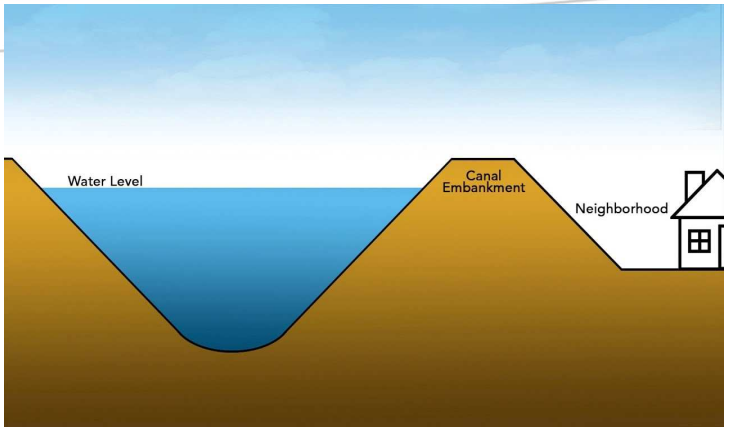
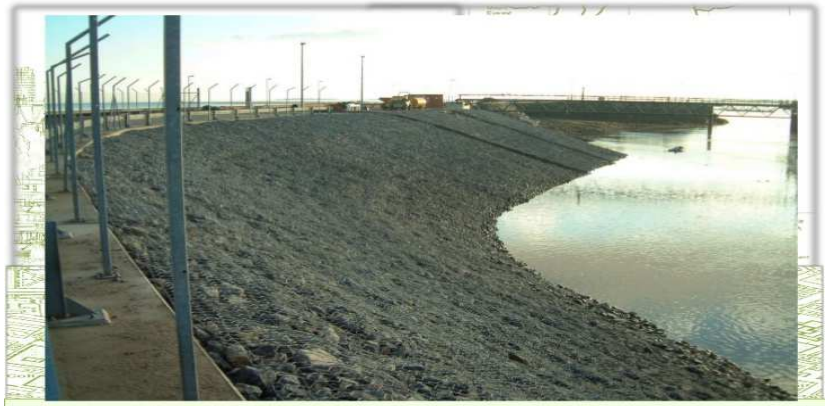
Embankment:

Embankment is a ridge built with earth or rock to contain flood water or to construct a road, railway, canal. Embankments vary in nature and function under a variety of situations.

Embankments are often constructed using material obtained from a cutting. Embankments need to be constructed using non-aerated and waterproofed, compacted (or entirely non-porous) material to provide adequate support to the formation and a long-term level surface with stability.





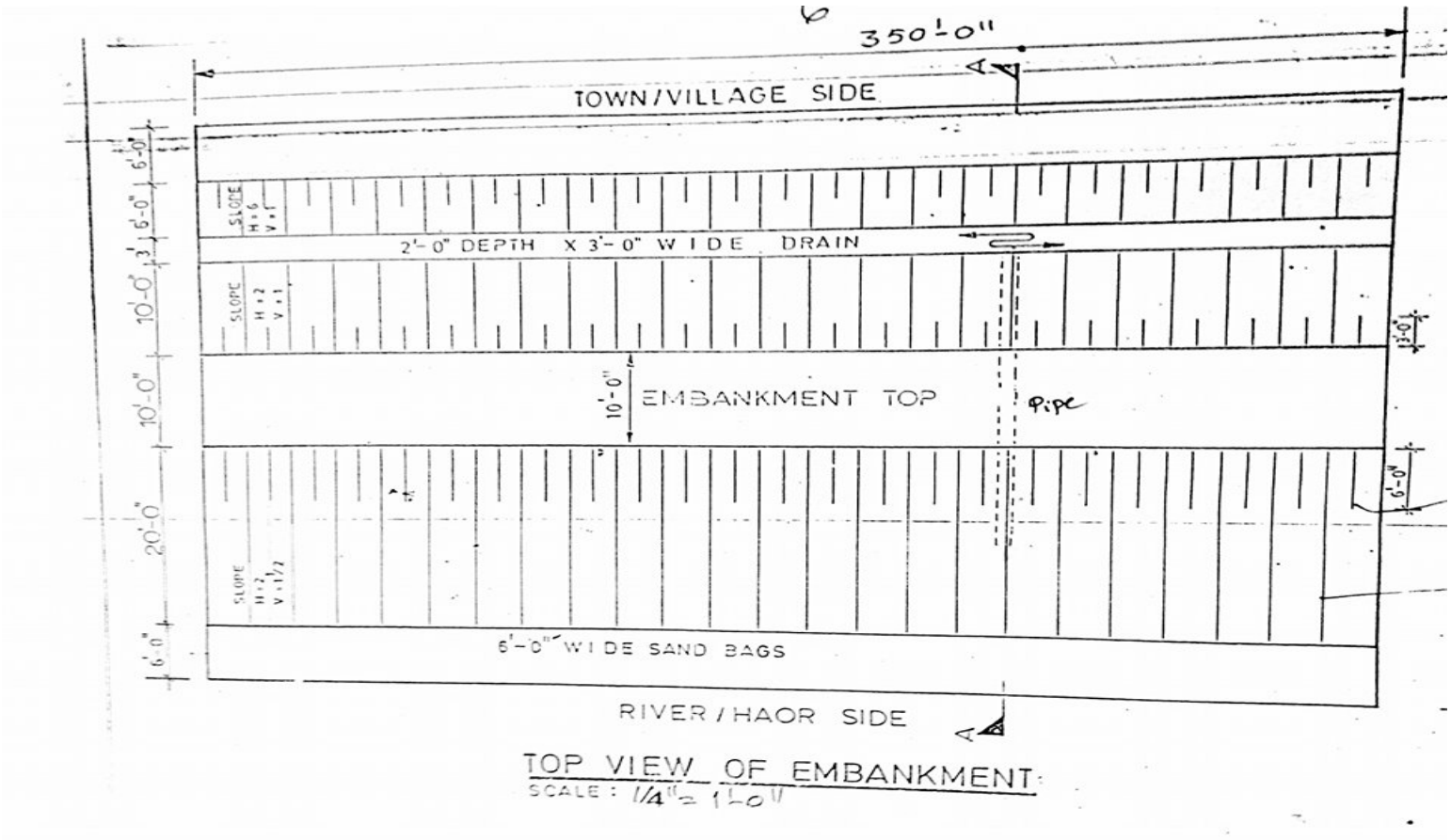


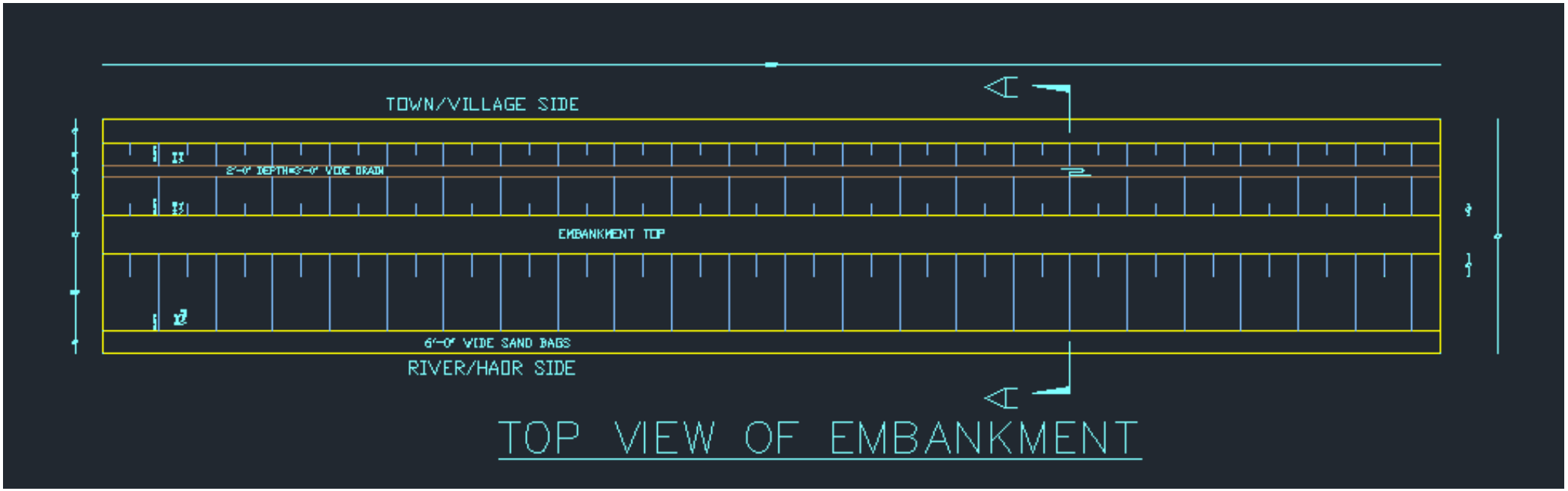
The Embankment along the DEE River in North Wales, England

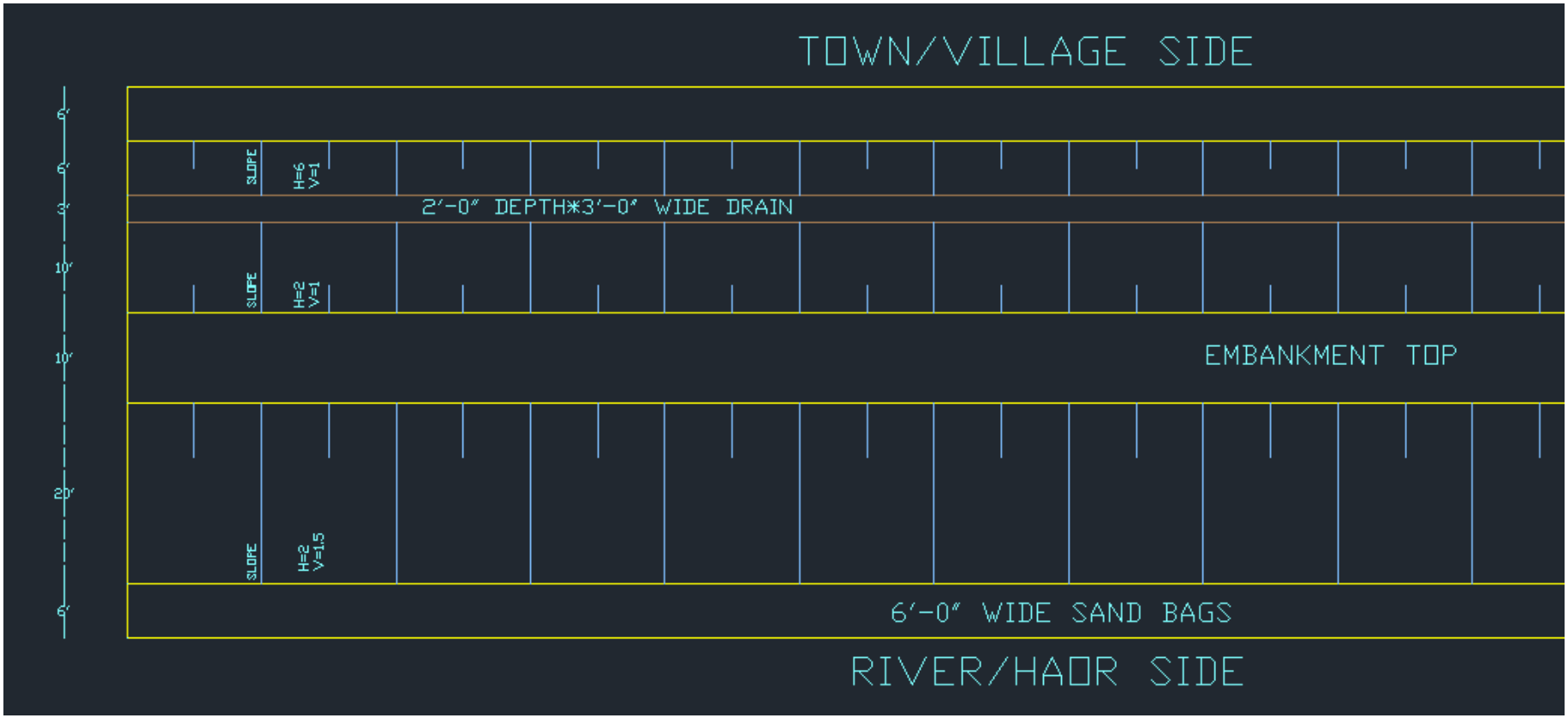
Types of Embankment:

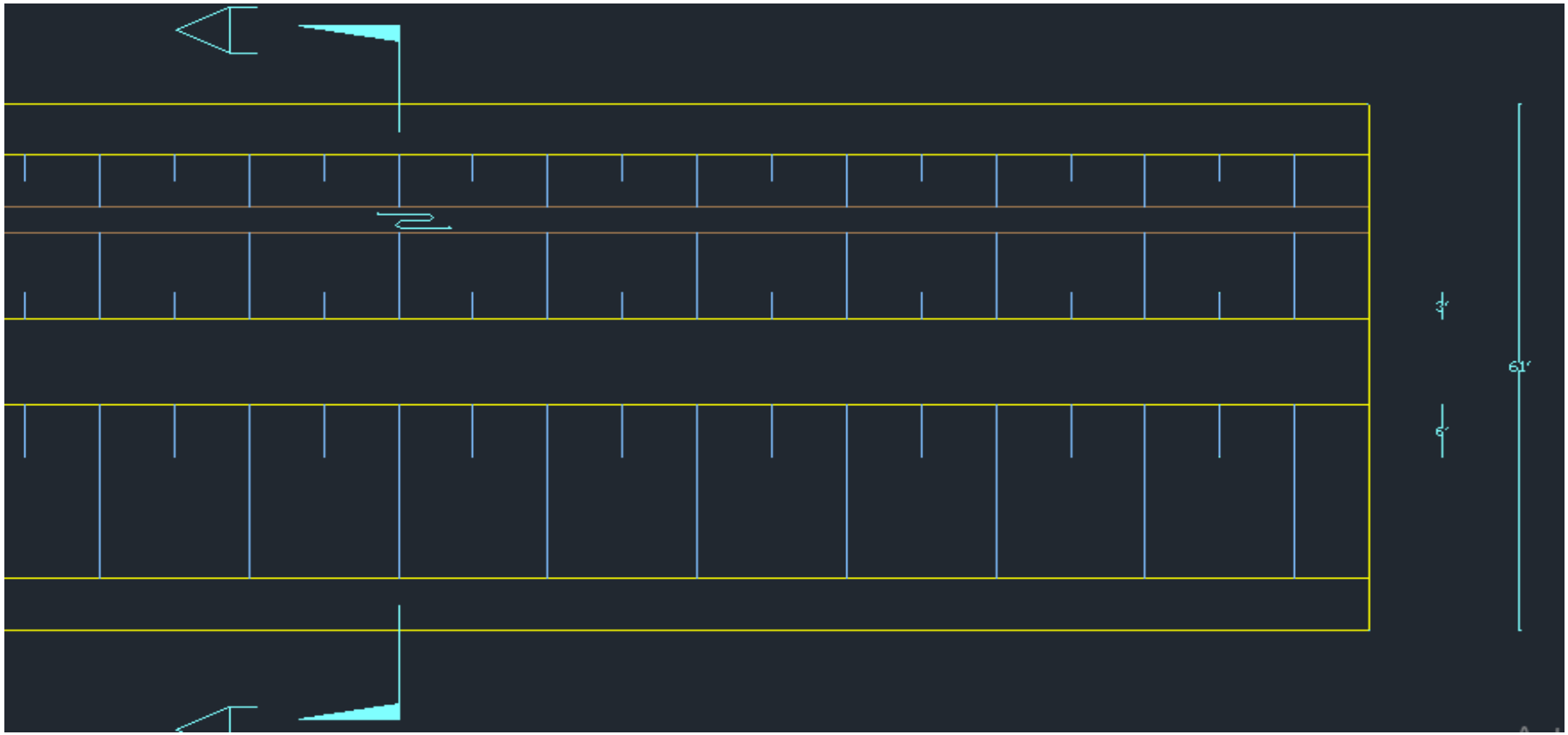
1. Earth-Filled Embankment/ Earthen Embankment
2. Rock-Filled Embankment
3. Earth and Rock-Filled Embankment

