

**Kurdistan Region**  
**Salahaddin University-Erbil**  
**College of Engineering Water Resources Department**



# **Design of Chamrga Earth Dam**

**Research Project**

Submitted to the department of water resources engineering in partial fulfillment of  
the requirement for the degree of BSc. in hydraulic engineering

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(2023-2024)



**This study dedicated to**

First and foremost, many thanks to gracious Allah for giving us strength and wisdom throughout this work. Then our precious parents, siblings, our supervisor (Mrs. Tara H. Aurahman) for her continuous support and advice throughout this investigation.

Also dedicates to everyone who might find this work interesting.

## Supervisor Certificate

I certify that the engineering project titled "**Design of chamrga earth dam**" was done under my supervision at the Water Resources Engineering Department-College of Engineering-Salahaddin University-Erbil. In the partial fulfillment of the requirement for the degree of Bachelor of Science in Water Resources Engineering.

**Supervisor**

Signature:

Name: Lect. Tara H.aurahman

Date:     /

## **Abstract**

The presented paper describes a dam project which constructed in **chamrga village**. After considering all investigation types ( hydrological investigation , geological investigation , engineering survey ) which done at the site , that selected to construct the dam .the dam type is earth fill dam , it is selected according to the availability of the material at the area around the site , after studying all aspects that affect the constructing the dam , the cross section chosen consist of shell and core due to availability of the materials , and this type of cross section is the most famous cross section that chose for dams around the world. (Chimney and cut off and safety against seepage).

# Chapter One

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## INTRODUCTION

### 1.1 Definition

Earth-fill dams, sometimes referred to as rolled-earth dams, earthen dams, or just plain earth dams, are built as a straightforward \_embankment of well-compacted earth. While a homogenous rolled-earth dam may have a drain layer to catch seep water, it is made entirely of one kind of material. A zoned-earth dam is composed of discrete, differentiable sections or zones, usually a locally abundant shell encased in a waterproof clay core. In order to collect and remove seep water and maintain the integrity of the downstream shell zone, modern zoned-earth embankments use filter and drain zones. A hydraulic fill was used in an antiquated zonal earth dam building technique to create a watertight core. Similar to a rock-fill dam, rolled-earth dams can also use a waterproof facing or core. The frozen-core dam is an intriguing form of temporary earth barrier that is sporadically utilized in high latitudes. It is composed of pipes that circulate a coolant to keep a watertight area of permafrost within.

Since the beginning of time, earth dams have been constructed to store water for irrigation. But the extent, if not the height, of these dams was not limited. We are currently building earth dams at previously unheard-of scales. Previously deemed unsuitable for the construction of dams are now being utilized. Building higher dams with better designs and more creative elements has been made possible by advancements in soil mechanics, earth dam behavior research, and improved construction methods. As a result, an earth dam currently stands as the highest dam in the world.

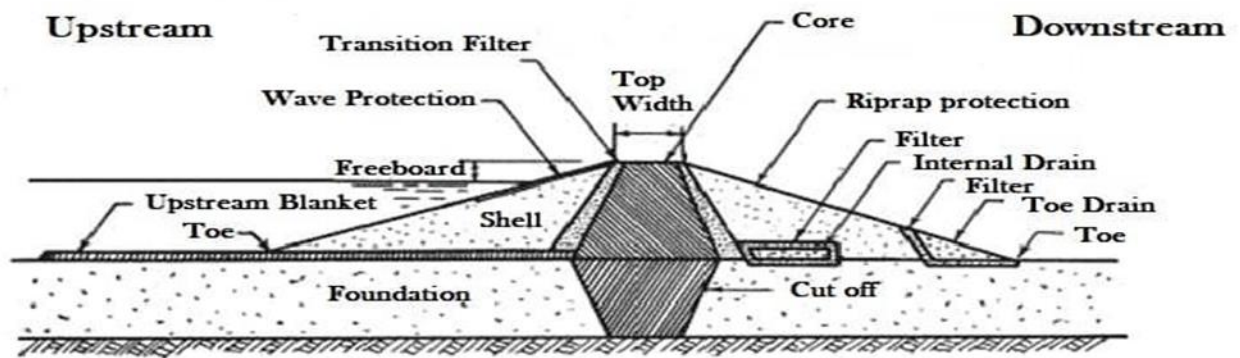


Figure 1.1 Earth dam component

## 1.1.2 BASIC COMPONENTS OF AN EARTH DAM

### 1.Foundation

2.Core or (membrane)

