

Division 22 - PLUMBING SPECIFICATION
SECTION 22 05 00.00 - COMMON WORK RESULTS FOR PLUMBING
GENERAL
The general conditions, supplementary conditions and instructions to bidders shall apply to and be part of this specification.
Contractor shall comply with all applicable codes, rules and regulations.
Contractor shall obtain and pay for all permits, certificates of inspection and approvals required.
The base bid shall include furnishing all materials, labor, tools, equipment and installation of all work required to provide complete plumbing systems as outlined in Division 22.
Examine the drawings, specifications, and visit the site prior to submitting a bid.

APPLICABLE STANDARDS
The following standards shall govern:
American Society for Test Materials (ASTM);
American Standards Association (ASA);
Underwriters Laboratories (UL);
National Fire Protection Association (NFPA);
Illinois Plumbing Code.

The installation of all plumbing work shall conform to the applicable local plumbing codes and statutes.
PLANS
Plans are diagrammatic indicating required size, points of termination of piping and suggested routes. However, it is not intended that drawings indicate all necessary fixtures. Install piping in such manner as to conform to the structure, avoid obstructions and preserve headroom. All piping shall be run as straight as possible and symmetrical with architectural items. Piping shall be concealed in pipe shafts, pipe spaces, and furring wherever possible. Piping fabricated before coordination with the other trades will be done at contractor's own risk.

In the event of inconsistencies or conflict within or between the Contract Documents, provide the better quality, more costly or greater quantity of work and comply with the more stringent requirements. Seek the direction of the Engineer of Record for clarification of conflicts as soon as a conflict is identified. (Prior to installation) CUTTING, PATCHING AND DEMOLITION
Contractor shall include all necessary cutting and patching required to perform their work.
Care shall be taken when working in existing spaces so as not to damage existing walls and ceilings where work is being performed. Provide non-destructive concrete structural scanning or concrete x-ray prior to cutting, cutting or coring.
Saw cut all slab penetrations. Seal around all wall, floor and ceiling pipe penetrations with NFPA approved sealant material to maintain the fire resistant and watertight integrity of the assembly.
Disconnect and remove from site all plumbing installation systems, equipment, and components indicated to be removed and as necessary to perform the described scope of work. No unused plumbing systems, equipment, and components shall be abandoned. No means of demolition shall be used that would result in damage to structures, materials, equipment or components indicated to remain or endanger the health, safety and welfare of the general public.

EXCAVATION AND BACKFILL
Perform all excavation and backfilling required for this work. Contractor shall consult with utility company prior to beginning excavation.
At a minimum, all piping shall be laid on a bed of sand, 6" deep, well tamped into place and properly graded to permit the pipe to have an even bearing throughout its entire length. Sand shall be installed around the piping and to a point 6" above the piping.

PIPE JOINTS AND CONNECTIONS
Any minor adjustment in location of alignment of new work or connection to existing utilities shall be performed as directed by the engineer without additional cost to the owner.
The contractor shall be responsible for damages to the grounds, walks, road, building, piping systems, electrical systems, and their equipment and contents, caused by leaks in the piping systems being installed or having been installed by him. The contractor shall repair at his expense all damaged so caused. All repair work shall be done as directed by and in such manner as satisfactory to the architect.
Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the contractor's guarantee bond nor relieving the contractor of his responsibilities during the bonding period.

Where new plumbing systems are required to be connected to existing plumbing systems, it is the contractor's responsibility to verify the location, size, invert elevation, pressure, condition, and they shall verify that the existing plumbing system is indeed the correct and appropriate plumbing system for any work to be done. Provide all necessary camera scouting and dye testing as necessary. If there is any need for concern, if it is determined that the existing plumbing system is not a correct or appropriate plumbing system or not connected to a correct or appropriate plumbing system, if the condition of the existing plumbing system is not viable for re-use, or any other condition that would not allow the proper functioning of the new plumbing system, the contractor shall notify the engineer in writing immediately via RFI and wait for direction before proceeding.
Interruption of Existing Plumbing Services: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated.
Notify, Architect, Construction Manager, and Owner no fewer than seven days in advance of proposed interruption of service.
Do not proceed with interruption of service without Architect's written permission.

