

# Construction Technology 3

## Topic: Earth Retaining Wall



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# Introduction

What is earth retaining wall?

- structure that retains earth behind it and prevent soil from sliding and eroding away.
- used to bound soils between two different elevations often in areas of terrain possessing undesirable slopes or in areas where the landscape needs to be shaped severely.
- Such as roadway overpasses



# Type of Retaining Walls

- 1.) Gravity Wall
  - Crib wall and Gabion Wall
- 2.) Embedded Wall
  - Diaphragm Wall
- 3.) Hybrid Wall
  - Tailed concrete block



# Crib Wall ( Gravity Wall)



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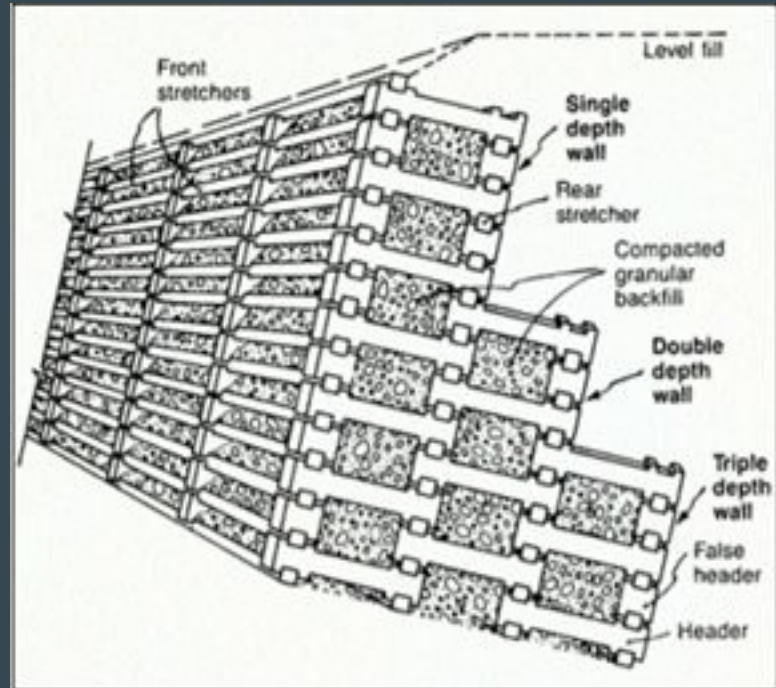
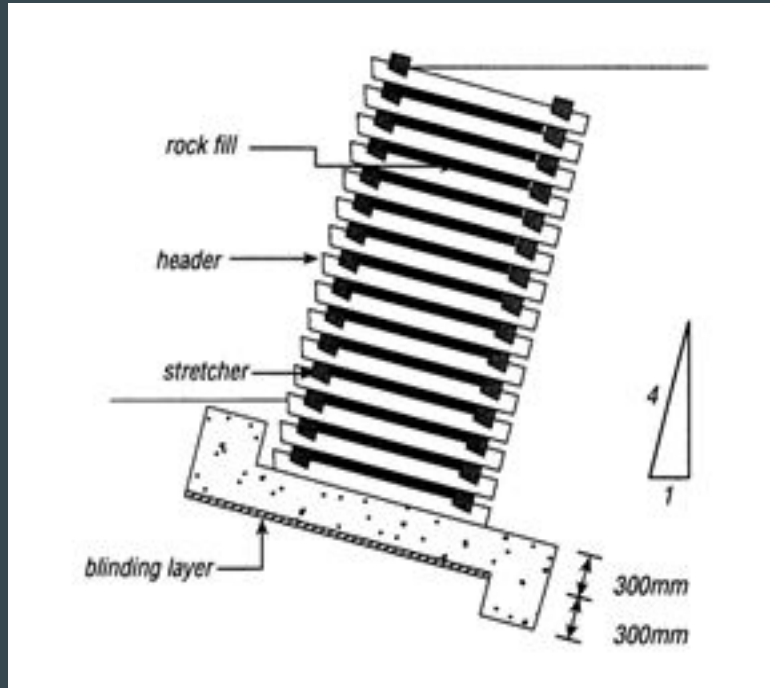
## What is Gravity Wall?

- Are walls that rely on their huge weight and geometrical dimensions to retain the material behind it and achieve stability against sliding, overturning and failure.
- Can be made of concrete, brick, masonry or block.

# Characteristics of Crib Wall

- One of the oldest gravity wall systems.
- Is a cell-based retaining system.
- It resists earth pressure by a combination of its own weight and friction on the effective back of the wall.
- They are assembled and stacked together with the infill material
- Can built economically 6 to 40 feet or even higher
- Walls can be straight, curved or angled and incorporate landscape features if required.
- Normally used for commercial wall, landscape wall, embankment, slope stability and etc.

