

# Jawahar Navodaya Vidyalaya, Mawphlang

## VIGYAN JYOTI (PHASE – 2)

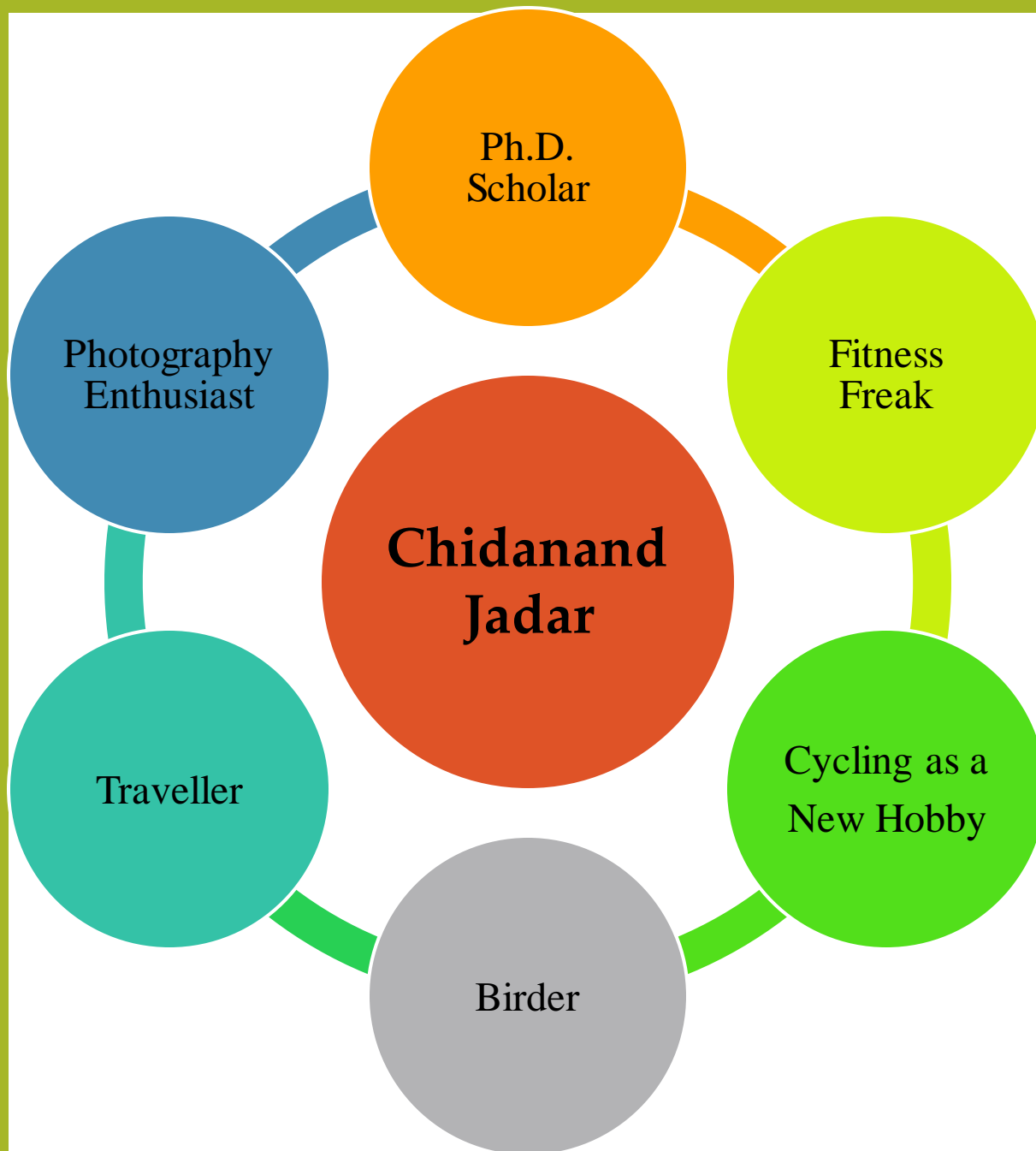
### INTRODUCTION TO CIVIL ENGINEERING THROUGH THE CONCEPTS OF SCIENCE

By

**CHIDANAND M JADAR**

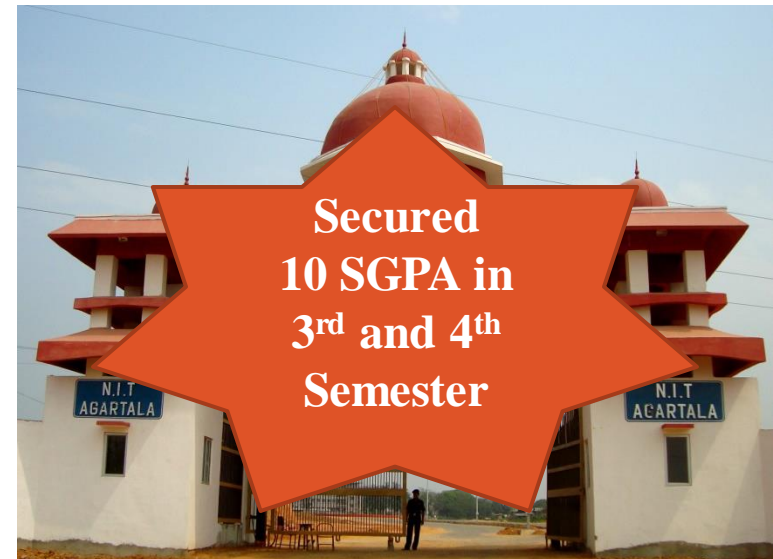
**Ph.D Scholar, Dept of Civil Engg,  
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**chidujadar**

