

# COMPACTION OF SOIL

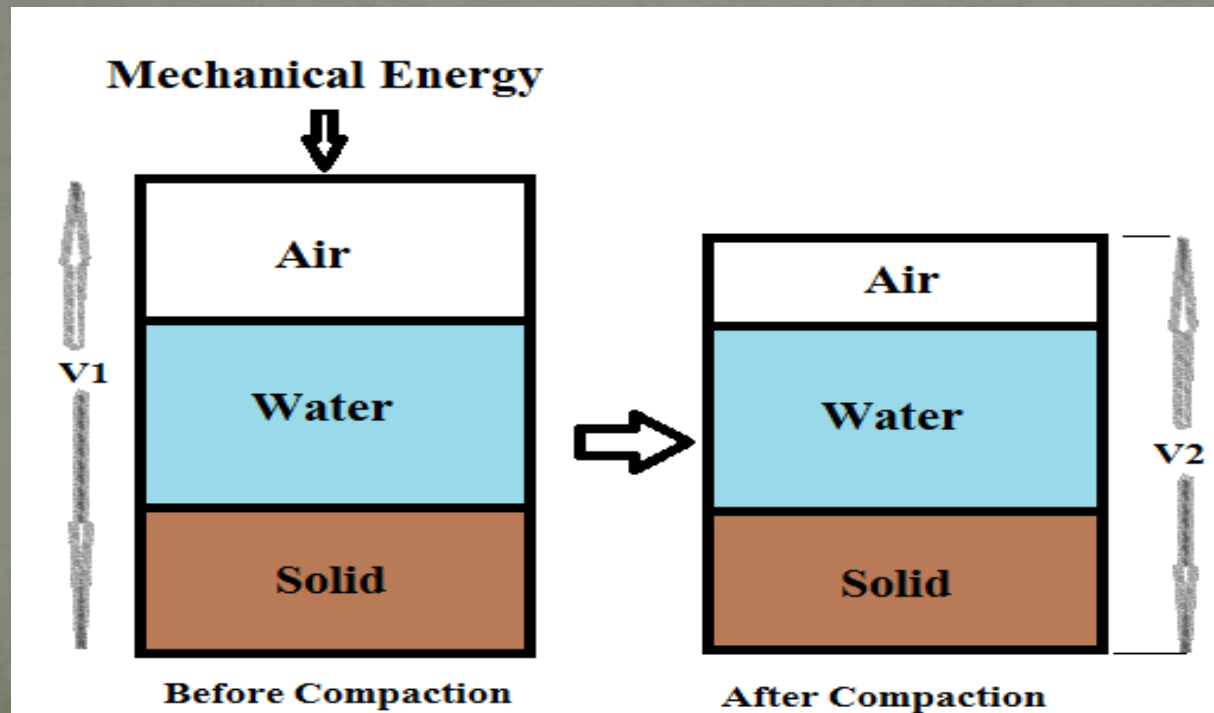


# WHAT IS COMPACTION?



# DEFINATION OF COMPACTION

The densification of soil by the application of mechanical energy is known as compaction