# Component of Crib Wall



# Material of the Block Unit

## 1.) Pressure Treated Timber

- Suitable for rural roads where it blends well with the surroundings
- Long-term durability of such units should be critically considered





# Material of Block Unit

## 2.) Precast Reinforced Concrete

- Mostly used for building crib walls
- Plain concrete units are not recommended to use for crib walls due to the ease of cracking.



# Material of Block Unit

## 3.) Recycle Waste Plastic

- Block unit made of 100% recycled waste polymers



# Requirement and Consideration

- Units must be spaced at close intervals so as the infill doesn't easily spill through the units
- Stretcher must be parallel to the wall face while headers must be perpendicular to the wall face.
- Before constructing the crib wall, it is necessary to confirm the dead and live load. Load applied to the crib walls directly affects external and internal stability of the crib walls.
- Sealing the top of the crib wall with a compacted clay plug to minimize entry of surface runoff.

# Advantages of Crib Wall

- Can be built by hand and do not require skilled labor
- Easily and quickly erected.
- Crib wall section can be pre-cast and transported to site and held in stock for emergency works.
- Crib walls can save up to 30% of construction cost if the height of crib wall is 2 to 12 meters.
- Aesthetics



# Disadvantages of Crib Wall



- Usually requires a concrete base
- Timber crib is not highly durable.
- Precasting works needed for concrete walls and transport to site.
- Not very economical for short lengths of wall.
- Not particularly well suited to rapidly varying base level.

# Manufacturing of Crib Wall Unit

- Usually made of 20mpa concrete and grade 300 reinforcing steel and then cured for a minimum of seven days.
- They are wet cast and vibrated in precise steel molds, not pressed to give the greater durability required to comply with the Building Code.



# Construction Process of Crib Wall

Excavated and removal of all loose rock and soil as required for crib wall slab footing



Control line for crib wall set out is carried out by a registered surveyor is used to set the front line to provide clear working space



As the wall goes up, work progresses from either the back or front depending on the property line and site restrictions

# Construction Process of Crib Wall

Stretchers and closers are laid the length of the wall while headers are placed with the H-groove shape interlocking on the front and rear stretchers and closers.



Agricultural drainage pipe is then placed at the rear base of the wall with outlets.



Infill is either crushed rock or other granular material, with compaction carried out manually.



# Construction Process of Crib Wall

On completion of the wall, the top front stretchers may be glued in place with epoxy mortar adhesive to prevent displacement.



Backfill crib wall with the specified/approved crushed rock around header components.



# Case Study I

Lisarow Aged Care Facility - Central Coast, NSW



Location: Lisarow, New South  
Wales, Australia

Max height: 5.875m

Length: 156 meter

System: Precast concrete crib  
wall

Construction Duration: 4 Weeks

# Challenges Faced During Construction

- Current stage consisted of demolition of the existing infrastructure, earthworks, foundation works, a new multi-storey building, new access road, landscaping and replacement of existing timber gravity retaining walls.
- Excavated embankments would not be compromised due to inclement weather conditions experienced throughout the project



# Solution

- Utilized both single depth and double depth construction.
- Single header construction was used in front of the stable gravity retaining walls, while double header construction was used to retain the embankment where the failing timber crib walls were to be removed.
- Each respective completed section of crib wall was then backfilled with 40 to 70mm basalt aggregate up to underside of soil plug, followed by soil batter installation



# Advantages of this Crib Wall

- The wall also incorporated a nicely constructed radii around existing trees and other obstructions
- The high quality precast concrete components provide for long term durability and will not warp easily.



# Case Study II

Center Parcs Woburn Forrest, UK



Location: Center Parcs, Woburn  
Forrest, UK

Max. Retained Height: 8.8m

System: Ecocrib system reinforced soil

Face area: 1000m<sup>2</sup>

Construction time: 5 weeks

# Challenges Faced During Construction

- Design of 3 large multi-purpose leisure complexes of over 40,000m<sup>2</sup>
- Conservation of surrounding forest
- Able to support the Plaza hotel car park and a linking bridge



# Solution

- Providing a one-stop-shop solution consisting of the design, supply and installation over 1000m<sup>2</sup> of geogrid reinforced soil Ecocrib
- Site-won fill material (Woburn sand) was used between horizontal layers of geogrid reinforcement helping further to reduce waste and provide a highly cost effective solution





# Advantages of this Crib Wall

- 1000m<sup>2</sup> of reinforced soil Ecocrib used in the scheme equivalent to 18 million plastic bottle tops or 75 tons of plastic waste diverted from landfill and no waste is created during manufacture or installation.
- Reduce the immediate and long-term environmental impact of this new Center Parcs development



**THE END**

**THANK YOU.**