

TEACHING LEARNING MATERIAL

GANDHI SCHOOL OF ENGINEERING, BHABANDHA

BRANCH- CIVIL ENGINEERING
SUBJECT- HIGHWAY ENGINEERING

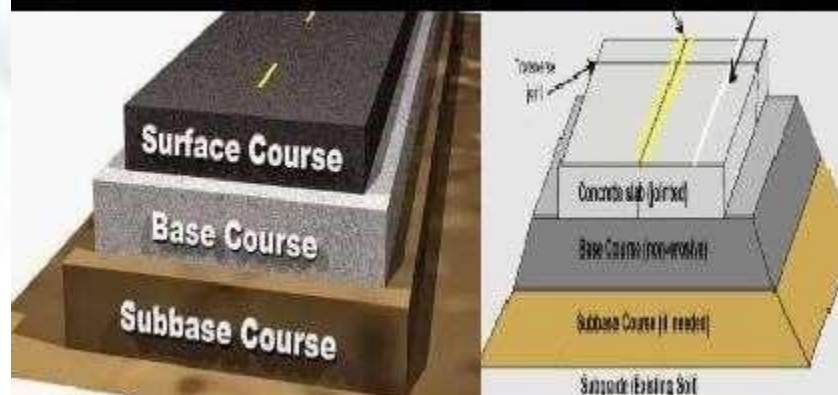
SEMESTER- 4TH

PREPARED BY- Er. SRIDHAR SAHU

Standards values of Road way width recommended by IRC (Indian Road Congress)

Sr no	Road classification	Plain & Rolling area	Mountainous & steep area
1	National highway & state highways i) Single lane ii) Two lane	12.0m 12.0m	6.25m 8.80m
2	Major district roads i) Single lane ii) Two lane	9.0m 9.0m	4.75m ----
3	Other district roads i) Single lane ii) Two lane	7.5m 9.0m	4.75m -----
4	Village roads – Single lane	7.5m	4.00m

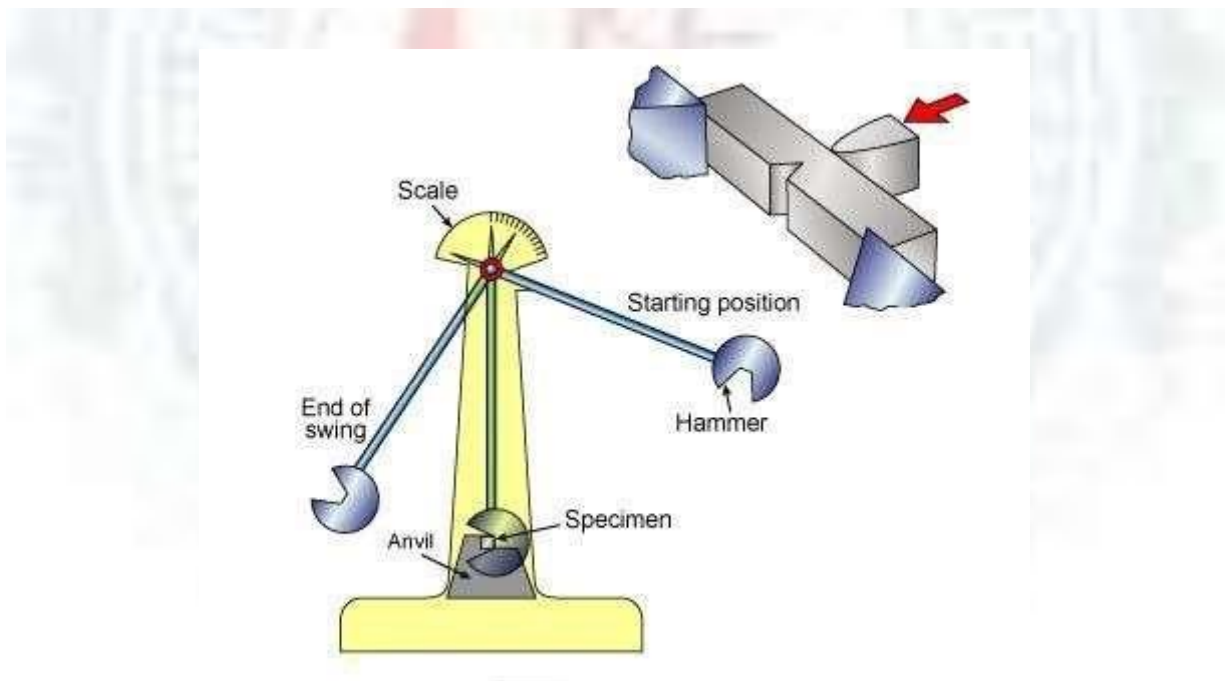
What is Road Pavement in civil engineering