$$\gamma_1 = W_1 / V_1$$

$$\gamma_2 = W_1 / V_2$$

$$\gamma_2 > \gamma_1$$



# REQUIREMENT OF SOIL COMPACTION

To increase  
soil strength

To improve  
the stability  
of soil

To reduce soil  
permeability

To reduce  
erosion  
damage

# FACTOR AFFECTING COMPATION

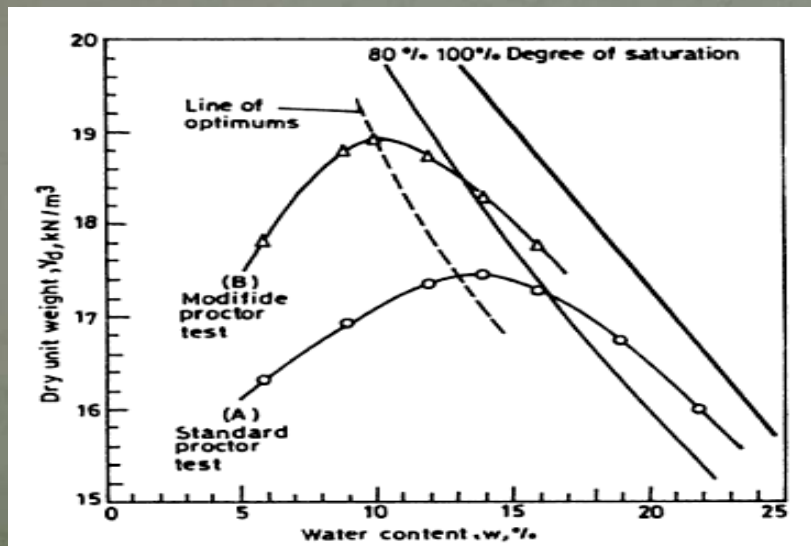
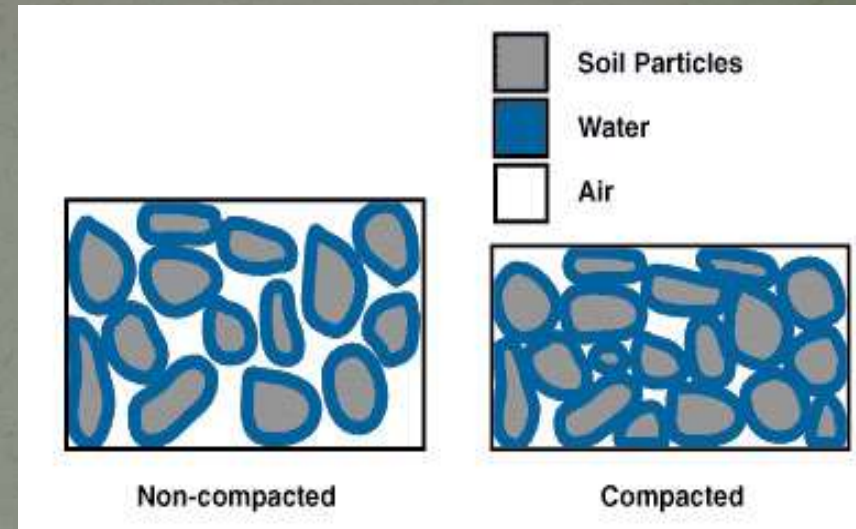
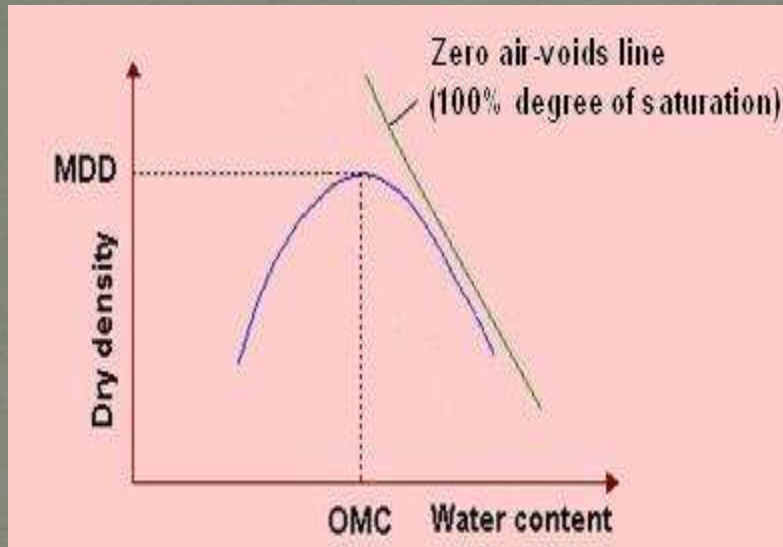
**WATER CONTENT**

