



Main Drainage System Components

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روابط فيديو المحاضرة Lecture Video Links

رابط الاشتراك المباشر بقناة الأكاديمية على اليوتيوب **YouTube Channel MCP Engineering Academy**

https://www.youtube.com/channel/UCai6zpiwL05SgeqQeE0FkDg?sub_confirmation=1

رابط قائمة قسم ال Plumbing باليوتيوب لمشاهدة فديوهات شرح موضوعات الملف

<https://www.youtube.com/watch?v=Y450TWfl-d4&list=PLxlyLdQZwkEPm99zVidOGuJ2XzPGaxOx2>

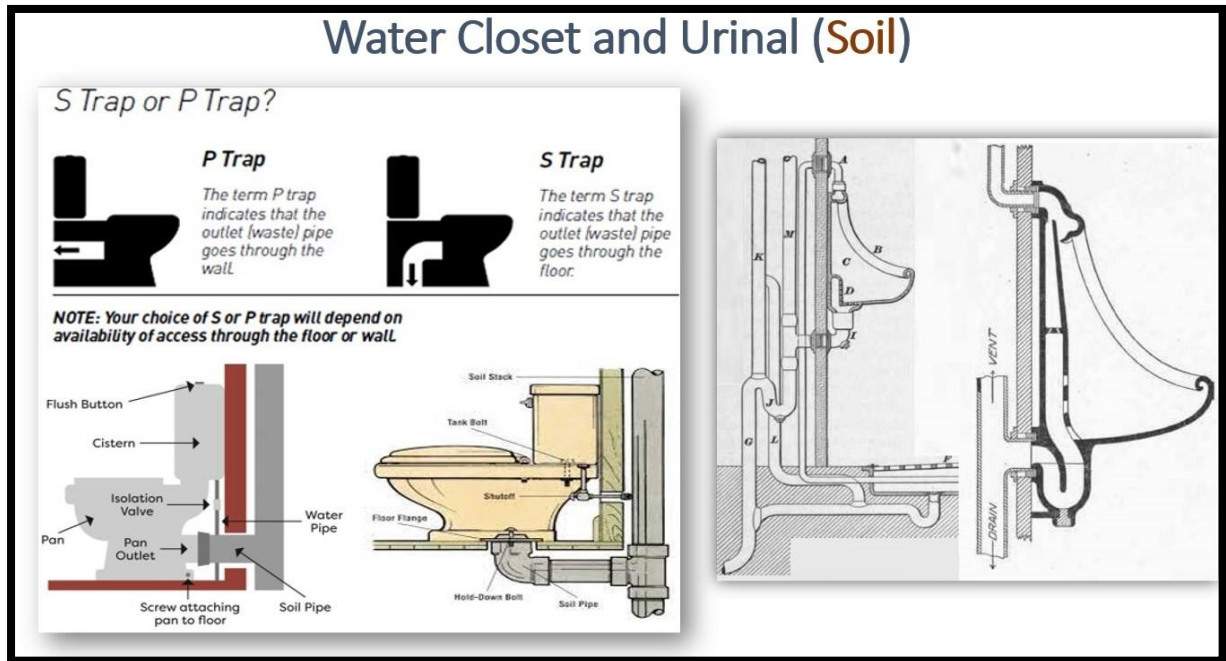
لمشاهدة كاملا موضوعات الملف بالمحاضرة التفاعلية على موقعنا الالكتروني

<https://www.mcp-academy.com/blog/main-drainage-system-type-and-component-and-test-methods>

Plumbing Fixture Type

➤ Soil Water

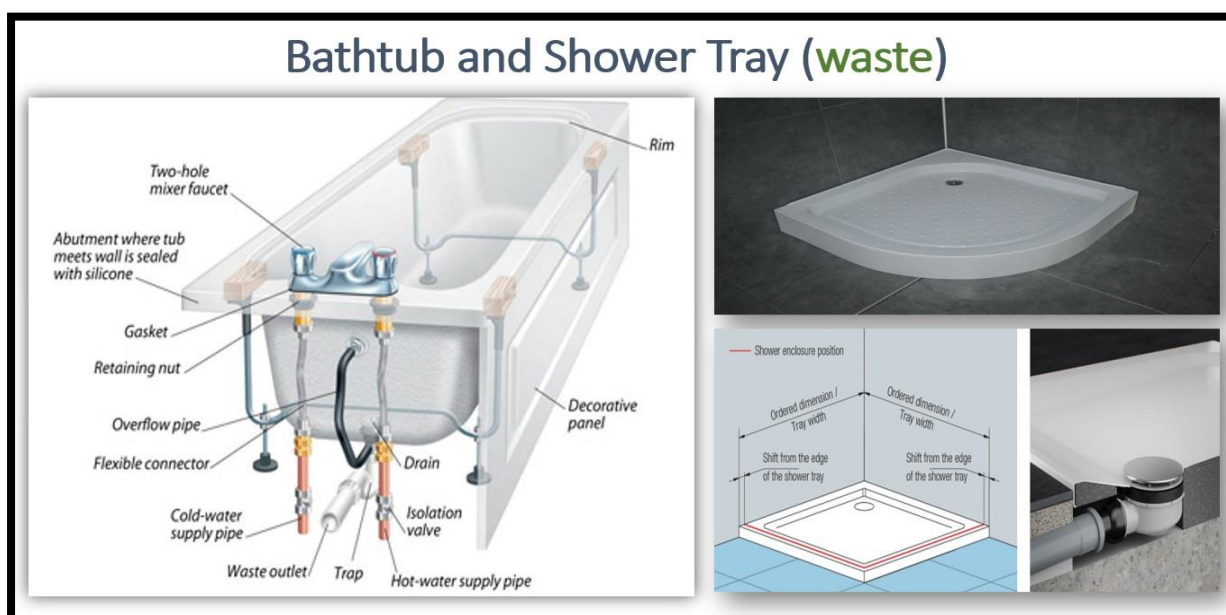
Such as water closet WC, Urinal or bidet (no recycling, direct convey for sewage network)



➤ Waste Water

WASTE. The discharge from any fixture, appliance, area or appurtenance that does not contain fecal matter.

WASTE PIPE. A pipe that conveys only waste.



Wash Basin and Janitor Sink (waste)



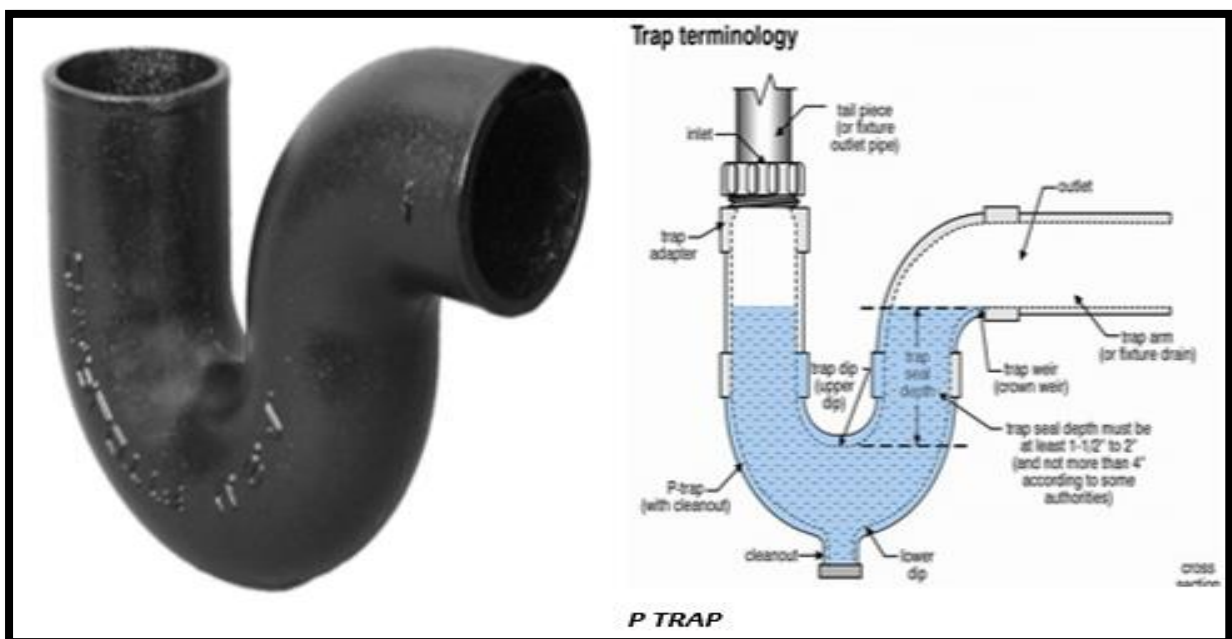
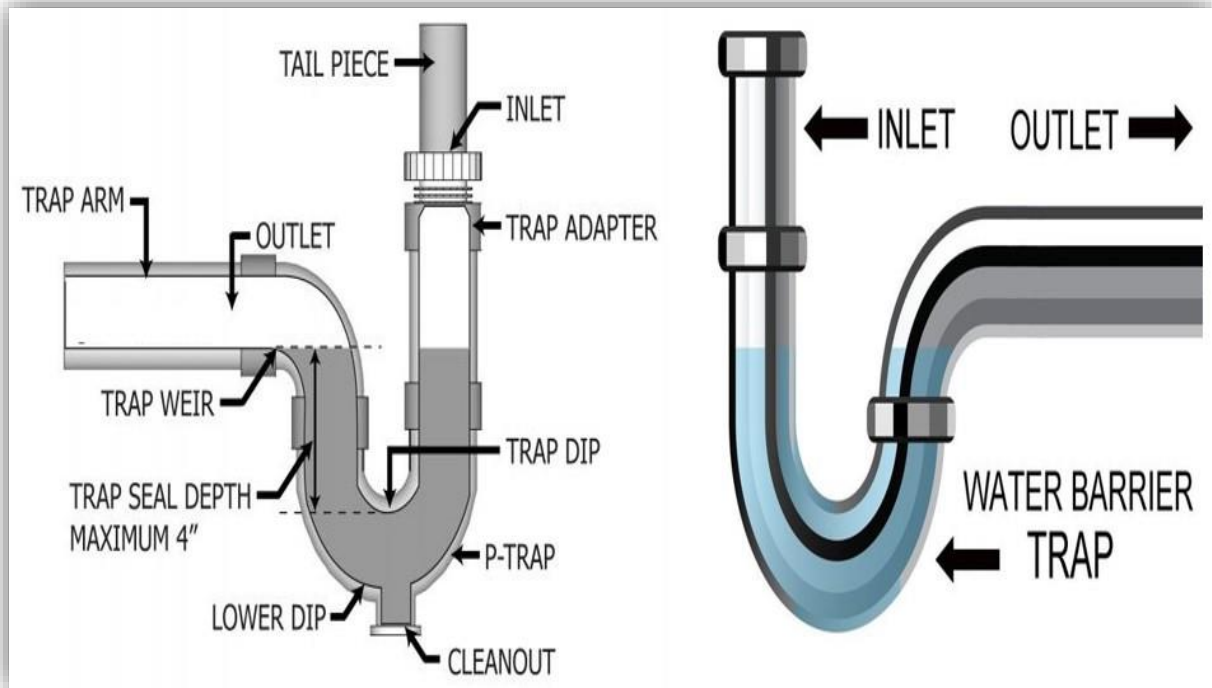
Drainage Trap

In plumbing, a trap is a shaped portion of pipe designed to trap liquid or gas to prevent unwanted flow, most notably sewer gases from entering buildings while allowing waste materials to pass through.