WARRANTY
This contractor shall warrant that all work under this section shall be free of defective work, materials and parts for a period of one year after acceptance of the work and shall repair, revise, and replace, at no cost to the owner, any such defects occurring within the warranty period.
22 05 03.00 - SUBMITTALS FOR PLUMBING
General
Where submittals are required by the Contract Documents, they shall be prepared and supplied in accordance with the Contract Documents. In addition to Division 01, the Contractor is advised to review and comply with the requirements articulated within each Division and within each section of that Division.
Some Divisions may include a division-specific Submittal Requirements for a section. Where this section exists, it articulates additional requirements for submittals that apply to the work of that Division.
The following requirements help to identify, track and keep the project on schedule and an appropriate technical review. Submittals that do not conform to the administrative requirements are rejected and returned, without technical review.
Requirements
Supply submittals for each type: Submittals shall be supplied on a section-by-section and type-by-type basis. For example, independent product data submittals shall be furnished for each section that requires product data submittals. Independent shop drawing submittals shall be furnished for each section that requires shop drawings. Refer to the specifications for identification of which submittals are required for the project. Separate PDF file packages shall be supplied for each section, for each submittal type, with electronic submittals are required. Each PDF shall represent a single standalone submittal.
Separately bound and identified submittals shall be provided where hardcopies are required.
Include a transmittal: Transmittals shall be provided for each submittal for each section of each type and iteration.
Include cover sheet / title page: The cover sheet shall include the information identified in the contract documents. It shall be included as the first page of each electronic and hardcopy document based on the submittal type. The cover sheet shall be created by the contractor and shall not appear on any available materials from KHLH upon request. The cover sheet shall be available from the website at www.khlh.com.
Index: Index shall enumerate the contents of the submittal.
Include checklists: Where checklists are included with the specifications, complete and include them within the appropriate submittal. Supply complete submittals of each type. Where a section requires a product data submittal, all product data for that section shall be submitted together at one time, as one complete submittal. Do not send product data as one submittal and the other half as a separate one. When resubmittal is required (e.g. Revise and Resubmit) the revised submittal shall be more complete, more accurate and more contract-compliant than its rejected predecessor. The submittal number (for each section and type) shall increment to

each subsequent submittal (00 - Original submission, 01 - First Resubmission, 02 - Second Resubmission, etc.). Resubmittals shall include a copy of the reviewers comments supplied with the prior submittal rejection and shall be amended with a description of the specific action taken to comply with the reviewer's comments. The absence of this on resubmittal is cause for rejection.
Name electronic files to match the submittal ID and cover sheet: The electronic file name of submittals shall match the submittal ID included on the submittals cover page. For example: The original first product data submittal for Section 220523 would be labeled as: 220523.00-PD-00; the first resubmittal of same shall be labeled "220523.00-PD-01". The original first shop drawings submittal file for the same section would be labeled "220523.00-SD-00"; the first resubmittal of same shall be labeled "220523.00-SD-01".
Use of Electronic Drawings from the Owner's Design Team
Plan drawings for the Project were created with Revit. Revit electronic files are not available. If expressly permitted by the Owner and the terms of the Contract, editable electronic versions of published two-dimensional plan drawings may be made available for the creation of shop and as-built drawings for a nominal surcharge by sheet series for projects that were designed in Revit and must be converted to an AutoCAD or Navisworks format.
Due to the proprietary nature of internal design systems, editable native-software versions of some drawings, including but not limited to system diagrams and details will not be made available in an editable form. In these cases, electronic versions of the drawings may be made available only in PDF, iPDF or similar non-editable electronic form, at the sole discretion of the Design Professional.
The Request Drawings form can be accessed, filled out and submitted at the following internet address (scroll down to bottom of home page): <http://www.khlhng.com>
22 05 23.00 - GENERAL DUTY VALVES
GENERAL

Provide stops or isolation valves on domestic water supplies to isolate hot and cold water to each fixture, including all equipment and equipment provided by others.
Fixtures, item or units furnished by the manufacturer with integral stops or stops specified with the fixture are considered to be properly valved at the fixtures.
Access shall be provided to all valves.
Valves on domestic water piping shall be ball valves.
Ball valves - 2 inch and smaller: Lead-Free, 2-piece body, 600 psi CWP, 100 psi at 300°F; cast bronze body, full port, Teflon seats; blowout-proof stem, adjustable packing gland, chrome plated bronze ball, and vinyl-covered steel handle. Provide solder ends. Provide extended valve stems for valves used on insulated lines. Provide equal to or better than the following:
Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the work include, and are limited to, the following:
American Valve, Inc.
Conbraco Industries, Inc.; Apollo Valves.
Crane Co.; Crane Valve Group; Crane Valves.
Hammond Valve.
Milwaukee Valve Company.
NIBCO INC.
Red-White Valve Corporation.
Watts Regulator Co.; a division of Watts Water Technologies, Inc.

CHECK VALVES
Spring check valves - class 125, cast bronze body and cap, horizontal swing, y-pattern, with a bronze disc, and having threaded or solder ends. Provide solder ends for domestic hot and cold water service. Provide equal to Nibco T-480-Y-LF.
22 05 29.00 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
GENERAL
Support all piping and equipment by hangers or brackets. Provide structural steel members where required to support piping and equipment. No portion of piping or valves shall be supported by equipment.