**COMPACTING EFFORT**

**TYPE OF SOIL**

**METHOD OF COMPACTION**

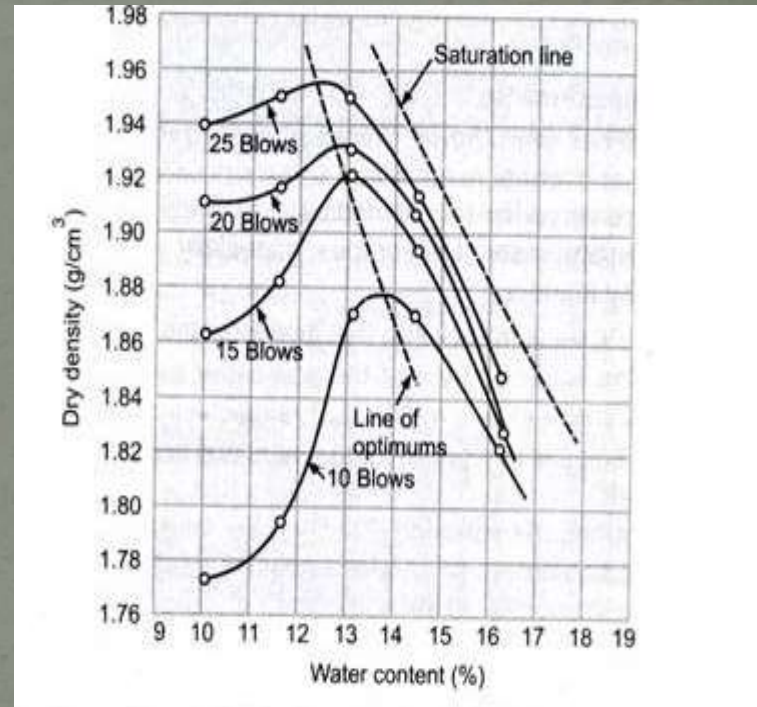
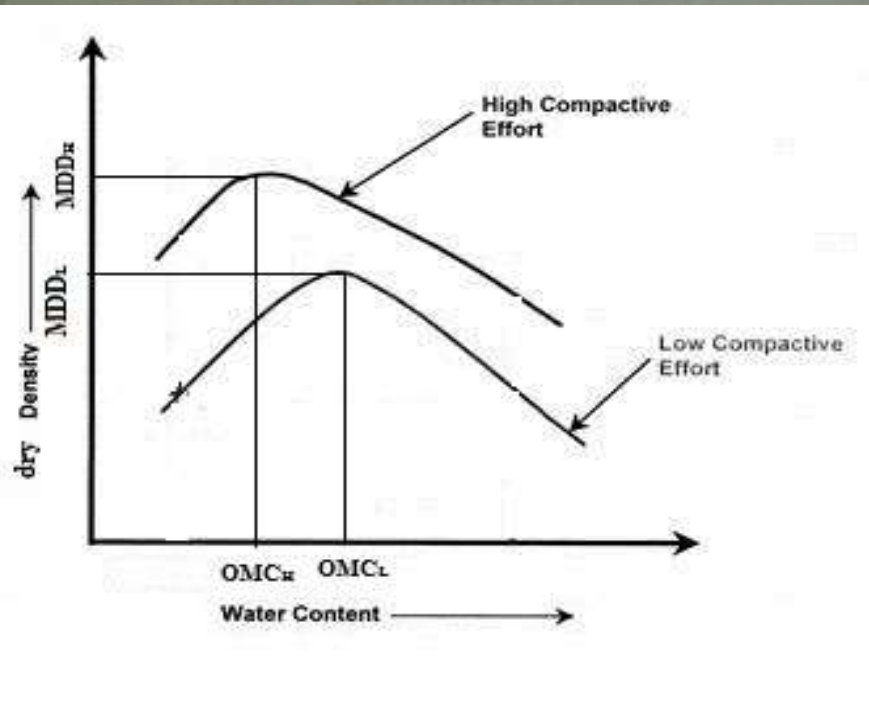
# WATER CONTENT



