15400 Plumbing

Part 1: General

1.01 The University is responsible for the operation and maintenance of the building plumbing systems. Consequently, connections, attachments, extensions, or other modifications necessary for a project must be planned, budgeted, designed, and constructed by the project.

1.02 Select and specify plumbing equipment based on specific project requirements and these general guidelines.

1.03 The prime focus of the plumbing design shall be reliability, durability, maintainability, and accessibility.

Part 2: Design Guidelines - Plumbing General

2.01 Submit specified plumbing fixture catalog cut sheets with or before final CD design review submittal.

2.02 Specify ASME expansion tank with all water heater tank systems.

2.03 Store domestic hot water at 140°-150° F and deliver through a thermostatic mixing valve at temperature that conforms to A.D.A. requirements.

2.04 Caulk wall-mounted fixtures with 100% white silicone sealer.

2.05 All fixtures shall be provided with accessible integral or separate I.P.S. stops.

2.06 Specify lavatory and sink p-traps and water supplies subject to A.D.A. to be insulated with fully molded flexible vinyl insulation that conforms to A.D.A. requirements.

2.07 Specify chrome-plated cast brass p-trap with cleanout, ground joint, threaded 1 1/2" outlet for lavatories, sinks, and water coolers.

2.08 Specify chrome-plated cast brass escutcheons with set screws for exposed flush valves, water supplies, and p-traps in all toilet rooms.

2.09 All exposed piping in toilet rooms shall be chrome-plated brass.

2.10 Specify hose bibbs for all toilet rooms with floor drains, mechanical equipment rooms, cooling towers, packaged chillers, and roof top mounted AHU's. Specify loose key operated hose bibbs for public toilets.

2.11 Specify all available vandal-proof features for plumbing fixtures located in student and public areas. Provide to Facilities Operations any special tools required to remove vandal-proof items.

2.12 Show square feet of roof drainage at all roof leader piping sizes.

2.13 Specify bolted to floor steel pipe carriers for **all** wall mounted urinals, lavatories, and water coolers.

2.14 Use the same manufacturer for each grouping of faucets, valves, flush valves, etc. for the entire building.

2.15 Specify separate non-potable lab HW and CW systems with backflow preventers for buildings with mostly laboratories.

2.16 Specify shock absorbers with lockable access doors for domestic water systems with flush valves.

2.17 Specify interceptors and appropriate treatment for any waste that could be detrimental to the drainage system and/or the City of Raleigh waste treatment plant.

2.18 Sump pumps and/or sewage lift stations are not allowed. Elevator sump pumps are acceptable.

2.19 Provide water and waste isometric riser diagrams for all buildings. Show plumbing fixture schedule including fixture units.

2.20 All piping shall be routed as to remain clear of transformer vaults, refrigerated spaces, switchgear rooms, panelboards, elevator shafts, or other critical areas. Drain pans or shields are not an acceptable alternative.

2.21 Insulate bottom side of roof drain pans and horizontal roof leader piping. Also, insulate bottom side of floor drains and p-traps receiving condensate from a cooling coil or ice machine.

2.22 Cold and hot water piping is not permitted in exterior walls. Freeze proof wall hydrants with extended stems can be supplied from interior partitions perpendicular to exterior walls.

2.23 Space exterior wall hydrants maximum of 200 feet apart.

2.24 Provide isolation valves in accessible valve box located in corridor wall outside each laboratory space for each lab service.

2.25 Provide primers for all floor drains.

2.26 Specify high silicon acid waste (Durion) piping for kitchen and concession area waste lines.

2.27 Specify floor drains for toilets with two or more flushing fixtures.

2.28 Provide “wet” columns at various locations for shell buildings.

Part 3: Design Guidelines – Plumbing Specialties

3.01 **Valves:** Gate valves shall be installed, whether shown on plans or not, on all hot and cold water branch lines. Check valves shall be swing check type, rated for 125 psi. Specify extended stems for valves in insulated lines. Ball valves shall be 3-piece full port type. Ball valves may be used for gate valves if the full port type.

3.02 **Cleanouts:** All required cleanouts shall be shown on plans and/or riser diagrams. Wall cleanouts in corridors are preferred to floor cleanouts where possible. Cleanouts shall be adjustable and equipped with an internal brass plug with countersunk brass screws holding the rim to the body and cover. Use tops with tile recess for floor coverings or terrazzo. Provide a permanent carpet indicator where cleanout is located under carpet. Yard cleanouts shall be brass recessed type in 24" x 24" x 6" concrete pad. Wall cleanouts to have stainless steel round access covers, frame with anchor lugs and cover plate with screws.

3.03 **Access Panels:** Access panels shall be provided where shutoff valves, air chambers, or other equipment is located in chases or other concealed spaces. They shall be fire rated where required and equipped with full piano hinge. Access panels shall be of sufficient size for maintenance of equipment and key lockable in public areas.

3.04 **Flush Valves:** Flush valves shall be diaphragm type either Delaney "Flushboy" or Sloan "Royal" series. Discuss with NCSU using 24- volt automatic flush valves on urinals and water closets.

3.05 **Faucets:** Solid brass construction with vandal proof aerator – "Chicago Faucet Co." or "T & S Brass". Provide all vandal proof options in student and public areas.

3.06 **Compressed Air Systems:** Provide instrument quality air for laboratories. Use oil flooded rotary screw unit with appropriate filtration, ASME wet receiver tank with 200 psi working pressure, and 120 volt automatic drain valve for tanks and filters. Provide compatible air dryer, either refrigerated or desiccant type depending on the application.