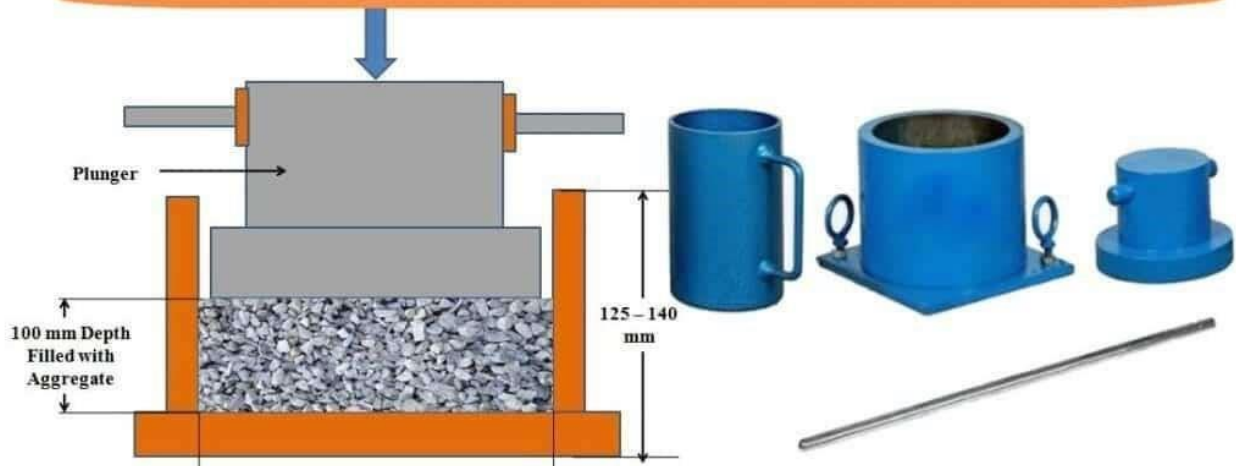
Los Angeles machine



Los Angeles abrasion test setup



Aggregate Crushing Value Test Procedure



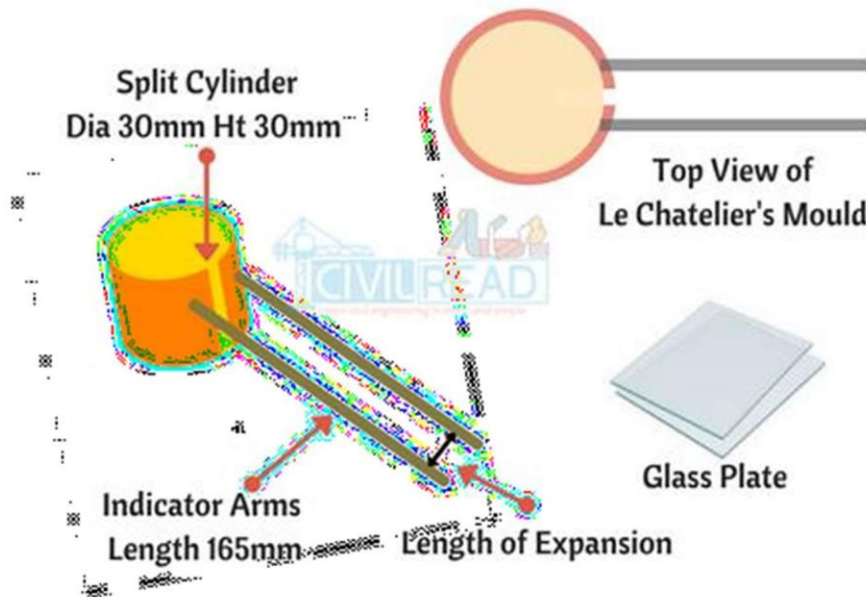
Split Cylinder
Dia 30mm Ht 30mm

Top View of
Le Chatelier's Mould