TRAP. A fitting or device that provides a liquid seal to prevent the emission of sewer gases without materially affecting the flow of sewage or wastewater through the trap.

TRAP SEAL. The vertical distance between the weir and the top of the dip of the trap.

International Plumbing Code IPC Trap Definition



Trap Details with trap seal depth and location

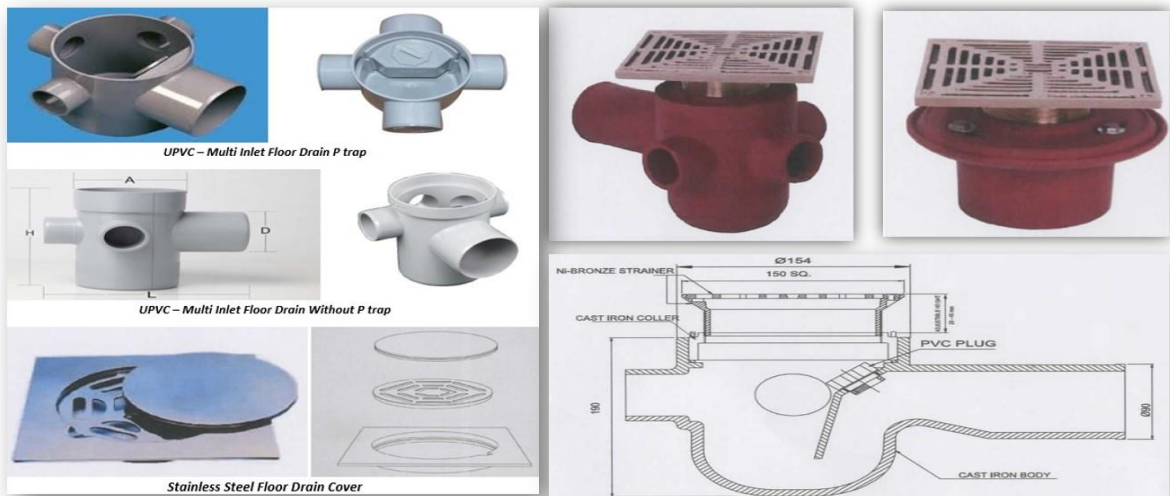
Drainage Receptor

Receptor receives wastes to the sanitary drain system (any liquid with non-fecal matter)

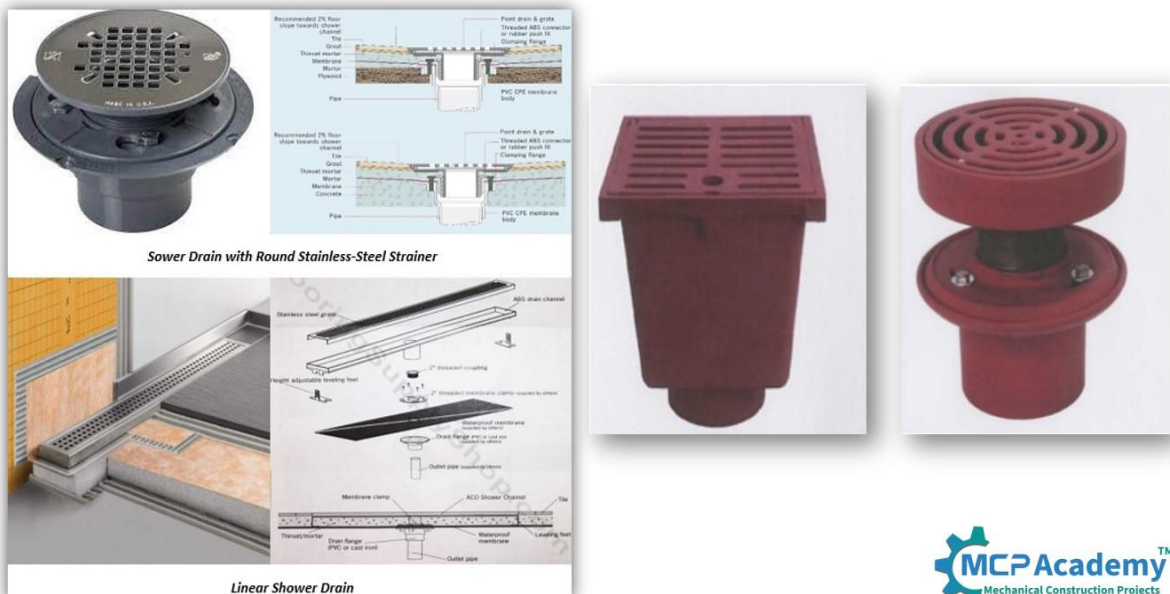
IPC WASTE RECEPTOR DEFINITION

WASTE RECEPTOR. A floor sink, standpipe, hub drain or floor drain that receives the discharge of one or more indirect waste pipes.

Floor Drain



Shower Drain and Area Drain



Channel Drain and Funnel Drain



Receptor Trap as per application

- 1- **Case 1** if receptor collect waste water such as floor drain and (connect with drainage network), trap shall be installed with drain receptor
- 2- **Case 2** if receptor collect rain water such as roof drain (connect with storm network or free discharge by down spot nozzle), trap is not required

Finally, trap is required to install with any fixture or receptor which is direct connection with sewage network



Roof Drain, Floor Drain, Channel Drain and Area Drain (PHOTO FROM SITE)

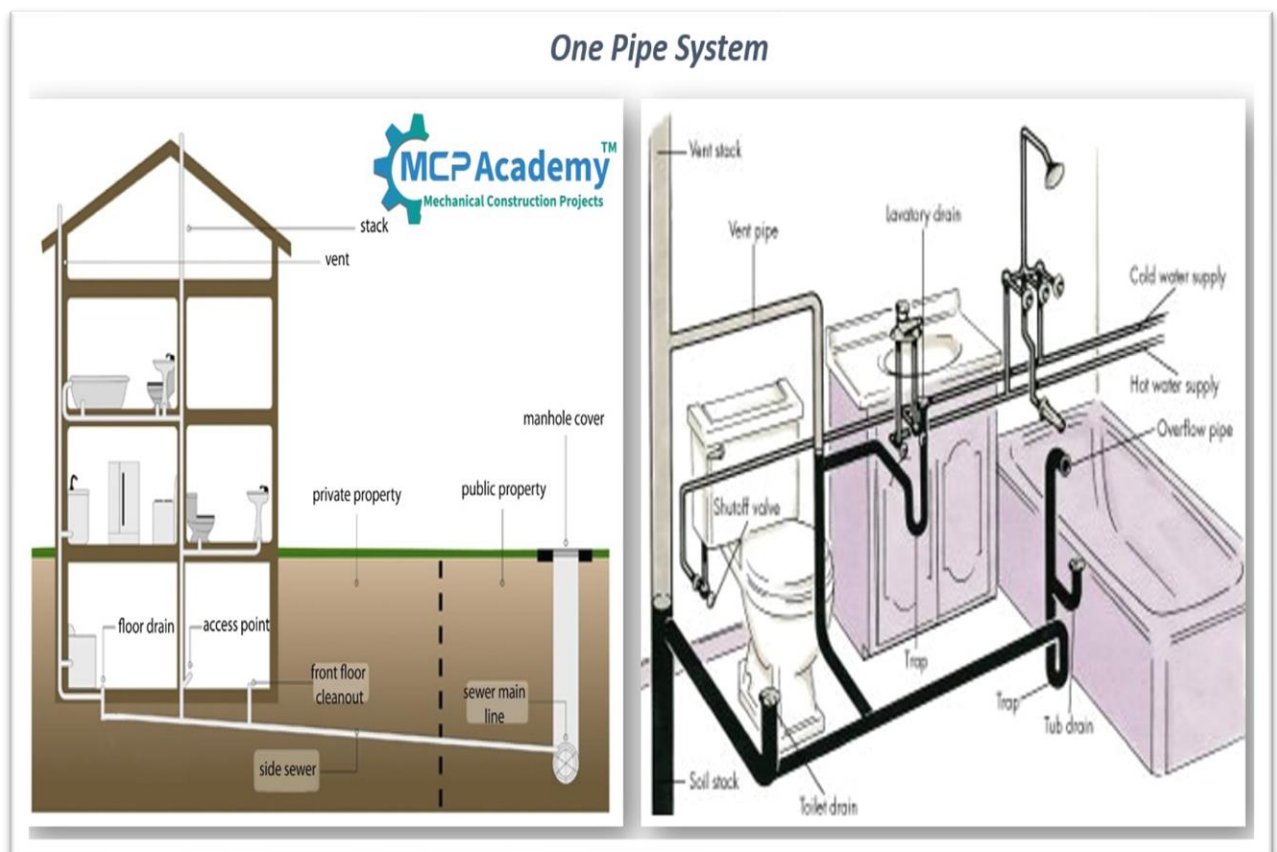
One pipe and two pipe drainage system

One pipe drainage system collects both waste and soil from inside building with one main drainage pipe line.

Two pipe drainage system separate collection using two piping one for waste water collection and other for soil from inside building

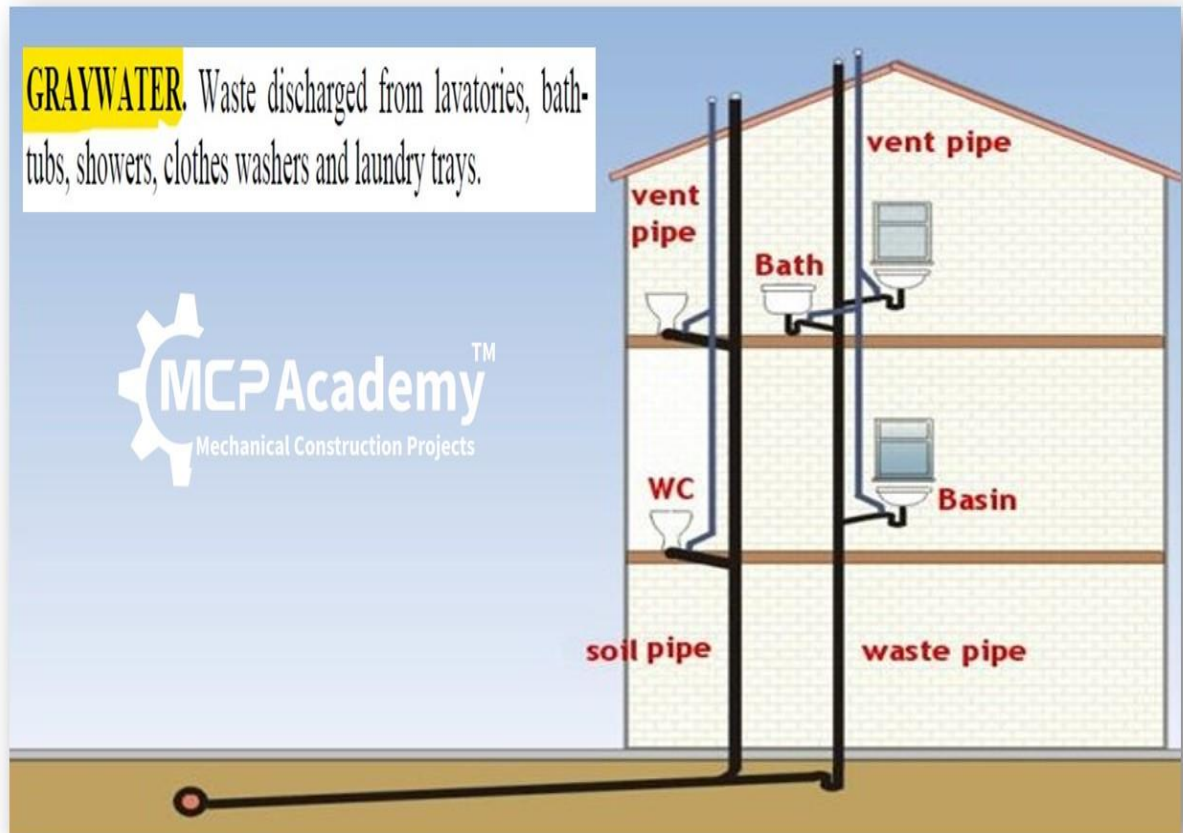
Two pipe system use for application of recycling and sustainability (collecting waste water then recycle to use for irrigation or water closet flush tank).