DELEGATED DESIGN
For equipment supports, this contractor shall retain a qualified professional engineer to provide support calculations of static and dynamic loading due to operating equipment weight, seismic and wind forces. The signed and sealed calculations and details shall be submitted by the retained professional engineer.
PIPING
Provide hangers, supports, clamps and attachments to support piping properly from building structure. Support from the decking above is prohibited. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or provide intermediate supports for larger pipe sizes. Hanger spacing for individual pipe hangers to be Anvil International Clevis Hanger Fig. 260, Eicon, or approved equal.
Rod sizes to conform to the following: 3/8" rods for 3/4" to 2" pipe; 1/2" rods for 2-1/2" to 3" pipe; 5/8" rods for 4" to 5" pipe; 3/4" rods for 6" pipe.
Hangers shall be sized to allow insulation to pass through unobstructed, provide saddle support for insulation at all hangers.
Hanger spacing for steel piping unless otherwise noted is to be as follows: 1-1/4" or smaller to be 8' on center; 1-1/2" to 2" to be 10' on center; 2-1/2" and larger to be 12' on center and at each change of direction.
Hanger spacing for copper pipe to be as follows: 1" or smaller 6' on center; 1-1/4" or larger 8' on center.
Hanger spacing for cast iron piping shall be 5'-0" on center.
Hanger spacing for CPVC and PVC pipe to be as follows: 1" and smaller to be 3' on center; 1-1/4" or larger to be 4' on center.
Piping shall also be supported at each change in direction, valves and equipment.
22 05 53.00 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
PIPING
Provide self-adhesive pipe labels with white background and black lettering, contact type with permanent adhesive backing. Include identification of piping service using same designations or abbreviations as used on the drawings and an arrow indicating flow direction.
EQUIPMENT
Provide self-adhesive plastic equipment labels with white background and black lettering, contact type with permanent adhesive backing. Include identification of piping service using same designations or abbreviations as used on the drawings and an arrow indicating flow direction.

Provide insulation: Insulation, accessories, and fittings with both, straight, and even sides through-out. Provide length of piping including fittings.
Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
INSULATION
Install domestic cold water piping, associated fittings and valves with flexible elastomeric 1/2" thick insulation.
Install domestic hot water piping, associated fittings and valves with flexible elastomeric, 2" thick fiberglass insulation or per local energy code, whichever greater.
Install domestic hot water return piping, associated fittings and valves with 1" wall thickness insulation or per local energy code, whichever greater.
Insulate waste piping above ceilings that receive condensate with 1/2" wall thickness insulation.
Insulate exposed sanitary drains, domestic water, domestic hot water, and vent pipes for plumbing fixtures for people with disabilities.
FLEXIBLE ELASTOMERIC INSULATION
Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type I for sheet materials.
Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated.
Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the work include, and are limited to, the following:
Aeroflex USA, Inc.; Aerocel.
K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.
FIBERGLASS INSULATION
Fiberglass piping insulation: ASTM C 547, Class 1 Encase pipe fittings insulation with one-piece pre-molded PVC fitting covers.
Vapor Barrier Material: Paper-backed aluminum foil, except as otherwise indicated, strength and permeability rating equivalent to adjoining pipe insulation jacketing.

Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.
Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated.
Manufacturers: Subject to compliance with requirements, available products that may be incorporated into the work include, and are limited to, the following:
Armstrong World Industries, Inc.
Owens Corning Fiberglass Corp.
Keene Corp.
CertainTeed.
Johns Manville.
ADHESIVES
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.
Insulation for hand-pipe fixtures
All hand-pipe lavatory p-trap and angle stop assemblies shall be insulated with trap wrap protective kit manufactured by Proflo model PF202WH or equal. Abrasion resistant, anti-microbial vinyl enamel cover shall be smooth. For traps, the insulation shall have a cleanout nut cap to allow service to the trap without disassembly. For stops, the insulation shall have a lock lid that prevents tampering but allows access without removal of the insulation. Fasteners shall remain substantially out of sight.
Manufacturers: subject to compliance with requirements:
Proflo
Truabond
Plumbrerx
22 11 16.00 - DOMESTIC WATER PIPING
GENERAL
Install piping concealed from view unless noted otherwise, free of sags and bends. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction. Clean and disinfect potable domestic water piping using approved procedure by authorities having jurisdiction.
Install at right angles; diagonal runs are prohibited unless otherwise shown. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal. Coordinate all piping with all other trades.
Provide water pressure regulators where necessary to limit the incoming water pressure to 80 psi inside the building.
DOMESTIC WATER PIPING JOINTS:
Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.
Solder Filler Metals: ASTM B 32, lead-free alloys.
Flux: ASTM B 91.
PEX and CPVC is approved for interior water piping. Type "L"; copper pressure-seal joint; and pressure-seal joint systems.
CATHODIC PROTECTION
Provide dielectric insulation at points where copper or brass pipe comes in contact with ferrous piping, reinforcing steel or other dissimilar metal in structure.
22 11 19.00 - DOMESTIC WATER PIPING SPECIALTIES
BALANCING VALVES
Provide balancing valves where required for proper balancing of water systems as shown on the contract documents.
Balancing valves shall be equal to Red-White Valve Corporation model 9517AB (NPT) or model 9519 (solder). Valve shall have brass body, globe valve regulation and isolation properties, fixed orifice design for precise measurement, integral juriory stop to ensure repeatable setting, full shutoff without affecting memory settings, high and low pressure metering points, precision indicator windows, rugged top set hand-wheel assembly, pressure rating of 300 psi, and ANSI 150 lb. pressure class.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
Crane Co.; Crane Valve Group; Crane Valves.
Hammond Valve.
Milwaukee Valve Company.
NIBCO Inc.
Red-White Valve Corp.

