

SECTION 22 00 10: PLUMBING DESIGN GUIDELINES

1. GENERAL

- A. This section details the general design requirements for building plumbing systems, including domestic water, sanitary sewer and drainage systems, for both new and retrofit applications.
- B. Brown University typically utilizes city mains to provide domestic water, fire protection water, sewer, and storm services to each building on an individual basis. For new construction the intent is for each building to have separate lateral connections to city water, sewer, and storm mains.
- C. All new plumbing system designs shall include detailed building domestic water, drainage and sewage low and riser diagrams showing all major system components, meters, controls and isolation valves, and interfaces with other building and campus utility systems.
- D. For renovation projects, flow and riser diagrams shall be provided with updates to clearly indicate locations of all new system tie-ins being added, or components to be removed.
- E. Review the need for redundant water services at the project planning phase for critical buildings, such as Research, Laboratory and certain campus support facilities. Considerations for water system redundancy may be in the form of:
 1. Valved hose connections at the water service entrance
 2. Valved and isolated emergency cross-ties to adjacent facilities domestic water service
 3. Multiple domestic water services entering the facility from different street services
 4. Avoid the use of central water filtration or treatment systems: where water conditioning is required, preference is to use "point of use" water treatment systems. Show water treatment system connections on the plumbing risers, including associated backflow preventer(s) and isolation valves.
- F. Sanitary and lab waste systems shall be gravity-flow wherever possible; minimize the use of pumped sanitary and lab-waste systems.
- G. Do not locate plumbing devices requiring preventive maintenance or testing (such as backflow preventers, and control or sensing devices) within occupied vivaria spaces or above its suspended ceilings. Locate plumbing devices associated with fume hoods, snorkels, biosafety cabinets, tissue culture hoods, or other laboratory equipment either in adjacent spaces, or located in the research space, in a location where routine preventive maintenance and testing will not affect the normal use of the lab equipment or lab functionality.
- H. Provide space in lab buildings for future installation of neutralization systems on laboratory waste lines at their connection to the sanitary system
- I. For new construction, utilize a single common manufacturer for each type of equipment or equipment category, such as fixtures, faucets, accessories and equipment.

- J. All plumbing risers to have isolation or sectionalizing valves at each floor level to allow for localized draining and servicing of the water system.
- K. Provide drain valves at the base of each plumbing riser or isolated piping section. Provide drain valves with hose end fitting, chain and cap; cap pressure rating shall match or exceed system or hydrostatic pressure (whichever is greater) at the point of installation.
- L. Locate all floor-mounted major mechanical equipment on concrete housekeeping pads.
- M. Ensure that cleanouts for drainage, sewage and lab waste piping is readily accessible; locate cleanouts in common public spaces or utility rooms whenever possible.

2. DOMESTIC WATER SERVICES

- A. Provide each building water service entrance with a dedicated building meter. Review proposed meter size and meter quantities during the Design phase, as in some cases multiple smaller-size meters are most cost-effective than a single larger meter.
- B. Provide separate irrigation service complete with backflow preventer and exclusion meter per Narragansett Bay Commission requirements, where landscape irrigation is supplied.
- C. Each building water service (Potable and Non-Potable systems) shall be protected by two reduced pressure backflow preventers with strainers, piped in parallel with ball or butterfly shut-off valves.
 - 1. Manufacturers:
 - Watts,
 - Febco (vertical use)
 - Ames
- D. Water Service Rooms:
 - 1. Water service entrance rooms shall be adequate in size for the proper servicing of equipment, including access for replacement of all components and provide for required spare parts storage. Rooms shall be accessible by a standard stair or elevator; ship's ladders are NOT acceptable.
 - 2. Provide adequate floor drains in rooms; drains are to be connected to the sanitary sewer system, not to storm sewer.
- E. Water Pressure Booster Sets:
 - 1. Domestic water booster sets shall be duplex or triplex type, with each pump powered from a variable speed drive (VFD). VFD shall be controlled with automatic alternating lead/lag controls, with VFD speed control paced from a system pressure transducer.
 - 2. Connect alarms from the water booster sets to the building BAS where available. At a minimum, provide alarms for low and high water pressure and pump failure.
 - 3. Connect water booster sets to building Standby generator and power system where available
 - 4. Manufacturers:
 - Grundfos, Taco, or equal
 - Amtrol for small bladder tank/booster pump sets

- F. In-line Circulator Pumps: Taco (bronze or stainless steel)
- G. Water Piping, Above Ground:
 - 1. Copper Pipe: types K or L
 - 2. Fittings: cast copper alloy, wrought copper or bronze
 - 3. Joints: flared or solder
 - 4. Pro-press mechanical joints and fittings
- H. Expansion Tanks:
 - 1. Diaphragm-Type Compression Tanks
 - 2. Welded steel, rated for working pressure of 150 psig minimum
 - 3. Manufacturers: Amtrol
 - 4. Accessories: pressure gage, air-charging fitting and tank drain
 - 5. Commercial type with replaceable bladder.
 - 6. Manufacturers:
 - Amtrol
 - Taco
- I. Hot Water Temperature Mixing Valves: Provide isolation ball valves upstream of mixing valves for isolation; provide bypass line with its own isolation valve around the mixing valve
 - 1. Manufacturers: Symmons
- J. Ball Valves: all isolation valves to be ball valves, minimum Class 150, full port, with lever handle and balancing stops
 - 1. Manufacturers:
 - Apollo
 - Milwaukee
- J. Water Coolers:
 - 1. Provide with water dispenser for bottle fill at hydration stations.
 - 2. Manufacturers:
 - Elkay
 - Halsey
 - Taylor
 - Oasis
- K. Toilets and Urinals:
 - 1. Waterless toilets and urinals are not allowed
 - 2. Manufacturers:
 - American Standard
 - Kohler
 - Toto
- L. Toilet Seats:
 - 1. Plastic, white color, open front
 - 2. Manufacturers:
 - American Standard
 - Kohler