Two pipe system is Preferred, not mandatory for housing project for system more protection and to prevents entry of bugs and insects from sewer line to waste water pipes (case of trap vaporization)



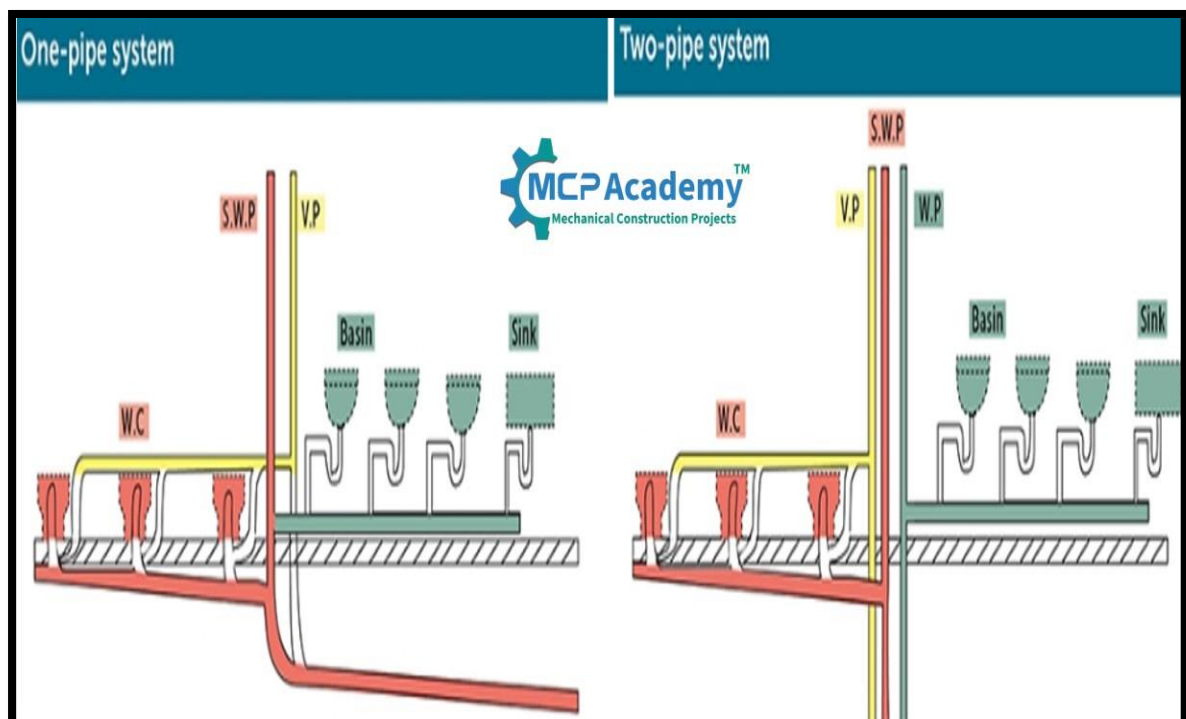
Two Pipe System

GRAYWATER. Waste discharged from lavatories, bath-tubs, showers, clothes washers and laundry trays.



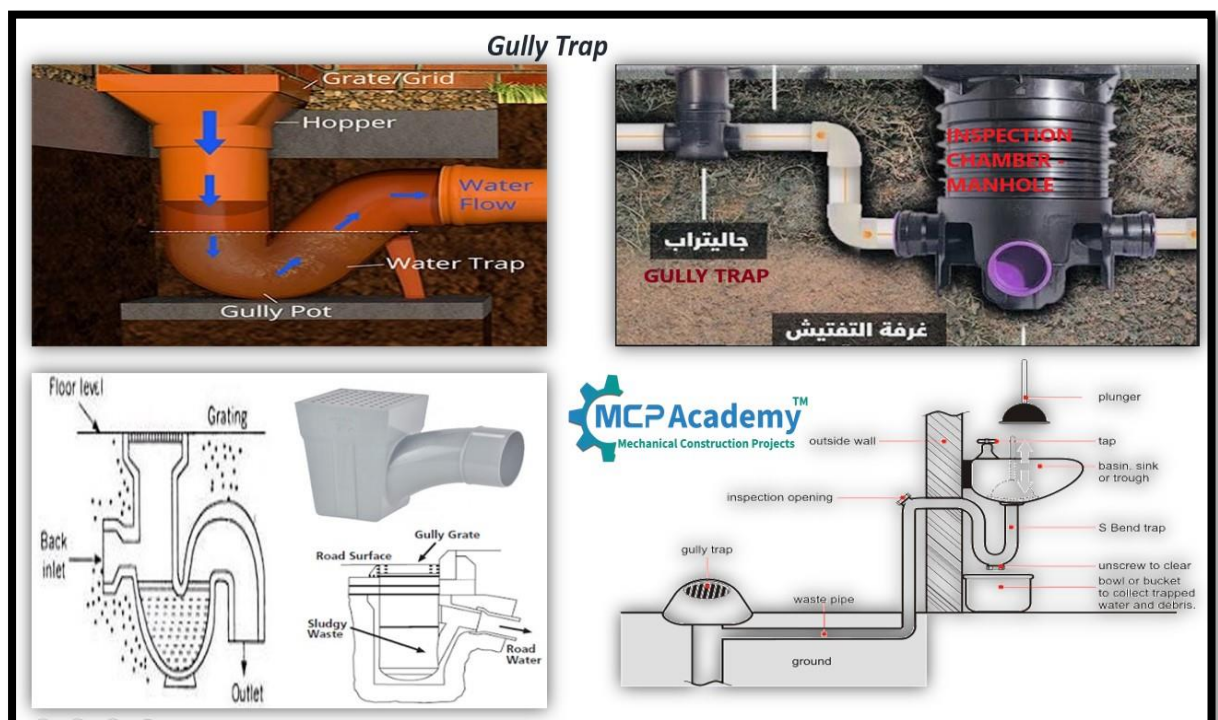
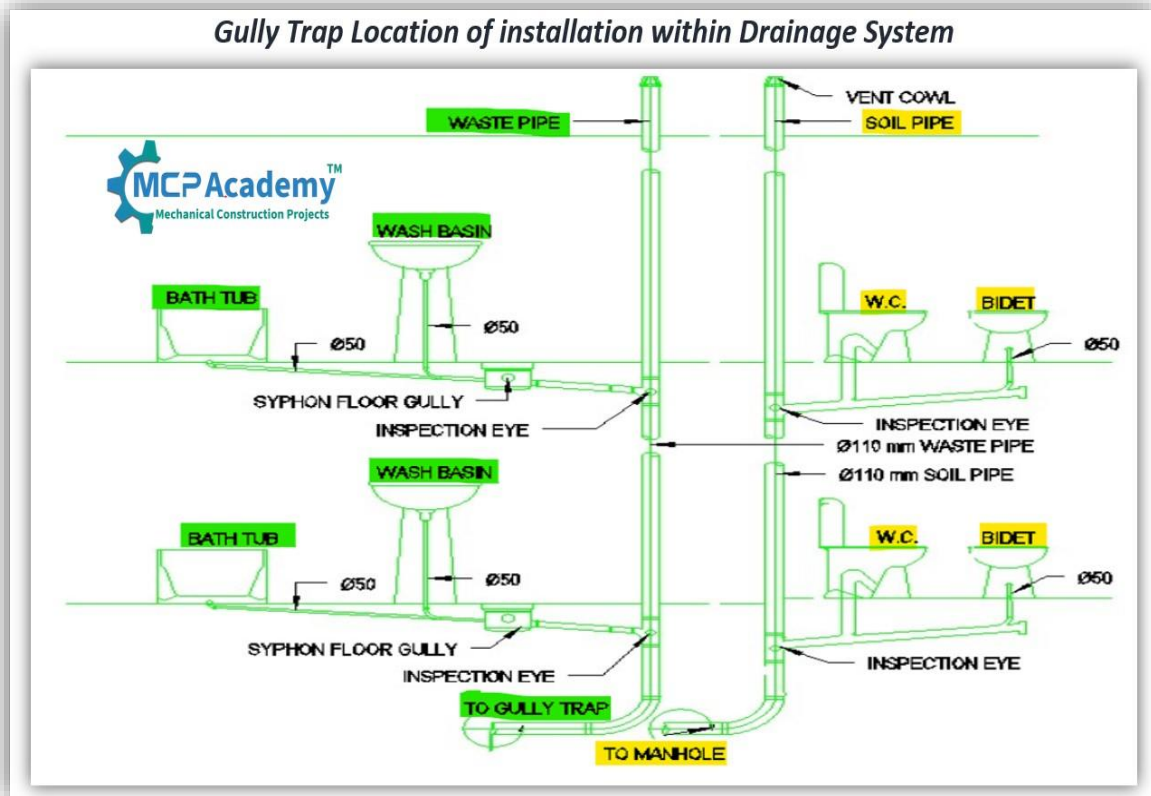
One-pipe system

Two-pipe system



Gully Trap

Gully Trap is provided outside the building before connecting to external sewerage line. It also collects waste water from the kitchen sink, wash basins, baths and wash area, it also prevents entry of bugs and insects from sewer line to waste water pipes.



Clean Out

CLEANOUT. An access opening in the drainage system utilized for the removal of obstructions. Types of cleanouts include a removable plug or cap, and a removable fixture or fixture trap.