VACUUM BREAKERS
Vacuum breakers shall be equal to Watts model LF298A for piping connections or Watts LF8 series for hose connections. Vacuum breakers shall comply with ASSE 1001 for pipe connections, ASSE 1011 for hose connections, bronze body and threaded connections with rough bronze finish.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the following:
MIFAB, Inc.
Prier Products, Inc.
Watts; a division of Watts Water Technologies, Inc.; Watts Regulator
Rod sizes to conform to the following: 3/8" rods for 3/4" to 2" pipe; 1/2" rods for 2-1/2" to 3" pipe; 5/8" rods for 4" to 5" pipe; 3/4" rods for 6" pipe.
Hangers shall be sized to allow insulation to pass through unobstructed, provide saddle support for insulation at all hangers.
Hanger spacing for steel piping unless otherwise noted is to be as follows: 1-1/4" or smaller to be 8' on center; 1-1/2" to 2" to be 10' on center; 2-1/2" and larger to be 12' on center and at each change of direction.
Hanger spacing for copper pipe to be as follows: 1" or smaller 6' on center; 1-1/4" or larger 8' on center.
Hanger spacing for cast iron piping shall be 5'-0" on center.
Hanger spacing for CPVC and PVC pipe to be as follows: 1" and smaller to be 3' on center; 1-1/4" or larger to be 4' on center.
Piping shall also be supported at each change in direction, valves and equipment.
22 05 53.00 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
PIPING
Provide self-adhesive pipe labels with white background and black lettering, contact type with permanent adhesive backing. Include identification of piping service using same designations or abbreviations as used on the drawings and an arrow indicating flow direction.
EQUIPMENT
Provide self-adhesive plastic equipment labels with white background and black lettering, contact type with permanent adhesive backing. Include identification of piping service using same designations or abbreviations as used on the drawings and an arrow indicating flow direction.

FLOOR DRAINS
Provide floor drains in compliance with ASME A112.6.3. Provide floor drains with trap-seal primer fitting. All floor drains located in rooms with tile floors shall be provided with manufacturer's standard square grate, unless noted otherwise.
Refer to plumbing drain schedule for project specific floor drain manufacturers and models.
22 30 01.00 - POINT OF USE THERMOSTATIC MIXING VALVES
GENERAL
Thermostatic mixing valves shall be provided for all public hand washing sinks and lavatories and shall be ASSE 1070 listed, lead free, sweat connections, 125 psi operating pressure. Mount under sink or lavatory. Set outlet temperature of thermostatic mixing valve to 105 degrees F.
CONNECTIONS
Install piping adjacent to pump to allow service and maintenance. Provide unions and shutoff valves on each side of pump. Provide check and balancing valves. Provide strainer upstream of pump and downstream of shutoff valve. Install pressure and temperature gage connectors at suction and discharge of each pump.
Interlock pump between water heater and hot-water storage tank with water heater burner and lime-delay relay.
Install stops for plumbing fixtures with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the following:
Armstrong Pumps Inc.
Barnes, Crane Pumps & Systems
Bell & Gossett; ITT Corporation
Grundfos
Peerless Pump Inc.
TACO Incorporated
Zoeller Company
22 16 13.00 - NATURAL GAS PIPING SYSTEMS
GENERAL
Plumbing contractor shall be responsible for installing gas piping run-outs to all gas-fired equipment, including equipment supplied by the HVAC and electric contractor. Piping shall be installed full-size (as indicated on the drawings) to each unit's gas inlet connection, burner, regulator, etc. Plumbing subcontractor shall provide gas cock and make final connections. Connections to each gas-fired equipment item shall include a drip leg and shutoff gas cock. Comply with

