PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Plumbing specialty items or components associated with domestic water and drainage systems.

B. Related Sections:
   1. Section 15010 - Basic Mechanical Requirements.
   2. Section 15050 - Basic Mechanical Materials and Methods.
   3. Section 15410 - Plumbing Piping.
   4. Section 15440 - Plumbing Fixtures.
   5. Section 15450 - Plumbing Equipment.

1.02 REFERENCE

A. Latest American Society of Plumbing Engineers (ASPE) Data Book, Volume 1, Fundamentals of Plumbing Design.


1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Roof Drains:
   a. Carefully coordinate location and depth of drains to assure adequate pitch of the drainage area to drain.
   c. All roof drains connected to storm sewers shall have test-tee cleanouts, at the base on the exterior wall of the building or in the ground immediately outside the building.
   d. Roof and overflow drains shall share the same “pan”.
   e. Strainer/dome shall be made of cast iron.
   f. Roof drain pans shall be secured to the structure.

2. Floor Drains:
   a. Provide floor drains in shower, toilet rooms, mechanical rooms and other areas as required by building design, such as near reduced-
pressure backflow preventers. Non-public toilet rooms with one or two fixtures may not have a floor drain.

b. Floor sinks are required for indirect drains, and are preferred in mechanical rooms.

3. Downspouts:
   a. Minimum downspout size to be 4".
   b. Terminate with downspout nozzle.
   c. Coordinate required location of splash blocks under every downspout.

4. Cleanouts:
   a. Select cleanout locations and access for minimum disturbance of occupant functions and building systems operation during cleanout servicing. Ascertain that Architect and University agree with location and appearance.
   b. Specify cleanouts above each urinal (56" AFF on single-stack risers) and multiple lavatories (42" AFF or at least above flood level of lav.) If wall is partially covered with tile, the cleanouts shall be within the tile field or above it, not partially in each.
   c. Specify cleanouts 6" above highest trap on that floor on the main vent of each group of fixtures and in vent stacks for isolated fixtures on each floor.
   d. Design cleanouts full size at base of each stack and at end of each horizontal run. Do not exceed 100 ft. on horizontal runs.
   e. Specify cleanout plugs line-size up to 3", and 4" for line sizes 4" through 6".
   f. Specify wall cleanouts where piping is concealed in walls or non-accessible chases, 42" AFF. Main line shall be 18" AFF.
   g. Where cast iron pipe is used, specify cleanouts with cast iron bodies and threaded "ABS" or "Delrin" plugs. Use “Never-Seize” on threads.
   h. Design locations for cleanouts where they will be easily accessible for rodding. Provide sheet note that “cleanouts shall be 2” from finished surface of wall.”

5. Hose Bibbs:
   a. Provide hose bibbs with vacuum breakers as required by code and in the following locations:
      i. Each mechanical equipment room.
      ii. Kitchen areas equipped with floor drainage systems.
      iii. Within 20 feet of furthest point of cooling towers and condensers.
   b. External hose bibbs shall be installed as required by code or to meet landscaping or maintenance needs.
   c. Mounting height to be 42" above floor in equipment rooms.
   d. An isolation valve shall be provided near all hose bibs to minimize system draining.

6. Shock Arresters for Water:
   a. Give careful attention to the prevention of water hammer in the design of water distribution systems.

c. Specify mounting as close to the line or quick-closing valve as possible. Remote mounting or excessive (over 6") nipple mounting will not be acceptable.

d. Specify or show on Drawings threaded ball valve between pipe and shock arrester.

e. Specify 20” x 20” minimum access panels centered on each shock arrester that is otherwise inaccessible.

7. Reduced-Pressure Backflow Preventer (RPBFP):

a. Note: Water entry to building shall be located at or above grade so that testing and emergency outflow of water from RPBFP can be drained to grade.

b. Provide reduced-pressure type backflow preventers on all connections between the domestic water system and make-up supplies to any non-potable system, (e.g. Water Heating, Boilers, Cooling Towers, Chiller, Solar, Etc.).

c. Specify to anchor backflow preventer in place.

d. Specify air gap drain assembly for drips and hang and anchor drain tubing rigid and stable to drain receptor.

e. Specify test and approval by certified tester.

f. Specify strainer upstream of all backflow preventers.

g. Specify that height AFF not to exceed 5 feet, and not be above ceilings.

h. Strainer is required before RPBFP device.

i. Specify 2” RPBFP device as bypass around all new RPBFP devices on service to buildings. (Sizing is dependent on building use: A larger size may be required. Consult University for approval.)

j. RPBFP low level alarm shall be above drain in containment tank.

k. Reduced-pressure backflow-prevention devices on mains need to be installed before PRV station.

l. Reduced-pressure backflow-prevention devices shall have isolation valves before and after device. Device valves are considered part of device, not isolation valves. Unions shall be used for 1-1/2" and under. Flanges shall be used for 2" and over. All flanges shall have stainless-steel trim.