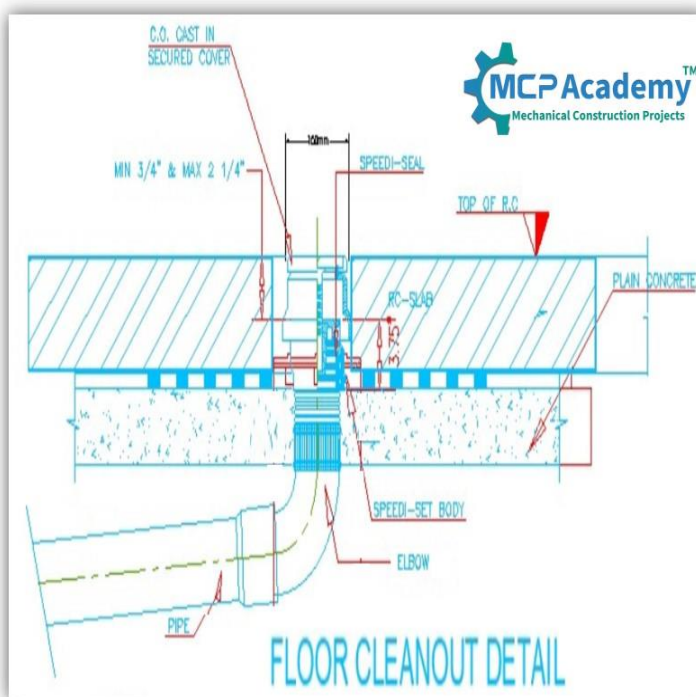
IPC – INTERNATIONAL PLUMBING CODE (CLEAN OUT DEFINITION)

Install at sewage piping for cleaning and maintain

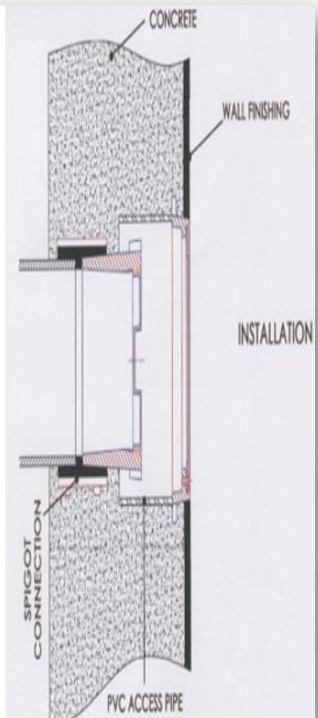
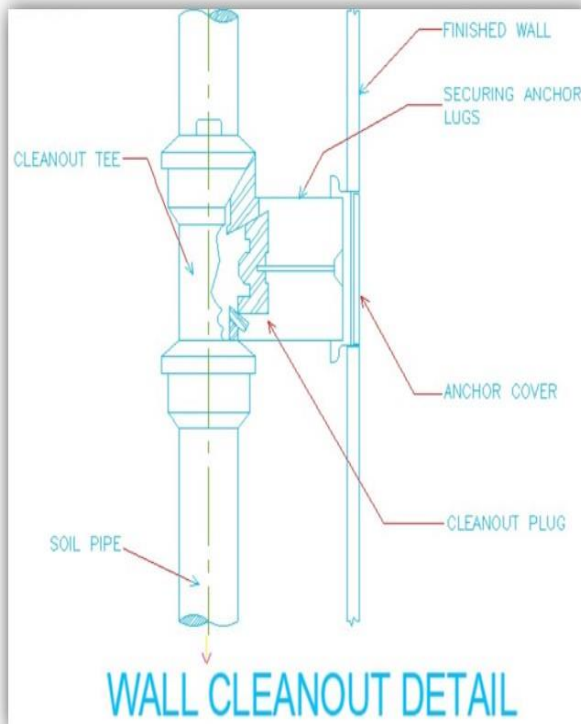
Clean out type as per location of installation

- Floor clean out
- Wall clean out
- Above ceiling clean out
- Clean out inside shaft

Cast Iron Floor Cleanout and Installation Detail



Wall Clean Out



Stainless Steel Wall Clean Out



Above Ceiling and Exposed Cleanout



CO for Vertical piping inside shaft and exposed



➤ **International Plumbing Code Clean Out Requirement**

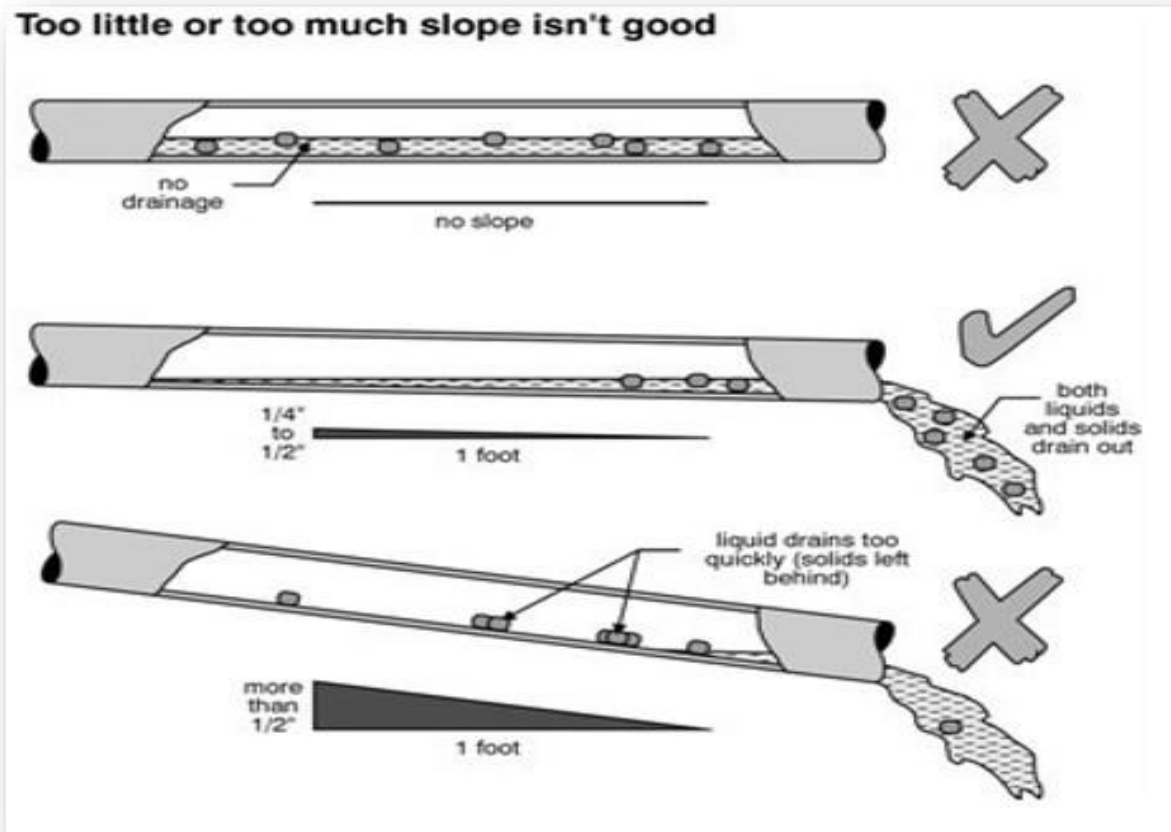
708.1.4 Changes of direction. Where a horizontal drainage pipe, a *building drain* or a *building sewer* has a change of horizontal direction greater than 45 degrees (0.79 rad), a cleanout shall be installed at the change of direction. Where more than one change of horizontal direction greater than 45 degrees (0.79 rad) occurs within 40 feet (12 192 mm) of *developed length* of piping, the cleanout installed for the first change of direction shall serve as the cleanout for all changes in direction within that 40 feet (12 192 mm) of *developed length* of piping.

708.1.5 Cleanout size. Cleanouts shall be the same size as the piping served by the cleanout, except that cleanouts for piping larger than 4 inches (102 mm) need not be larger than 4 inches (102 mm).

708.1.11 Cleanout access. Required cleanouts shall not be installed in concealed locations. For the purposes of this section, concealed locations include, but are not limited to, the inside of plenums, within walls, within floor/ceiling assemblies, below grade and in crawl spaces where the height from the crawl space floor to the nearest obstruc-

Drainage Piping Slope

Important for drainage piping slope



➤ *International Plumbing Code Slope Calculation*

SLOPE. The fall (pitch) of a line of pipe in reference to a horizontal plane. In drainage, the slope is expressed as the fall in units vertical per units horizontal (percent) for a length of pipe.

713.3.2 Slope of horizontal drainage piping. Horizontal drainage piping shall be designed and installed at slopes in accordance with Table 704.1.

SECTION 704 DRAINAGE PIPING INSTALLATION

704.1 Slope of horizontal drainage piping. Horizontal drainage piping shall be installed in uniform alignment at uniform slopes. The slope of a horizontal drainage pipe shall be not less than that indicated in Table 704.1 except that where the drainage piping is upstream of a grease interceptor, the slope of the piping shall be not less than $\frac{1}{4}$ inch per foot (2-percent slope).

**TABLE 704.1
SLOPE OF HORIZONTAL DRAINAGE PIPE**

SIZE (inches)	MINIMUM SLOPE (inch per foot)
2 $\frac{1}{2}$ or less	$\frac{1}{4}$ ^a
3 to 6	$\frac{1}{8}$ ^a
8 or larger	$\frac{1}{16}$ ^a

For SI: 1 inch = 25.4 mm, 1 inch per foot = 83.33 mm/m.

a. Slopes for piping draining to a grease interceptor shall comply with Section 704.1.

- *Drainage Piping Slope Percent as per Saudi Building Code SBC 701 – Plumbing*

CHAPTER 7 SANITARY DRAINAGE

Horizontal drainage piping shall be installed in uniform alignment at uniform slopes. The slope of a horizontal drainage pipe shall be not less than that indicated in Table 704.1.

**TABLE 704.1 Slope of Horizontal
Drainage Pipe**

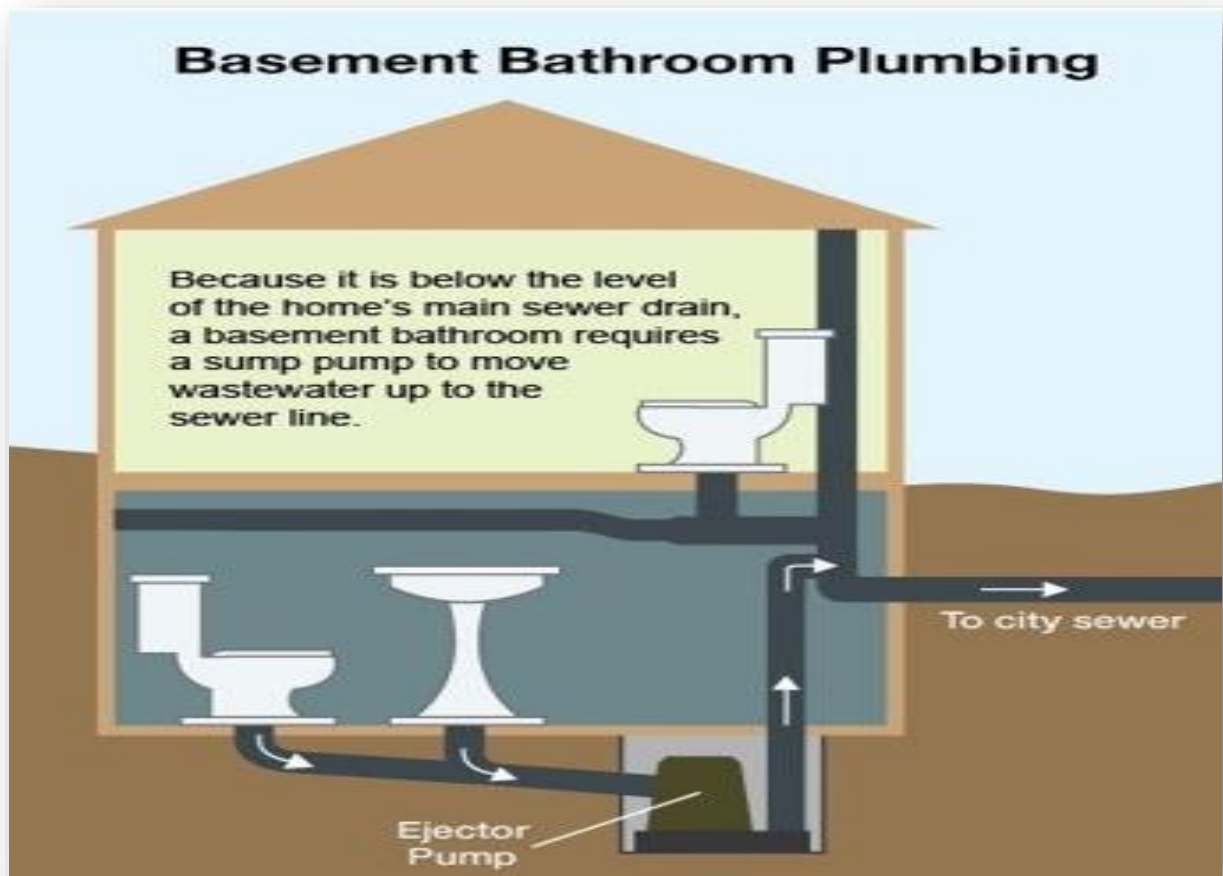
SIZE (mm)	MINIMUM SLOPE (%)
65 or less	2
80 to 150	1
200 or larger	0.5

Sump Pit and Submersible Pump

Sump Pit is a basin at the lowest part of the basement, placed deep enough to allow the drainage pipe to fully evacuate all of the collected water.

