PLUMBING
PRACTICES

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CHAPTER 01

INTRODUCTION

DEFINITION

Plumbing may be defined as the art, business or work involved in the design, installation and maintenance of pipes, fixtures, equipment and accessories that convey fluids like water, gas and water carried wastes within a building and around its premises. A plumber is a person engaged in the art and work of plumbing. The word plumber has been derived from the latin word "Plumbum", meaning lead.

HISTORY OF PLUMBING

The Indus valley civilization reveals that in Mohenjodaro and Harappa, well integrated public water supply system and well-planned drainage system were in existence even about 3000 BC. History also reveals that in Athens, Rome there was water carriage drainage system. In Rome city there was a large drain about 1.6 km long known as "Cloaca Maxima" which was designed as a paved and vaulted tunnel to convey the city sewage, wastewater and rainwater into the river Tiber. The drain is still in limited use.

During Roman Civilization; (circa 40 BC) generally lead pipes were used for water supply and waste disposal. Since lead dissolves in water so continuos consumption of lead contaminated water resulted in sickness and death. The Indus civilization in Mohenjoder and Harappa was more advanced. At that time copper and iron pipes were commonly used. Plumbers, apart from executing water supply and drainage works also did storm drainage works and installed flue pipes, for removing the gases from kitchen and fire places.

In the mid-14th century the developing society and the builders realized the role of plumbers and demanded better quality of work at competitive price. Plumbers also felt about their commitment regarding their jobs. This ultimately led to the formation of a guild of plumbers, known as the "Worshipful company of plumbers" in 1365 AD in England. The company was a trade association of the plumbers, which guarded their professional rights and trade interests. It also provided technical education to the plumbers.

Until the middle of the seventeenth century, pipes made of wood, clay and lead were used. At that time, no high pressure with standing pipe was available. Later with the development of pumps driven by steam, cast iron pipes were developed.

PLUMBING IN BANGLADESH

The history of plumbing in Bangladesh is not known but it can be well presumed that formal plumbing with piped water supply and waste disposal has been practiced during British rule in this region. The presence of some of plumbing items particularly the existence of rainwater down pipe in some century old buildings reveals the fact. The burning example of early plumbing practice is the Court Building in Chittagong, built by the Public Works Department in the year 1803-04. Rectangular shaped cast iron pipes of size $5^{3}/_{8}$ in. x $3^{3}/_{8}$ in. (outer dimension) were installed for rainwater drainage. These pipes still remain attached vividly on the exterior walls and features as an architectural element of the building facade.

Later during Pakistan rule from 1947 to 71, plumbing practice in this region did not improve remarkably but there are evidences of some

orthodox practices of plumbing in some important buildings. Presence of a cast iron fitting called Upright-Wye in the vent pipe system, installed on northern exterior wall of Housing and Settlement office building at Segunbagicha, Dhaka, endorse the fact. Another example of good plumbing practice is in the then Hotel Inter Continental, now named as Hotel Sheraton, in Dhaka.

After the heroic emergence of Bangladesh, the glorious example of plumbing practices is in the "National Assembly Building" at Sher-e-Bangla Nagar, Dhaka where state-of-art plumbing has been practiced. This landmark building has been commissioned in the year 1983 - 84. The history of plumbing afterward was not pleasant though there was a rising trend in development of modern and high-rise building structures. It can be said that there was a declining trend in all spheres of the plumbing field. Professionals ignored the importance of plumbing and refrained from maintaining the quality of work. Manufacturers started producing substandard products with few exceptions. Deterioration deepened so much that till mid nineties there was hardly any trap of standard dimension could be collected from market. Traps with virtually no water seal were used in the plumbing installations. In cast iron pipes the size of bell used to be made smaller. To economize the plumbing system the venting system would be dropped in drainage piping. As a result during that period very few buildings could be found having sanitary drainage system. Presently this situation has improved with the availability of imported uPVC plastic fittings and CI pipe fittings. Plastic piping and fittings are gaining popularity and its use is increasing day by day. People are now more aware of plumbing. More professionals are getting involved in this field. At present plumbing is recognized as the most vital service for a building.

SCOPE OF PLUMBING

It is important to understand the scope of work of a plumbing professional and the type of service he has to provide. Plumbing professionals shall be capable of dealing with all these services and they will advise architects or other concerned professionals regarding the

space, load requirements for equipment, pipe etc. to be used in plumbing works. Plumbing services include the followings.

