



**US Army Corps
of Engineers
Afghanistan Engineer District**

AED Design Requirements: Plumbing

**Various Locations,
Afghanistan**

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CHAPTER 11

PLUMBING

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CHAPTER 11

PLUMBING

11.1 GENERAL.

11.1.1 Scope. The term "plumbing installation" as used herein includes water service pipe; building drain, waste, and vents; roof and storm drains; domestic hot and cold water systems; hospital gases; and vacuum and compressed air systems, including all pipe, fixtures, vents and branches. A system includes all connections in the building to a point 1.5 meters outside the building.

11.1.2 Document Requirements. All required documents, including drawings and design analysis, shall be prepared and presented in a professional manner on letter size paper (8 and 1/2-inch by 11 inch).

11.2 APPLICABLE PUBLICATIONS.

The current edition of the publications listed below form a part of this Manual:

OCE Publication:

Architectural and Engineering Instructions (AEI)	Design Criteria
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Department of the Army Technical Manuals:

TM 5-810-6.	Non-Industrial Gas Piping Systems.
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TM 5-842-2	Laundries and Dry Cleaning Plants
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Unified Facility Criteria (UFC)

UFC 3-450-01	Noise and Vibration Control
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UFC 3-310-04	Seismic Design Criteria for Buildings
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UFC 3-420-02FA	Compressed Air
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UFC 3-420-01	Plumbing Systems
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UFC 3-230-08A	Water Supply: Water Treatment
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Department of the Navy (NAVFAC):

DM-3.5. Design Manual for Compressed Air
and Vacuum Systems.

International Code Council:

International Building Code
International Plumbing Code
International Fuel Gas Code

American National Standards Institute, (ANSI) Standard:

A 13.1. Scheme for the Identification of
Piping Systems.

National Fire Protection Association (NFPA) Standards:

No 54 National Fuel Gas Code

11.3 CONCEPT SUBMITTAL REQUIREMENTS.

11.3.1 General Considerations.

a. At the Concept design stage of project development it is recognized that all calculations are tentative for analysis purposes and only indicate approximate capacities of equipment. Any dimensions and sizes required are order-of-magnitude figures, conservatively stated, to assure adequate space for installation and maintenance of equipment and utility elements such as piping, pumps, etc.

b. Equipment shown in plans and sections is not shown in great detail but is merely presented as simple geometric forms with approximately correct dimensions.

c. Piping layouts shown are simple main pipe runs showing general location, routing and, when applicable, approximate order-of-magnitude sizes.

d. Drawings and sketches. Scale of concept drawings will generally be smaller than the working drawings. Plans and sections need be only large enough to properly show pertinent information. Sketches, neatly drawn, will be acceptable when sufficient to show pertinent information or convey basic system concepts. Quantity of concept drawings

are to be kept to the minimum number required to convey basic systems information. Some mechanical information required in the Concept submission may logically be included on other discipline drawings or in sketch form in the design analyses and need not be duplicated on formal drawings.

e. When the plumbing design involves systems or components which are of an ordinary nature, e.g., simple residential, administrative, etc. the concept submittal can be simplified when approved by Afghanistan Engineer District (AED).

11.3.2 Concept Design Analysis. The following specific items shall be included, as applicable.

a. A list of criteria furnished by AED, codes, documents, and design conditions used; references to any authorized waiver of criteria and codes.

b. Tentative calculations and sizing of domestic hot and cold water, sanitary, roof drainage, compressed air, vacuum, fuel gas, water treatment, and special gas systems.

c. Description, approximate capacity, and location of all miscellaneous equipment such as air compressors, vacuum pumps, water treatment softeners, water heaters, fuel gas storage tanks, etc., to be installed in the project.

d. Hot water and fuel gas demand analysis, including hourly heating capacity, hourly requirements, and storage capacity.

11.3.3 Concept Design Drawings. The plans shall be sufficiently complete to show locations and the general arrangement of plumbing fixtures and major plumbing system equipment.