Most of use at core elevator shaft, underground pump room water tank, sewage collection for down floor from level of external utilities manhole.

BUILDING SUBDRAIN. That portion of a drainage system that does not drain by gravity into the building sewer.



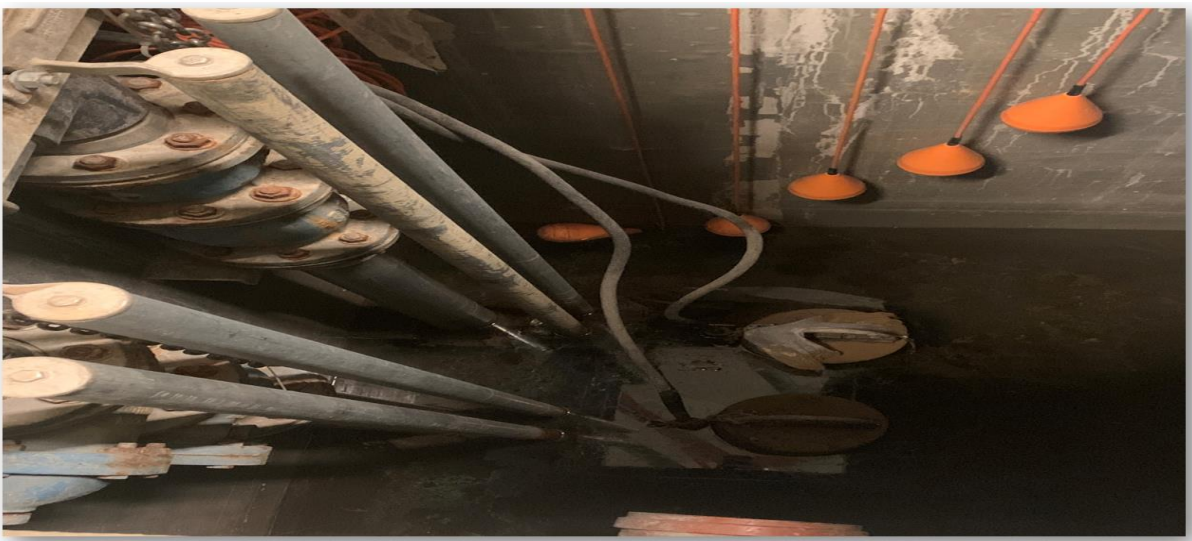
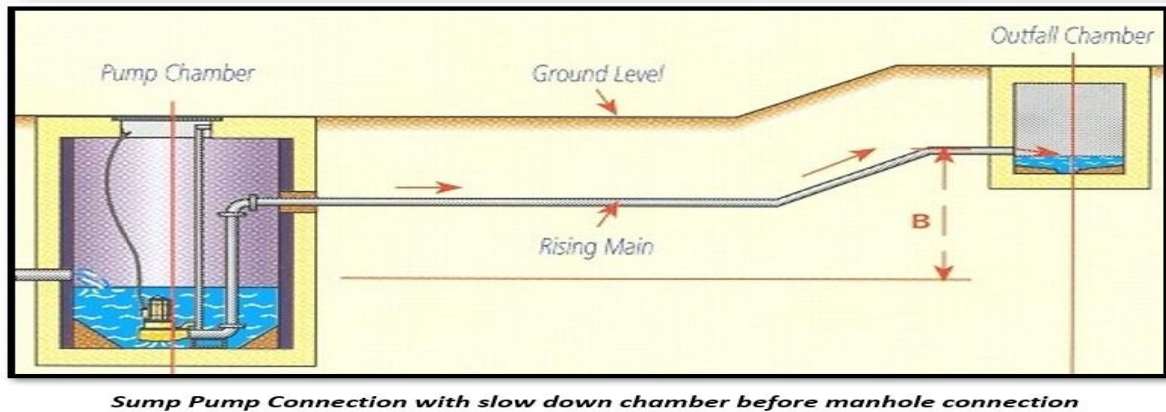
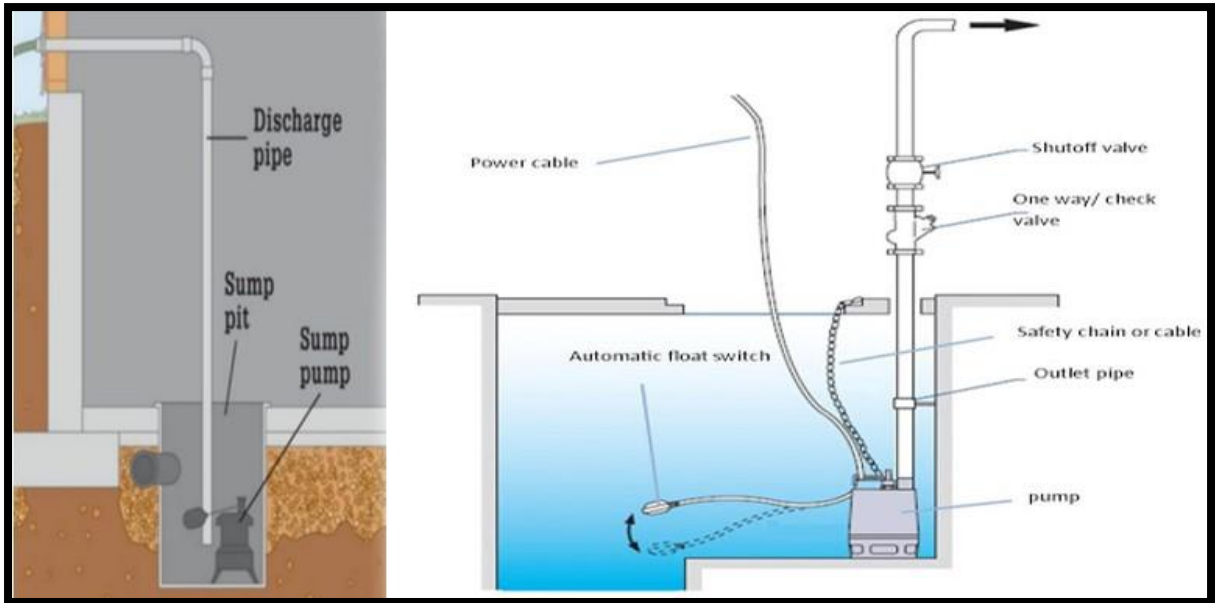
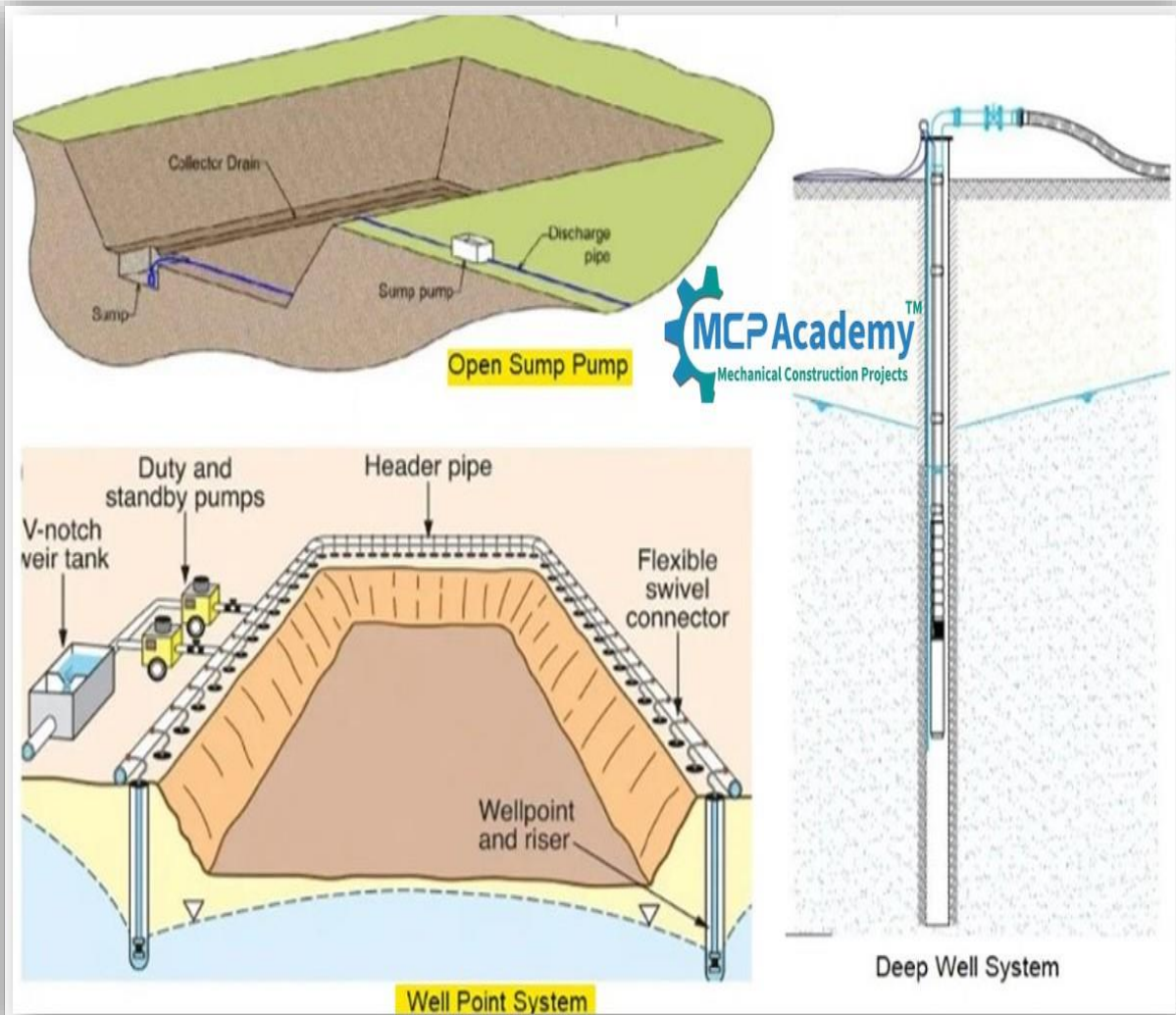


Photo from site installation

Dewatering System

Dewatering is the removal of water from the work area. The purpose is to prevent water from interfering with the work, and to prevent the discharge of contaminants such as suspended sediment and concrete. Dewatering may include damming, stream bypass, pumping, and/or draining the site.