- Toto
 - Church
- M. Sinks, Stainless Steel:
1. 18 Gauge minimum thickness
 2. Manufacturers: Elkay
- N. Sink Faucets:
1. In residence halls, provide manual-controlled faucets
 2. In public-access bathrooms, provide automatic faucets, with water-powered turbine charger; battery-powered faucets are not acceptable. Configure faucets to be warm water with adjustable set point.
 3. In offices and other locations, manual or automatic faucets are acceptable
 4. Manufacturers:
 - American Standard
 - Kohler
 - Delta
 - Chicago or
 - Toto
 5. Laboratory sink faucet manufacturers:
 - Chicago
 - Watersaver
- O. Toilet Flush Valves:
1. Toilet valves to be dual-flush type
 2. In residence halls, provide manual flush valves
 3. In public-access bathrooms, provide automatic flush valves, water-powered turbine charger; in offices and other locations, manual or automatic flush valves are acceptable
 4. Manufacturers:
 - Sloan (Royal)
 - Toto
- P. Shower Valves:
1. Provide with built-in shut-off
 2. Extension kits are not acceptable
 3. Manufacturers:
 - Symmons
- Q. Bathtubs:
1. Cast-iron type
 2. Manufacturers:
 - American Standard
 - Kohler
- R. Shower Stalls: Schluter system
- S. Shower Bases: Lasco (fiberglass)

- T. **Hose Bibs and Hydrants:**
1. Interior locations: provide hose bibs in multi-stall bathrooms, trash rooms, custodial closets and mechanical rooms
 2. Interior single service type: bronze or brass with integral mounting flange, hose thread spout, and integral vacuum breaker. Provide with hand wheel in mechanical rooms; provide with lock shield and removable key in public spaces.
 3. For custodial closets only-Interior mixing type: Bronze or brass, wall mounted, double service faucet with hose thread spout, integral stops, hand wheels, and vacuum breaker
 4. Exterior: non-freeze, self-draining type with polished bronze hose thread spout
 5. Manufacturers:
 - J.R. Smith
 - Zurn
 - Josam

3. TRAP PRIMERS

- A. Provide trap primer devices on all floor drains in occupiable areas or areas connected to occupiable areas that do not receive waste water on a regular basis year-round. Traps shall have a reliable means of maintaining water in the trap seal at all times.
- B. For floor drains in critical research facilities, vivaria or other spaces where air cleanliness is critical; provide automatic trap primers with timers.
- C. For other locations requiring a trap primer: provide mechanical-type trap primer, Sloan VBS series or equal, piped to each trap.

4. SUMP, SEWAGE EJECTOR & HOT PIT EJECTOR PUMPS

- A. Provide pumps with the following features:
1. Duplex type with automatic lead-lag controls
 2. Provide with Pump motor failure and high water level alarms
 3. Pump discharge to be equipped with individual isolation valve and check valve
- B. Connect pump failure and high level alarms to the building BAS where available
- C. Connect pumps to the building Standby generator and power system where available.
- D. Sewage ejectors shall be "grinder"- type
- E. All wetted components of hot pit ejector pumps shall be rated for high temperature (200°F) use
- F. Manufacturers:
1. Hot pit ejectors: Zoeller, or approved equal
 2. Sump and sewage ejector pumps: Zoeller, Grundfos, Weil or Little Giant

5. STORM WATER PIPING

- A. Buried: Cast Iron or PVC Schedule 40 (or higher).
- B. Above-Grade-in locations where noise is not objectionable:
1. Cast Iron or PVC Schedule 40 (or higher)

2. Low-noise applications, including academic, research and residential occupancies: Cast Iron or sound-insulated PVC Schedule 40 (or higher)
3. 1-3 family residential occupancies: PVC Schedule 40 (or higher)

6. SANITARY SEWER PIPING

A. Buried:

1. Research and Laboratory facilities, large Academic facilities and any locations that have large central hydronic water heating systems or campus heating hubs: Cast Iron
2. Small Academic facilities and 1-3 family residences: Cast Iron or PVC Schedule 80 (or higher)

B. Above-Grade:

1. In 1-3 family Residential and small Academic occupancies and other locations not subject to high waste water temperatures (over 140°F from equipment failures or leaks), or high ambient temperatures (over 140°F in normal operation or due to equipment failure), and where noise is not objectionable: Cast Iron or PVC Schedule 40 (or higher).
2. In locations subject to high waste water temperatures (over 140°F from equipment failures or leaks), or high ambient temperatures (over 140°F in normal operation or due to equipment failure), or where noise is objectionable: Cast Iron.

7. CHEMICAL RESISTANT SEWER PIPING

- A. Cast Iron Pipe: CISPI 301, hubless, service weight
- B. Glass Pipe: ASTM C1053
- C. Polypropylene or Polypropylene flame retardant Pipe

8. ACID WASTE PIPING

- A. Allowable manufacturers: Lab Line or Enfield (mechanical joints only). Fuse Seal for acid waste pipes 3" and larger