Top View of Embankment:

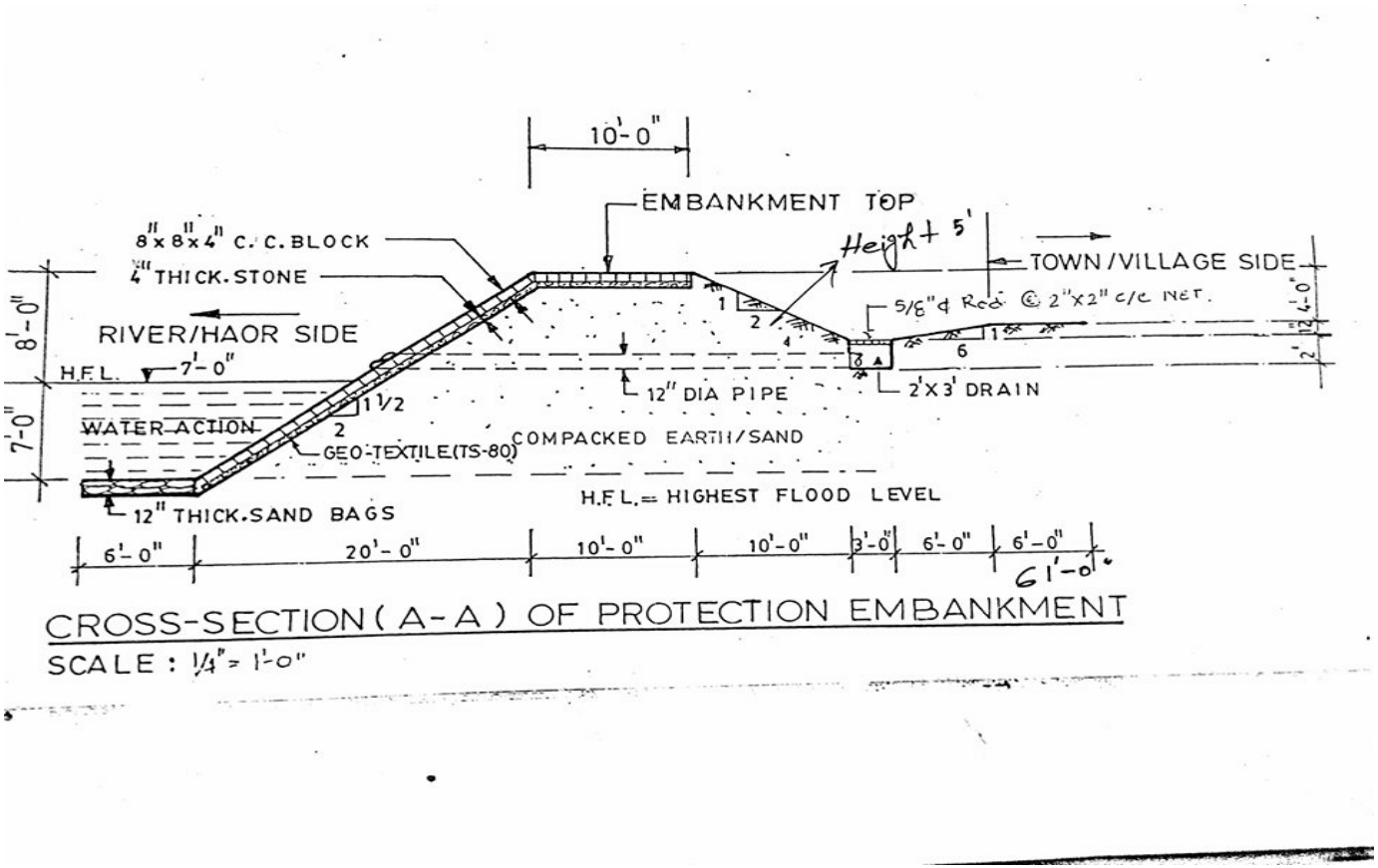


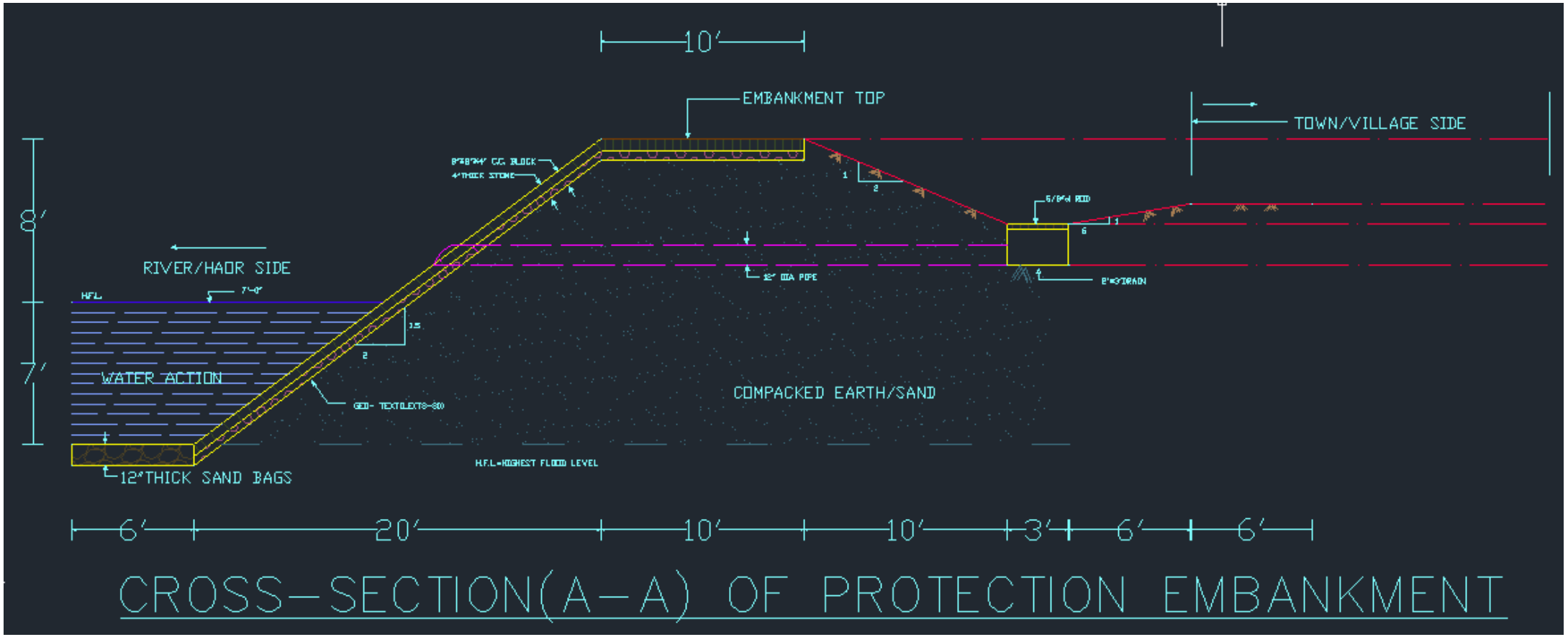

TOWN/VILLAGE SIDE
2'-0" DEPTH=2'-0" WIDE DRAIN
EMBANKMENT TOP
6'-0" WIDE SAND BAGS
RIVER/HAOR SIDE
TOP VIEW OF EMBANKMENT


TOWN/VILLAGE SIDE
6'
6'
3'
10'
10'
20'
6'
SLOPE
H=6
V=1
2'-0" DEPTH*3'-0" WIDE DRAIN
SLOPE
H=2
V=1
EMBANKMENT TOP
SLOPE
H=2
V=1.5
6'-0" WIDE SAND BAGS
RIVER/HAOR SIDE


3'
61'
6'

Cross-Section of Embankment:



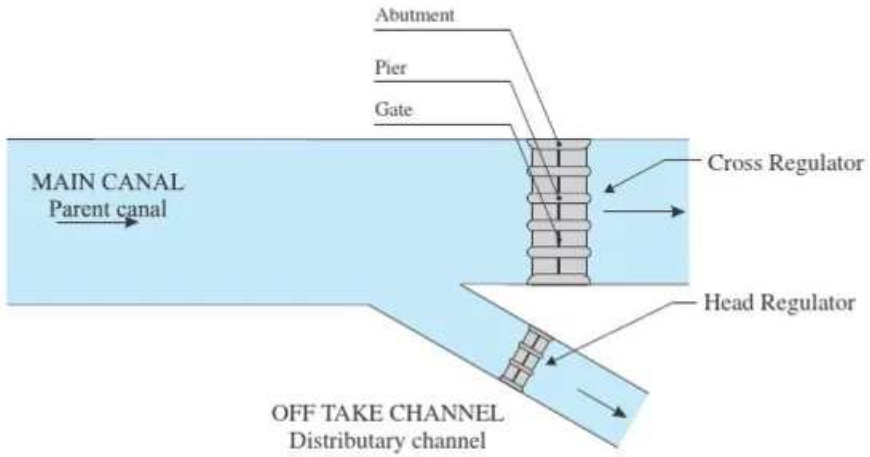


CROSS–SECTION(A–A) OF PROTECTION EMBANKMENT

Regulator:

Head and Cross Regulators

The supplies passing down the parent canal and off take channel are controlled by cross regulator and head regulator respectively.

