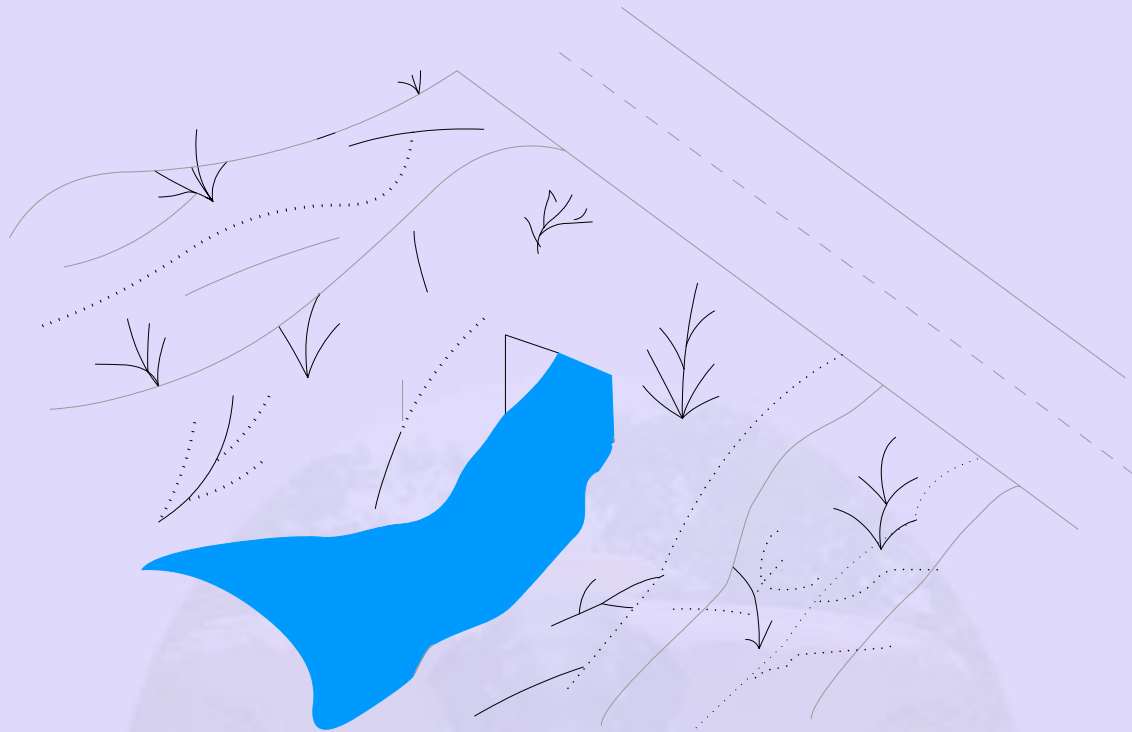


## CULVERTS



### Highway Culverts

A culvert is a (small) bridges structure of less than 6 meter span between faces of abutment and does generally have two spans. A culvert must be large enough to carry the flow without any heading up at the entrance. To provide for this, culverts should be assumed as flowing only half full when the approach channel is wide and shallow; if the banks are steep and the channel is narrow  $3/4$  th full flow may be taken. For arched type as lying half-way between the springing and the crown. But on the other hand it is not economical to make a culvert unnecessarily high with extra approach embankments high abutments, headwalls and walls, for retaining deep over-fills. The depth of a culvert should be small, and it does not matter much if the opening stops appreciably below the formation level of the road and the inlet is sometimes submerged; instead the length should be increased suitably so that the road embankment, with its natural side slopes is accommodated without high retaining headwalls. The Heading up of the water at the inlet should not go higher up than predetermined safe level, nor overtop the road embankment. The fixing of this level is the first step in the design. Where the masonry abutments supporting arches or slabs are designed for culverts functioning under

"head", bed pavements must be provided. And, in all cases, including pipe and box culverts, adequate provision must be the exit against erosion by providing curtain walls. To get the best advantage of the capacity of a culvert the shape of the entrance should be such as to cause the least amount of restriction to the free flow of the water. This can be achieved in the case of face walled culverts by means of pitched aprons at both ends and pitched trained banks with outwards curved chords which make an angle of  $70^\circ$  with the face wall. Slight chamfering or bell-mouthing at the inlet ends of pipes or barrels will increase their capacity of discharge. Further increase in the rate of flow is obtained in pipe culverts by fixing the invert some what below the natural bed levels of the stream.