8. Water Pressure Regulation:

a. Use self-contained pressure regulating valves with stainless steel seating.

b. Valves to have bronze bodies for 200 psi working pressure.

c. Average main pressure can be assumed 100 psi and to be reduced to about 70 psi.

d. Use at least three valves, such that the sum of cross-section areas of PRVs shall match cross-section area of pipe that supplies station.

e. Reduced pressure for 20 percent valve shall be 70 psi, one of the 40 percent valves set at 68psi, and the other at 66psi. Install full size "Y" pattern epoxy-coated or brass strainer on inlet side of valve assembly. Depending on the size of the service, we prefer 2 inch valves. Multiple
2 inch valves make it easier to replace a bad valve and are less likely to affect the building water supply.

f. Install pressure gages, complete with ball valves.
g. Gage range 0 psi to 200 psi.
h. Gages to be house side and on service side of each reducing valve inside of each shut-off valve for each P.R.V.
i. Provide 2” emergency fire-hose hook-up with valve between isolation and reduce pressure.
j. Unions shall be used for 1-1/2” and under. Flanges shall be used for 2” and over. All flanges shall have stainless-steel trim

9. Temperature and Pressure Relief Valves:
a. Provide relief valves on all water heaters and pressure vessels per ASME Standard.

10. Trap Primers:
a. When near a toilet room, provide Sloan trap primers where traps in floor drains may dry out and allow sewer gas to escape into building spaces; for example, toilet rooms and mechanical rooms or plenums. When not near a toilet room, provide Proset Trap Guard™.

11. Under-lavatory scald protection:
a. Specify pre-molded insulation covers for drains and water supplies to ADA accessible lavatories.

12. Stop-valves:
a. Standard brass-stem ¼-turn stops with handle-(no plastic).

13. Emergency showers

14. Main Water Meters:
a. General
i. Project Engineer of Record shall submit building annual consumption projections.
ii. Units
   a) Water shall be in kgal for consumption

b. Utility Services Meter Panel (UMP)
i. All meter panels shall be in accordance with the University of Colorado Boulder Utility Standard No. EO-100-A latest revision for integration into the Utility Control System (UCS). Coordinate UMP with all other utility main meters (ie steam, chilled water, and electric).
ii. Meter Panel shall house flow computers (totalizers) and Advanced Metering Infrastructure (AMI) Gateways devices.
iii. The UCS gateway (Master) device shall reside in the meter panel.
   a) Gateway device shall be industrial grade with internal firewall.
b) Acceptable manufacturers:
   a. MOXA Mgate Model #3170 (or approved equal)

c) All meters (chilled water, electrical, steam, domestic water) shall communicate via a dedicated RS-485 network utilizing ModBus RTU Protocol.

iv. One dedicated IP connection shall be installed for the UMP
v. A dedicated 115V circuit shall be supplied for the UMP.

c. Flow Computer/Totalizer:
   i. Specify Kessler-Ellis Products (KEP) ST-1 panel mounted flow computer to be installed and connected to all main water meters. The KEP flow computer will receive the analog flow signal (or pulse output) as an input from the meter and send consumption (gallons) output via Modbus RTU Protocol to the ModBus Gateway over RS485 communication trunk. All wiring and terminations are to be completed by Temperature Controls contractor or electrical contractor (pre-approval required) including installation of KEP, wiring of meter to KEP, wiring of KEP to ModBus Gateway, setup and KEP programming. Commissioning shall be performed by Utility Services. Refer to Division 15 section 950, 951, and 955 for further information on BAS requirements

d. Electromagnetic type meter:
   i. Specify in-line, full diameter, flanged, electromagnetic type meter for all service larger than 2”. Meter to be manufactured by Onicon, Inc, model 3100, or UCB approved equivalent, with internally generated 4 – 20 mA analog output. Meter sizing and installation shall be approved by UCB Utility Services.
   ii. Acceptable Manufacturers:
       a) Onicon model F-3100 series
       b) Rosemount
       c) Yokogawa
       d) ABB

e. Bronze Disc Meter:
   i. Specify bronze disc meter with RTR register on service 2” and below. The RTR shall pulse to the KEP ST1. When it is determined a compound meter is required for 2” service a mag meter shall be specified. Disc meter to be manufactured by Badger or UCB approved equal. Meter sizing and installation shall be accepted by UCB Utility Services.