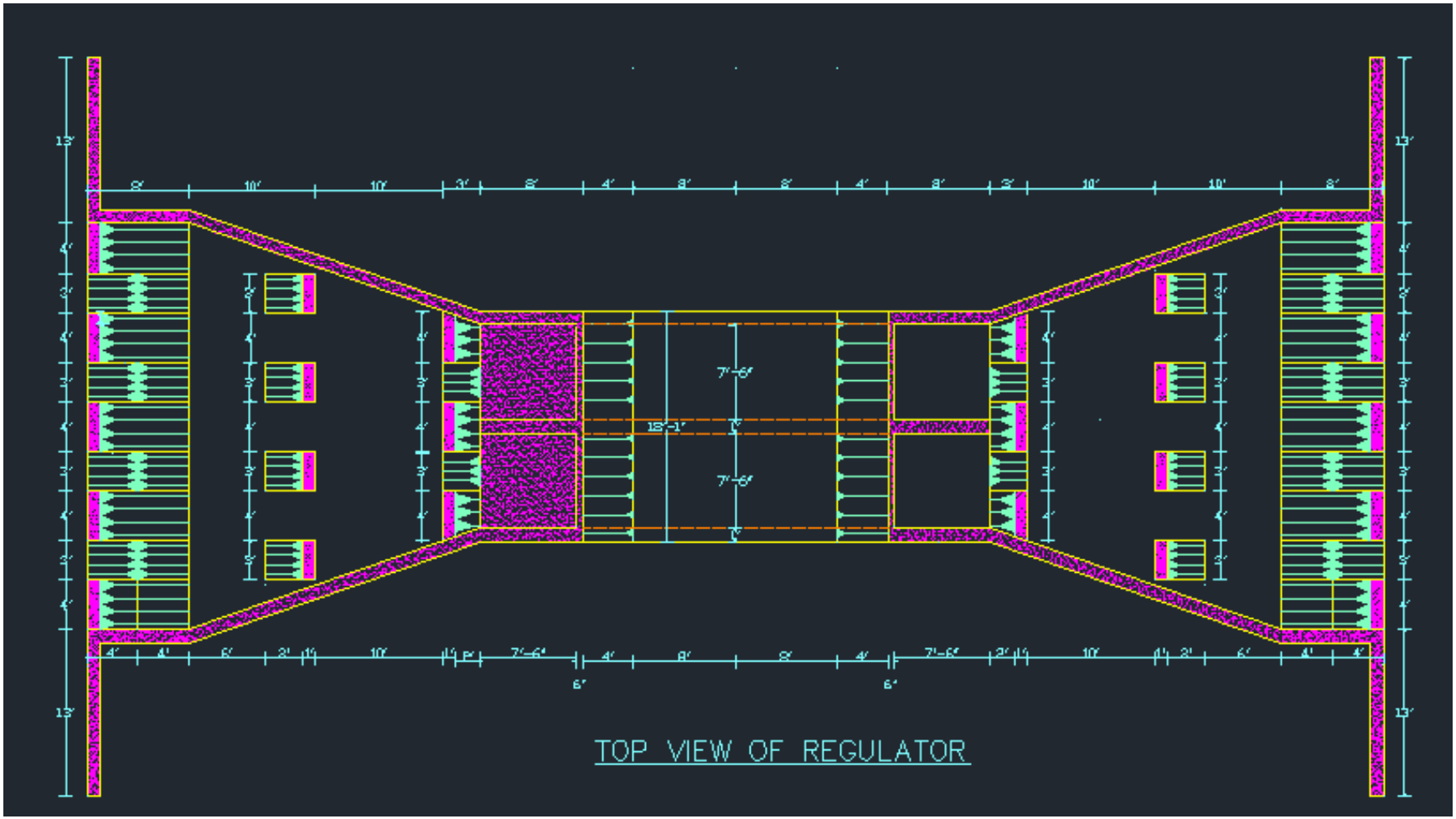


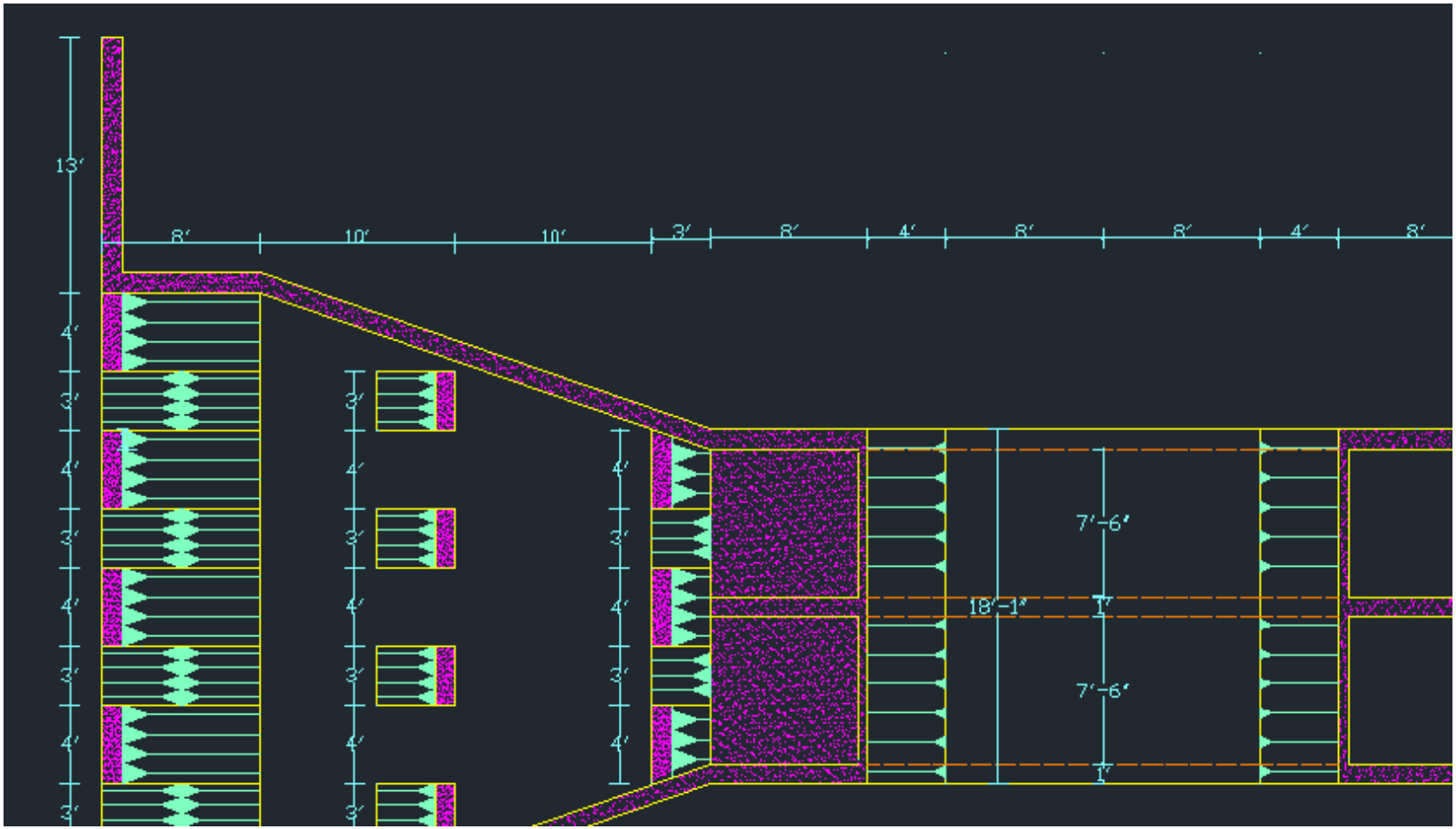
Functions of Cross Regulators

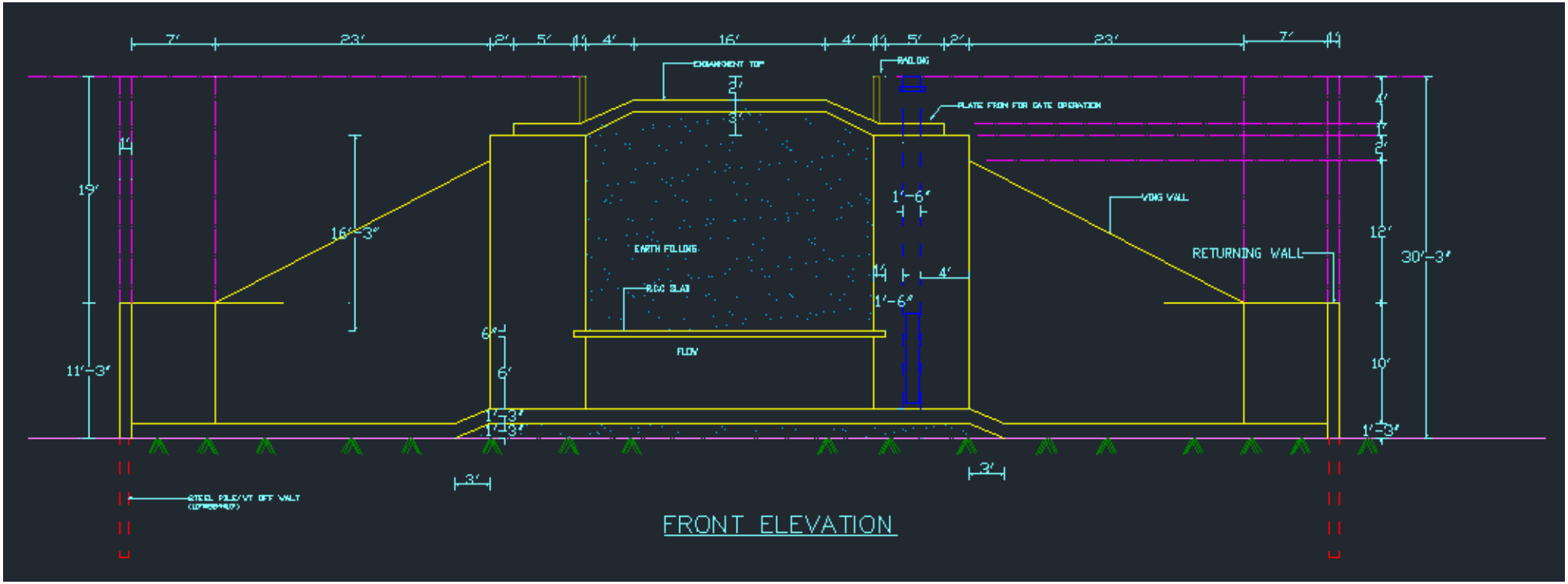
1. Regulation of the canal system.
2. Raising the water level in the main canal in order to feed the off take channels.
3. To facilitate communication by building a road over the cross regulator with little extra cost.
4. To absorb the fluctuations in the canal system.

Functions of Head Regulators

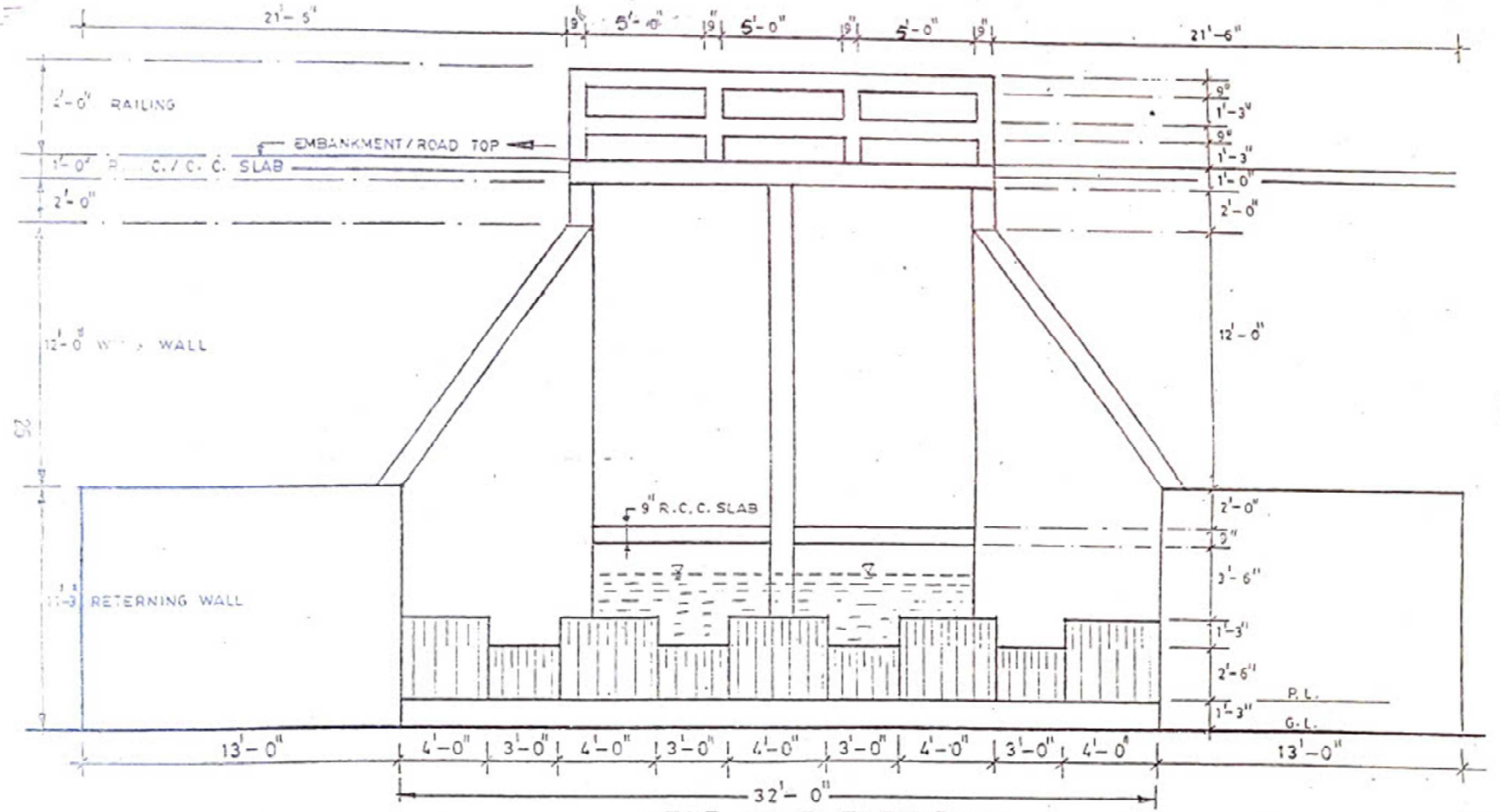
1. To regulate and control supplies entering the off take channel (distributary) from the main (parent) canal.
2. To control silt entering into the distributary.
3. To serve for measurement of discharge.


TOP VIEW OF REGULATOR


13′
8′
10′
10′
3′
8′
4′
8′
8′
4′
8′
4′
3′
4′
3′
4′
3′
4′
3′
4′
3′
4′
3′
4′
3′
4′
3′
4′
3′
4′
3′
4′
3′
4′
7′-6″
1′
18′-1″
1′
7′-6″
1′



FRONT ELEVATION



LEFT SIDE ELEVATION

Bridge:

A **bridge** is a structure built to span a physical obstacle (such as a body of water, valley, road, or rail) without blocking the way underneath.

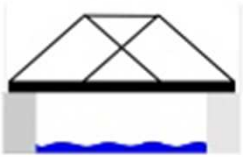
It is constructed for the purpose of providing passage over the obstacle, which is usually something that is otherwise difficult or impossible to cross.

There are many different designs of bridges, each serving a particular purpose and applicable to different situations. Designs of bridges vary depending on factors such as: the function of the bridge, the nature of the terrain where the bridge is constructed and anchored, and the material used to make it and the funds available to build it.

