

## Culvert and Problems Leading to its Failure

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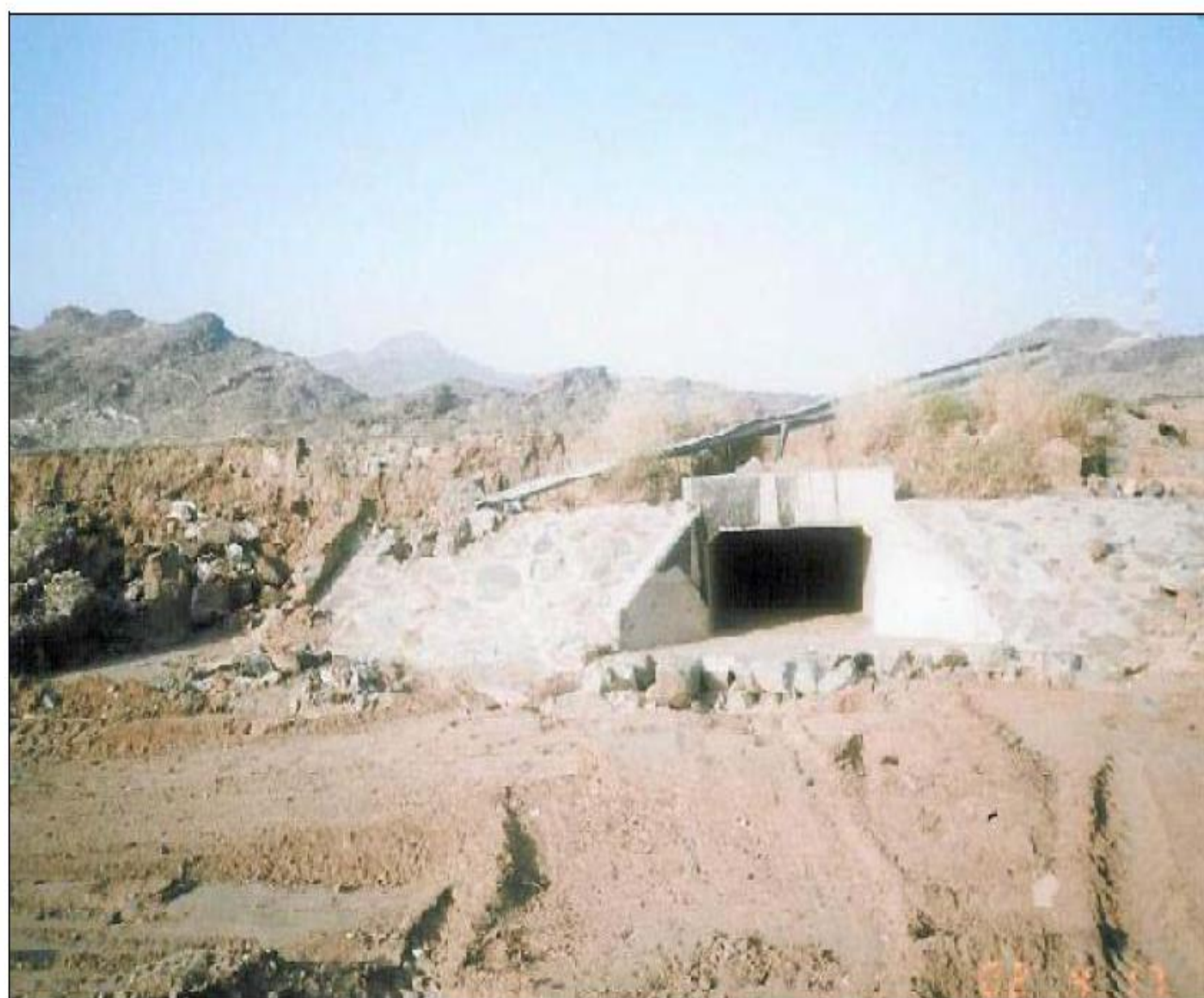
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### Abstract

A culvert is a opening under a road which allows water to drain flood water. Culverts are a vital part of the system used to drain roads and highways, keeping them safe and extending their lifetimes. Culvert are considered to be means used to avoid the damages of the floods on the roads. Because of the risk of floods and rainwater against the roads and the infrastructure in cities, the research aims to help avoid theses risks by correct a standard design procedure for different parts of culvert and avoiding the mistakes in construction.

### Objective

- Compare between what we learned and what is existing in the field for such type of important structures.
- Role of culvert in highways protection.
- The common mistakes in culvert construction.



(Figure 2) Effect of size of culvert  
(Location: Makkah – Arafat road no.2)



(Figure 1) Effect of floods on roads  
(Location: Makkah – Arafat road no.2)

### Significance to the Kingdom

*The kingdom is depended mainly on highways in transportation and these highways are exposed to flood disaster from year to year . So , many culverts are constructed through valleys to protect highway infrastructures from these floods. Errors in design or construction of such types of structures may cause catastrophe.*



(Figure 3) A level of culvert higher than the level of ground surface.  
(Location: Makkah – Arafat road no.2)

### Description

People who are in charge of city management usually pay attention to the top necessities and classify them in accordance with a priority scale. Among the top priority subjects in today's world is to have an extensive system to reduce the risk of floods produced from the gathered rainwater in the bottom of valleys. A part of this system of draining water and reducing floods effects is to drain water through culverts (channel pipes...etc.) and make the roads pass above them. The culvert is made from different types of materials like steel, polyvinyl chloride, and concrete. There are many types of culvert among them are:

- Pipe Single or multiple
- Box culvert single or multiple

The following figures show some of common used culvert in Saudi Arabia. The size of the culvert depends on the amount of water which flows through it.

### Drawing



Examples of multiple vents box culvert



One vent box culvert