11.4 PRELIMINARY REVIEW SUBMITTAL REQUIREMENTS.

11.4.1 Preliminary Design Analysis. The Preliminary design analysis shall include all items in the Concept design analysis and any necessary revisions. In addition, the following specific items shall be included when applicable.

a. Detailed calculations for sizing equipment, piping, water treatment systems, etc. for each plumbing system involved in the design.

b. Data showing the capacity of hot and domestic potable water circulating or booster pumps (where required).

c. Any other information or computations required to permit verification that the design complies with the design

criteria, codes, and standards and is satisfactory for the intended purpose.

d. Catalog Cuts. As a minimum catalog cuts for all major items of equipment shall be submitted. Catalog cuts shall be a part of the design analysis.

11.4.2 Preliminary Design Drawings. The plans shall include, but not be limited to the following:

a. Enlarged partial plans and riser diagrams of typical toilet rooms including hot water, cold water, waste, and vent piping.

b. Locations and arrangement of all plumbing fixtures and equipment.

c. Layout of domestic water, sewer, roof drainage, and all other piping systems used in the building, including sections and details, especially of congested areas, etc.

d. Flow diagrams of compressed air systems including all equipment such as air compressors, accessories, pipe, tubing, and control valve actuators or any other equipment to which air is supplied.

e. Since equipment rooms represent the most congested areas for both equipment and piping. The drawings shall represent by enlarged partial plans, sections, and details that sufficient removal, maintenance, replacement, and installation space has been provided.

f. Vertical control for horizontal runs of piping, etc. shall be clearly delineated on the drawings. The drawings, by sections, elevations, or notes, shall show vertical control of piping. The design shall ensure sufficient vertical clear height has been provided.

11.4.3 Equipment Schedules. The final form of all equipment schedules which will be included in the project shall be shown with Preliminary equipment data filled in.

11.5 FINAL REVIEW SUBMITTAL REQUIREMENTS.

11.5.1 Final Design Analysis. The design analysis shall include all of the information required in the Preliminary submittal but in its final form, any additional information required, and also the information listed below when applicable.

a. All textbooks, handbooks, and other references used in the design analysis shall be cited, giving page and paragraph numbers from which data is obtained.

b. The basis of sizing water treatment system shall be presented.

c. Pump lpm, TDH, and horsepower calculations shall be shown for potable drinking water, and hot water re-circulating pumps. The friction losses in the water circuits and pipe sizing shall be tabulated for proper review.

d. The method of sizing hot water heaters, etc. shall be shown.

e. Equipment sizing calculations to support the selection of all equipment shall be shown in the design analysis.

f. Explanatory notes shall be included in the design analysis covering all rationale for design which would not be obvious to an engineer reviewing the analysis. The A-E shall review the prepared plans and specifications and determine that they are in accordance with this manual and all other criteria and instructions furnished by AED. It will be the responsibility of the designer to coordinate the plumbing systems with the other trades involved in the building design and to eliminate interference between plumbing equipment and other components of the building.

11.5.2 Final Design Drawings. Flow diagrams, riser diagrams, and plans containing all the necessary details to attract accurate and competitive bids and to afford a clear understanding throughout construction shall be included in the drawings. Plans shall be complete in all respects, showing location of all equipment, piping, and accessories. Sections and details shall be provided as required to clearly show all aspects of the system design. The following specific items shall be included when applicable:

a. Schematic flow and/or riser diagrams of all systems.

b. Equipment room layouts and appropriate sections and details.

c. Pipe sizes.

d. Vertical control for horizontal runs of piping, etc. shall be clearly delineated on the drawings. The drawings, sections, elevations, or notes, shall show vertical control of piping and ductwork. The design shall ensure sufficient clear vertical height has been provided.

e. Equipment to be furnished and installed by others.

f. Equipment schedules giving capacities, working temperatures and pressures, and other pertinent data necessary to give a clear and concise description of all equipment.

11.5.3 Catalog Cuts. Complete catalog cuts and data sheets shall be submitted for all major items of equipment. Catalog cuts shall be a part of the design analysis.

11.6 READY TO ADVERTISE (RTA). The comments generated during the Final design review shall be incorporated in the documents before they are submitted as RTA.