Types of bridges: Based on Structure



Beam bridge



Truss bridge



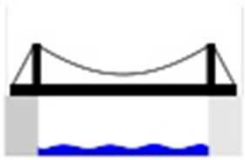
Cantilever Bridges



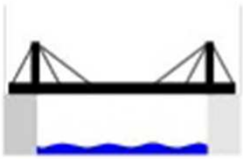
Arch bridge



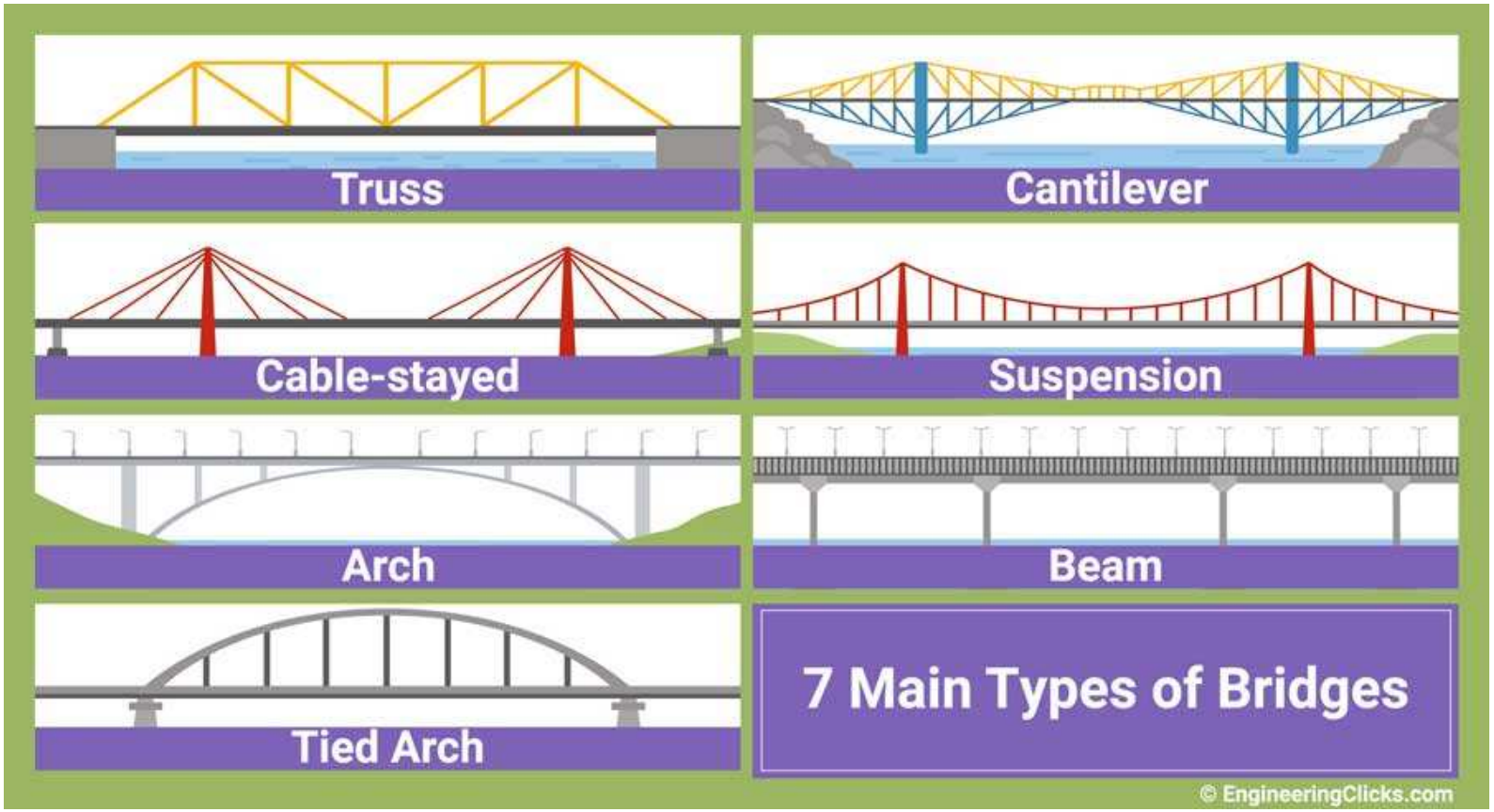
Tied arch bridge



Suspension bridges



cable-stayed bridge

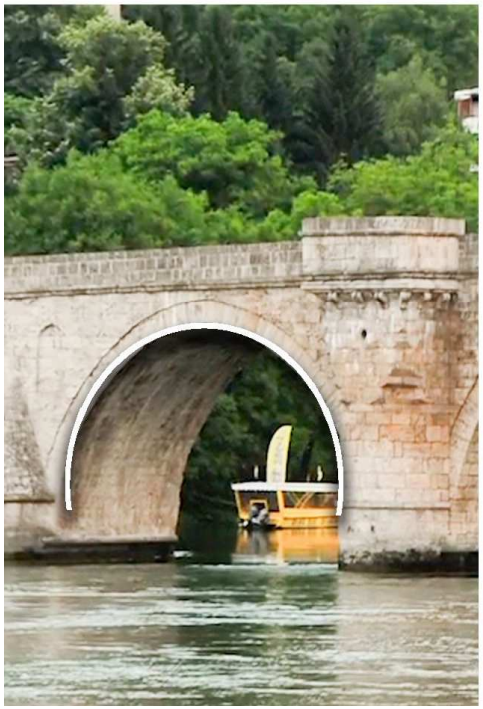

Truss
Cantilever
Cable-stayed
Suspension
Arch
Beam
Tied Arch
7 Main Types of Bridges
© EngineeringClicks.com

Types of Bridges:

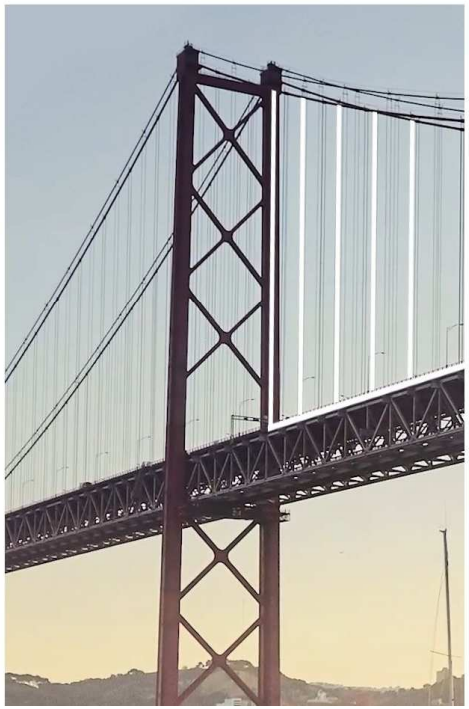


Types of Bridges:

