

SECTION 15051

COMMON WORK RESULTS FOR PIPING

**PART 1 –GENERAL**

**1.1 INTRODUCTION**

**A. Definitions:**

1. Plumbing: Building mechanical equipment, piping, and fixtures that provide domestic hot and cold water, sanitary and special waste drainage, and roof and other storm drainage.
2. Point of Connection: The plumbing connection point for site distribution is usually located five feet (5') outside the building foundation. A careful study of existing site documentation and field verification should precede any detailed design efforts.

B. Goal: To engineer a functional, economical and efficient plumbing system in compliance with applicable codes.

**C. System Conditions:**

1. Domestic Water Supply:
  - a. Supply pressure: Minimum 50-80 PSIG, consultant to verify.
  - b. Chemical Composition: Information regarding the chemical composition of the University water supply is available from the Operations and Maintenance Department.
2. Liquid Waste Removal:
  - a. The University Sanitary Sewerage System is connected to the City of Palo Alto Waste Treatment System and must conform with the requirements of the City of Palo Alto.
  - b. Acid waste and other contaminated liquid wastes shall not discharge directly into the Sanitary Sewerage System. Specific methods of hazardous waste disposal shall be discussed with personnel from the University's Department of Health and Safety early in the design process.

D. Fire Protection: Fire protection system supply water is taken from the building domestic water supply system. Refer to Section 13930: Automatic Fire Sprinkler Systems.

E. Environmental Conditions: Refer to Division 15: Mechanical

F. Codes: All designs shall comply with the applicable requirements of the Santa Clara County Plumbing Code, California Title 24 and other applicable ordinances and codes.

- G. Energy Efficiency and Water Conservation: Refer to SOM Facilities Guidelines Division 15: Mechanical.

## 1.2 QUALITY ASSURANCE

- A. Designer Qualifications: All plumbing design work shall be signed and stamped by a professional mechanical or civil engineer (as applicable) licensed in the state of California. Requests for exceptions to this requirement shall be evaluated by the University Manager of Engineering and Construction Management or SOM Office of Facilities Planning and Management.
- B. Testing:
1. Plumbing installers shall provide testing services as set forth in the Contract Documents.
  2. All testing shall be performed in the presence of the SOM Project Manager's representative.
  3. Deviations from the cleaning, testing, and certification requirements set forth in the Contract Documents shall be requested in writing, stating reasons; and are subject to approval by the Project Manager's Representative.

## 1.3 DESIGN SUBMISSION REQUIREMENTS

- A. General:
1. Design drawings, data and calculations at various stages of completion shall be submitted for each phase of the SOM's plan review process. The specific submittal requirements for each phase are outlined below.
  2. Refer also to Section 01330: Submission Requirements.
  3. Drawings shall provide location and size, of underground sewer, storm, and potable water service.
  4. Drawings shall provide a schedule sheet for the following items:
    - a. Plumbing fixtures: i.e., water closets, floor drains, sinks, BFP, hose bibs, sump pumps, eyewashes, showers, etc.
    - b. Fixture unit riser stack calculations for each drainage system per UPC.
  5. Drawings shall provide isometric riser diagrams for the waste and vent systems per UPC.
  6. Drawings shall provide typical details for the following items:
    - a. Single pipe hanger with sizing schedule and anchor bolt data.
    - b. Multi-pipe trapeze hanger with sizing schedule and anchor bolt data.
    - c. Seismic bracing schedule for all applicable hanger assemblies.
    - d. Expansion joint and fire stop sealant assemblies for walls, floors, and ceiling penetrations.
    - e. Roof drainage assemblies, area drainage assemblies and overflow assemblies per the Roof and Waterproofing Standard of the NRCA

and UBC Standard.

- f. Equipment support sleepers per Stanford University and NRCA Standards.
- g. Pressure reducing backflow preventer assemblies per Stanford University, UPC, and ASSE Standards.
- h. Wall mounted trap primer assemblies per UPC.
- i. Emergency eyewash and shower assemblies per Stanford University and ANSI Standards.
- j. Restroom fixture assemblies detail schedule.
- k. Title 24 handicap compliance assemblies details.

B. 100% Schematic Design Submissions:

- 1. Selection of types of plumbing systems.
- 2. Preliminary system cost estimate in terms of unit cost (dollars per square foot gross building floor space, dollars per system or component, or similar).
- 3. Location of major plumbing equipment.
- 4. Schematic diagrams of major piping systems.