11.7 TECHNICAL REQUIREMENTS.

11.7.1 Packaged Equipment. Packaged equipment shall be used to the greatest extent possible to simplify specifying, purchasing, installation, and maintenance of equipment.

11.7.2 Existing Services. The location, elevation, etc..., of all existing sewers, water mains, and other necessary services will be verified to ascertain that such services are adequate and that connection thereto is permissible. If the water supply pressure obtained from the water main is inadequate, a house tank or hydro pneumatic system shall be provided. In the event that sanitary sewer or water services are not available or connections thereto are prohibited, an individual sewage disposal or water system shall be installed to adequately serve the building. Water flow tests on public hydrants shall be made to ascertain the adequacy of the fire protection water supply based on the water supply system.

11.7.3 Soil Surveys, to determine the electrical resistivity and percolation characteristics of the soil and ground water information along the alinements of all proposed buried piping systems, shall be conducted.

11.7.4 Sanitary and Roof Drainage Systems.

11.7.4.1 Storm and Sanitary Sewers. Requirements for storm drainage outside buildings are included in Civil portion of this document. Roof and area drains shall be piped to storm drains wherever available. In no case shall drainage be directed to adjacent property without approval of AED. Interior downspouts from roof drains shall be entirely separated from the sanitary system inside of the building, even though they may connect to a combined city sewer.

11.7.4.2 Lift Stations and Backwater Valves. Special consideration should be given to insure against the possibility of sewage and water backup. See UFC 3-420-01 for guidance.

11.7.4.3 Roof Drains. Design of roof drains shall be on the basis of one-hour rainfall and 25-year records (if available). It shall also be in accordance with the recommendations of the National Standard Plumbing Code. The extent of any water retention on the roof shall be coordinated with the structural engineer.

11.7.4.4 Compactor Area Drains. An area drain shall be provided in trash compactor areas.

11.7.4.5 Floor Drains. Floor drains shall be provided in all boiler and mechanical equipment rooms and adjacent to each emergency deluge shower in addition to all areas listed as requiring floor drains in UFC 3-420-01. Provide at least one floor drain with trap in each room with a water source, e.g., in kitchens, toilets, and tea rooms. Where fire pumps are installed having conventional packing glands, floor drains with dedicated gland leak-off piping shall also be provided.

11.7.4.6 Grease Interceptors shall be installed outside of buildings in accordance with UFC 3-420-01.

11.7.4.7 Garbage Can Washing Facilities, including hot water booster heater shall be provided on the kitchen loading platform or in other suitable space adjacent to the kitchen service doors.

11.7.5 Water Supply System. For guidance additional to the paragraphs below, refer to Chapter 18: WATER, WASTEWATER, AND SOLID WASTE SYSTEMS.

11.7.5.1 Water Treatment. The A-E shall provide recommendations as to the chemical treatment system required for the following special facilities. The systems recommended shall be based upon an evaluation of the existing site water quality analysis.

a. Laundry softening is required where the water supply has a total hardness of 86 ppm or more, in accordance with TM 5-842-1.

b. Dishwashing for Mess Halls. Softening is required where the water supply has a total hardness of 86 ppm or more, in accordance with UFC 3-230-08A.

c. Hospitals. Softening is required where the water supply has a total hardness of 171 ppm or more, in accordance with UFC 4-510-01.

d. Aircraft/Vehicle Wash Facilities.

e. Humidifiers.

11.7.5.2 Water Usage. In all locations, the minimum acceptable level of water usage shall be maintained. Consideration should be given to methods that will preserve fresh water supplies, and minimum water treatment.

11.7.5.3 Dual Distribution Network. Where dual site water distribution networks exist and are approved for use within buildings, i.e., one raw or hard water main and one treated or soft water main, two separate cold water piping systems shall be installed as follows.

a. All facilities. Hard water shall be supplied to water closets and urinals.

b. Public facilities. Hard potable water shall be supplied to sinks and lavatories; soft water shall be supplied to drinking fountains and hot water heaters.

c. Living quarters (private or hotels). Soft water shall be supplied to both cold water faucets and hot water heaters.