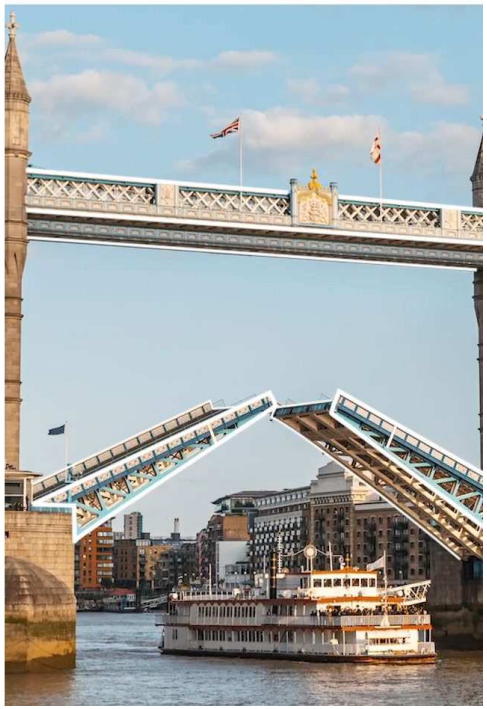
ARCH



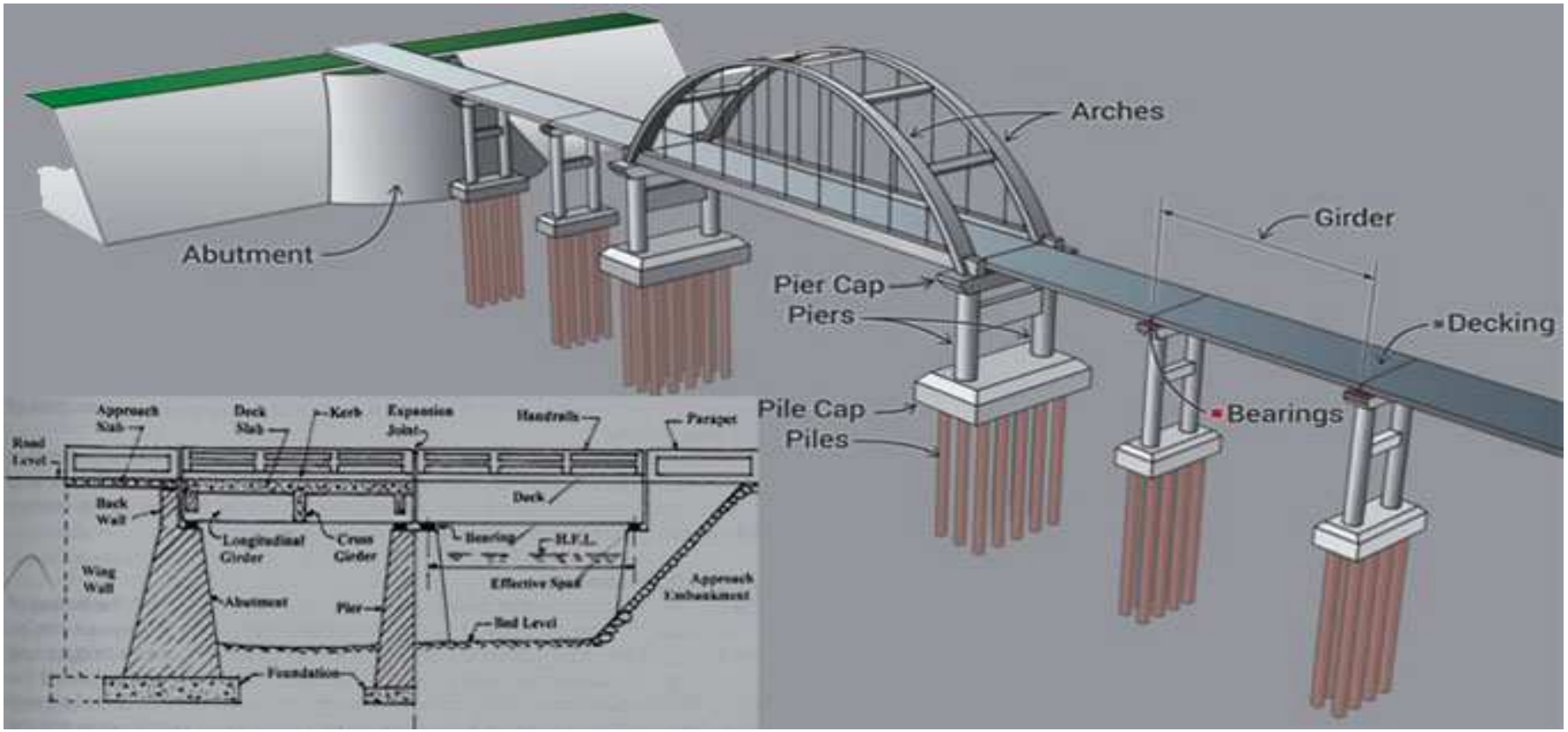
SUSPENSION

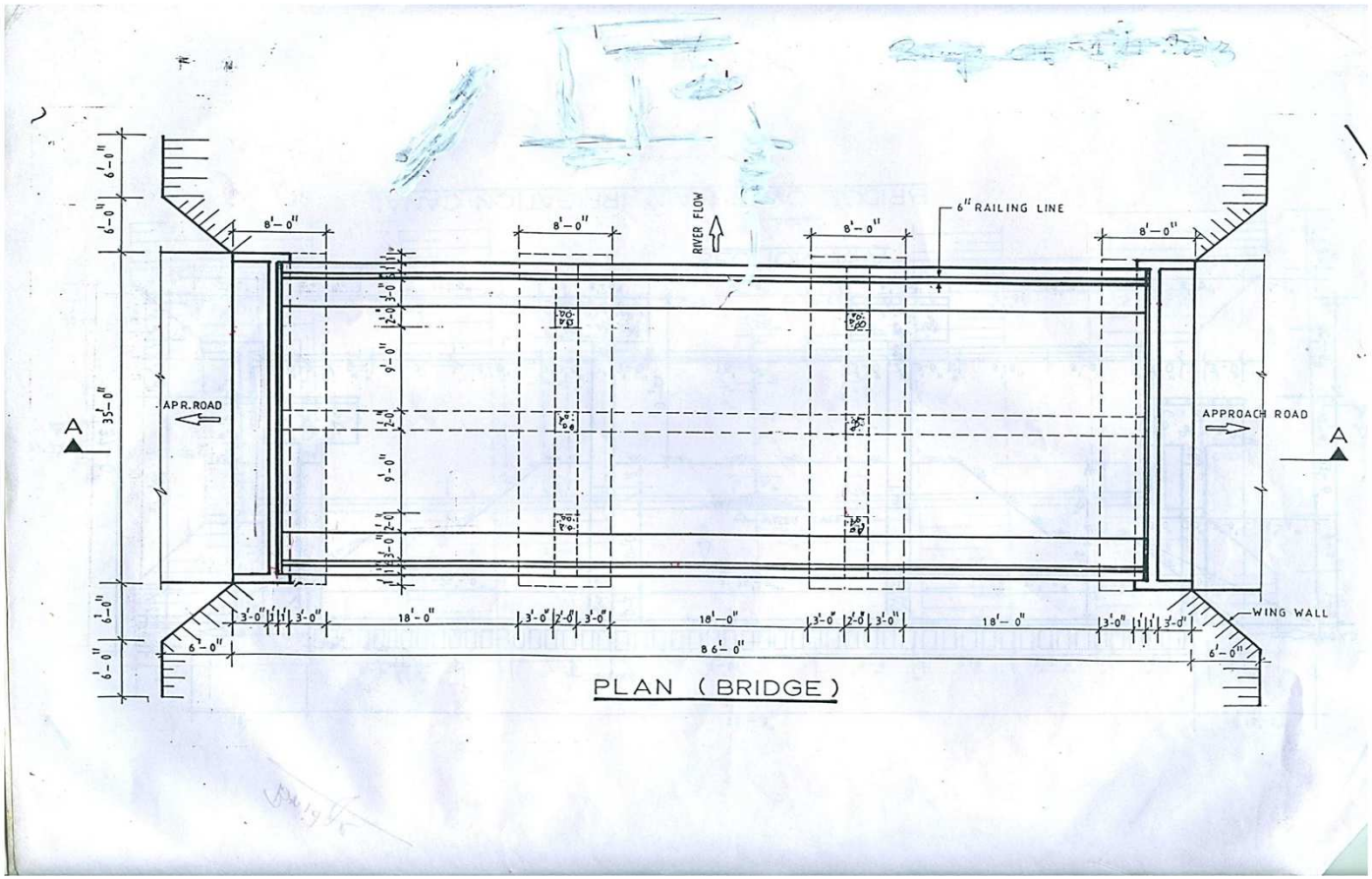


DRAW

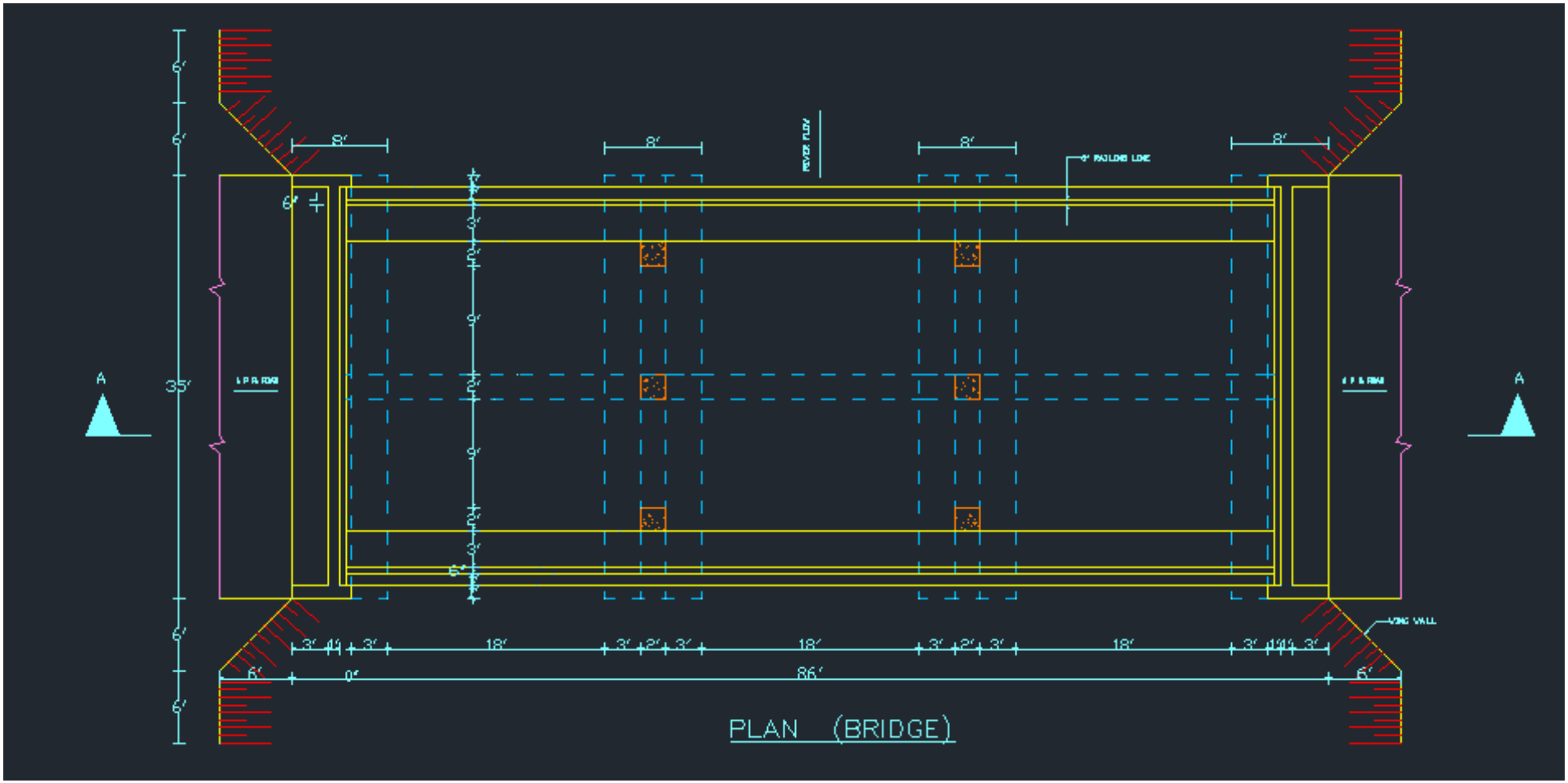


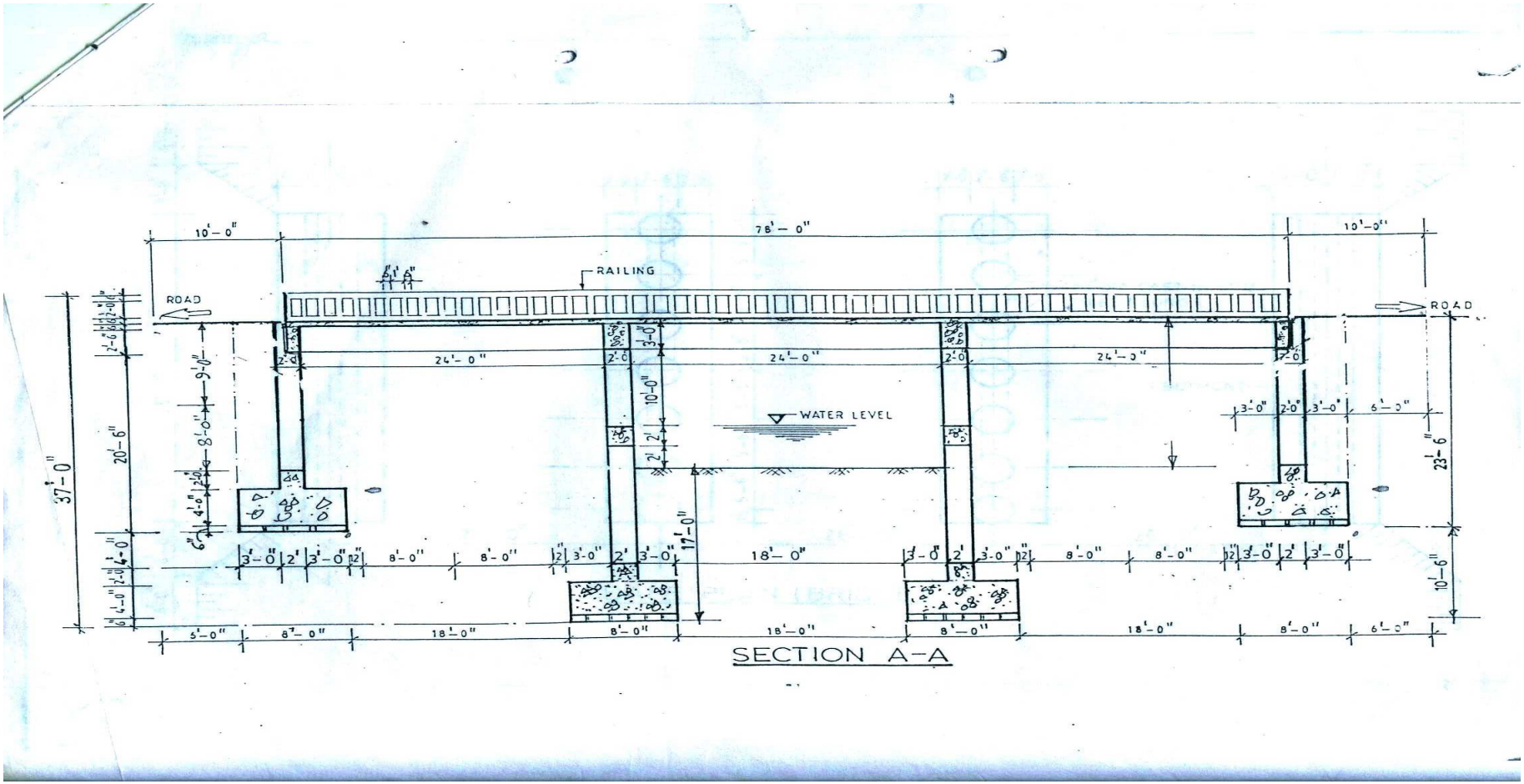
Components of Bridge:



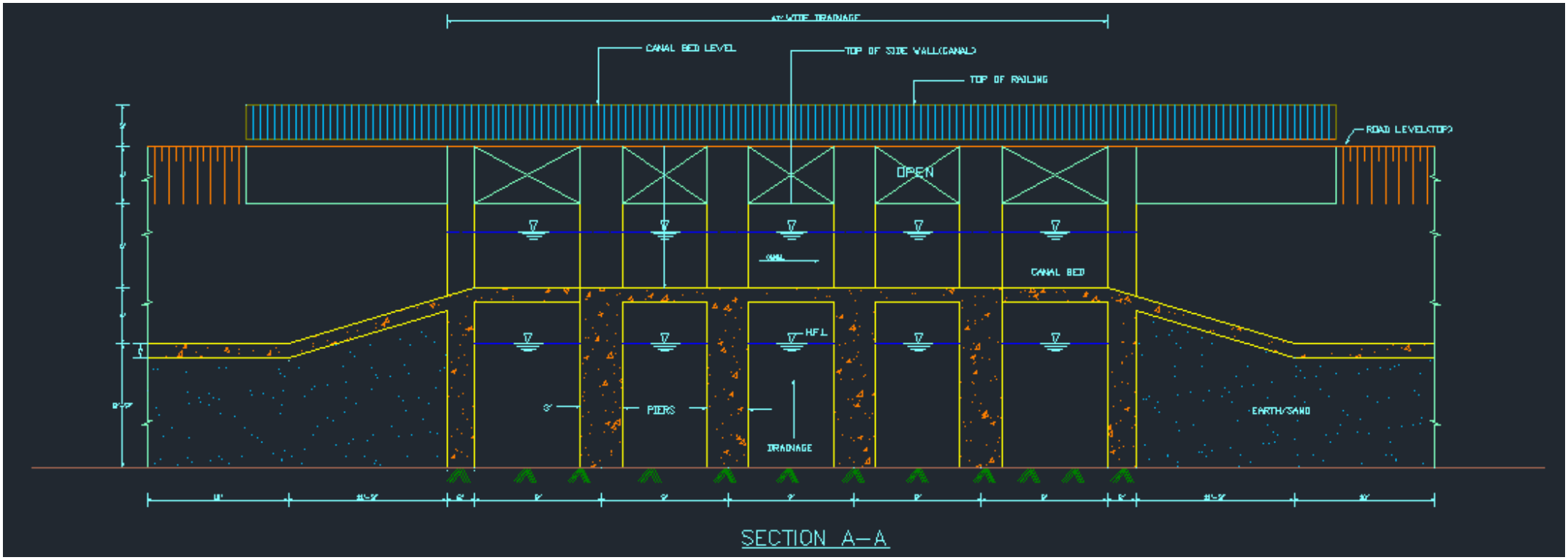

RIVER FLOW
6" RAILING LINE
8'-0"
APR. ROAD
APPROACH ROAD
WING WALL
A
A
35'-0"
6'-0"
6'-0"
6'-0"
6'-0"
6'-0"
6'-0"
3'-0"
3'-0"
18'-0"
3'-0"
2'-0"
3'-0"
18'-0"
3'-0"
2'-0"
3'-0"
18'-0"
3'-0"
3'-0"
86'-0"

PLAN (BRIDGE)

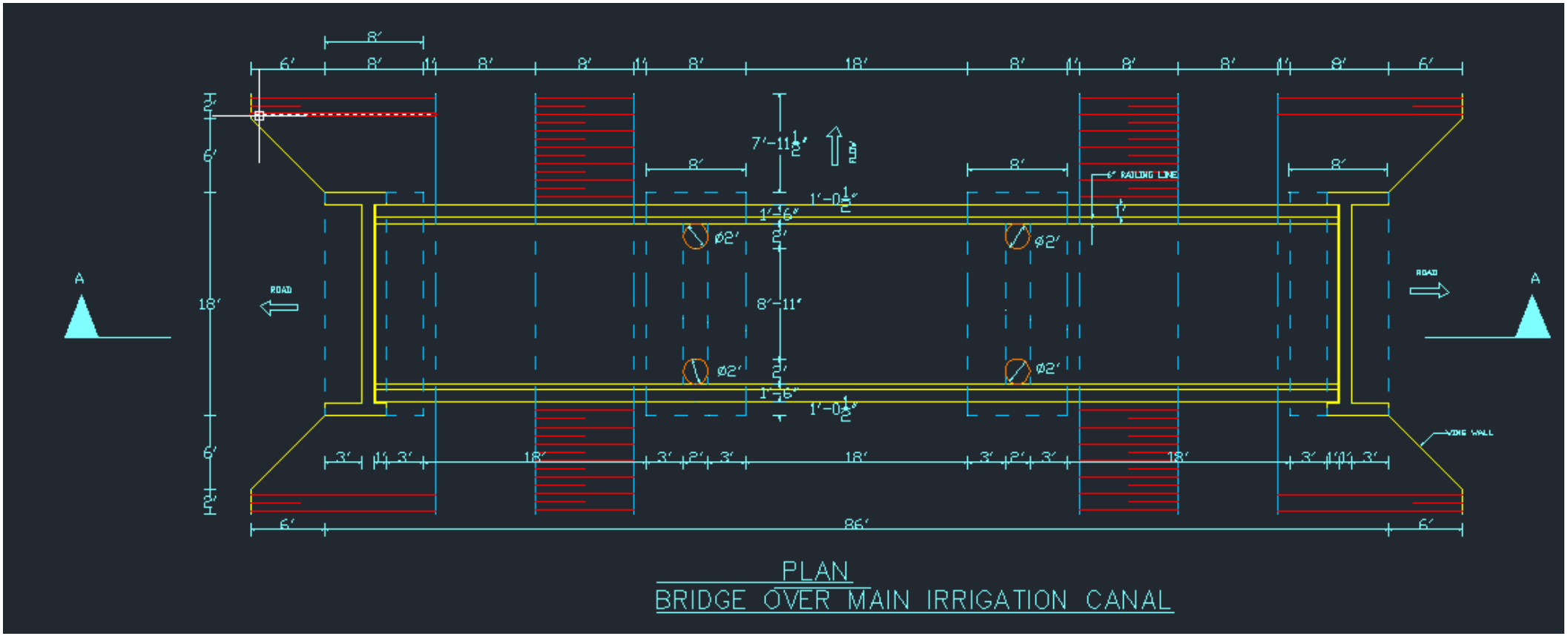

6'
6'
35'
6'
6'
8'
8'
8'
8'
RIVER FLOW
6' RAILING LINE
A
A
3'
4'
3'
18'
3'
2'
3'
18'
3'
2'
3'
18'
3'
4'
3'
6'
6'
86'
WING WALL
PLAN (BRIDGE)


10'-0"
78'-0"
10'-0"
RAILING
ROAD
ROAD
24'-0"
24'-0"
24'-0"
WATER LEVEL
37'-0"
20'-6"
9'-0"
8'-0"
4'-0"
10'-0"
17'-0"
18'-0"
23'-6"
10'-6"
3'-0" 2' 3'-0" 8'-0" 8'-0" 3'-0" 2' 3'-0" 3'-0" 2' 3'-0" 8'-0" 8'-0" 3'-0" 2' 3'-0"
5'-0" 8'-0" 18'-0" 8'-0" 18'-0" 8'-0" 18'-0" 8'-0" 6'-0"

SECTION A-A


CANAL BED LEVEL
TOP OF SIDE WALL(CANAL)
TOP OF RAILING
ROAD LEVEL(TOP)
OPEN
CANAL BED
HFL
PIERS
DRAINAGE
EARTH/SAND

SECTION A–A


PLAN
BRIDGE OVER MAIN IRRIGATION CANAL
ROAD
ROAD
A
A
86'
18'
6'
8'
18'
3'
2'
1'
ø2'
RAILING LINE
WING WALL

Cross Drainage Structures:

Cross drainage structures are constructed when there is a crossing of canal and natural drain, to prevent the drain water from mixing into canal water.