equipment manufacturer's instruction. For connections to gas-fired rooftop equipment, plumbing contractor shall be responsible for the roof penetration and shall install the gas piping through the roof in a location that has been coordinated with the HVAC contractor.
Contractor shall be responsible for all the costs associated with work provided by the utility company, including tap fees, installation costs, materials, equipment, road cuts, and bores if applicable.
BUILDING DISTRIBUTION PIPING:
All piping from meter regulator to gas fired equipment connections shall be black steel.
Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
Pipe size 2" and smaller: Malleable-Iron Threaded Fittings
Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
Field prepare and paint exterior natural gas piping, fittings, etc., with ABC 200 primer and metal primer and topcoat with exterior alkylid enamel flat. Color to match building exterior and approved by the architect.
GENERAL DUTY VALVES:
Metallic valves 2 inches and smaller shall comply with ASME B16.33, cold working pressure of 125 psig.
Provide one-piece ball valves with bronze body, chrome-plated brass ball, blowout proof stem and seat, and bronze trim complying with MSS SP-110.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
BrassCraft Manufacturing Company; a Masco company.
Conbraco Industries, Inc.; Apollo Div.
Lyal, R. W. & Company, Inc.
McDonald, A.
Perfection Corporation; a subsidiary of American Meter Company.
SOLENOID VALVES
Provide brass or aluminum solenoid valve with nitrile rubber seats and discs, stainless steel springs, 120 volt, Class B, continuous duty molded replaceable coil, visual position indicator. Provide NEMA ICS 6, Type 4 coil enclosure. Valve will be normally open, fail safe closed.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
ASCO Power Technologies, LP; Division of Emerson.
Dungs, Karl, Inc.
Eclipse Combustion, Inc.
Goyen Valve Corp.; Tyco Environmental Systems.
Magnum Valve Corporation.
Watts Regulator Co.; Division of Watts Water Technologies, Inc.
PRESSURE REGULATORS:
Provide pressure regulators to conform with ANSI Z21.80, cast iron or die-cast aluminum body, interchangeable zinc-plated steel springs and diaphragm plate, single port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure sensing piping external to the regulator.
Pressure regulators shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
Overpressure Protection Device: Factory mounted on pressure regulator.
Regulator shall include vent limiting device, instead of vent connection and piping, if approved by authorities having jurisdiction.
NATURAL GAS METERS:
Service meters shall comply with the requirements of the utility supplying gas to the facility.
22 16 00 - SANITARY, WASTE AND VENT PIPING SYSTEM
GENERAL
Provide a complete soil, waste and vent system in the building and on the site as indicated on the drawings and as specified herein.
Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.
Underground building drain piping including mains, branches, traps connections to fixtures and drains, and connections to stacks, terminating at connection to existing sanitary sewer.
INTERIOR PIPING
Schedule 40 PVC pipe and fittings shall be used throughout.
Contractor shall maintain integrity of piping. Piping shall not run in plenum spaces and ceiling plenum spaces, except where permitted when penetrating a rated wall, floor, or other barrier.
Piping alignment shall be as indicated on the drawings and as approved. Approved wyes, tees and elbows for direction changes shall be suitably supported or secured to maintain such alignment. Pitch cleanout pipes shall be uniform at a minimum of 1/8" per foot for cleanout pipes greater than 2" and indicated on drawings. Pitch cleanout pipes shall be uniform at a minimum of 1/4" per foot for cleanout pipes 2" and smaller and as indicated on the drawings. Cleanouts shall be provided for all fixtures, traps, and other structural elements during construction of the building. Refer to architectural drawings for locations.
Vent all fixtures, companion branch vents to main vent risers at least six inches above floor level. Cleanouts shall be provided to soil or waste pipe, free of drops and sags.
Cleanouts shall be full size of pipe up to 4", and 4" for larger sizes. For underground and concealed lines, provide cleanouts in accessible positions at each right angle turn and at intervals not to exceed fifty feet. In floors, install flush with finish floor with extension pipe from cleanout wye.
22 15 13.00 - SANITARY WASTE PIPING SPECIALTIES
CLEANOUTS
Cleanout equal to Zurn Z-1446 with smooth nickel/bronze square wall access panel and frame.
Provide a sanitary tee and threaded cap cleanout plug in suspended waste piping.

FLOOR DRAINS
Provide floor drains in compliance with ASME A112.6.3. Provide floor drains with trap-seal primer fitting. All floor drains located in rooms with tile floors shall be provided with manufacturer's standard square grate, unless noted otherwise.
Refer to plumbing drain schedule for project specific floor drain manufacturers and models.
22 30 01.00 - POINT OF USE THERMOSTATIC MIXING VALVES
GENERAL
Thermostatic mixing valves shall be provided for all public hand washing sinks and lavatories and shall be ASSE 1070 listed, lead free, sweat connections, 125 psi operating pressure. Mount under sink or lavatory. Set outlet temperature of thermostatic mixing valve to 105 degrees F.
CONNECTIONS
Install piping adjacent to pump to allow service and maintenance. Provide unions and shutoff valves on each side of pump. Provide check and balancing valves. Provide strainer upstream of pump and downstream of shutoff valve. Install pressure and temperature gage connectors at suction and discharge of each pump.
Interlock pump between water heater and hot-water storage tank with water heater burner and lime-delay relay.
Install stops for plumbing fixtures with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the following:
Armstrong Pumps Inc.
Barnes, Crane Pumps & Systems
Bell & Gossett; ITT Corporation
Grundfos
Peerless Pump Inc.
TACO Incorporated
Zoeller Company
22 16 13.00 - NATURAL GAS PIPING SYSTEMS
GENERAL
Plumbing contractor shall be responsible for installing gas piping run-outs to all gas-fired equipment, including equipment supplied by the HVAC and electric contractor. Piping shall be installed full-size (as indicated on the drawings) to each unit's gas inlet connection, burner, regulator, etc. Plumbing subcontractor shall provide gas cock and make final connections. Connections to each gas-fired equipment item shall include a drip leg and shutoff gas cock. Comply with