11.7.5.4 Metering. In general, provide separate metering for each building on site, including single family housing units, except for small structures such as guard houses, sheds, etc.

11.7.5.5 Backflow Prevention. The water distribution system shall be protected against the flow of water or other liquids into the distributing pipes from any source or sources other than their intended flow. Refer to the International Plumbing Code for requirements on all systems.

11.7.5.6 Pressure Reducing Valves. Where excessive water pressures (above 448 KPa) are encountered, pressure reducing valves shall be installed to protect plumbing units or equipment which are inadequate to withstand such pressures. The valves shall be installed either on the building service line or on individual lines to the various units, whichever is more economically feasible.

11.7.5.7 Potable Water Outlets.

a. Water coolers (Drinking Water Dispensers) in work areas should be located out of the way of possible traffic aisles whenever possible. However, if located in the flow of traffic, they shall be provided with safety guard rails to protect user and fountain where shop type vehicles are used. Provide cold drinking water stations in the following locations:

- (1) Near toilet rooms.

(2) In lunchrooms.

(3) In accordance with UFC 3-420-01.

b. Water shall be chilled by standard packaged, self-contained water coolers (electric water coolers) with hot water heating capability as authorized. See UFC 3-420-01 for drinking water consumption requirements.

c. Vending machine areas. Valved and capped potable cold water outlets shall be provided for vending machines at convenient locations in vending areas. Hot water for hot drinks may be incorporated with water coolers as authorized by AED.

11.7.5.8 Domestic Hot Water.

a. Shower system capacity. (See UFC 3-420-01.) In the design of any buildings in which water closets and showers are installed, the designer shall exercise the necessary precautions to prevent personnel from being scalded while taking showers due to simultaneous operations of water closets equipped with flush valves. The final temperature for hot water supplied for showers shall not exceed 43°C. It is suggested that consideration be given to the correction of this condition by the methods listed hereinafter:

(1) Water supply line design. The water supply lines shall be designed to provide an adequate flow of water without excessive pressure drops.

(2) Separate water lines. Separate water supply lines shall be provided for the showers, so that a sudden demand on the water supply such as would be caused by the simultaneous flushing of flush valve equipped closets, will not affect the flow to the showers.

(3) Valves for showers. The showers shall be equipped with pressure-balancing mixing valves.

(4) "Mixed Water Temperature Control", in accordance with International Plumbing Code.

b. Water heaters.

(1) Wherever commercial or industrial size domestic hot water heaters (as opposed to residential size) are supplied from a hard water line, a water softener shall be installed in the

cold water line to the heater. All water softeners in individual buildings shall be of the automatic duplex type, so that there is no interruption of the soft water supply during backwash.

(2) The energy source for water heaters shall be electric. Other sources may be as indicated in UFC 3-420-01 and as determined by availability and economic considerations. Electric water heaters serving individual toilet rooms may be economically justified when toilet rooms are spaced far apart requiring long runs of piping or where venting is a problem. Where more than a 2,000-watt capacity is required, dual heater elements shall be specified to reduce instantaneous power demands.

(3) Check valves will not be placed on cold water inlet of water heaters.

c. Selection of piping materials and storage tanks. The selection of pipe, valves, fittings, materials and tanks will be in accordance with the quality of the water as classified in UFC 3-420-01. Material selection must be coordinated with the project specifications.

d. Domestic hot water temperatures shall be in accordance with UFC 3-420-01.

11.7.5.9 Hose Faucets (bibbs) and Lawn Faucets. All hose bibbs and lawn faucets shall be furnished with 15 mm water supply and standard hose type connections.

a. Exterior. Where buildings are located in grassed areas, lawn faucets shall be located so that watering may be accomplished using not more than 30 meters of hose and so that sprinkling can be accomplished without extending the hose over main walks and driving areas. A hose bibb with vacuum breaker shall be mounted adjacent to the cooling tower sump. A shutoff valve and drain shall be included in all areas if subject to freezing conditions.

b. Interior. Hose bibbs shall be provided at interior locations as follows and in other locations where required.