TYPES OF CROSS DRAINAGE WORKS

Depending upon levels and discharge, cross drainage works may be grouped into following types:

A. Canal crossing over a Drain

- An Aqueduct
- Siphon Aqueduct

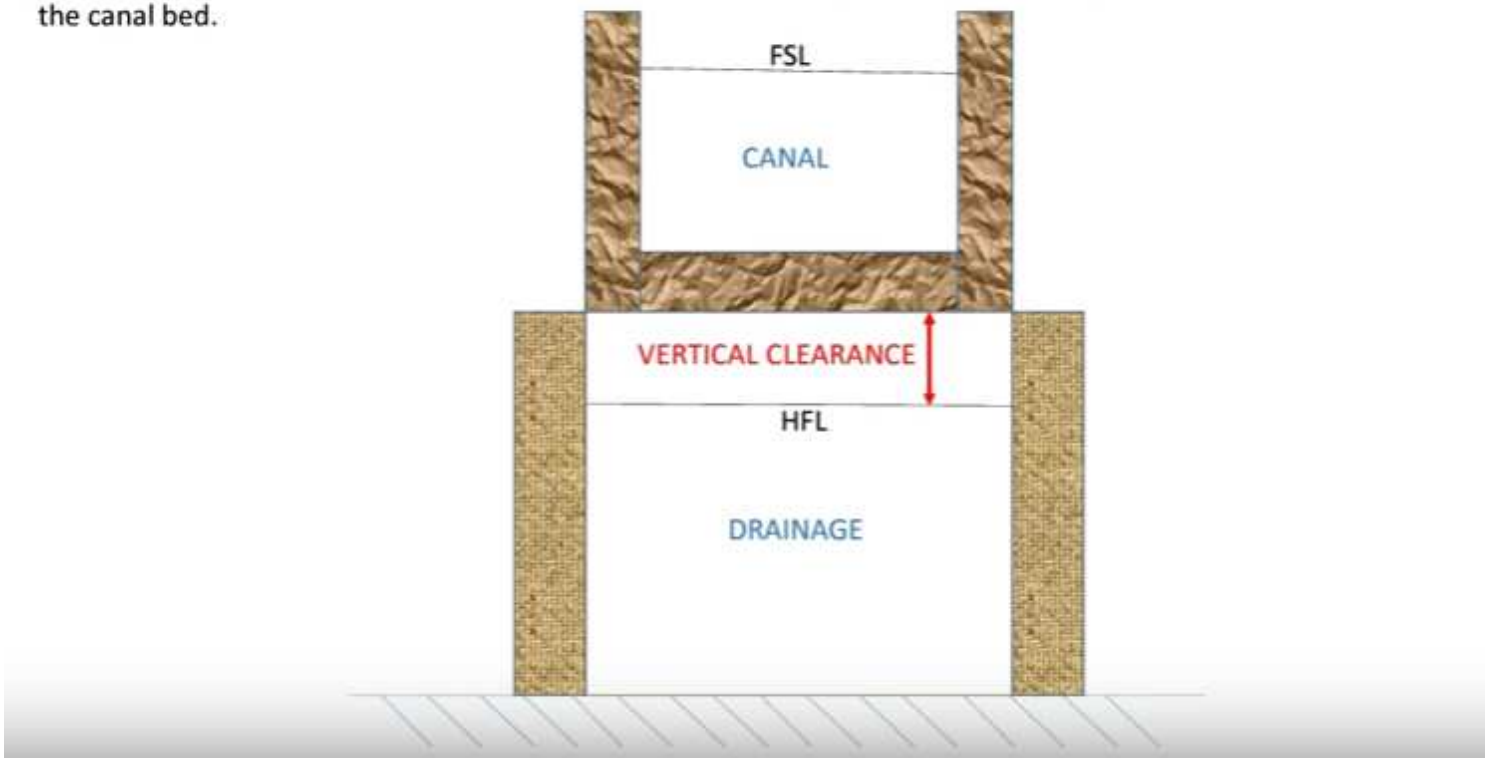
B. Canal crossing under a Drain

- Super passage
- Siphon

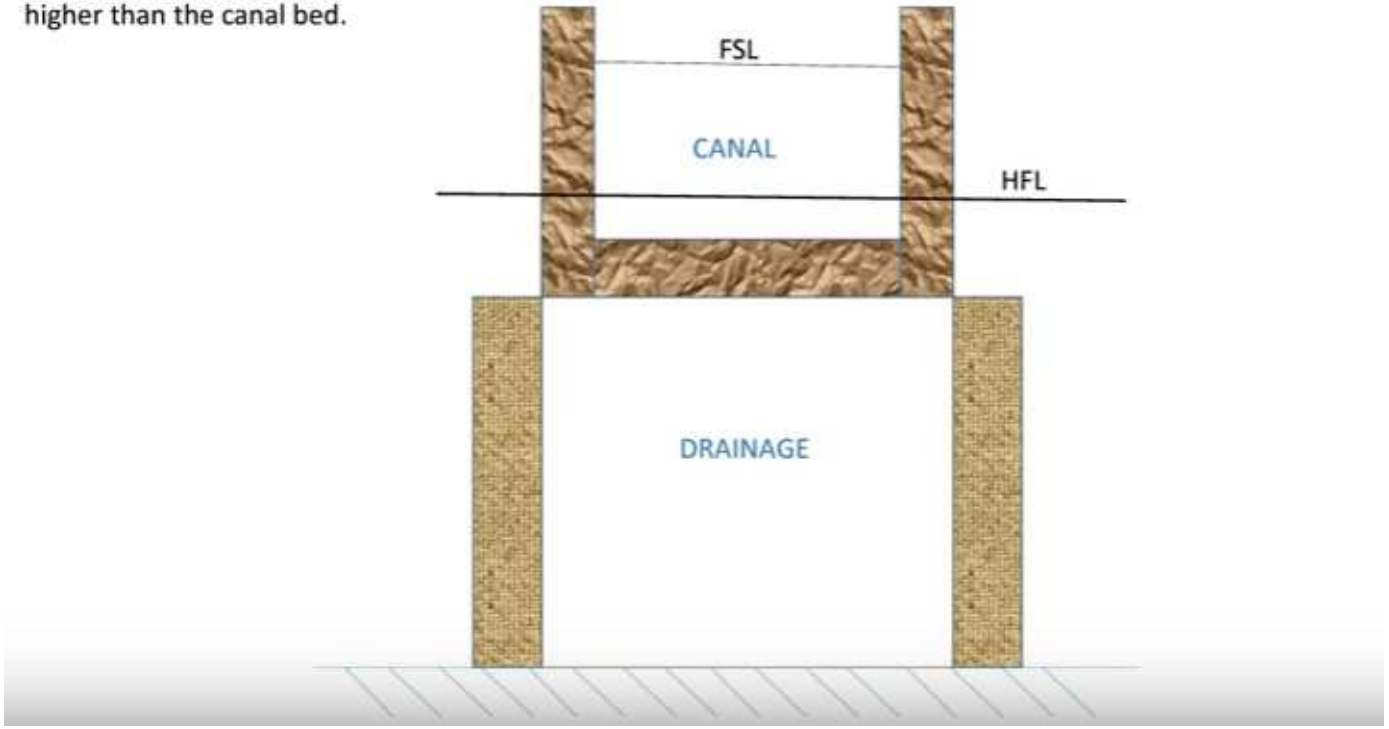
C. Canal crossing a Drain at the same level

- Level crossing
- Drainage Inlet and Outlet

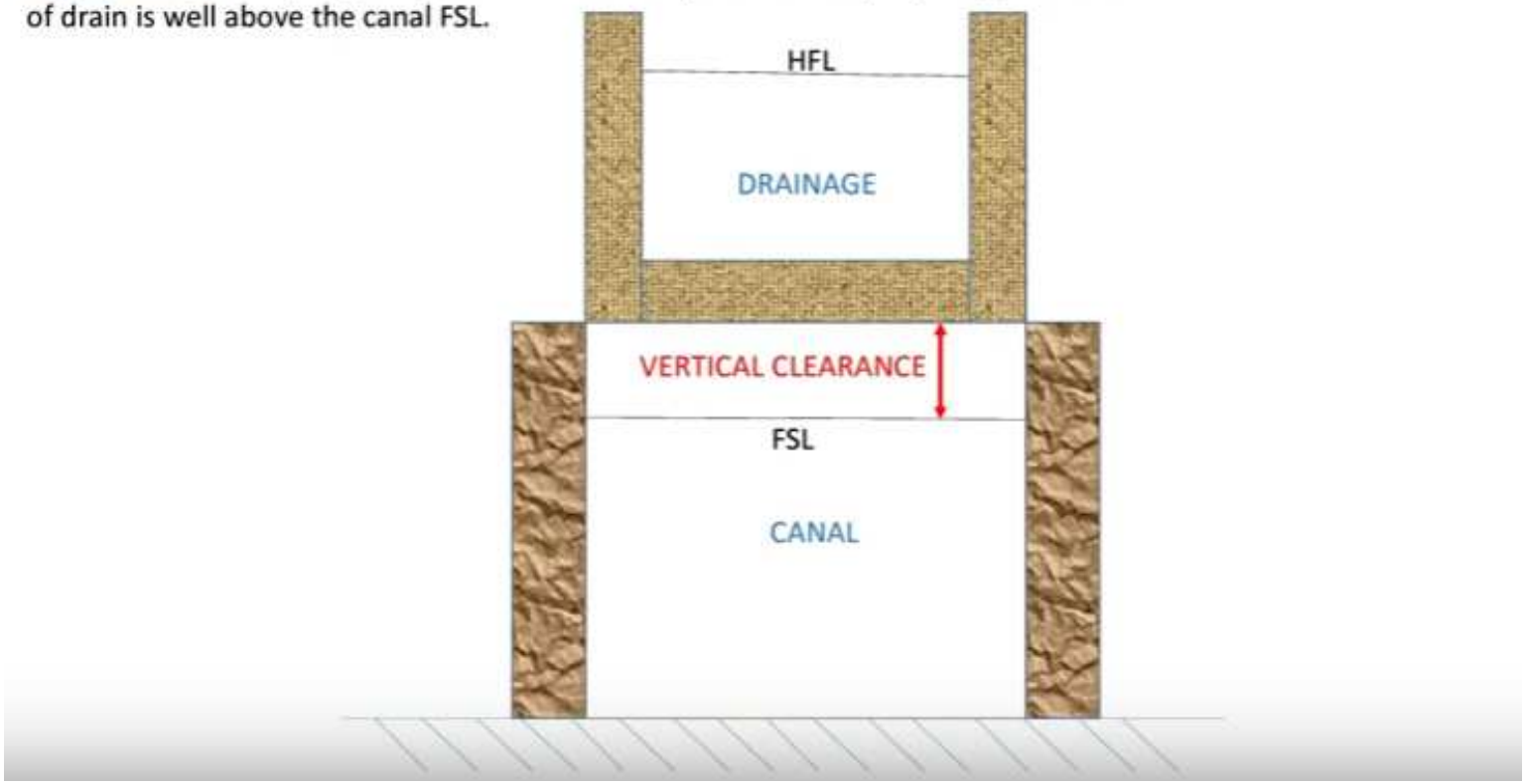
Aqueduct : In the aqueduct HFL (highest flood level) of drainage should remain lower than the level of the canal bed.



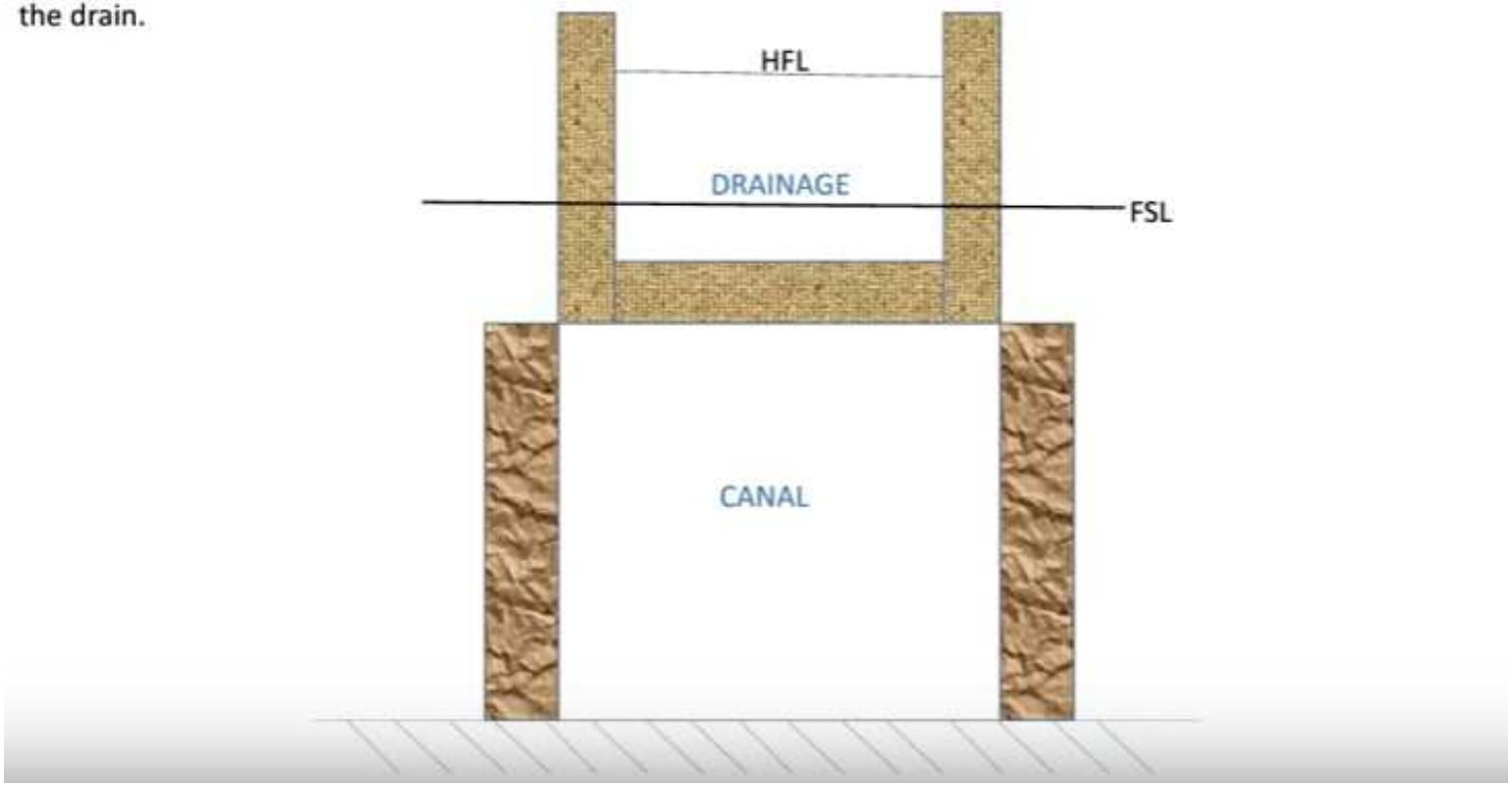
Syphon Aqueduct : A syphon aqueduct is constructed where the water surface level of the drain at HFL is higher than the canal bed.



Super passage : A super passage is reverse of an aqueduct. A super passage is constructed where the bed of drain is well above the canal FSL.



Canal Syphon : A syphon is constructed where the FSL (full supply level) of the canal is higher than the bed of the drain.