3.Shell

4.Transition Filter

5.Internal Drain

6.Toe Drain

### 1.2 Mechanism for making section of dam

- Homogeneous earth dams
- Non-Homogeneous (zoned) earth dams

### 1.3 Types of the Earth dam

Homogeneous Embankment type

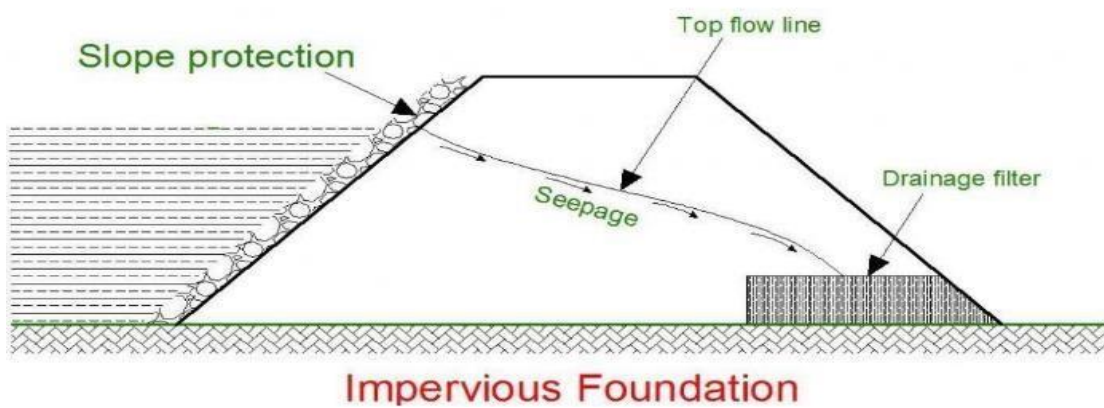
Zoned Embankment type

Diaphragm type



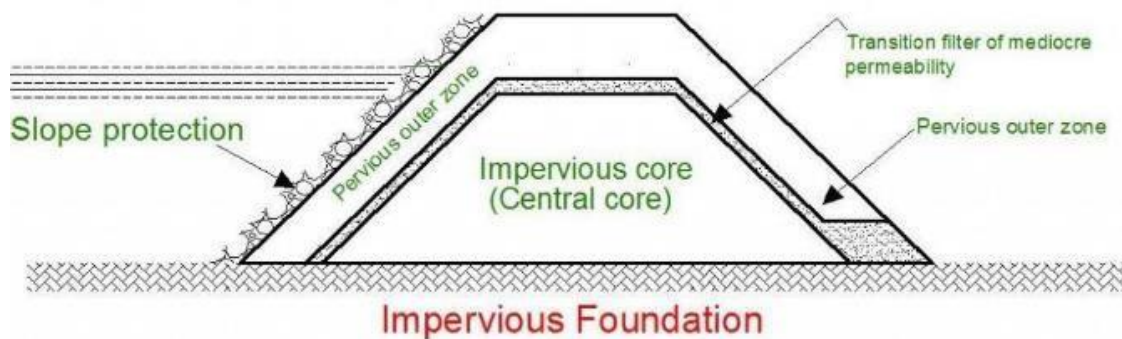
### 1.3.1 Homogeneous Earthen Dam

These dams are constructed with uniform and homogeneous materials. It is suitable for low height dams (up to 10m). These dams are usually constructed with soil and grit mixed in proper ratios. The seepage action of such dams is not favorable, therefore, for safety in case of rapid drawdown, the upstream slope is kept relatively flat (3:1). Homogeneous section is modified by constructing rock toe at the downstream lower end and providing horizontal filter drain.



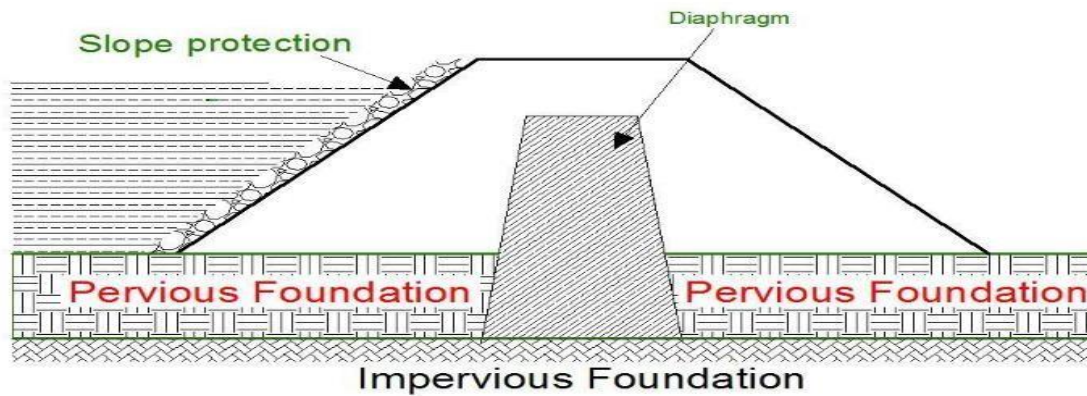
### 1.3.2 Zoned Embankment

These are dams with the central portions called core or hearting made from materials which are relatively impervious. The thickness of the core wall is made sufficiently thick to prevent leakage of water through the body of the dam.



### 1.3.3 Diaphragm

This kind of dam is made of permeable materials and has a thin, impermeable diaphragm in the middle to stop water seepage. Any impermeable material, including masonry, cement concrete, and impermeable clayey soil, can be used to create the thin impermeable diaphragm. Either the upstream face or the Centre of the dam can house the diaphragm. The thickness of the impermeable core or diaphragm determines the primary distinction between zonal and diaphragm types of dams. The diaphragm has a maximum thickness of 10 m.



### 1.4 Objectives of project