(1) At least one cold water hose bibb in mechanical equipment rooms housing central heating and refrigeration equipment.

(2) At least one cold water hose bibb at trash compactor areas.

(3) At least one hot water hose bibb at garbage storage locations.

(4) A cold water hose bibb in battery room for wash down of spills and leaks.

c. Vehicle maintenance facilities. Hose bibbs shall be provided in the following areas:

(1) At least one hose bibb for cold water service in the repair and lube area.

(2) At least one hose bibb at each gasoline servicing island. Provide a frostproof type hydrant where the winter design temperature is -1°C . or below.

(3) One hose bibb in each wash bay.

(4) An unthreaded hot water faucet three (3) feet above floor in the wash bay.

11.7.5.10 Emergency Deluge Showers and Eyewash Fountains. A deluge shower and combination eye-face wash fountain shall be provided in the following areas:

a. Any area where acid is handled, such as battery rooms.

b. The general vicinity of chemical water treatment feeders in the mechanical equipment rooms, or as required by the nature of the chemicals being handled, the form of the chemical (powder, liquid, etc.), and the type of feed equipment.

11.7.6 Piping System.

11.7.6.1 General. Piping materials and sizes shall comply with the recommendations in the International Plumbing Code and the applicable Guide Specifications. Flow velocities in water pipe shall not exceed 2.4 meters per second. All piping shall be sloped to permit complete drainage and must be properly supported with allowances for expansion and contraction. Piping systems shall contain sufficient isolation valves to allow segregation of the system for maintenance, draining, and/or testing. Piping systems, which may be extended by another contractor or at some future date, shall be terminated with blind-flanged valved connections. Expansion loops or expansion joints and anchor points shall be shown on plumbing drawings. Water supply piping shall not be buried under concrete floors except in special

instances where other methods of installation are impracticable. See UFC 3-420-01 for further guidance.

11.7.6.2 Concealment of Piping. All piping with the exception of individual fixture runouts shall be completely concealed in finish spaces such as offices, toilet rooms, housing units, etc. In other spaces, overhead lines shall be concealed whenever dropped ceilings are provided unless construction interferences prevail. Vertical stacks and risers in workshop spaces shall be concealed or properly protected from damage by trucks.

11.7.6.3 Pipe Supports. Exposed interior pipe supports shall be coordinated with pipe supports used for process piping, heating systems, and cooling system piping, and will be identical throughout each individual facility.

11.7.6.4 Interferences. All work shall be installed so as not to interfere with lighting and other equipment and to provide necessary clearances where truck lifts operate.

11.7.6.5 Color Coding. Plumbing and piping in building will be identified in accordance with the applicable portion of the American National Standard Institute (ANSI) A13.1. Compressed gas cylinders and piping will be coded in accordance with applicable commercial standards.

11.7.7 Plumbing Fixtures. The number of plumbing fixtures allowed for various types of facilities and hospitals shall be as listed in AEI Design Criteria.

11.7.7.1 Faucets and Shower Heads in all facilities shall be provided with flow limiting devices for water conservation. Maximum allowable flow shall be 7.5 to 9.5 lpm for faucets and 11 to 13 lpm for shower heads. In addition, lavatories for the following areas shall be provided with self-closing type faucets with adjustable closing time (generally from 2 to 15 seconds): public buildings, barracks, gymnasiums, offices, motels, auditoriums, mess halls (except kitchens), clubs, schools, and swimming pools.

11.7.7.2 Floor Receptors and Service Sinks. Provide a floor-mounted receptor with 80 mm drain and removable strainer plate in each janitor's closet and battery room. A service sink shall be installed in areas where there is insufficient space for a floor receptor. Receptors shall be cast or molded stone, or enameled cast iron, with rim guard, approximately 700 mm by 700mm with wall-mounted service sink faucet.

11.7.7.3 Utility or Engineers' Sinks. Utility or engineers' sinks shall be provided in main mechanical equipment rooms, general repair shop, paint shops, and elsewhere as required.