$$\gamma_d = \frac{G \gamma_w}{1 + e} = \frac{G \gamma_w}{1 + \frac{wG}{S}}$$

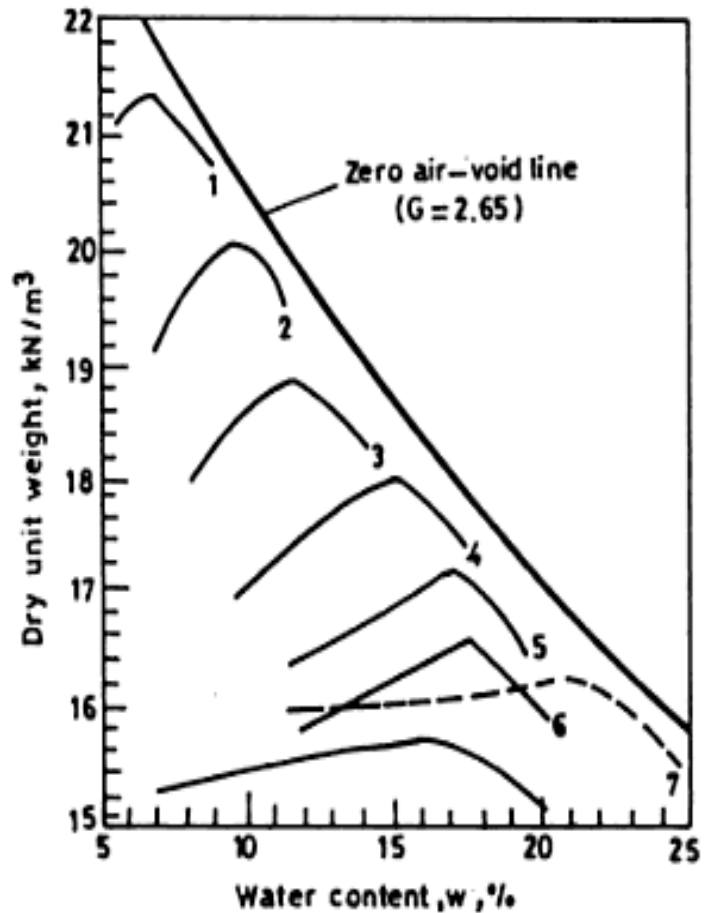
$$\gamma_d = \frac{(1 - n_a) G \gamma_w}{1 + wG}$$

# COMPACTIVE EFFORT





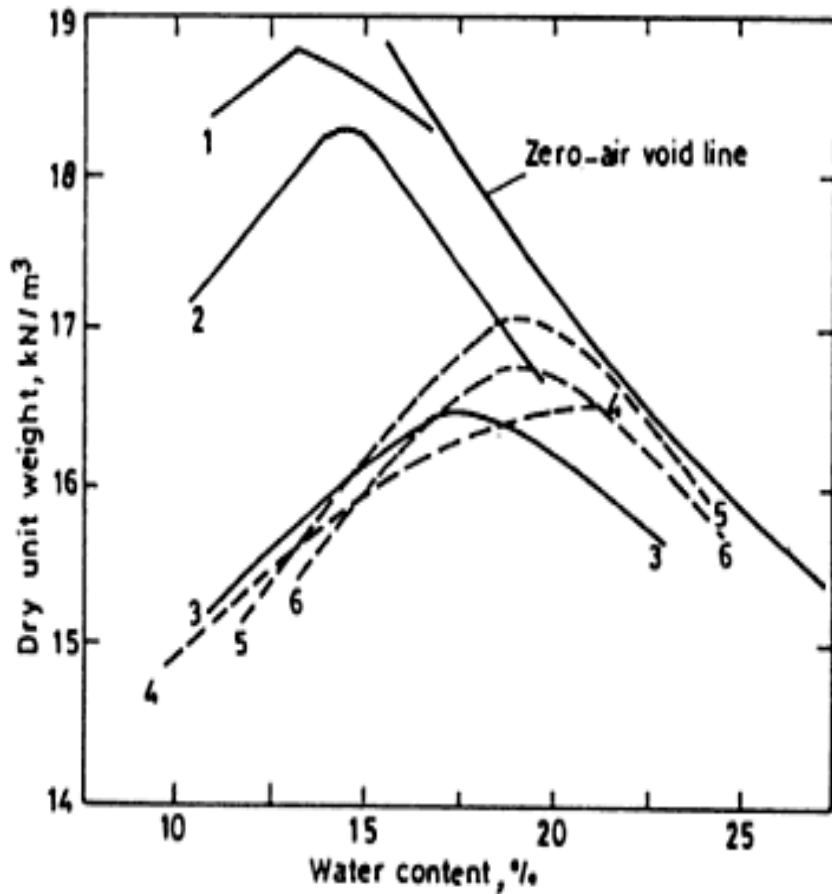
# TYPE OF SOIL



compactive curve	Description of Soil
1	Well graded to loamy sand(SW-SM)
2	Well graded sandy loam (SM)
3	Med graded sandy loam(SM)
4	Lean sandy silt clay(CL)
5	Lean silty clay(CI)
6	Loessial silt(ML)
7	Heavy clay(CH)
8	poorly graded sand(SP)



