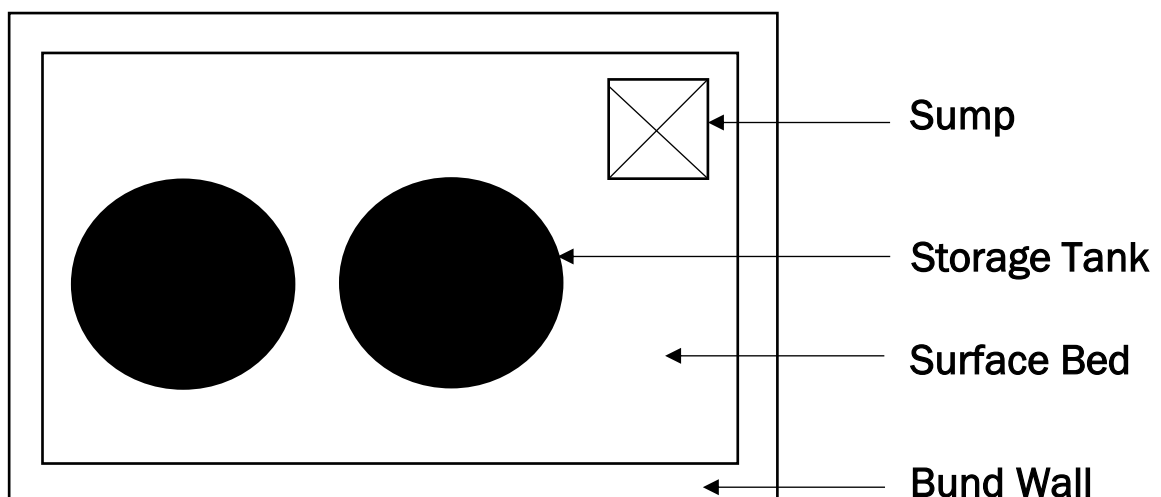


BUND DESIGN

ENSURING THE SAFE STORAGE OF HAZARDOUS LIQUIDS

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A bund is essentially a safety feature used in plant designs. The liquid which needs to be stored on site is usually stored in tanks of the required dimensions. The purpose of a bund is to retain the liquid which is stored in the tanks in the case of a spillage or tank failure. Designing a bund is an opportunity for interdisciplinary work because it requires input from a Process engineer, a Mechanical engineer, and a Civil engineer. The figure below shows a typical bund layout, and certain civil design aspects have been discussed in detail in this article.



Bund Volume

A bund is designed to house 110% of the volume of the largest tank in the bund. This allows for full containment should the tank leak and the entire volume of liquid is released. Should the bund house multiple tanks, the combined volume of 2 tanks can be designed for in the case of simultaneous failure. Many plants house liquids which are hazardous for humans as well as the environment. Therefore, it is important that this liquid is contained and can be pumped into a safe storage container before it infiltrates into the earth or before any humans come into contact with the substance. Therefore, a bund has a concrete surface bed so that no spillage may seep into the earth.

The bund wall needs to be designed to hold the specified 110%. It follows that for a lower bund wall, a larger floor area will need to be provided. However, for a larger wall height, a smaller floor area will be required. Depending on the height of this wall, it should be designed as a retaining wall, and the density of the stored liquid should be considered. Appropriate reinforcing should be provided.

Bund Wall Dimensions

Safe Passageways

It is important to note that a bund needs to be accessible without a door being added into the walls (in order to prevent leakage out of the bund in the case of a spill). Therefore, staircase access should be provided over the bund wall with a landing at the top. Enough space should be provided around the tanks for personnel access (i.e., 1m around the tanks).

In order to allow for easy extraction should there be a leak, or should there be a rainstorm, a reinforced sump should be provided in the corner of the bund. The surface bed of the bund should be sloped towards this sump. Pumping from this sump should be considered. One option is to use a manual pump in the case of a full sump. However, automated pumping can be designed for.

Sump Design

Epoxy Coating & Tank Bases

Depending on the nature of the chemicals housed, an epoxy should be used to coat the bund area. The inner surface area of the bund walls, and the slab, need to be coated with this epoxy. However, for further protection, the outer walls of the bund may be coated as well, upon specification from the Client. The epoxy should be specifically chosen for the provided chemical specifications of the stored liquid. Bear in mind that some chemicals that may be housed can be corrosive. In this case, minimal steel should be used in the design, and a corrosion-resistant coating should be applied to the staircases if a steel staircase is used. Tanks should be placed on top of tank bases. This provides a foundation designed for the specific loading of the tank, and it allows for the tank to be slightly raised off the surface bed. This is further protection to the tank in the case of a leak.