

SECTION 22 05 00 - COMMON WORK RESULTS FROM PLUMBING

PART 1 - GENERAL

1. The plumbing system design should take into consideration the type of facility, program, project type, and site considerations. Project requirements and program are to be reviewed and verified with the College.
2. All plumbing systems shall be designed and installed in accordance with the currently enforced edition of Indiana Plumbing Code published by the Building Officials and Code Administrations as modified and adopted by the Indiana Fire Prevention and Building Safety Commission.
3. No roof drains or restrooms shall be located above or routed through elevator equipment rooms, data spaces telecommunications rooms, or electrical rooms. No piping is to pass through these rooms.

PART 2 - ABBREVIATIONS

GF	Ground Fault Interrupter
RO	Reverse Osmosis
DI	De-Ionized

SECTION 22 11 16 - DOMESTIC WATER PIPING

1. The incoming water service shall enter the building in the mechanical/boiler room through two parallel installed reduced-pressure-principle backflow preventers (lead-free). Dual backflow devices shall be installed at the service entrance to allow the building to remain in service during backflow assembly maintenance.
2. After the backflow preventers, domestic water to the water heater shall be provided with a rough-in for a water softener, including a floor drain.
3. Raw cold water shall be provided for all water closets, urinals, lavatories, hose bibbs, and wall hydrants.
4. Cold, hot, and hot water return piping shall be routed above ceilings. No underfloor slab piping unless approved by the College.
5. Shut-off valves shall be provided at all branch lines where required for proper operation of piping and equipment, including valves in all branch lines where necessary to isolate sections of piping and at each fixture. Ensure isolation valve locations have been reviewed with the College to ensure there are enough for appropriate maintenance.
6. Walk-in plumbing chases shall be provided where practical (especially with restrooms containing four or more fixtures back-to-back). If not, a minimum of 24" shall be provided in all chases (or as approved by the College). Chases that do not meet this requirement shall be noted and reviewed during design development with the College.
7. The water supply system shall be designed to provide a minimum of 45 psi at the most remote outlet during normal operation and not to exceed 75 psi.
8. If water main pressure exceeds 80 psi, it is required to install a pressure-reducing valve.
9. All domestic piping, including cold, hot, and hot water return piping shall be insulated.
10. Entire systems shall be tested and disinfected with a hypochlorite solution.
11. Water hammer arrestors shall be provided on both hot and cold water lines servicing fixtures and equipment with quick closure valves.

12. Each toilet room must have an isolation valve for each room.

13. Unions are required at all solenoid valves.

Domestic Underground Piping Nominal Size Range

Minimum Diameter	¼"	½"	3"	14"	24"	30"
Maximum Diameter	2½"	2½"	12"	20"	24"	64"

Design

Working Pressure PSIG	125	125	150	150	150	150
Working Temperature Fahrenheit	250	250	350	250	200	150
Pressure Class	350	350	350	250	200	150

14. The minimum burial depth of exterior domestic water lines will be 5' 0".

15. Ductile Iron Mechanical Joint: AWWA C151 with Mechanical Joint Bell and plain spigot end, cast iron pipe, centrifugally cast with asphaltum coating. Class as noted in schedule. Pipe to be marked and carry nominal weights and dimensions as required by state and local codes. As manufactured by James B. Clow and Sons; American Cast Iron Pipe; Alabama Pipe, U.S. Pipe and Foundry.

16. Mechanical Joint: AWWA C111 ductile or grey-iron, standard pattern, same class as noted for pipe.

17. Mechanical Joint: AWWA C111 ductile or grey-iron glands, rubber gasket, and steel bolts. Reinforce joint at hydrants, fitting, or valves with heavy wrought iron clamps and wrought iron rods in accordance with standard details of National Board of Fire Underwriters. Apply heavy coat of bituminous solution to assembly.

18. Acceptable PVC materials may be used outside of the building perimeter if approved by the College. A locator wire shall be applied to the pipe as required.