11.7.7.4 Fixture Materials. Fixtures shall be of the materials listed hereinafter:

a. Bathtubs. Porcelain enameled cast iron or steel, acid resisting.

b. Floor drains. Cast iron.

c. Grease traps. Usually reinforced concrete or cast iron; vitrified clay in laboratories.

d. Laundry trays. Reinforced fiberglass or porcelain enameled cast iron.

e. Lavatories. Porcelain enameled cast iron, acid resisting. Lavatories in dormitories shall be provided with carriers, except for those lavatories which are installed on masonry chase type or solid masonry walls.

f. Medical plumbing equipment. See UFC 4-510-01.

g. Sinks. Kitchen, stainless steel; scullery, stainless steel; and service, porcelain enameled cast iron, acid resisting.

h. Urinals. Vitreous china. Modesty shields shall be provided to isolate urinals except when they are provided with integral extended shields.

i. Water closets. Vitreous china. Both Eastern and Western style closets may be required. Eastern Water closet shall be specified enameled cast iron.

j. Ablution Faucets: Each water closet shall be provided with abluion faucet (wash hose) unless otherwise directed. Ablution faucet shall be installed on the right side of the water closet. The nozzle for the faucets shall be suitable for the type of water closet used (Eastern or Western type).

11.7.8 Pipe Protection.

11.7.8.1 Pipe Sleeves. Pipes passing under or through wall shall be protected from breakage. Any plumbing pipe passing under a footing or through a foundation wall shall be provided with a relieving arch; or there shall be built into the masonry wall an iron pipe sleeve two pipe sizes greater than the pipe passing through; or equivalent protection shall be provided as may be approved by AED.

11.7.8.2 Corrosion. Pipe subject to corrosion passing through or under corrosive fill such as cinders, concrete, or other corrosive material, shall be protected against external corrosion by protective coating, wrapping, or other means which will resist such corrosion. Piping made of inherently noncorrosive material will be used to the greatest extent possible. Dielectric unions shall be used where dissimilar metals are used in the same piping system.

a. Corrosion Protection for Piping Materials at Building Service Entrances.

(1) Below ground Cast Iron and Ductile Iron Pipe.

All pipe joints, fittings, valves, etc., are to be electrically bonded. This bonding is to provide electrical continuity to disconnect differential corrosion from electrically isolated piping elements; to provide the ability to test the buried pipe and to facilitate installation of sacrificial anodes if needed. After installation and before insulating and backfilling, all pipe, fittings, valve bodies, etc., are to be coal-tar epoxy coated and checked with a holiday tester. Insulation and insulation protection shall be applied as required. Prior to backfill, all piping shall be encased in polyethylene.

(2) Below grade Steel Pipe. In addition to the above corrosion treatment, the steel pipe shall be cathodically protected and also bonded to the grounding network inside the building.

11.7.9 Seismic Design. Design for the plumbing systems shall conform to the requirements of TM 5-809-10. Seismic zone determinations shall be in accordance with the GEOTECHNICAL section, of this manual.

11.7.10 Noise Control. All noise control design work shall be in accordance with TM 5-805-4.

11.7.11 Testing and Inspection. A/E shall specify that all new, altered, extended, or replaced plumbing shall be left uncovered and unconcealed until it has been tested and approved. Testing of each piping system shall be performed. All equipment, materials, and labor required for testing a plumbing system shall be furnished by the installing contractor. Potable water systems shall be disinfected.

11.7.12 Compressed Air and Vacuum Systems. Design for Compressed Air and Vacuum systems shall be in accordance with TM 5-810-4. NAVFAC DM-3.5 shall be used for design for Compressed Air Pressure above 1034 KPag.

11.7.13 Fuel Gas Piping: Design for fuel gas piping systems shall be in accordance with the recommendations of TM 5-810-6.

11.7.13.1 Fuel gas heating valves shall be as required by the International Fuel Gas Code otherwise approved.

11.7.14 Equipment and Fixture Schedules. The following equipment and fixture schedules shall be provided on the mechanical plumbing schedule drawings. Each schedule shall neatly provide sufficient space to include all applicable information required. The applicable equipment and fixture schedules shall be submitted, as hereinbefore described, on the preliminary and final drawings.