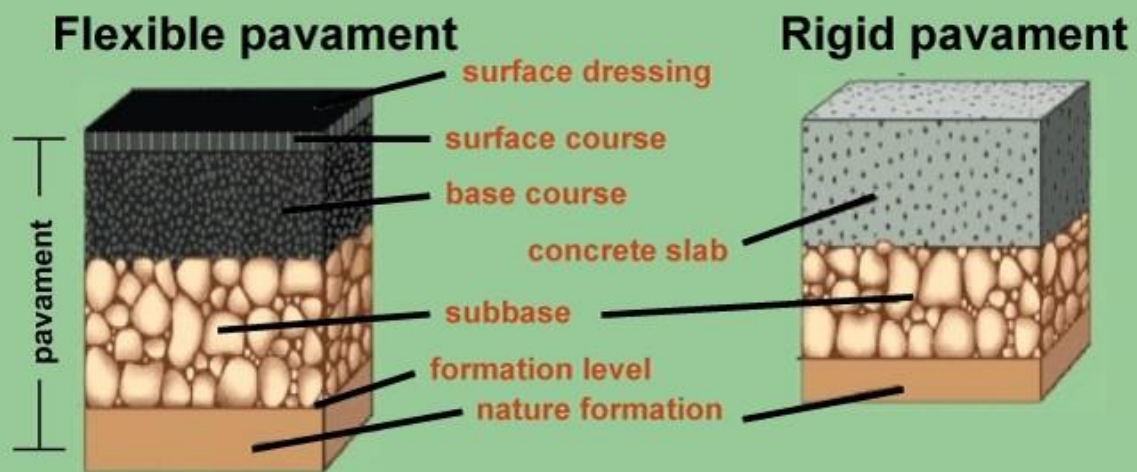
Indicator Arms
Length 165mm

Length of Expansion

Glass Plate



Difference Between Flexible Pavement & Rigid Pavement

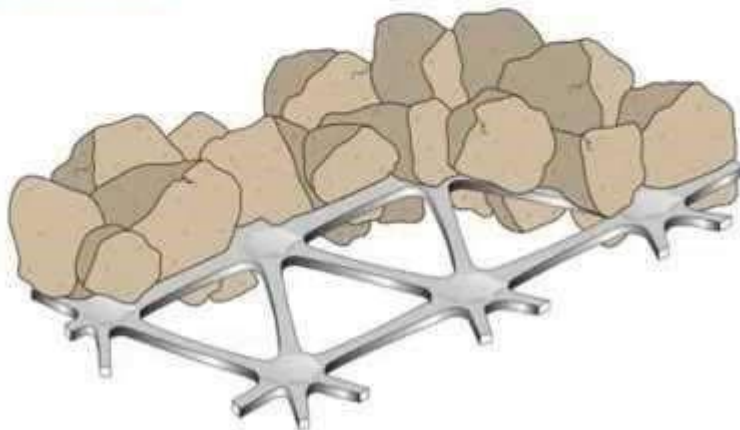


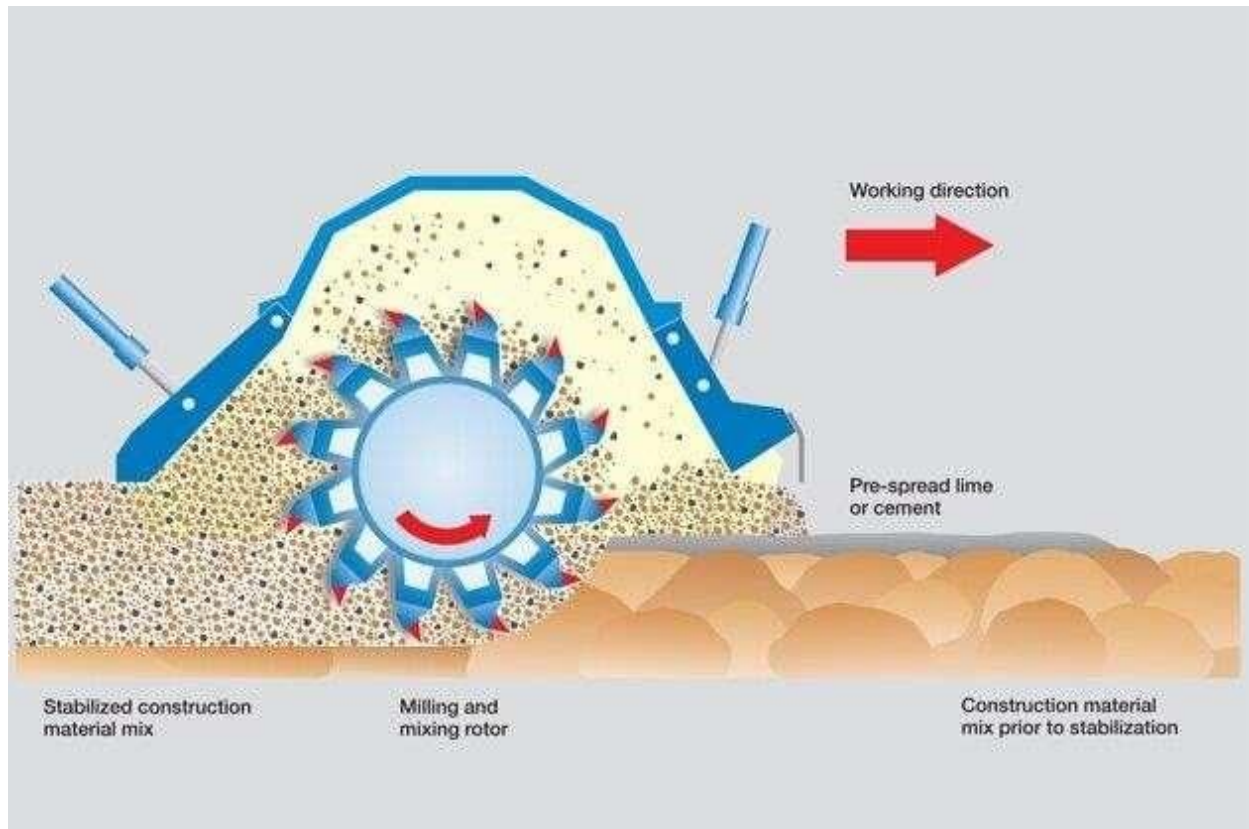
Mechanical Stabilization

Tensar

Geogrid interlocks with granular material and **confines the particles at the base of the layer.**

As more stone is placed and compacted, this confinement continues through the stone, resulting in a **stiffer ballast layer with less particle movement.**