C. 100% Design Development Submissions:

- 1. Location of all plumbing equipment.
- 2. Routing plans for all piping mains.
- 3. Riser isometric diagrams.
- 4. Preliminary design calculations, including selection of major equipment.
- 5. Preliminary cost estimate for all systems.
- 6. Life Cycle Cost Analysis on optional systems.
- 7. Outline specifications.

D. 50% Construction Documents Submissions:

- 1. 50% complete plumbing plans, sections, and details.
- 2. Final selection of equipment and systems options considered under Preliminary Design Development Phase.
- 3. Design calculations.
- 4. Revised system cost estimate based on 50% design documents.
- 5. 50% complete specifications.

E. 100% Construction Documents Submissions:

- 1. 100% complete design drawings.
- 2. 100% design calculations.
- 3. Revised system cost estimate based on 100% design documents.
- 4. 100% complete specifications.

F. Contract Close-out:

- 1. As-Built Record Drawings: All changes to Contract Drawings and Specifications, including schedules, control diagrams, etc., shall be

incorporated into As-Built Record Drawings in accordance with Section 01330: Submission Requirements.

2. Operations and Maintenance Manuals shall include complete plumbing systems operating and service descriptions written by the Consulting Engineer. The descriptions shall supplement any operating instructions provided as part of vendor-furnished equipment. Refer to Section 01330: Submission Requirements.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Pre-purchased Equipment: The consultant responsible for the pre-purchase specification of equipment or materials shall consult the Project Manager regarding delivery, inspection and acceptance, storage, and handling of the products.

#### 1.5 GENERAL DESIGN CONSIDERATIONS

##### A. General:

1. Design shall be in accordance with applicable ASHRAE and ASPE handbooks.
2. Maintenance shall be an important design consideration for all systems. Sectional valving shall be included, so that shutdown of parts of systems need not disrupt operation of entire building systems.
3. Water and energy conservation shall be important design considerations for all systems. Review water conservation features with University Project Engineer.
4. Design parameters for equipment selection shall conform with ASHRAE, ASPE, and UPC.
5. Water distribution velocities shall be selected for minimal noise levels while maintaining adequate flow.
6. Careful attention shall be given to the prevention of water hammer in the design of water distribution systems.
7. Cleanout locations and access shall be selected for service accessibility, as well as to minimize disturbance of occupant functions and building systems operation during cleanout servicing.
8. Routing of plumbing piping shall be planned such that pipe leakage would result in minimal damage to books, manuscripts, sensitive instruments and equipment, etc.
9. Coordination: The University expects careful design coordination between plumbing, process piping, HVAC, electrical, and fire protection systems. Scaling of drawings shall be coordinated between major disciplines to facilitate plan checks by the overlay method.
10. Provide floor drain (with trap and primer) in mechanical rooms, laundry rooms and other locations as required by Code.

- B. Pressure Piping Interface: Pressure piping systems (domestic and fire service, chilled water, etc.) which typically use a restrained joint system (welded, threaded, victaulic, etc.) for hung interior piping and an unrestrained joint system (rubber-ring, push-on, mechanical joint, etc.) for buried exterior piping must be anchored, or otherwise restrained inside the structure to prevent separation of the unrestrained joints under pressure. Required restraints must be designed to carry the substantial loads generated by a minimum hydrostatic pressure of 150 PSI, or higher if the completed system will be subjected to higher pressure such as in testing. Design calculations for the restraints should be included in the engineering submittals.
- C. Roof and Storm Drainage: Design criteria for storm drainage shall be carefully considered for each building to avoid flooding and related water damage. Roof and storm drains shall be designed for ease of maintenance.
- D. Sanitary Waste: Sanitary waste systems shall be designed to allow for future addition of laterals to accommodate twenty (20%) percent expansion of system capacity.
- E. Laboratory Waste
  1. Laboratory waste systems shall be designed to allow for future addition of laterals to accommodate expansion of system capacity. Future capacity shall be as directed by the University Project Engineer.
  2. University Environmental Health and Safety Department will work with the Project Engineer and Design Consultants to establish design criteria for acid disposal.
- F. Emergency Eyewash, Deluge Showers and Drench Hoses
  1. Emergency Eyewash, Deluge Showers, and Drench hoses shall be provided in buildings as required by the Stanford Environmental Health and Safety (EH&S) Guidelines.

END OF SECTION