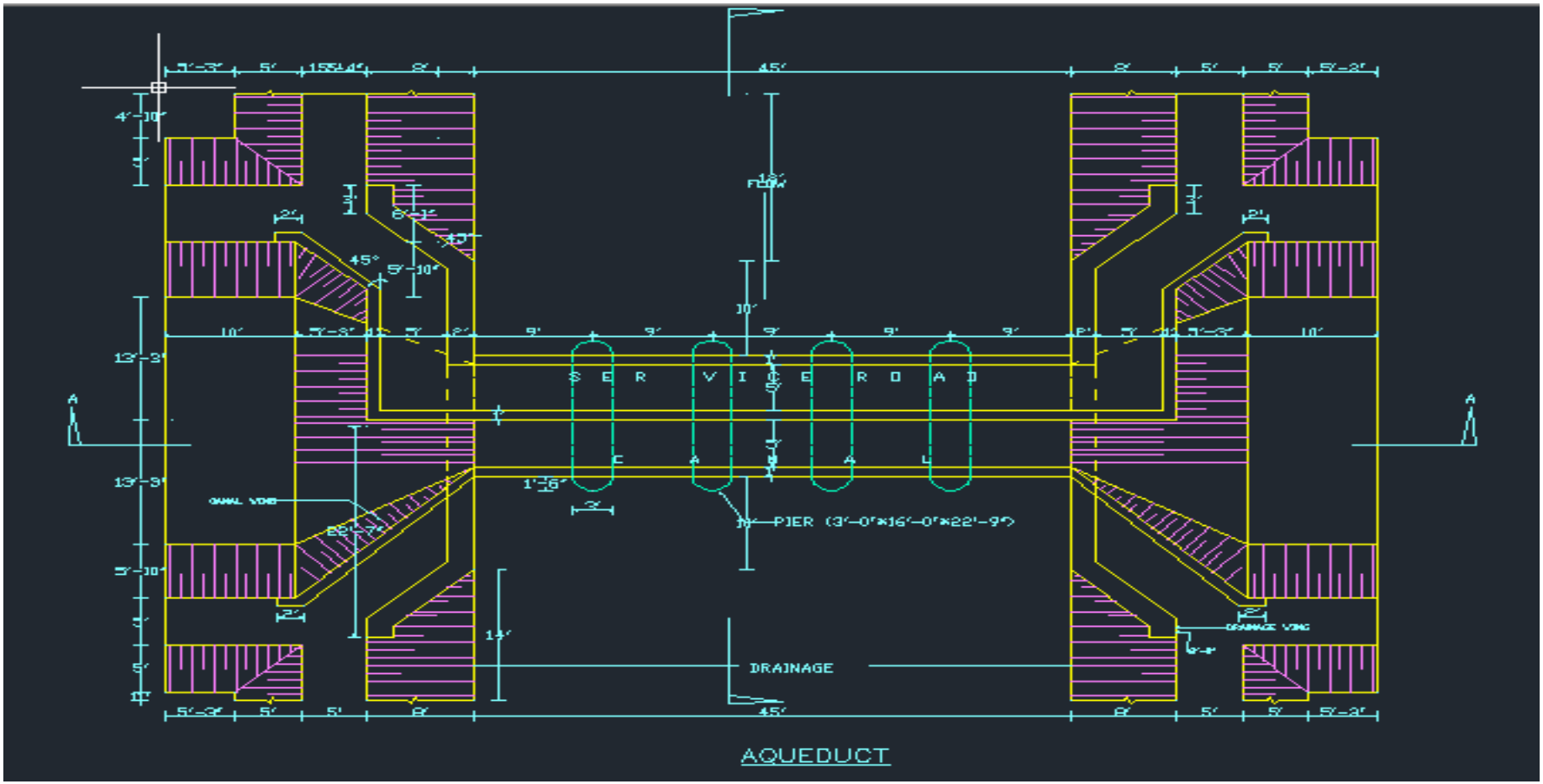


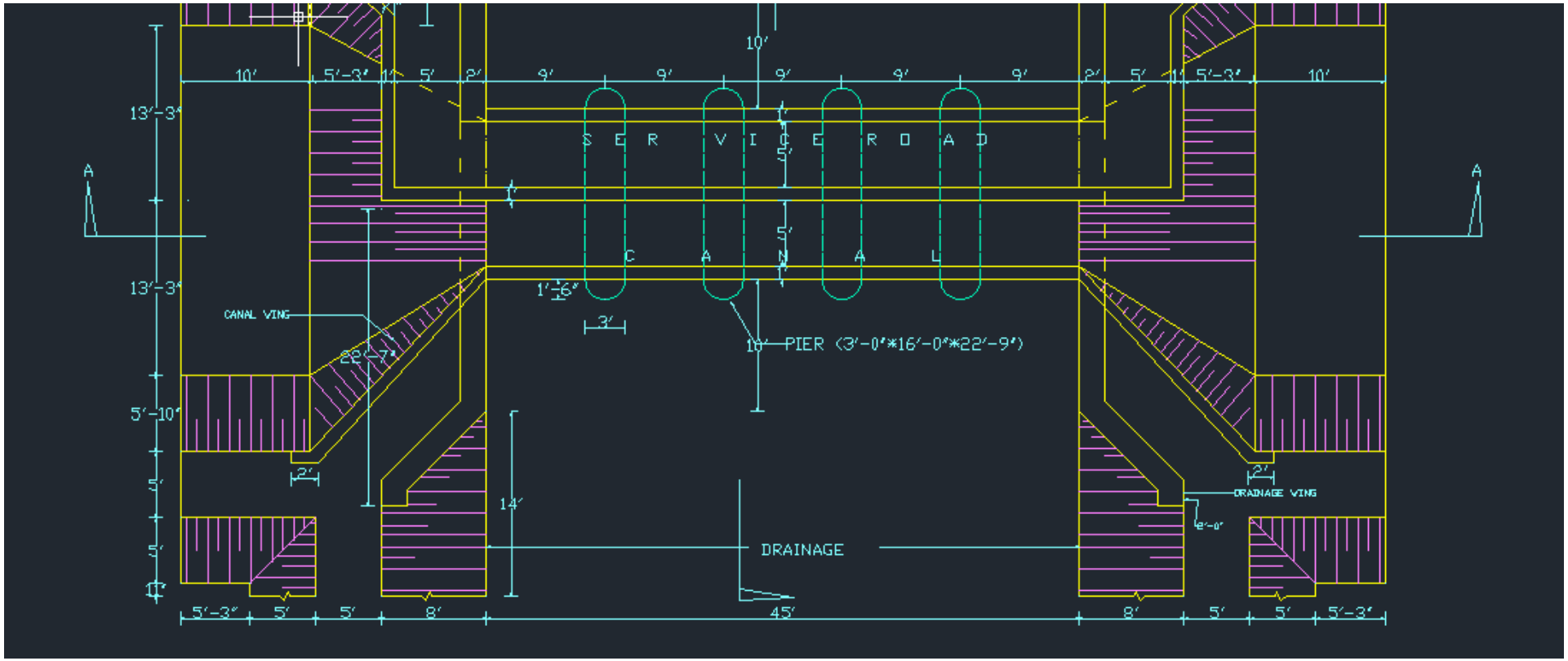
Also, known as Syphon.

Aqueduct:






SERVICE ROAD
CANAL
PIER (3'-0"x16'-0"x22'-9")
DRAINAGE
AQUEDUCT


SERVICE ROAD
CANAL
CANAL WING
DRAINAGE WING
DRAINAGE
PIER (3'-0"*16'-0"*22'-9")
10'
5'-3"
5'
2'
9'
13'-3"
5'-10"
1'-6"
3'
22°-7"
14'
45'
8'
A

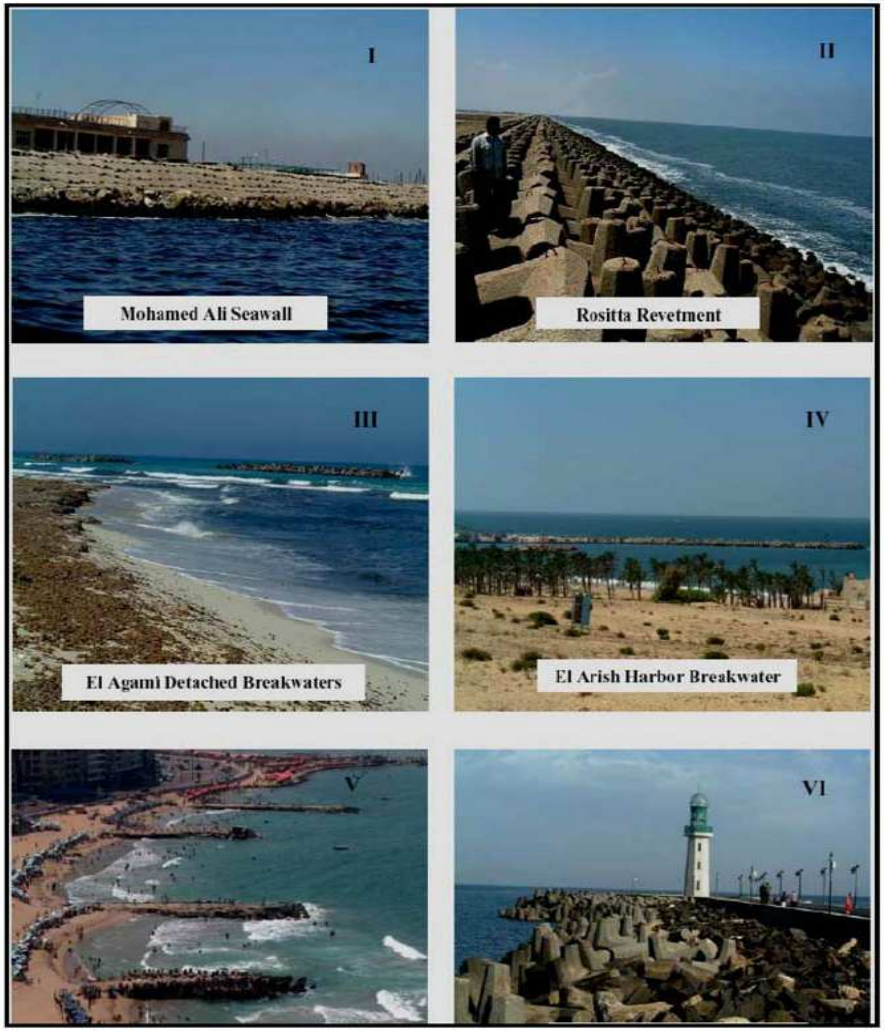
Coastal Structures:

They are also known as Shore Protection Works. Coastal structures are an important component in any coastal protection scheme. They directly control wave and storm surge action or to stabilize a beach which provides protection to the coast.



Different Types of Coastal Structures:

- ❑ Sea dike
- ❑ Seawall
- ❑ Revetment
- ❑ Bulkhead
- ❑ Breakwater
- ❑ Submerged sill
- ❑ Groin
- ❑ Jetty
- ❑ Training Wall
- ❑ Beach Drain
- ❑ Storm surge barrier



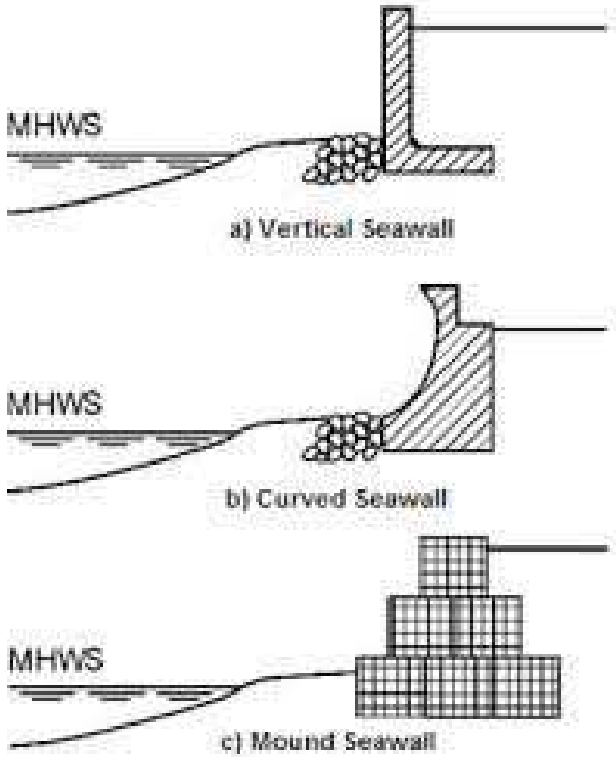
Sea dike:

A sea dike is a manmade structure designed to protect low-lying areas from flooding from the sea or ocean. They typically are designed with several components including a sand core, a watertight outer protective layer, toe protection and a drainage channel. Sea dikes are intended to withstand and resist water and wave action. They are widely used in countries with low lying geographies such as Vietnam, Bangladesh, Thailand, the Netherlands and parts of the United States.



Sea wall:

A seawall (or sea wall) is a form of coastal defense constructed where the sea, and associated coastal processes, impact directly upon the landforms of the coast. The purpose of a sea wall is to protect areas of human habitation, conservation and leisure activities from the action of tides, waves, or tsunamis.



Sea wall:





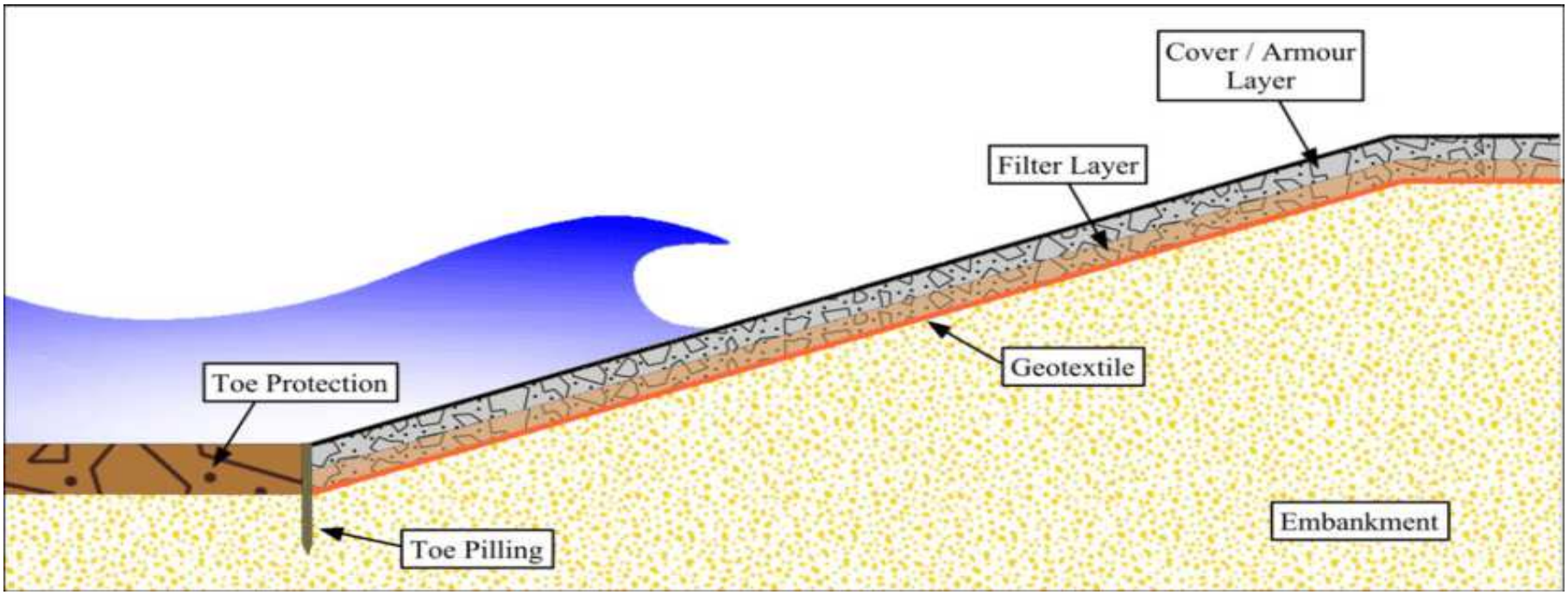


Revetment:

A revetment is a passive structure, which protects against erosion caused by wave action, storm surge and currents. The main difference in the function of a seawall and a revetment is that a seawall protects against erosion and flooding, whereas a revetment only protects against erosion. A revetment is thus a passive coastal protection measure and is used at locations exposed to erosion or as a supplement to seawalls or dikes at locations exposed to both erosion and flooding. Revetments are used on all types of coasts.