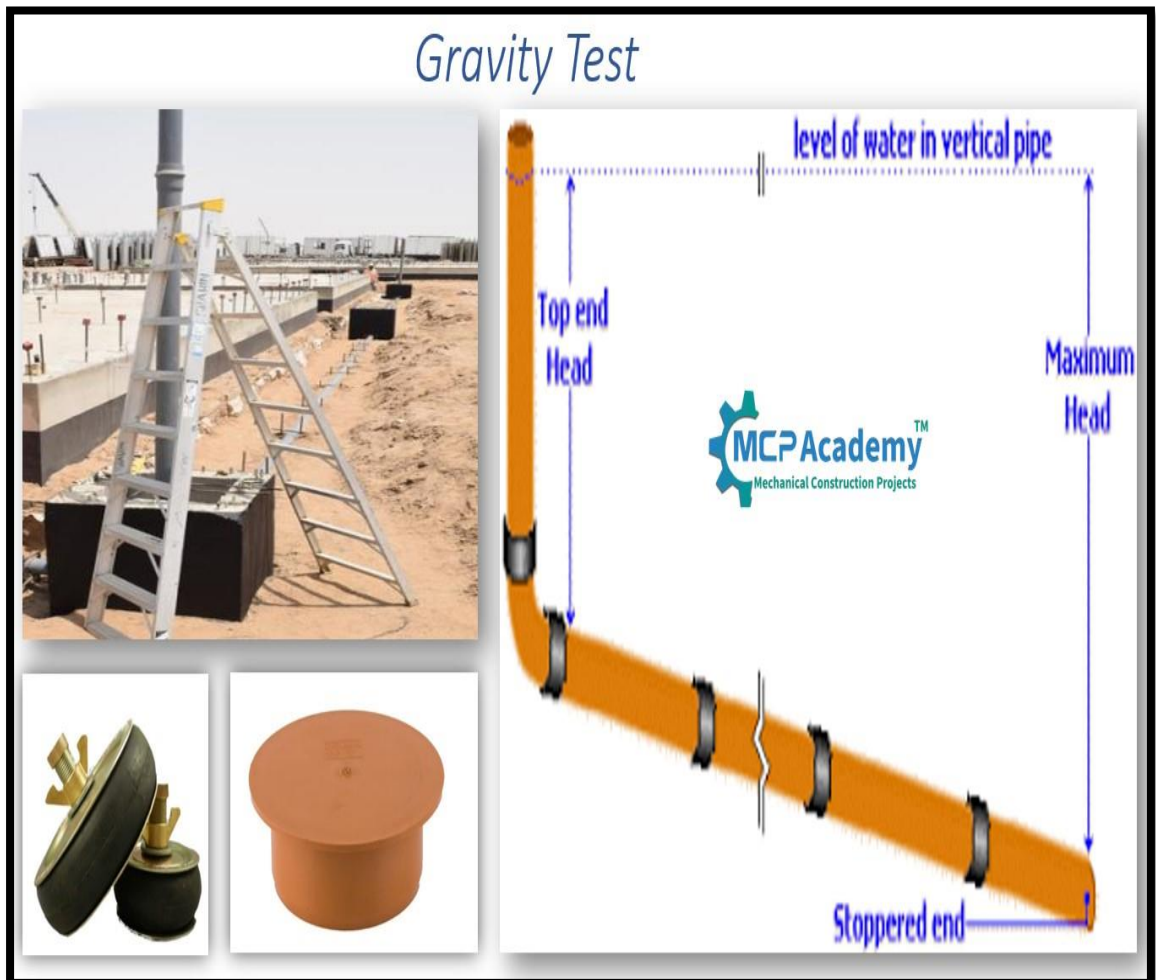


DRAINAGE LEACKAGE PIPING AND TRAP SMOKE TEST

➤ Leakage Piping Gravity Test

312.6 Gravity sewer test. Gravity *sewer* tests shall consist of plugging the end of the *building sewer* at the point of connection with the public sewer, filling the *building sewer* with water, testing with not less than a 10-foot (3048 mm) head of water and maintaining such pressure for 15 minutes.

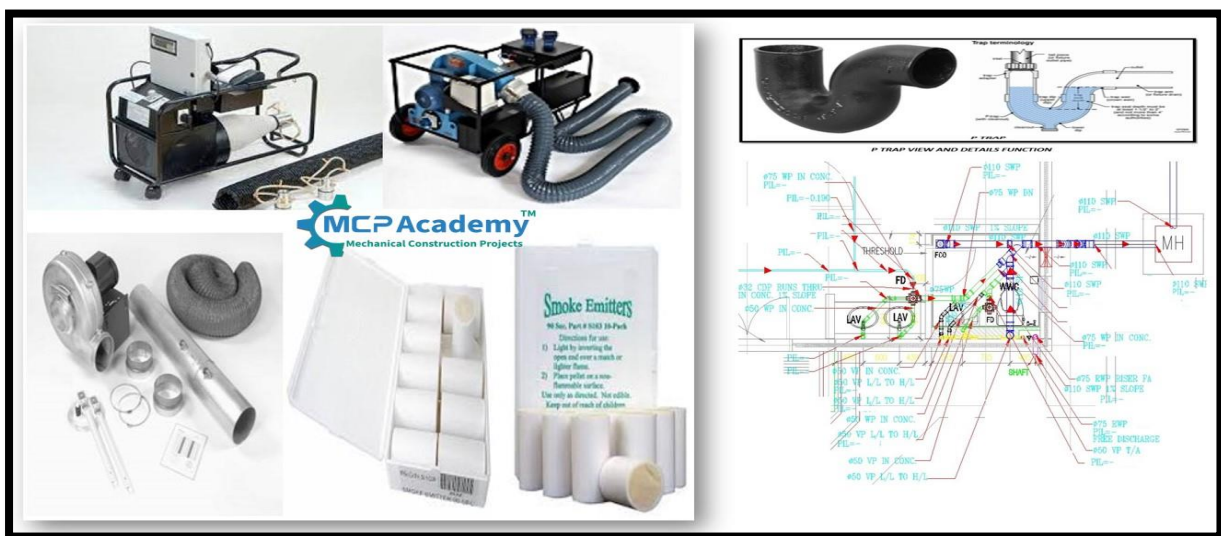
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➤ Smoke Test for Trap (final test)

312.4 Drainage and vent final test. The final test of the completed drainage and vent systems shall be visual and in sufficient detail to determine compliance with the provisions of this code. Where a smoke test is utilized, it shall be made by filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof, the stack openings shall be closed and a pressure equivalent to a 1-inch water column (248.8 Pa) shall be held for a test period of not less than 15 minutes.

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➤ PIPING END RISER SUPPORT



Chemical Waste

Chemical waste and vent systems are designed to convey chemical waste to a dilution tank or neutralization basin so the waste may be treated prior to entering the sanitary waste system. The acidity and corrosiveness of the chemicals in the waste stream dictate the piping material.

702.6 Chemical waste system. A chemical waste system shall be completely separated from the sanitary drainage system. The chemical waste shall be treated in accordance with **Section 803.2** before discharging to the sanitary drainage system. Separate drainage systems for chemical wastes and vent pipes shall be of an **approved material** that is resistant to corrosion and degradation for the concentrations of chemicals involved.

➤ **Neutralization Tank**

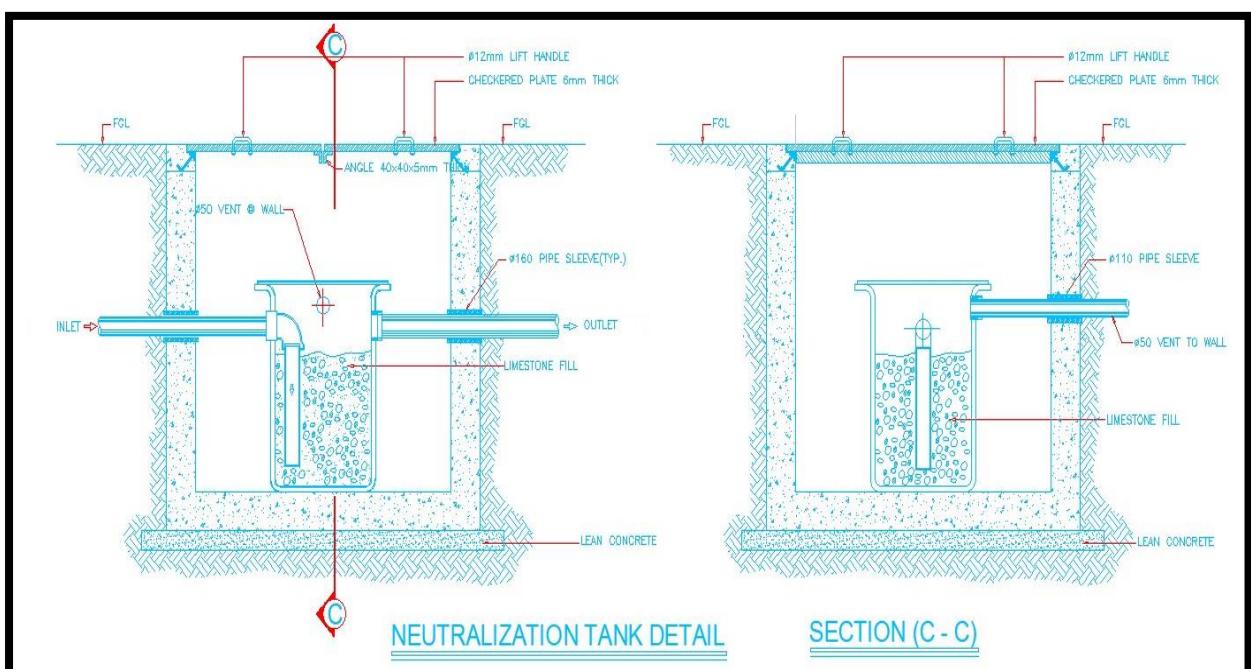
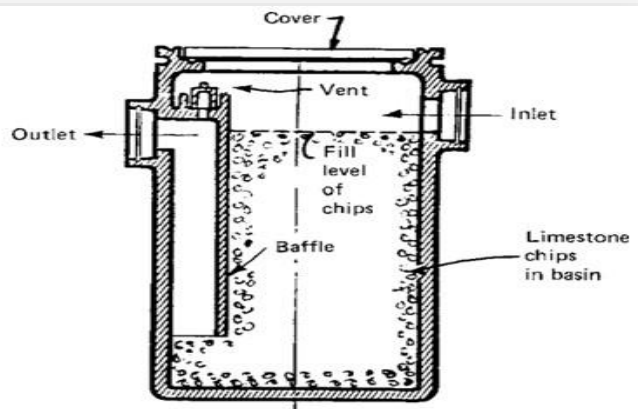
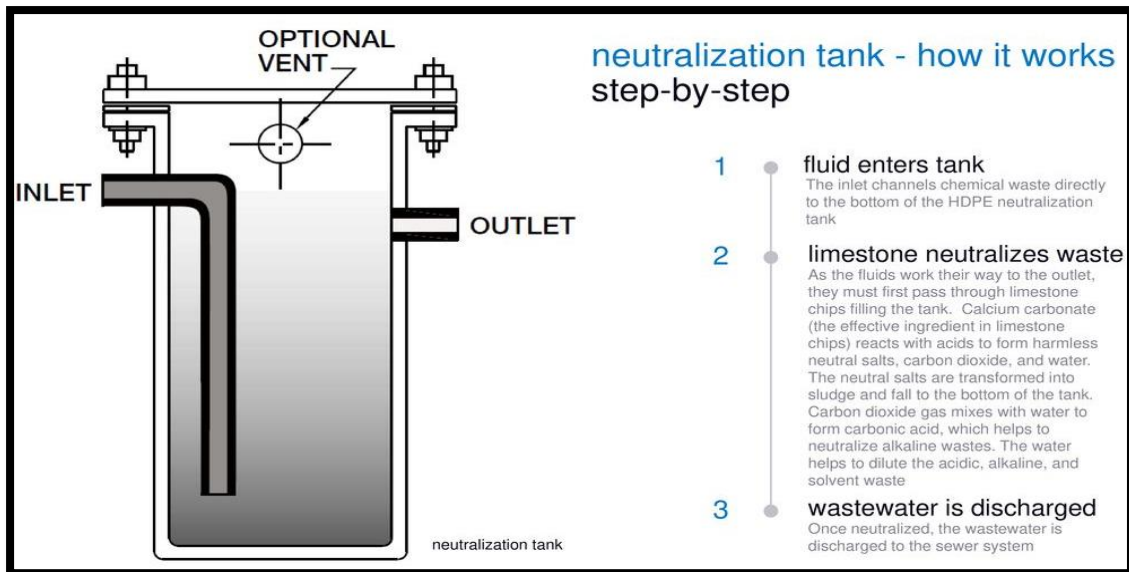
Neutralization Tanks are used to alter the pH level of corrosive waste drainage by dilution or chemical neutralization so the treated effluent can be safely discharged into sanitary sewer systems in compliance with local regulations.