PLUMBING FIXTURE SCHEDULE

Plan	PIPE CONNECTION SIZE, millimeters.					
Code	Description	CW	HW	WASTE	VENT	
P-1	Water Closet (Western)	25	--	100	50	
P-2	Urinal	20	--	50	40	
P-3	Bathtub	15	15	40	40	
P-4	Lavatory	15	15	40	40	
P-6	Service Sink	15	15	80	40	
P-11	Shower	15	15	50	40	
##	P-12	Drinking Fountain	15	--	32	40

NOTE:

The above schedule is intended as a guide only. Additions or deletions will be made to suit specific requirements. Each schedule will show designations or P numbers in **consecutive** numerical order, using the same designations on the plans as appear in the schedule and in the specifications. If more than one type of each fixture is required, such types shall be designated by alpha-numeric designations as shown. Where more than one type of building is to be covered

in a specification, each building shall carry the same designation or P number for identical fixtures.

Do not confuse this fixture with mechanically refrigerated water cooler.

WATER HEATER SCHEDULE

Equipment No.:

Location:

Building

Room

Unit Type:

Heating Capacity:

Total, kw

Recovery:

Rate, lph at _____ °C temperature rise

Storage Capacity - minimum, liters

Electrical Requirements:

Number of Elements, each

Capacity per Element, kw

Electrical Characteristics; volts, phase, hertz

Remarks:

HOT WATER STORAGE TANK SCHEDULE

Equipment No.:

Location:

Building

Room

Storage Capacity: minimum, liters

Dimensions:

Length, cm

Diameter, cm

Remarks:

WATER COOLER SCHEDULE

Equipment No.:

Location:

Building _____

Room _____

Recovery

lph @ 10°C Supply

lph @ 82°C Supply

Ambient Air Temperature

Degrees C.

Inlet Water Temperature

Degrees C.

PUMP SCHEDULE

Equipment No.:

Location:

Building _____

Room _____

Service: (Chilled potable water, hot water, etc.)

(operating, standby, etc.)

Unit Type: (Centrifugal, etc.)

Pump Data:

Flow Rate, lpm

Head, meter

Efficiency (Percent)

Pump Motor Data; horsepower, rpm volts, phase, hertz

Remarks:

AIR COMPRESSOR SCHEDULE

Equipment No.:

Location:

Building _____

Room _____

Capacity:

volume, scmh (acmh)

Pressure, KPa

Type: (reciprocating, oil free, liquid ring, etc.)

Motor Data:

Speed, rpm

Electrical characteristics in horsepower volts, phase, hertz

Refrigerated Air Dryer:

Capacity, scmh (acmh)

Receiver Capacity: liters

Operating Pressure: KPag

Cooling Media: (air, water)

Ambient Condition: Degrees Centigrade

Remarks:

MISCELLANEOUS EQUIPMENT CONNECTION SCHEDULE

Equipment No.:

Location:

Building _____

Room _____

Description: (garbage grinder, ice maker, sterilizer, tumbler,
ironer, etc.)

Pipe Connection Size:

cold water, mm

hot water, mm

waste, mm

vent, mm

compressed air, mm

vacuum, mm

Ductwork Connection Requirements:

vent, mm

flow, cmh

Remarks:

NOTE:

The above schedule shall be used for facilities, such as: mess halls, laundries, hospitals, laboratories which have various items of equipment falling into the F&E category and require various utility connections.

If a composite equipment schedule is provided by the architects it need not be duplicated.

11.8 Abbreviations:

cw	cold water
hw	hot water
°C	Degrees Centigrade
rpm	revolutions per minute
ppm	parts per million
lpm	liters per minute
lph	liters per hour
kw	kilowatt
mm	millimeters
cm	centimeters
m	meters
cmh	cubic meters per hour
scmh	Standard cubic meters per hour
acmh	Actual cubic meters per hour
sq	square
TDH	Total dynamic head
KPa	KiloPascals

* * * * *