3.07 **Backflow Preventers:** Locate backflow preventers for domestic and fire line services inside building for new buildings and inside if possible for existing buildings. Provide air gap device on reduced pressure assemblies and pipe full size to floor drain funnel. Backflow preventers and their installation shall meet City of Raleigh Public Utilities Department requirements.

Part 4: Design Guidelines – Plumbing Fixtures

4.01 **Water Closet:** Use white vitreous china, elongated bowl wall-mounted, siphon jet or blowout, white open-front heavy-duty plastic seat with stainless steel self-sustaining check hinge, water conserving diaphragm type lever-operated flush valve with solid ring support, 24” above fixture rim, cast iron chair carrier. Discuss with NCSU using 24-volt sensor-operated automatic flush valves.

4.02 **Urinal:** Use white vitreous china, integral trap, 2" outlet, wall-mounted with steel pipe carrier, water conserving diaphragm type lever-operated flush valve with solid ring support. Discuss with NCSU using 24-volt sensor-operated automatic flush valves.

4.05 **Lavatory:** Use white acid-resisting, enameled cast iron, wall-mounted with steel pipe carrier, 4" high back, single-lever centerset commercial faucet, grid drain, rigid supplies, wheel handle I.P.S. stops. Use vitreous china in countertop applications. Discuss with NCSU using 24-volt sensor-operated automatic faucets with tempered water for gang toilets.

4.06 **Sink:** Counter-mounted self-rimming 18 gauge type 302 or 304, 18-8 stainless steel with faucet ledge, commercial two-handle faucet with gooseneck spout, 1 3/4" radius corners, undercoated and sound deadener. Use 316 stainless steel for darkroom sinks.

4.07 **Electric Water Cooler:** Specify only dual level A.D.A. accessible type electric water coolers with electric push button or push bar, wall mounted with steel pipe carrier, all stainless steel exterior including skirt. Conceal all services including water supply, waste, and receptacle behind water cooler skirt. Use prison type vandal proof water cooler with remote chiller for locker room and gym areas.

4.08 **Mop Receptor:** Built-up of ceramic tile if other tile work on project, otherwise use pre-cast terrazzo 24" x 36" with stainless steel rim and stainless steel wall splash protectors. Provide a 3-tool mop hanger and hose end holder.

4.09 **Floor Drains:**

a. Mechanical Rooms: Galvanized cast iron parts with sediment bucket that supports round strainer. Strainer to suit application. Do not locate inside built-up air handling units. Provide primer connection. Use deep seal p-traps.

b. Other Locations: Coated cast iron body with chrome nickel alloy strainer to suit application. Use square tops where floor finish has a straight grid pattern. Use funnel drains for indirect waste. Provide primer connection. Provide clamping collar in waterproof floors.

c. Exterior stairwell drains shall be minimum of 12" x 12" x 6" drain sump with 4" outlet and grate cover.

d. Floor drains located in animal quarters shall have the strainers secured with vandal proof screws with "thread locker" to prevent strainers from coming loose.

4.10 **Domestic Water Heater:** Factory assembled and packaged, skid mounted semi-instantaneous steam heated hot water generator, ASME Code 316 stainless steel tank (45 or 60 gallon), copper u-bend heating coil, full steam package including pressure reducing valve, integral bronze circulator. Reference: Cemline SSH series.

a. Use semi-instantaneous type where the HW draw is mostly constant.

b. Add separate hydraulic cement lined steel tanks where storage is required such as dormitories, gym showers, and kitchens.

c. Electric water heaters are not allowed except:
   1. Where the life cycle costs show electric the best overall choice.
   2. The usage is low such as hand washing in toilets.

4.11 **Shower valve:** Single lever operated pressure balance anti-scald valve with integral stops and tamperproof water saver showerhead. Use thermostatic mixing valve in lockable enclosure for hot water supply to gang showers.

4.12 **Wall Hydrant:** Wall mounted concealed cast brass box type, non-freeze, automatic draining, and polished brass or stainless steel face with loose key lock.

4.13 **Wall Mounted Eye Wash:** Connect drain from eye wash bowl to building drainage system.

Part 5: Design Guidelines – Plumbing Piping

5.01 **Domestic Water:**
- a. Aboveground 2-1/2" and smaller - Type "L" hard drawn copper tubing. Specify 95-5 solder for 1-1/4" and smaller, silver brazing for 1-1/2" – 2-1/2".
- b. Aboveground 3" and larger – Cement lined ductile iron with flanged joints.
- c. Belowground – 3" and smaller - Type "K" soft copper tubing with silver brazed joints. No joints allowed under building slab. Stub above slab on grade near exterior wall.
- d. Belowground – 4" and larger - Cement lined ductile iron with push-on joints except use mechanical joints at all elbows.

5.02 **Drainage and Vent Systems:** Aboveground – Cast iron no-hub pipe with heavy-duty couplings such as "MG" or "Clamp-all". Belowground – Cast iron hub and spigot pipe with "Charlotte seals". Fixture arms – Schedule 40 galvanized steel with threaded fittings.

5.03 **Acid Waste:** Aboveground - Flame retardant schedule 40 polypropylene with socket fusion fittings. Mechanical joints allowed only under lab benches inside accessible cabinets (not in cabinet pipe chase). Belowground - Schedule 80 polypropylene with socket fusion fittings.

5.04 **Compressed Air and Vacuum:** Type "L" hard drawn copper tubing. Specify silver brazed joints and stainless steel flexible connections at equipment.

5.05 **Natural Gas:** Schedule 40 black steel with threaded malleable iron fittings.

5.06 See section 15075 Mechanical Identification for color scheme and labeling requirements.