SECTION 803 SPECIAL WASTES

803.1 Neutralizing device required for corrosive wastes. Corrosive liquids, spent acids or other harmful chemicals that destroy or injure a drain, sewer, soil or waste pipe, or create noxious or toxic fumes or interfere with sewage treatment processes shall not be discharged into the plumbing system without being thoroughly diluted, neutralized or treated by passing through an **approved** dilution or neutralizing device. Such devices shall be automatically provided with a sufficient supply of diluting water or neutralizing medium so as to make the contents noninjurious before discharge into the drainage system. The nature of the corrosive or harmful waste and the method of its treatment or dilution shall be **approved** prior to installation.

803.2 System design. A chemical drainage and vent system shall be designed and installed in accordance with this code. **Chemical drainage and vent systems shall be completely separated from the sanitary systems. Chemical waste shall not discharge to a sanitary drainage system until such waste has been treated in accordance with Section 803.1.**

International Plumbing Code IPC – Edition 2021

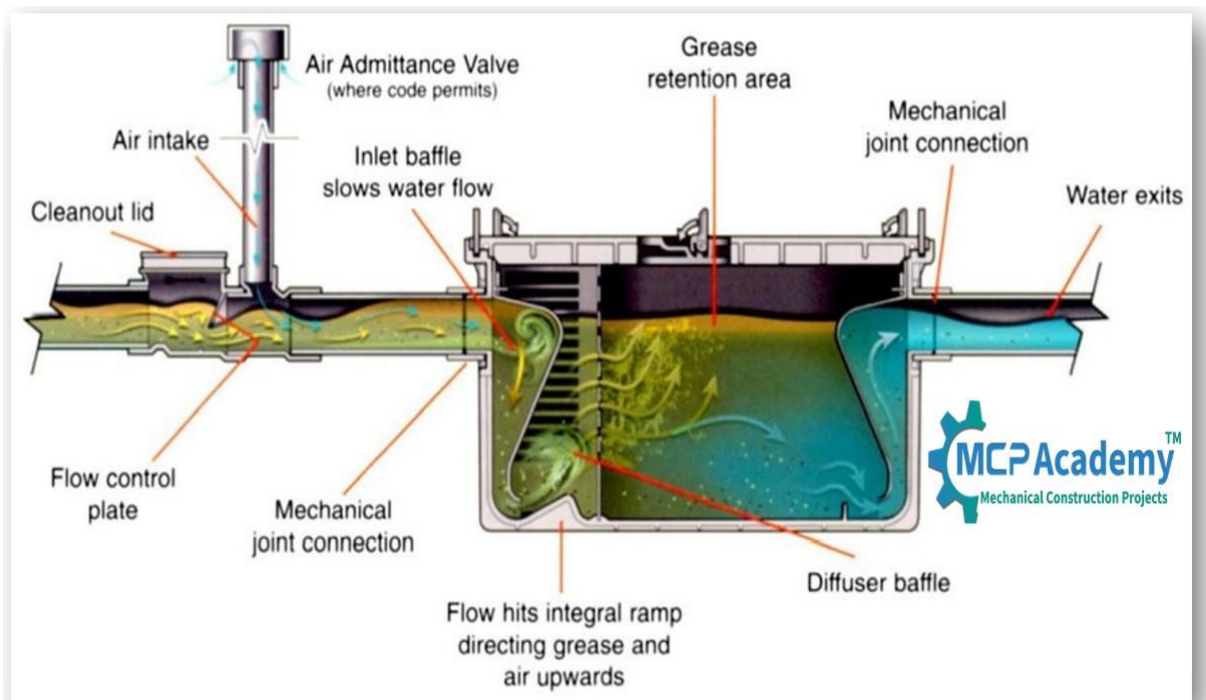


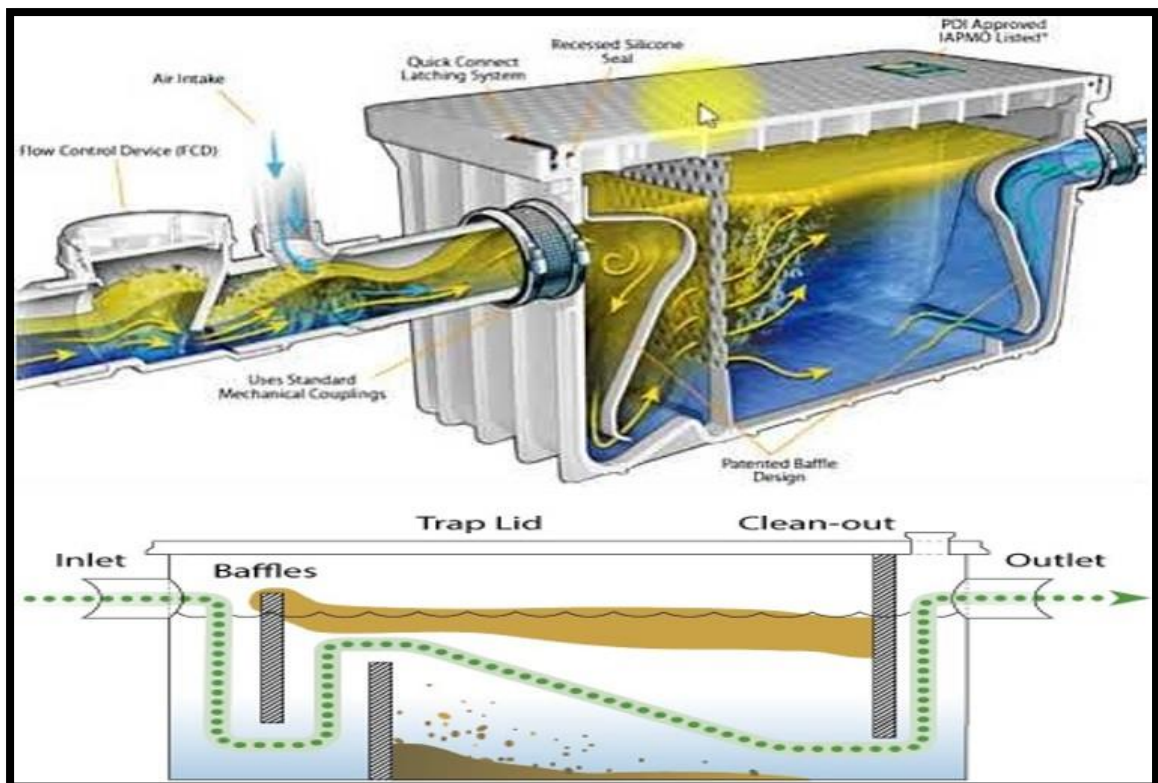
Polypropylene (PP) Piping use for chemical waste



Grease Interceptor

Grease Interceptor is located between kitchen drain lines and sanitary sewer lines. Grease interceptors capture the FOG that enters sink drains from food service activities such as food preparation, dishwashing and cleaning.





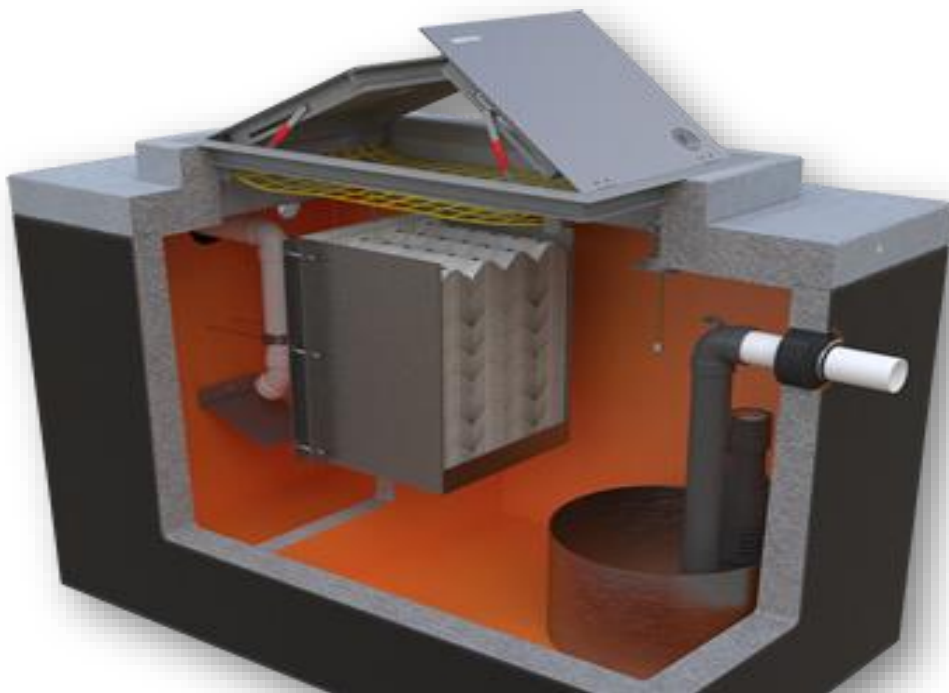
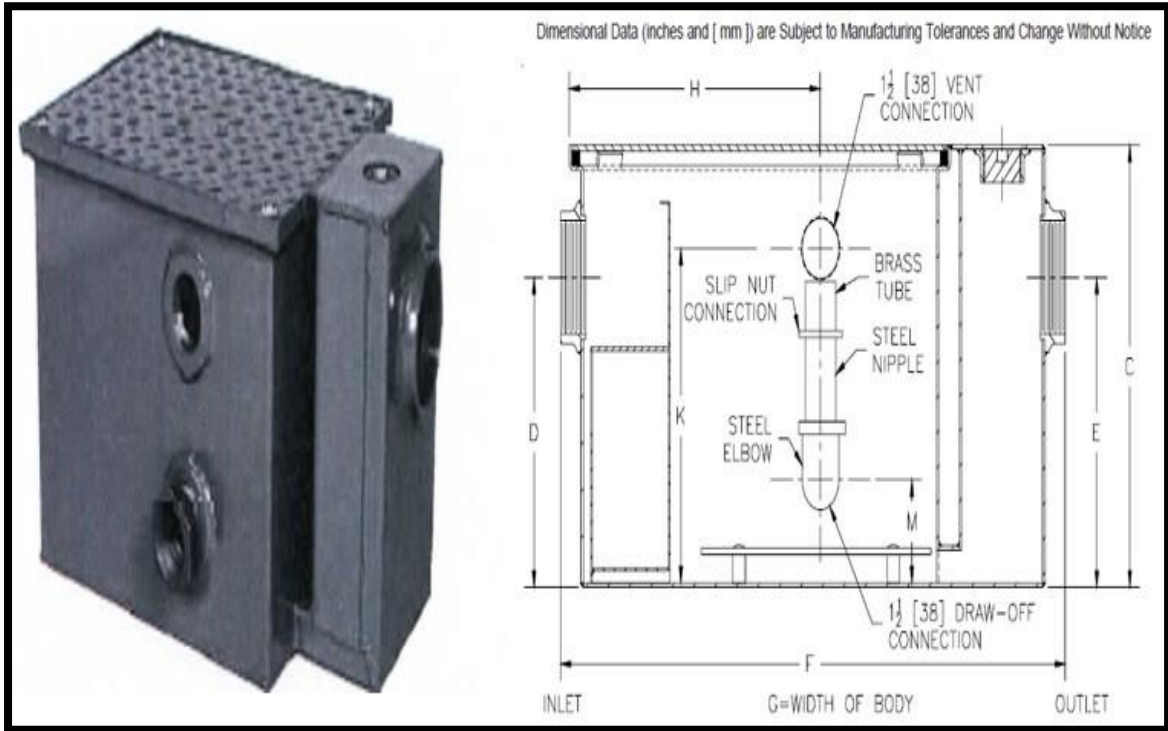
1003.3.1 Grease interceptors and automatic grease removal devices required.