Revetment:


Cover / Armour Layer
Filter Layer
Geotextile
Toe Protection
Toe Pilling
Embankment

Bulkhead:

A retaining wall used as a form of coastal management, akin to a seawall, or as a structural device such as a bulkhead partition. Coastal bulkheads are most often referred to as seawalls, bulkheading, or riprap revetments.



These manmade structures are constructed along shorelines with the purpose of controlling beach erosion.

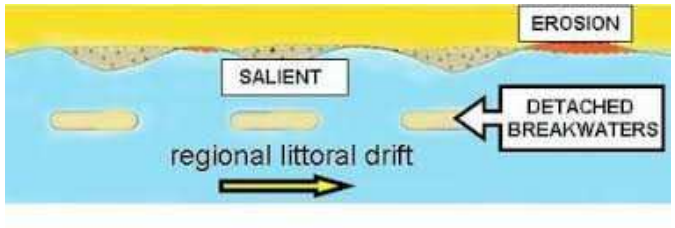


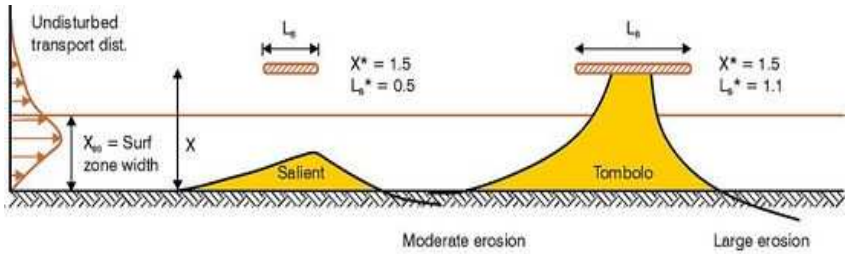
Breakwater:

Breakwaters are structures constructed near the coasts as part of coastal management or to protect an anchorage from the effects of both weather and longshore drift. Breakwaters reduce the intensity of wave action in inshore waters and thereby provide safe harborage. Breakwaters may also be small structures designed to protect a gently sloping beach to reduce coastal erosion; they are placed 100–300 feet (30–90 m) offshore in relatively shallow water.



Detached Breakwater:





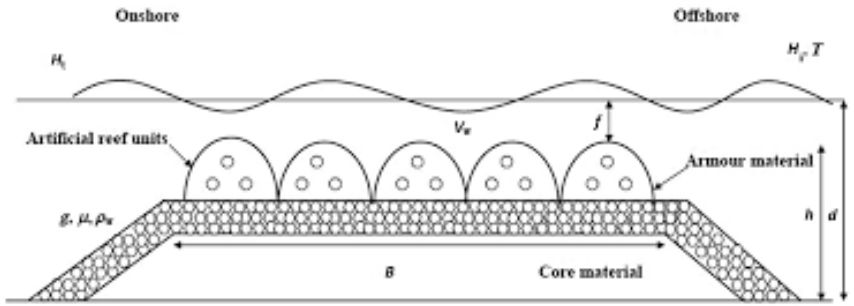




Reef Breakwater:

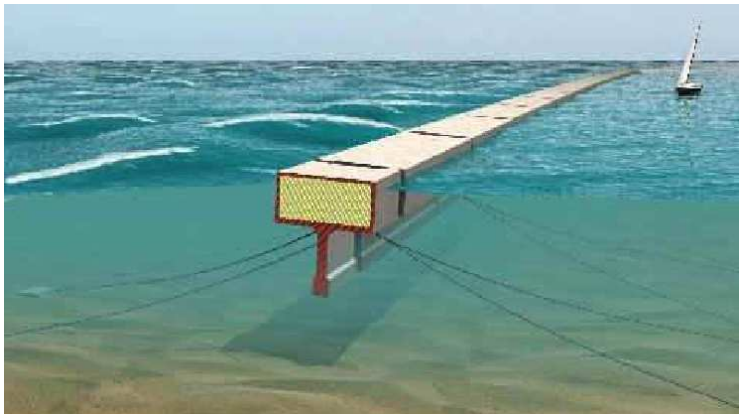








Floating Breakwater:



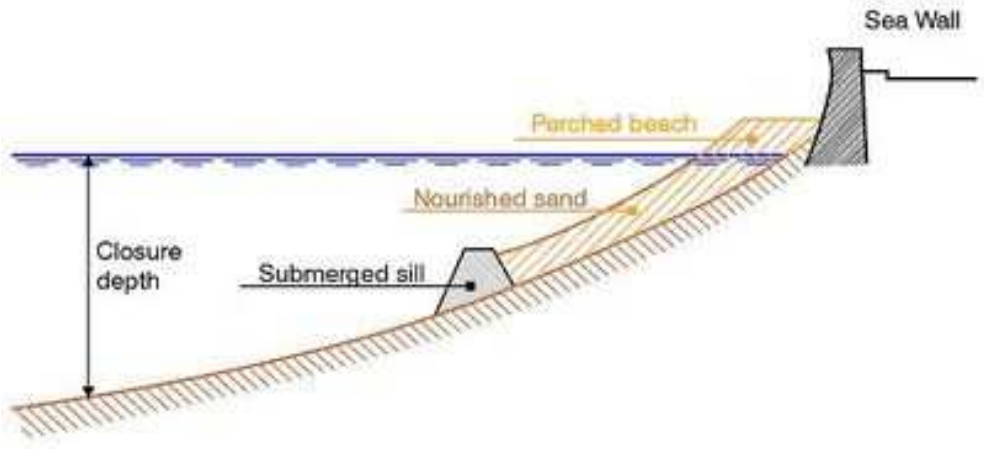






Submerged sill:

A perched beach provides a wider beach at locations where the natural beach has become too narrow and low due to the erosion of the coastal profile at a location, where the coastline is fixed. It will require large amounts of fill sand if the sand available for beach fill is of the same quality as or slightly finer than the natural sand because the it should, in principle, reach the closure depth in order to be stable. To avoid this, the submerged sill is introduced to support the lower part of the profile.



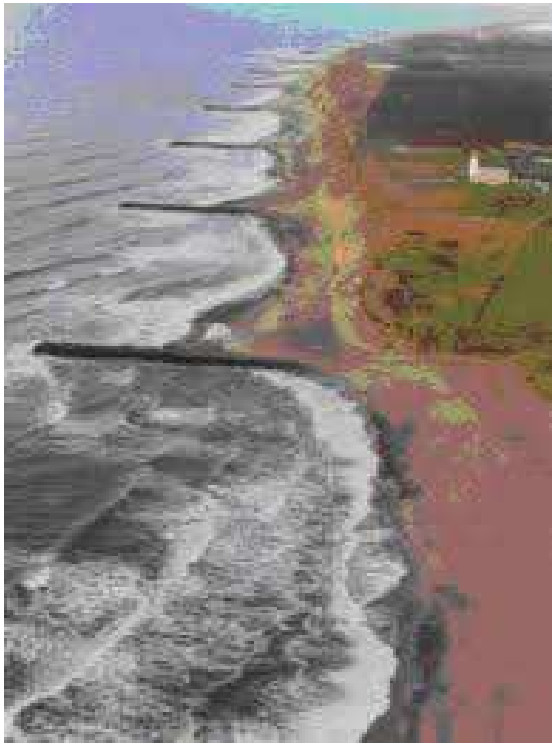
A sketch of a perched beach consisting of a beach fill (nourished sand) supported by a submerged sill.

Groyne/Groin:

Groynes are shore perpendicular structures, used to maintain updrift beaches or to restrict longshore sediment transport. By design, these structures are meant to capture sand transported by the longshore current; this depletes the sand supply to the beach area immediately down-drift of the structure.

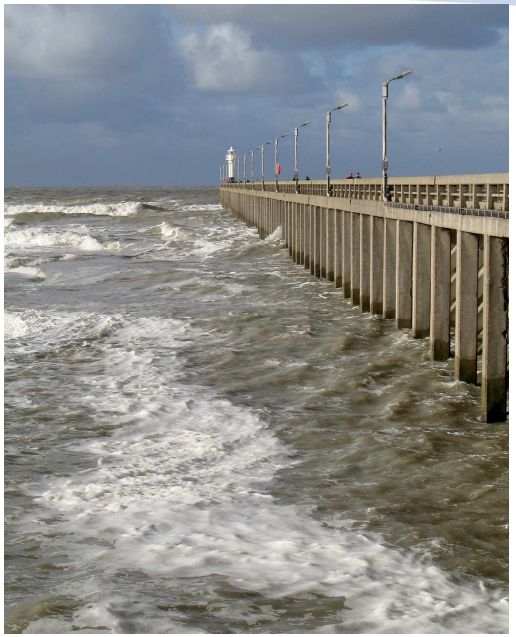






Jetty:

Jetties are another type of shore perpendicular structure and are placed adjacent to tidal inlets and harbors to control inlet migration and minimize sediment deposition within the inlet.









Training wall:

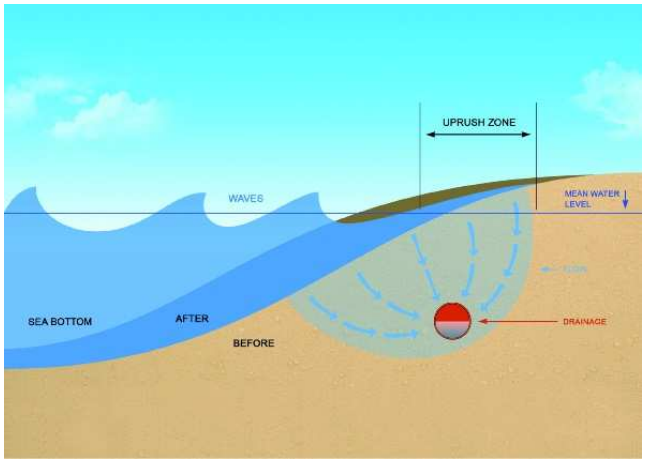
Training or entrance training refers to coastal structures built to constrain a river discharging across a littoral coast so that it discharges only where desired. Untrained entrances on sandy coasts tend to move widely and violently to discharge into the ocean, often upsetting those enjoying land nearby. A trained entrance often consists of rock walls that force the water into a deeper more stable channel. Trained entrances can provide better navigation, water quality and flood mitigation services, but can also cause beach erosion due to their interruption of longshore drift.

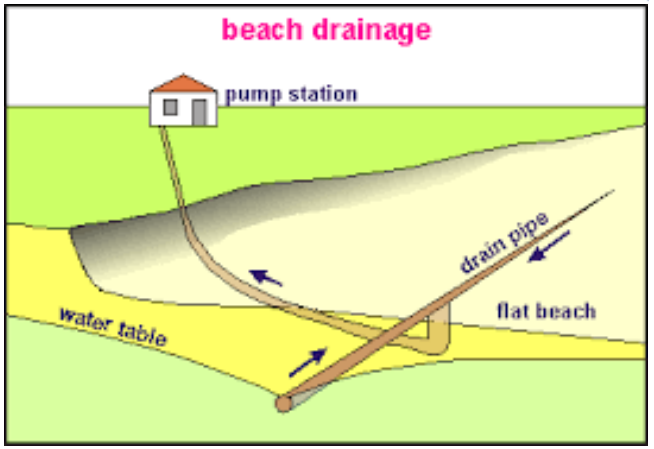


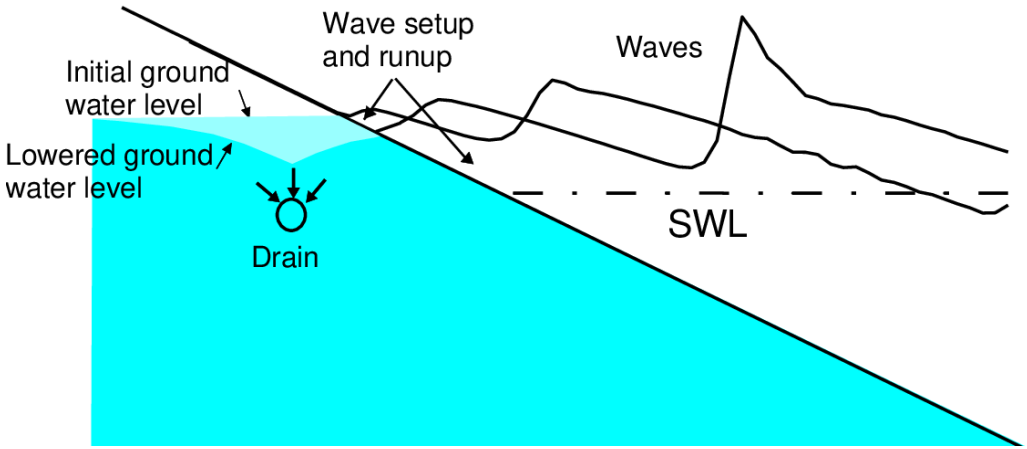


Beach drain:

A beach dewatering system or beach drain, is a shore protection system working on the basis of a drain in the beach. The drain runs parallel to the shoreline in the wave up-rush zone. The beach drain increases the level of the beach near the installation line, thus also increasing the width of the beach. Beach drainage is an example of a soft shoreline protection solution.







Storm surge barrier:

A flood barrier, surge barrier or storm surge barrier is a specific type of floodgate, designed to prevent a storm surge or spring tide from flooding the protected area behind the barrier. A surge barrier is almost always part of a larger flood protection system consisting of floodwalls, levees (also known as dikes), and other constructions and natural geographical features.





Harbor:

A harbor or harbour is a sheltered body of water where ships, boats, and barges can be docked. The term harbor is often used interchangeably with port, which is a man-made facility built for loading and unloading vessels and dropping off and picking up passengers. Ports usually include one or more harbors.



Thank You!!

ANY Questions?