equipment manufacturer's instruction. For connections to gas-fired rooftop equipment, plumbing contractor shall be responsible for the roof penetration and shall install the gas piping through the roof in a location that has been coordinated with the HVAC contractor.
Contractor shall be responsible for all the costs associated with work provided by the utility company, including tap fees, installation costs, materials, equipment, road cuts, and bores if applicable.
BUILDING DISTRIBUTION PIPING:
All piping from meter regulator to gas fired equipment connections shall be black steel.
Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
Pipe size 2" and smaller: Malleable-Iron Threaded Fittings
Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
Field prepare and paint exterior natural gas piping, fittings, etc., with ABC 200 primer and metal primer and topcoat with exterior alkylid enamel flat. Color to match building exterior and approved by the architect.
GENERAL DUTY VALVES:
Metallic valves 2 inches and smaller shall comply with ASME B16.33, cold working pressure of 125 psig.
Provide one-piece ball valves with bronze body, chrome-plated brass ball, blowout proof stem and seat, and bronze trim complying with MSS SP-110.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
BrassCraft Manufacturing Company; a Masco company.
Conbraco Industries, Inc.; Apollo Div.
Lyal, R. W. & Company, Inc.
McDonald, A.
Perfection Corporation; a subsidiary of American Meter Company.
SOLENOID VALVES
Provide brass or aluminum solenoid valve with nitrile rubber seats and discs, stainless steel springs, 120 volt, Class B, continuous duty molded replaceable coil, visual position indicator. Provide NEMA ICS 6, Type 4 coil enclosure. Valve will be normally open, fail safe closed.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
ASCO Power Technologies, LP; Division of Emerson.
Dungs, Karl, Inc.
Eclipse Combustion, Inc.
Goyen Valve Corp.; Tyco Environmental Systems.
Magnum Valve Corporation.
Watts Regulator Co.; Division of Watts Water Technologies, Inc.
PRESSURE REGULATORS:
Provide pressure regulators to conform with ANSI Z21.80, cast iron or die-cast aluminum body, interchangeable zinc-plated steel springs and diaphragm plate, single port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure sensing piping external to the regulator.
Pressure regulators shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
Overpressure Protection Device: Factory mounted on pressure regulator.
Regulator shall include vent limiting device, instead of vent connection and piping, if approved by authorities having jurisdiction.
NATURAL GAS METERS:
Service meters shall comply with the requirements of the utility supplying gas to the facility.
22 16 00 - SANITARY, WASTE AND VENT PIPING SYSTEM
GENERAL
Provide a complete soil, waste and vent system in the building and on the site as indicated on the drawings and as specified herein.
Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.
Underground building drain piping including mains, branches, traps connections to fixtures and drains, and connections to stacks, terminating at connection to existing sanitary sewer.
INTERIOR PIPING
Schedule 40 PVC pipe and fittings shall be used throughout.
Contractor shall maintain integrity of piping. Piping shall not run in plenum spaces and ceiling plenum spaces, except where permitted when penetrating a rated wall, floor, or other barrier.
Piping alignment shall be as indicated on the drawings and as approved. Approved wyes, tees and elbows for direction changes shall be suitably supported or secured to maintain such alignment. Pitch cleanout pipes shall be uniform at a minimum of 1/8" per foot for cleanout pipes greater than 2" and indicated on drawings. Pitch cleanout pipes shall be uniform at a minimum of 1/4" per foot for cleanout pipes 2" and smaller and as indicated on the drawings. Cleanouts shall be provided for all fixtures, traps, and other structural elements during construction of the building. Refer to architectural drawings for locations.
Vent all fixtures, companion branch vents to main vent risers at least six inches above floor level. Cleanouts shall be provided to soil or waste pipe, free of drops and sags.
Cleanouts shall be full size of pipe up to 4", and 4" for larger sizes. For underground and concealed lines, provide cleanouts in accessible positions at each right angle turn and at intervals not to exceed fifty feet. In floors, install flush with finish floor with extension pipe from cleanout wye.
22 15 13.00 - SANITARY WASTE PIPING SPECIALTIES
CLEANOUTS
Cleanout equal to Zurn Z-1446 with smooth nickel/bronze square wall access panel and frame.
Provide a sanitary tee and threaded cap cleanout plug in suspended waste piping.

