 402063288
PROFESSIONAL ENGINEER

DRAWING NAME
PLUMBING SCHEDULES

DAI PROJECT NO.
26032

P6.1

2026-06-24 - 1/8" = 1'-0"