A grease interceptor or automatic grease removal device shall be required to receive the drainage from fixtures and equipment with grease-laden waste located in food preparation areas, such as in restaurants, hotel kitchens, hospitals, school kitchens, bars, factory cafeterias and clubs. Fixtures and equipment shall include pot sinks, prerinse sinks; soup kettles or similar devices; wok stations; floor drains or sinks into which kettles are drained; automatic hood wash units and dishwashers without prerinse sinks. Grease interceptors and automatic grease removal devices shall receive waste only from fixtures and equipment that allow fats, oils or grease to be discharged. Where lack of space or other constraints prevent the installation or replacement of a grease interceptor, one or more grease interceptors shall be permitted to be installed on or above the floor and upstream of an existing grease interceptor.

International Plumbing Code IPC – Edition 2021

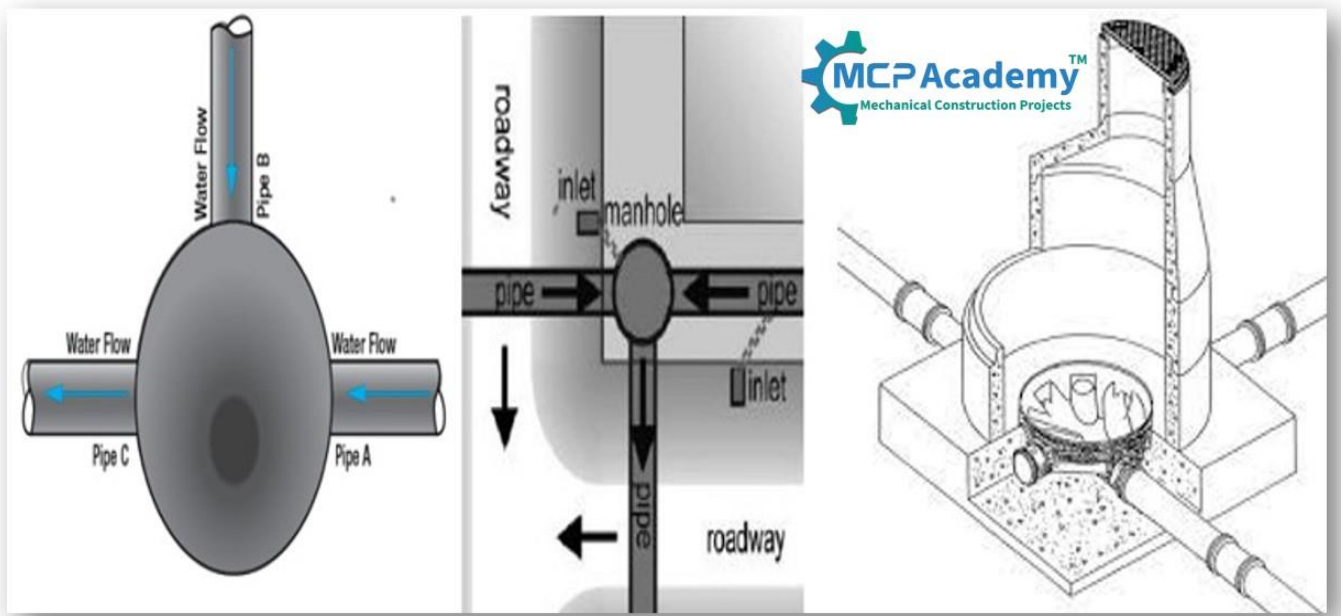
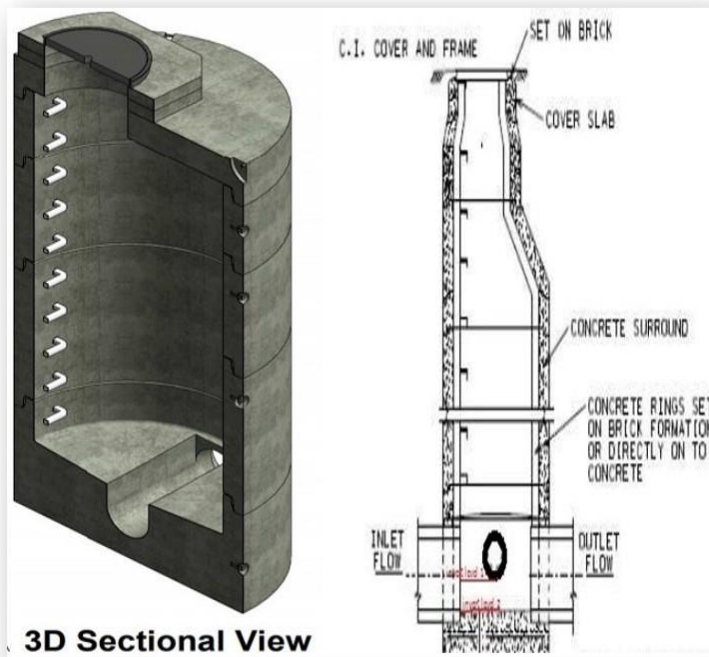
Oil Interceptors

Oil Interceptors separate oily waste from interior drainage systems or exterior run-off areas, preventing environmentally damaging and potentially dangerous oil substances from entering septic fields



Inspector Chamber and Manhole

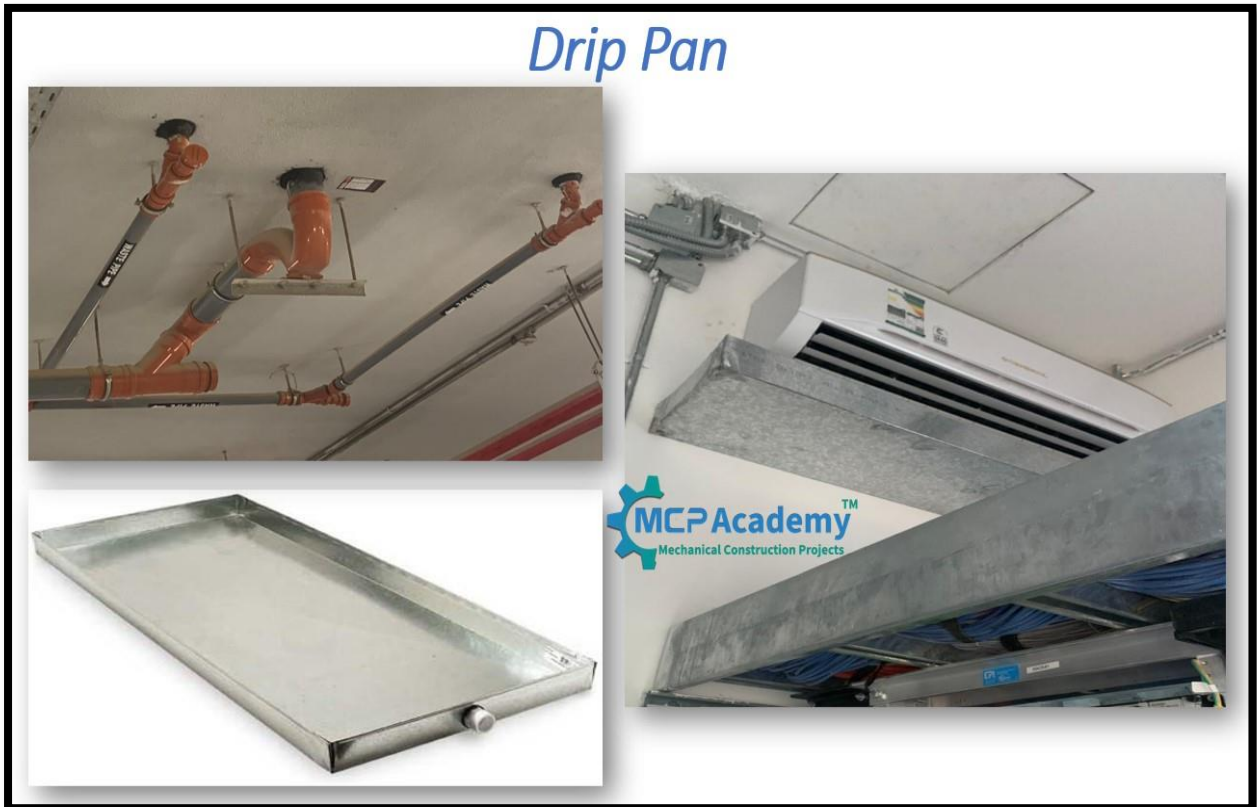
Inspection Chambers, Manholes, are an important part of any drainage system. These access points allow drainage professionals to inspect and survey underground utilities infrastructure, and perform essential repairs and cleaning work.



Special Piping location of Installation

Case of installation for drainage piping above ceiling at room our area which required more protection from any of sewage piping leakage at this case you shall use drip pan

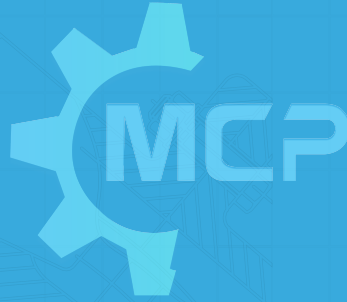
Drip pans a container for catching any of leakage water that drips from above



Drip Pan photo from Construction Drawing



نحن مهندسون متخصصون لدينا الخبرة على مدار العديد من السنوات بمجال الهندسة الميكانيكية
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للمستوى الاحترافي المطلوب للمنافسة بسوق العمل



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