1. Water supply system related
   i. Cold water supply.
   ii. Hot water supply.
   iii. Chilled water supply.
   iv. Water treatment for building occupants.
   v. Pump selection, installation and maintenance.
   vi. Steam and hot-water boiler selection and related works.
   vii. Fire suppression system.
   viii. Garden hydrant system.
   ix. Fountain, cascade and water fall.
   x. Swimming pool water supply, treatment and conditioning.
   xi. Interior-scape irrigation: Manual and automatic.

2. Waste disposal related.
   i. Plumbing fixture, pipe equipments selection, installation and maintenance.
   ii. Soil, waste and vent piping system.
   iii. Building sewer.
   iv. Basement drainage and pumping.
   v. Sewage pump selection and installation.
   vi. Swimming pool, fountain, water body drainage.
   vii. Wastewater recycling and reuse.

3. Storm water management related.
   i. Rainwater collection, storage, filtration, disinfection, and distribution.
   ii. Storm water drainage.

4. Gas supply related.
   i. Fuel gas supply in building.
   ii. Special gas like oxygen, Nitrous oxide etc. for medical applications.
   iii. Steam piping.

OBJECTIVE OF PLUMBING

Plumbing is installed in a building for providing convenience, comfort and safety as well as sanitation and good environment.

In a building, mostly water and gas is supplied, on the other hand, human excreta, ablutionary and kitchen wastewater are drained off from buildings. The objective of plumbing installations should be such that the system provides quick supply of wholesome, sufficient water, at the same time disposes the waste quickly and sanitarily. Furthermore, it should be kept in mind that the plumbing system shall be safe for the users particularly where high pressure, temperature and electricity is concerned. Plumbing installation should be in such a way that it does not impair the strength of building structures.

As a whole, the plumbing system should be designed in such a away that it should be economical as well as durable. Piping and equipment layout design should be such that these are easily approachable for easy operation and subsequent maintenance.

ACHIEVEMENT OF OBJECTIVES

When a plumbing professional designs the plumbing services, he must always be aware of the objective of the job. To meet the objectives, the design approach should reflect the following achievements.

1. Safety
   - i. Provide safe drinking water.
   - ii. Safe disposal of wastes.
   - iii. Piping and appliances are safely installed.
   - iv. Equipments are fitted with proper safety devices.
   - v. Structural safety has not been impaired by plumbing installation.

2. Sanitation
   - i. Non-polluting system.
   - ii. Waste disposal in public sewer system or in specified disposal area.

3. Good environment
   - i. Non-hazardous to the environment that may be created by improper waste disposal
   - ii. Surroundings free from bad smell.

4. Convenience
   i. Providing appropriate type and good quality, proper sized, fixtures and fittings.
   ii. Installing optimum number of fixtures and fittings.

5. Comfort
   i. Installing fixtures at appropriate position and comfortable heights considering users desire and disability.
   ii. Minimizing noise sound developed in the plumbing system.

6. Economy
   i. Providing optimum sized piping, fittings and equipment.
   ii. Installing fixtures, fittings and appurtenances of economy price.

7. Durability
   i. Providing long lasting pipes, fitting, fixtures and accessories.
   ii. Jointing the fixtures and pipe fittings properly.
   iii. Providing protective measures for all the elements in the plumbing system.
   iv. Testing the plumbing system to check for leakage and defective workmanship.
   v. Checking installation of the equipment for proper functioning before the system is put into operation.

8. Legality
   i. Designing the plumbing system in accordance with local code of practice or by laws.

ROLE OF PLUMBING PRACTITIONERS

In a plumbing job the role of four categories of trader are mainly involved. These are -

i. The plumbing professionals.
ii. The plumbing contractors.
iii. The plumbers.
iv. The manufacturers.

ROLE OF PLUMBING PROFESSIONALS

The Engineer who wishes to for practicing plumbing, studies all aspects of engineering design of water supply, waste disposal and storm drainage system, including the plumbing systems in buildings. This knowledge is applied in designing and installing the plumbing system. Another important aspect is planning for the plumbing services in a building. In this case he must consult with the Architects concerned so that no objection is raised after installation of the plumbing items. Not only the Architects but also the professionals of other building services must be consulted so that no hindrance occurs between the plumbing service elements and other building service elements.