SECTION 22 11 23 – PLUMBING PUMPS

1. Domestic booster pump system shall be tested at 0%, 25%, 50%, 75%, and 100% of full load capacity at scheduled suction and discharge pressure. Packaged system shall be tri-plex with the pump load of 50-50-50 to allow full building operation in the event of a pump failure. System to be equipped with VFDs and shut-off valves for each pump.
2. All plumbing pumps shall be factory assembled, wired, and tested prior to shipment.
3. An inline single-stage wet rotor type circulation pump shall be provided on the main system 120-degree Fahrenheit hot water recirculating lines. Hot water return pump to be equipped with a factory-installed VFD.
4. Circulation pump shall be sized to overcome pressure drop through thermostatic mixing valve and pressure drop through hot water and hot water return piping.
5. Required sump pumps, sewage ejectors, and lift stations shall be of the duplex design with automatic alternating controls, remote alarms, pilot lights, and all required auxiliaries. Pumps and alarms shall be monitored by the building management system.
6. Ejectors and stations shall be of the reverse flow design.

SECTION 22 13 00 - SANITARY, STORM, AND VENTING PIPING SYSTEMS

1. Sanitary waste and vent lines above slab within the building shall be code-approved PVC-type DWV materials.
2. Sanitary waste and vent lines below slab within the building shall be CISPI/Code-approved cast iron DWV pipe and fittings.
3. Horizontal pitch of pipe within the building, above and below slab, will not be less than $\frac{1}{8}$ " per foot.
4. Cleanouts shall be at 50' horizontal intervals, at any change in direction greater than a 45° angle, and at the individual fixtures. Cleanouts shall not be installed in public corridors and/or lobbies. If this cannot be avoided explore the use of wall cleanouts.
5. Vent stacks shall penetrate the roof with a minimum 4-inch diameter and extend to a minimum of 12 inches above the roof surface. Coordinate location with RTU intake.
6. All sanitary waste lines below the slab shall be collected together into main drains and exit the building to the sanitary sewer.
7. Cleanouts, the same size as the building drains, shall be brought to exterior grade surface within 5' of the building for each building drain.
8. Storm water lines above or slab shall be code-approved PVC-type DWV materials. Storm lines installed in sound-critical areas (board rooms, conference rooms, etc.) shall be insulated for sound control.
9. A cleanout shall be placed at the base of each vertical roof drain conductor.
10. All roof drain sump pans shall be four bolt patterns with under deck clamps and cast iron screens.
11. Horizontal roof drain conductors shall be insulated. Insulation shall meet application and code requirements. Engineer to identify areas of return air ceiling plenum and anything within the plenum shall meet the 25/50 flame/smoke rating.
12. At each roof drain, an overflow drain shall be provided.

13. The main roof drain shall be a cast iron dome and body; the overflow shall be of the same material as the main drain but have 2" high overflow collar.
14. Minimum size for roof drain outlets shall be 3" diameter.
15. All storm water lines below the slab shall collect into main drain lines, exit the building, and connect to the new storm sewer system.
16. Engineer to label each underground storm main exiting the building with main size, square footage of roof drained, rainfall rate used in calculations, and GPM discharged.
17. As with the sanitary waste line, exterior cleanouts shall be provided where the storm drains leave the building within 5' 0" of the building.
18. Floor drains must be provided in all new and renovated restrooms and custodian closets.
19. A floor drain must be incorporated into mechanical/boiler rooms.
20. Deep seal P-traps shall be used on all floor drains.
21. Walk-in plumbing chases shall be provided where practical (especially with restrooms containing four or more fixtures back-to-back). If not, a minimum of 24" shall be provided in all cases. Chases that do not meet this requirement shall be noted and reviewed during design development with the College.

PART 3 - DRAINAGE AND VENT SYSTEMS

1. Storm drain piping above ground, within building, use PVC type DWV.
2. Sanitary drain and vent piping above ground, within building, use PVC type DWV.
3. Sanitary drain and vent piping below ground, within building, use cast iron DWV.
4. Storm drain piping, below ground, within building, use PVC type DWV.
5. In return air plenums use no-hub cast-iron piping.

6. For pressure sewer and storm piping, use pressure-rated PVC piping and fittings.

PART 4 - ACID WASTE AND VENT SYSTEMS

1. The type of piping and need for an acid neutralization tank shall be discussed with the College prior to design in case-by-case application.
2. In return air plenums piping shall be PDVF, glass, or stainless steel piping.

PART 5 - GREASE TRAP

1. Provide grease trap as required by the Board of Health and local municipalities.
2. Provide access for grease trap and locate near a vehicle drive or loading area.
3. Grease trap to be located on the exterior of the building. Provide a water hydrant within 25' 0" of grease trap for maintenance.