# METHOD OF COMPACTION



Compaction curve	Method
1	Laboratory static compaction at 13790 kPa
2	Modified AASHTO compaction
3	Standard proctor compaction
4	Laboratory static compaction at 1379kPa
5	Field compaction rubber tyred loaded ,6 passes
6	Field compaction sheep's foot rollers,6 passes

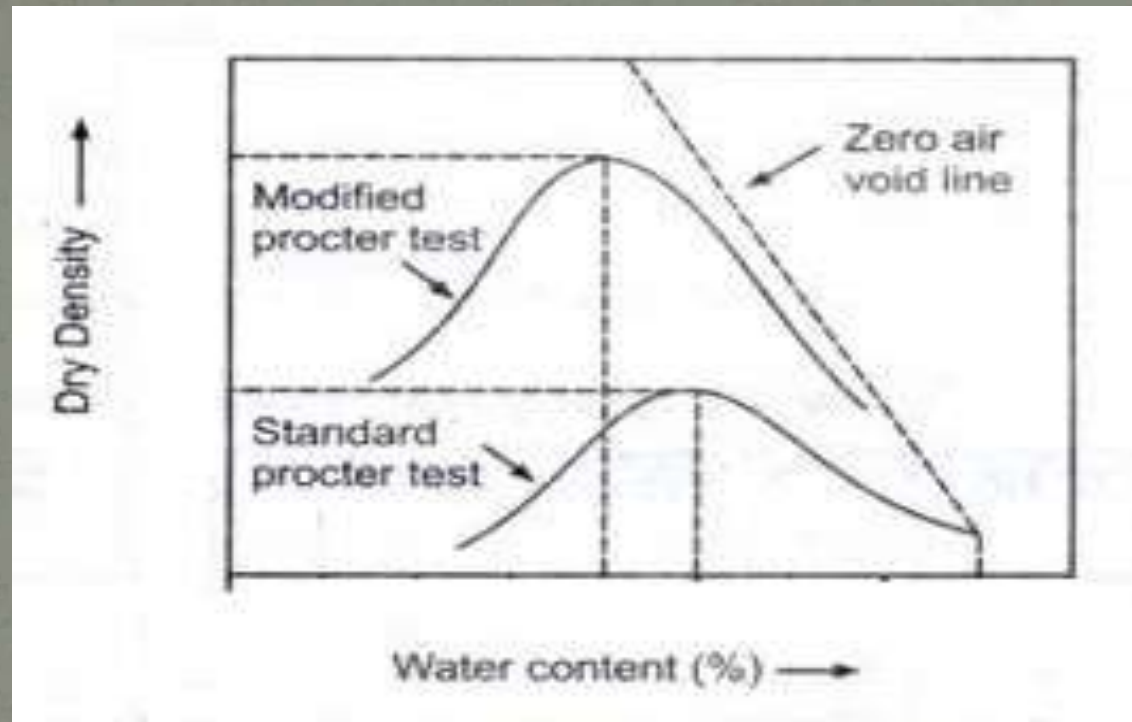
# LABORATORY TEST TO DETERMINE SOIL COMPACTION