FLOOR DRAINS
Provide floor drains in compliance with ASME A112.6.3. Provide floor drains with trap-seal primer fitting. All floor drains located in rooms with tile floors shall be provided with manufacturer's standard square grate, unless noted otherwise.
Refer to plumbing drain schedule for project specific floor drain manufacturers and models.
22 30 01.00 - POINT OF USE THERMOSTATIC MIXING VALVES
GENERAL
Thermostatic mixing valves shall be provided for all public hand washing sinks and lavatories and shall be ASSE 1070 listed, lead free, sweat connections, 125 psi operating pressure. Mount under sink or lavatory. Set outlet temperature of thermostatic mixing valve to 105 degrees F.
CONNECTIONS
Install piping adjacent to pump to allow service and maintenance. Provide unions and shutoff valves on each side of pump. Provide check and balancing valves. Provide strainer upstream of pump and downstream of shutoff valve. Install pressure and temperature gage connectors at suction and discharge of each pump.
Interlock pump between water heater and hot-water storage tank with water heater burner and lime-delay relay.
Install stops for plumbing fixtures with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the following:
Armstrong Pumps Inc.
Barnes, Crane Pumps & Systems
Bell & Gossett; ITT Corporation
Grundfos
Peerless Pump Inc.
TACO Incorporated
Zoeller Company
22 16 13.00 - NATURAL GAS PIPING SYSTEMS
GENERAL
Plumbing contractor shall be responsible for installing gas piping run-outs to all gas-fired equipment, including equipment supplied by the HVAC and electric contractor. Piping shall be installed full-size (as indicated on the drawings) to each unit's gas inlet connection, burner, regulator, etc. Plumbing subcontractor shall provide gas cock and make final connections. Connections to each gas-fired equipment item shall include a drip leg and shutoff gas cock. Comply with

equipment manufacturer's instruction. For connections to gas-fired rooftop equipment, plumbing contractor shall be responsible for the roof penetration and shall install the gas piping through the roof in a location that has been coordinated with the HVAC contractor.
Contractor shall be responsible for all the costs associated with work provided by the utility company, including tap fees, installation costs, materials, equipment, road cuts, and bores if applicable.
BUILDING DISTRIBUTION PIPING:
All piping from meter regulator to gas fired equipment connections shall be black steel.
Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
Pipe size 2" and smaller: Malleable-Iron Threaded Fittings
Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
Field prepare and paint exterior natural gas piping, fittings, etc., with ABC 200 primer and metal primer and topcoat with exterior alkylid enamel flat. Color to match building exterior and approved by the architect.
GENERAL DUTY VALVES:
Metallic valves 2 inches and smaller shall comply with ASME B16.33, cold working pressure of 125 psig.
Provide one-piece ball valves with bronze body, chrome-plated brass ball, blowout proof stem and seat, and bronze trim complying with MSS SP-110.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
BrassCraft Manufacturing Company; a Masco company.
Conbraco Industries, Inc.; Apollo Div.
Lyal, R. W. & Company, Inc.
McDonald, A.
Perfection Corporation; a subsidiary of American Meter Company.
SOLENOID VALVES
Provide brass or aluminum solenoid valve with nitrile rubber seats and discs, stainless steel springs, 120 volt, Class B, continuous duty molded replaceable coil, visual position indicator. Provide NEMA ICS 6, Type 4 coil enclosure. Valve will be normally open, fail safe closed.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
ASCO Power Technologies, LP; Division of Emerson.
Dungs, Karl, Inc.
Eclipse Combustion, Inc.
Goyen Valve Corp.; Tyco Environmental Systems.
Magnum Valve Corporation.
Watts Regulator Co.; Division of Watts Water Technologies, Inc.
PRESSURE REGULATORS:
Provide pressure regulators to conform with ANSI Z21.80, cast iron or die-cast aluminum body, interchangeable zinc-plated steel springs and diaphragm plate, single port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure sensing piping external to the regulator.
Pressure regulators shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
Overpressure Protection Device: Factory mounted on pressure regulator.
Regulator shall include vent limiting device, instead of vent connection and piping, if approved by authorities having jurisdiction.
NATURAL GAS METERS:
Service meters shall comply with the requirements of the utility supplying gas to the facility.
22 16 00 - SANITARY, WASTE AND VENT PIPING SYSTEM
GENERAL
Provide a complete soil, waste and vent system in the building and on the site as indicated on the drawings and as specified herein.
Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.
Underground building drain piping including mains, branches, traps connections to fixtures and drains, and connections to stacks, terminating at connection to existing sanitary sewer.
INTERIOR PIPING
Schedule 40 PVC pipe and fittings shall be used throughout.
Contractor shall maintain integrity of piping. Piping shall not run in plenum spaces and ceiling plenum spaces, except where permitted when penetrating a rated wall, floor, or other barrier.
Piping alignment shall be as indicated on the drawings and as approved. Approved wyes, tees and elbows for direction changes shall be suitably supported or secured to maintain such alignment. Pitch cleanout pipes shall be uniform at a minimum of 1/8" per foot for cleanout pipes greater than 2" and indicated on drawings. Pitch cleanout pipes shall be uniform at a minimum of 1/4" per foot for cleanout pipes 2" and smaller and as indicated on the drawings. Cleanouts shall be provided for all fixtures, traps, and other structural elements during construction of the building. Refer to architectural drawings for locations.
Vent all fixtures, companion branch vents to main vent risers at least six inches above floor level. Cleanouts shall be provided to soil or waste pipe, free of drops and sags.
Cleanouts shall be full size of pipe up to 4", and 4" for larger sizes. For underground and concealed lines, provide cleanouts in accessible positions at each right angle turn and at intervals not to exceed fifty feet. In floors, install flush with finish floor with extension pipe from cleanout wye.
22 15 13.00 - SANITARY WASTE PIPING SPECIALTIES
CLEANOUTS
Cleanout equal to Zurn Z-1446 with smooth nickel/bronze square wall access panel and frame.
Provide a sanitary tee and threaded cap cleanout plug in suspended waste piping.