f. Small Domestic Water Meters
   i. These meters are used for makeup lines for cooling towers and evaporative coolers, and other similar applications where UCB can obtain sewer credit from the city
   ii. Hersey Measurement Co., Niagara Meter Line, MTX Series, Model 433, 1% accuracy, standard totalizer and calibrated contacts for remote monitoring.
iii. Remote Monitoring
   a) Unless exempted by the University, the meter shall be connected to the Andover Controls system for remote monitoring of water usage. A two-wire, non-powered, connection is required. The signal to the Andover will be a pulsed (counter) input. Each pulse corresponds to a fixed number of gallons and the Temperature Controls Contractor shall program the system to calculate and display the total number of gallons passing through the meter.

   LEED: Required for certification.

15. Backflow Prevention
   a. Humidifiers and Evaporative coolers shall have a potable water supply and have an air gap or an ASSE 1012 or an ASSE 1022-listed device.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Floor drains, floor sinks, planter drains, deck drains, garage drains, trench drains, roof drains, downspout nozzles, storm drain expansion joints, cleanout fittings, sanitary vent terminal, and air gap fittings:
   1. Josam
   2. J.R. Smith
   3. Wade
   4. Zurn

B. Trench Drains-Heavy Duty C.I. Grate and Frame:
   1. J-Mark Foundry
   3. Neenah Foundry

C. Sillcocks:
   1. Woodford Model 67 Series, B67 Series

D. Hose Bibbs:
   1. Finished Rooms: Chicago Faucet.
   2. Unfinished & Equipment Rooms: Woodford.
E. Shock Arresters:
   1. Precision Plumbing Products Co. ("P.P.P.").
   2. Zurn
   3. JR Smith
   4. Josam
   5. Wade

F. Reduced Pressure Backflow Preventer (Main):
   1. Febco 860 for 2-1/2” and larger for containment within buildings.
   2. Febco 825Y for 2” and smaller
   3. Specify strainer before RPBFP device, brass or epoxy-coated iron
   4. Specify 2” RPBFP device as bypass around all new RPBFP devices on service to buildings. (Sizing is dependant on building use: A larger size may be required. Consult University for approval.)
   5. Carbonated-beverage dispensers to have an ASSE 1013-listed device installed when the building does not have building backflow containment device, with no copper or brass installed downstream of the device, as per the City of Boulder. If the building does have a building backflow containment device, install ASSE 1022-listed device.

G. Double Check Assemblies (For Fire Systems):
   1. Febco 850, 870/870V

H. Pressure Vacuum Breakers (For Irrigation):
   1. Febco 765

I. Spill-Resistant Vacuum (For evap. coolers, cooling towers and fume hood clusters):
   1. Breaker Watts 008 QT, Watts 008 QTS

J. Water Pressure Regulation Valve (Only):
   1. Mueller
   2. Watts

K. Temperature and Pressure Relief Valves (Bronze or Brass):
   1. Kunkle
2. Watts

L. Trap Primers:
   1. Near and within restrooms: Sloan F-72-A1
   2. Elsewhere: Use trap-primer alternative (Proset Trap Guard ™)

M. Water Meters:
   1. Badger bronze disc meter for 2” and below.
   2. Badger bronze recordall compound meter for 2 ½ to 6”.
   3. Above this, request University approval.
   4. Note: All meters must have pulse output for remote read-out, and be compatible with Andover DDC.

N. Under-lavatory scald protectors:
   1. Shall comply with ADA Accessible Design
   2. Plumberex Pro Extreme, Truebro Lav Guard or acceptable equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. In general, for project specifications, remove "Design Requirements in Part 1, Sub-paragraph A, Paragraph 1.03 "System Description" of this Design Guide and use list to expand on specific requirements of installation for each product specified.

END OF SECTION 15430