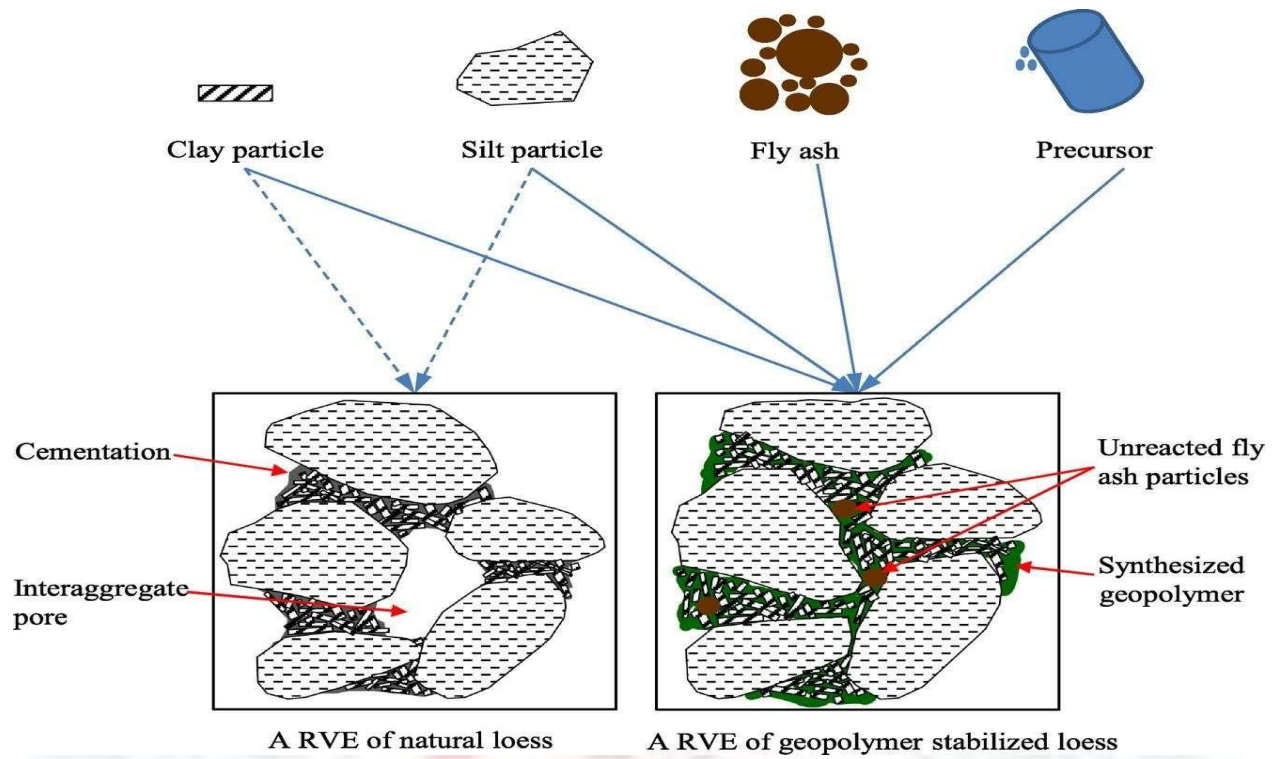




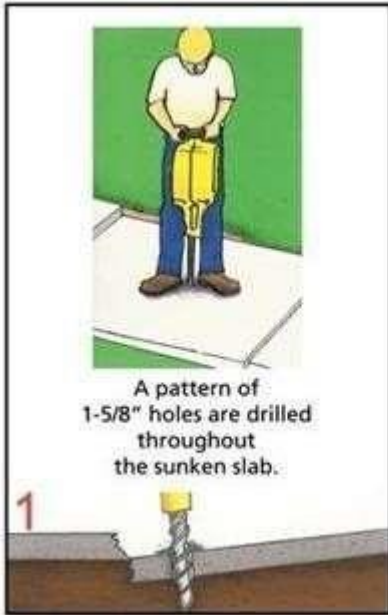
Lime stabilization

Cement Stabilization process

1. Excavation and spreading of material to the required layer thickness for stabilizing
2. Lime or cement spreading, with regular checks to control dosage
3. Mixing, to a depth depending on the soil and on the design requirements
4. Sealing the material, preventing carbonization of the lime while it reacts with the moisture in the soil. This involves trimming of the treated layer using bulldozers and passing over by a smooth roller
5. Allowing (or maturation) period - to allow time for the exothermic chemical reaction to take place between the lime and clay
6. Compacting the treated layer with a roller until required compaction is achieved.
7. Curing For 7 days minimum



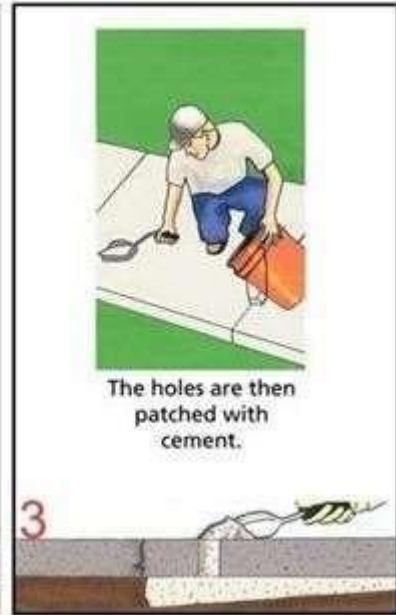
Bituminous concrete



A pattern of 1-5/8" holes are drilled throughout the sunken slab.



Slurry is pumped under the slab filling all voids. The slurry becomes pressurized and hydraulically raises the slab to the desired height.