FLOOR DRAINS
Provide floor drains in compliance with ASME A112.6.3. Provide floor drains with trap-seal primer fitting. All floor drains located in rooms with tile floors shall be provided with manufacturer's standard square grate, unless noted otherwise.
Refer to plumbing drain schedule for project specific floor drain manufacturers and models.
22 30 01.00 - POINT OF USE THERMOSTATIC MIXING VALVES
GENERAL
Thermostatic mixing valves shall be provided for all public hand washing sinks and lavatories and shall be ASSE 1070 listed, lead free, sweat connections, 125 psi operating pressure. Mount under sink or lavatory. Set outlet temperature of thermostatic mixing valve to 105 degrees F.
CONNECTIONS
Install piping adjacent to pump to allow service and maintenance. Provide unions and shutoff valves on each side of pump. Provide check and balancing valves. Provide strainer upstream of pump and downstream of shutoff valve. Install pressure and temperature gage connectors at suction and discharge of each pump.
Interlock pump between water heater and hot-water storage tank with water heater burner and lime-delay relay.
Install stops for plumbing fixtures with requirements, available manufacturers offering products that may be incorporated into the work include, and are limited to, the following:
Armstrong Pumps Inc.
Barnes, Crane Pumps & Systems
Bell & Gossett; ITT Corporation
Grundfos
Peerless Pump Inc.
TACO Incorporated
Zoeller Company
22 16 13.00 - NATURAL GAS PIPING SYSTEMS
GENERAL
Plumbing contractor shall be responsible for installing gas piping run-outs to all gas-fired equipment, including equipment supplied by the HVAC and electric contractor. Piping shall be installed full-size (as indicated on the drawings) to each unit's gas inlet connection, burner, regulator, etc. Plumbing subcontractor shall provide gas cock and make final connections. Connections to each gas-fired equipment item shall include a drip leg and shutoff gas cock. Comply with

equipment manufacturer's instruction. For connections to gas-fired rooftop equipment, plumbing contractor shall be responsible for the roof penetration and shall install the gas piping through the roof in a location that has been coordinated with the HVAC contractor.
Contractor shall be responsible for all the costs associated with work provided by the utility company, including tap fees, installation costs, materials, equipment, road cuts, and bores if applicable.
BUILDING DISTRIBUTION PIPING:
All piping from meter regulator to gas fired equipment connections shall be black steel.
Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
Pipe size 2" and smaller: Malleable-Iron Threaded Fittings
Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
Field prepare and paint exterior natural gas piping, fittings, etc., with ABC 200 primer and metal primer and topcoat with exterior alkylid enamel flat. Color to match building exterior and approved by the architect.
GENERAL DUTY VALVES:
Metallic valves 2 inches and smaller shall comply with ASME B16.33, cold working pressure of 125 psig.
Provide one-piece ball valves with bronze body, chrome-plated brass ball, blowout proof stem and seat, and bronze trim complying with MSS SP-110.
Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, and are limited to, the following:
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McDonald, A.
Perfection Corporation; a subsidiary of American Meter Company.
SOLENOID VALVES
Provide brass or aluminum solenoid valve with nitrile rubber seats and discs, stainless steel springs, 120 volt, Class B, continuous duty molded replaceable coil, visual position indicator. Provide NEMA ICS 6, Type 4 coil enclosure. Valve will be normally open, fail safe closed.
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Magnum Valve Corporation.
Watts Regulator Co.; Division of Watts Water Technologies, Inc.
PRESSURE REGULATORS:
Provide pressure regulators to conform with ANSI Z21.80, cast iron or die-cast aluminum body, interchangeable zinc-plated steel springs and diaphragm plate, single port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure sensing piping external to the regulator.
Pressure regulators shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
Overpressure Protection Device: Factory mounted on pressure regulator.
Regulator shall include vent limiting device, instead of vent connection and piping, if approved by authorities having jurisdiction.
NATURAL GAS METERS:
Service meters shall comply with the requirements of the utility supplying gas to the facility.
22 16 00 - SANITARY, WASTE AND VENT PIPING SYSTEM
GENERAL
Provide a complete soil, waste and vent system in the building and on the site as indicated on the drawings and as specified herein.
Above ground soil, waste and vent piping within buildings including soil stacks, vent stacks, horizontal branches, traps, and connections to fixtures and drains.
Underground building drain piping including mains, branches, traps connections to fixtures and drains, and connections to stacks,