SECTION 22 15 19 – AIR COMPRESSORS

PART 1 - COMPRESSED AIR SYSTEM

1. Air compressor shall be scroll type. Provide dryer oil-free air and automatic blowdown. Review application with the College.
2. Mount units on vibration isolators which have been anchored to substrate, in accordance with manufacturer's instructions. Location of air compressor shall be reviewed with the College.
3. Install units on 4" high reinforced concrete pad, 4" larger on each side than compressor base.
4. Consider increased acoustical treatment of separating wall partitions and door assemblies to isolate noise.
5. Coordinate with the users the locations of air outlets for maintenance use.

PART 2 - VACUUM AIR SYSTEM

1. Provide vacuum air systems in bio and dental labs as required by the College.

SECTION 22 31 00 – DOMESTIC WATER SOFTENERS

1. Softeners shall be provided as required and approved by the College. Softener shall operate on a sensor control.
2. Softeners shall be fully charged with fresh salt and minerals at Building Substantial Completion.
3. Softeners to be duplex or triplex to allow tank regeneration without interruption to the building.
4. All domestic hot water shall be softened; Engineer shall confirm with users if any specialty-use cold water is desired to be softened.

SECTION 22 34 00 – DOMESTIC WATER HEATERS

1. A gas-fired or electric water heater shall serve the building with domestic hot water. A gas-fired water heater shall be highly efficient for energy conservation.
2. Point-of-use water heaters may be considered if the building layout, programming requirements, and related efficiencies support the application. Engineer shall review and obtain approval from the College. Utilize a loop system only when practical.
3. A central thermostatic mixing valve shall be installed to provide 120-degree Fahrenheit hot water (adjustable). A thermostatic mixing valve shall be provided at all emergency shower locations. Mixing valve shall be digital-type (the brain).
4. Thermometers and domestic hot water expansion tank shall be provided.
5. Water heaters shall be duplex with each unit sized for 66% of the hot water load to allow building to stay in operation in the event of a failure.

SECTION 22 40 00 – PLUMBING FIXTURES

1. Water closets and urinals shall be wall-mounted vitreous china with hard wired sensor operated valves.
2. Lavatories shall be wall-mounted vitreous china with hard wired sensor operated faucets. Under-counter mounted lavatories should only be used when approved by the College. Acceptable option shall be a solid surface counter with an integral bowl.
3. Type and style of fixtures and trim for administration areas shall be reviewed and approved by the College.
4. Water Closet, Urinals, Lavatory:
 - A. Sloan Optima 111 ESS hard wired sensor-operated flush valves with manual override lever/button is the recommended Design Standard; 1.1 GPF for water closets, 0.125 GPF for urinals. Water-free urinals are not permitted.
 - B. Sloan Optima 350 EFA hard wired sensor operation with 0.35 GPM aerator is the recommended design standard.
 - C. Automatic sensors shall be provided on all water closets, urinals, and lavatories. Hard-wired power preferred for operated valves. Specified sensor and valve manufacturers shall be approved by the College.
5. Sinks in instructional areas shall be stainless steel, single-compartment, self-rimming sinks with 8" center set faucets with 2 1/2" ADA-compliant lever handles or automatic sensor set, as selected by the College.
6. Art room sinks must include a clay trap.
7. Hydrants shall be located as required for the ease of maintenance personnel. The wall hydrants shall be recessed; box type with locking covers, freeze proof, loose key operation, and shall be provided with an integral vacuum breaker.
 - A. Locations of Hydrants:
 1. Gang restrooms.
 2. Mechanical rooms.
 3. Mechanical courtyards.
 4. Roof.
 5. Exterior – every 100’.
8. Mop basins with stainless steel guards shall be installed in the janitor’s closets. Caulk around mop basin,

all fixtures, and wall. Provide a dome strainer.

9. A $\frac{3}{4}$ " spigot and floor drain is desired in each Mechanical and Boiler Room

PART 3 - FAUCETS

1. Gooseneck faucets to be used with College approval only. If approved, they shall be the 'swing away' type.

SECTION 22 47 00 – DRINKING FOUNTAINS AND WATER COOLERS

1. Provide electric water coolers where approved by the College and as required by code.
2. Install with GFI receptacles or fed from GFI breaker.
3. Provide water bottle fillers.
4. Utilize standard mounting heights for adult patrons and per ADA guidelines.