Standard Proctor test  
(Light compaction Test) IS  
2720 Part 7, 1970

Modified Proctor Test  
(heavy compaction Test) IS  
2720-part 8, 1983



# GRAPHICAL REPRESENTATION





# SOIL COMPACTION IN THE FIELD



Smooth steel  
drum roller



Pneumatic  
tyred rollers



Sheep foot  
rollers



Grid  
rollers



Vibrating  
plates



Tampers and  
rammers

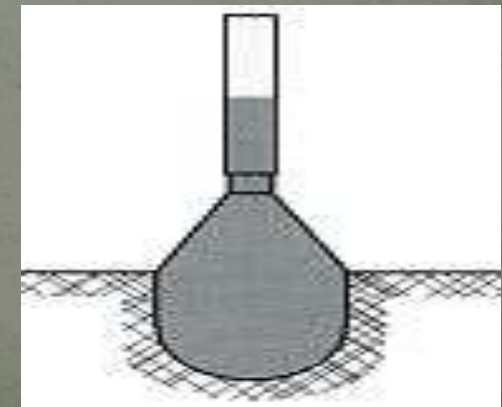
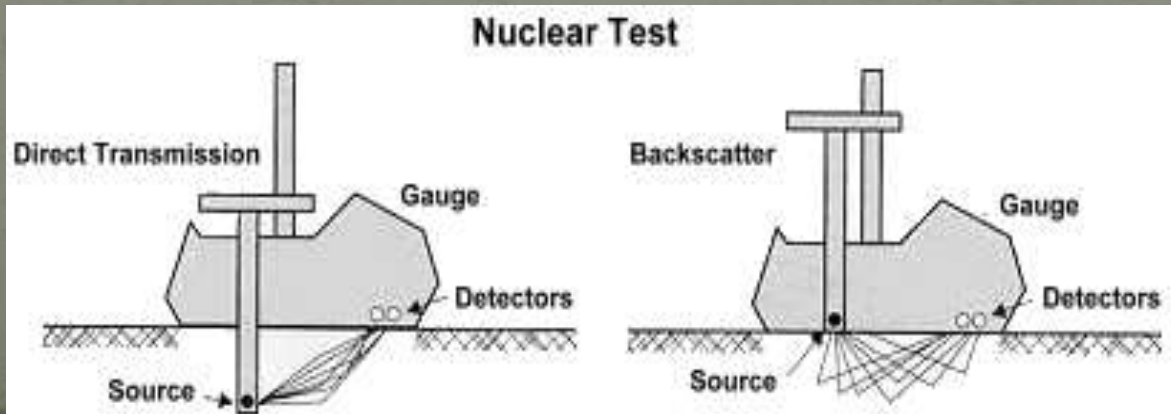
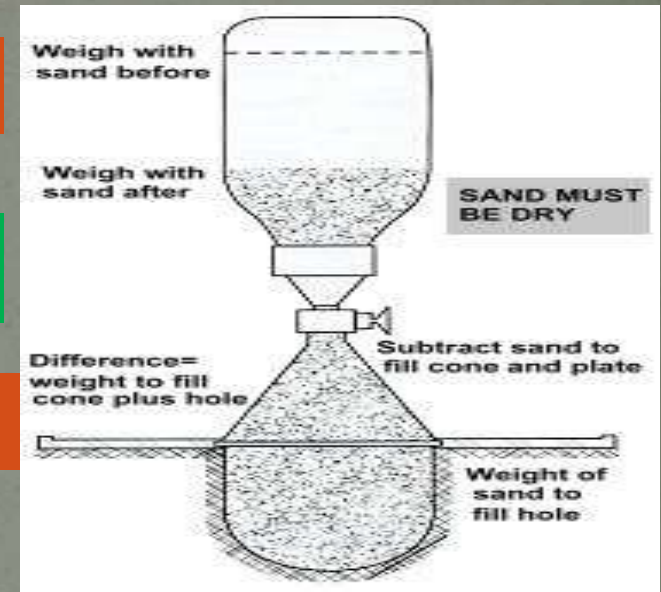


# CHECKING SOIL DENSITY IN THE FIELD

**SAND CONE (ASTM D1556-90)**

**BALLOON DENS METER**

**NUCLEAR DENSITY (ASTM D2292-91)**





# COMPACTION REQUIREMENTS

$$CR = Y_d / (Y_d)_{max}$$

$Y_d$  = dry density achieved in the field  
 $(Y_d)_{max}$  = Laboratory maximum dry density

Sl. no.	Type of work	Minimum relative compaction
1.	Highly expansive clay	85%
2.	Top 500mm of embankment below sub grade level and shoulders	100%
3.	Other portion of embankment	95%

# CONCLUSION

Ultimately compaction is depending on the void ratio of soil. Compaction is a factor of practical importance is the increase of soil strength and stability. Now a day in urban area land is one of the most common problems. In such case if soil's engineering property is not up to the requirement then there is no way without abandon that project. So in that case soil compaction can be applied as a one of the most economic ground improvement technique.

**THANK YOU**