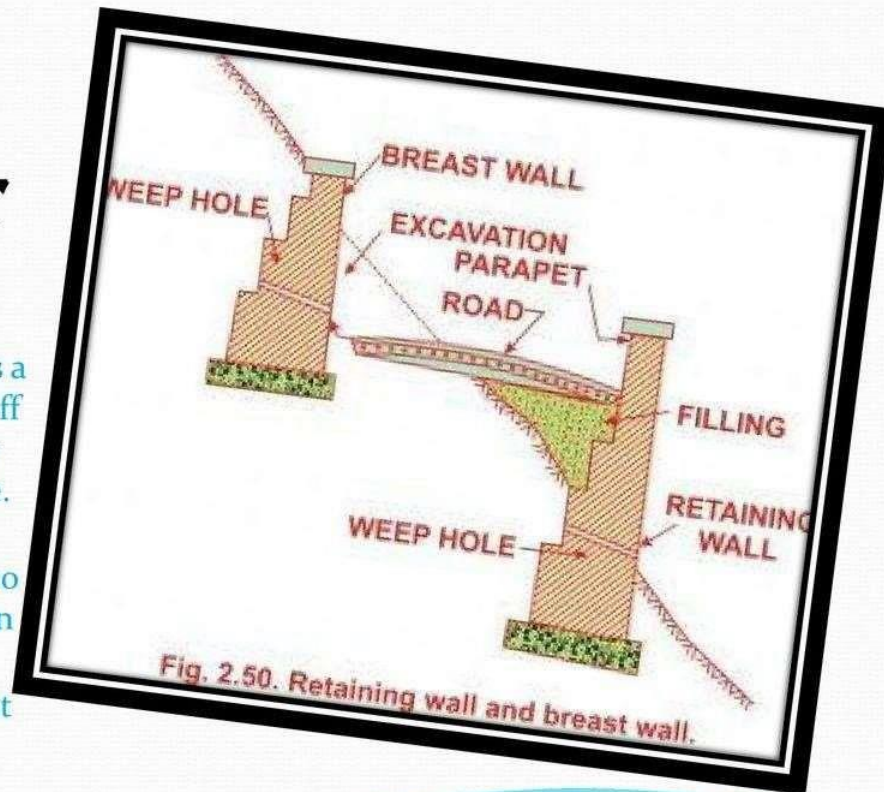


The holes are then patched with cement.

Grouting concrete

BREAST WALL

- Breast wall is a structure stand off to protect freshly cut or old surface.
- Breast wall is provided to the up side of the road in hilly area.
- Height of breast wall should not exceed 3m.



Simplified explanation of typical retaining walls

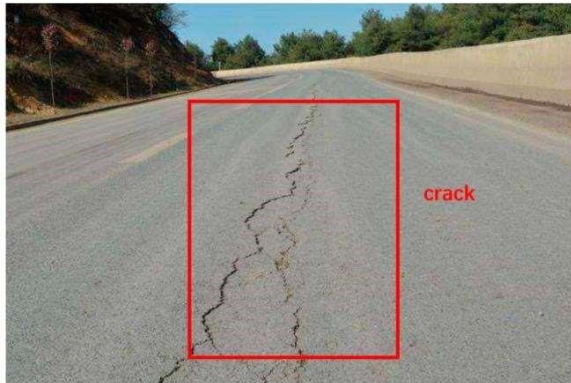
Gravity wall	Piling wall	Cantilever wall	Anchored wall
<p>Earth pressure vector Gravity vector (of wall) Reactive force vector (not all shown)</p>	<p>Earth pressure vector Gravity vector (of wall) Reactive force vector (not all shown)</p>	<p>Earth pressure vector Gravity vector (of wall) Reactive force vector (not all shown)</p>	<p>Earth pressure vector Gravity vector (of wall) Reactive force vector (not all shown)</p>
Standard wall type that holds the earth mainly through its own weight. Can pivot and topple relatively easily, as the internal leverage of the earth pressure is very high.	Using long piles, this wall is fixed by soil on both sides of its lower length. If the piles themselves can resist the bending forces, this wall can take high loads.	The cantilever wall (which may also extend in the other direction) uses the same earth pressure trying to topple it to stabilize itself with a second lever arm.	This wall keeps itself from toppling by having cables driven into the soil or rock, fixed by expanding anchors (can be combined with other types of walls).



Hill roads



Road drainage



(a)



(b)



(c)



(d)

Common types of road failures