# Academic Milestones





# Civil Engineering

Structural Engg

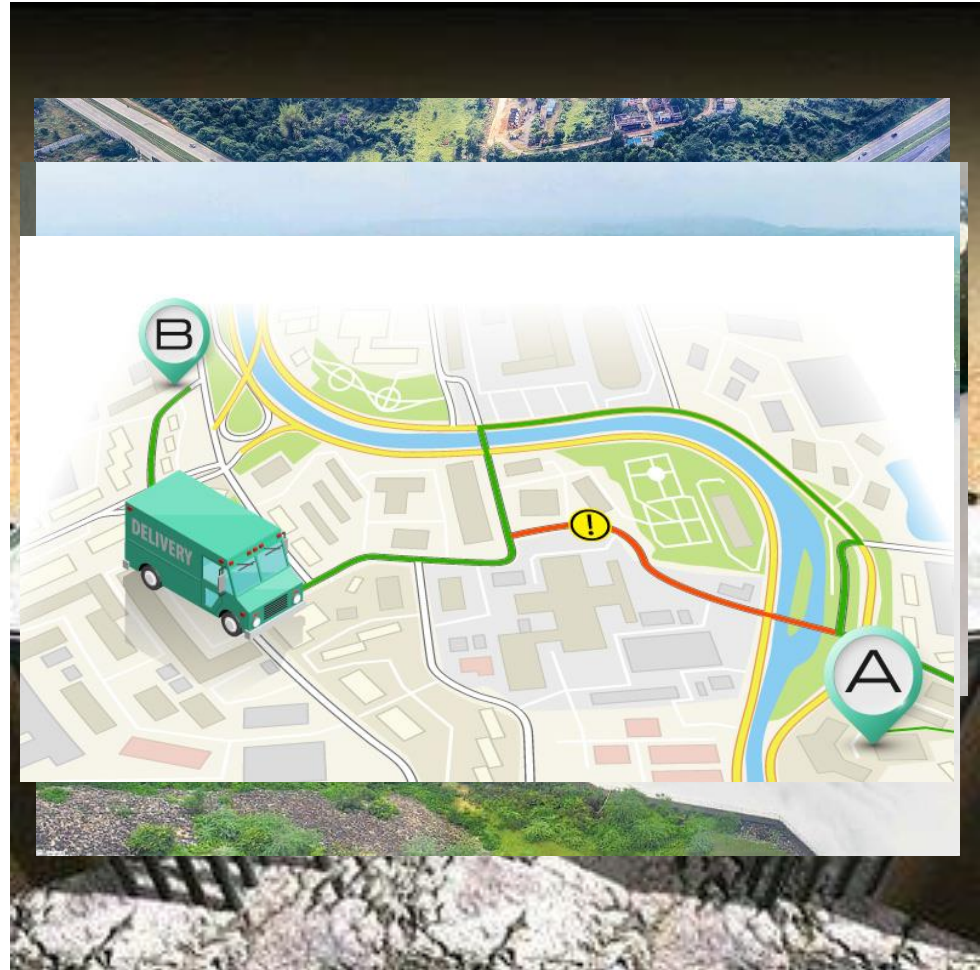
Geotechnical /  
Foundation Engg

Transportation  
Engg

Environmental  
Engg

Water Resource  
Engg

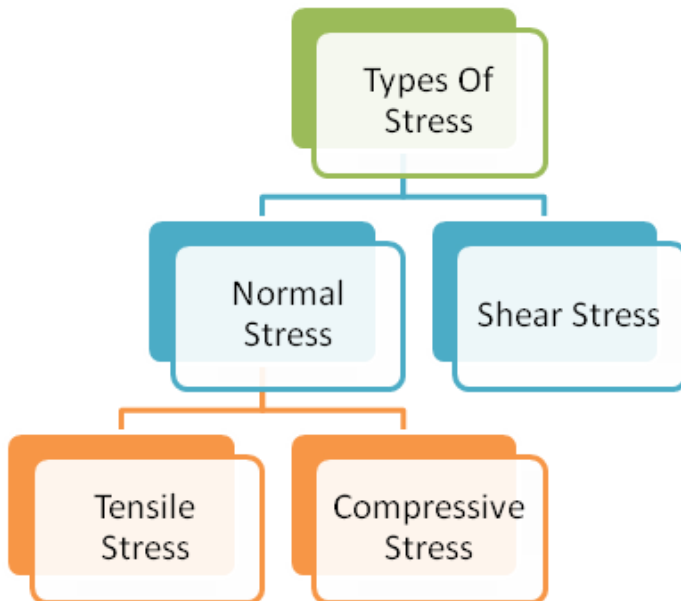
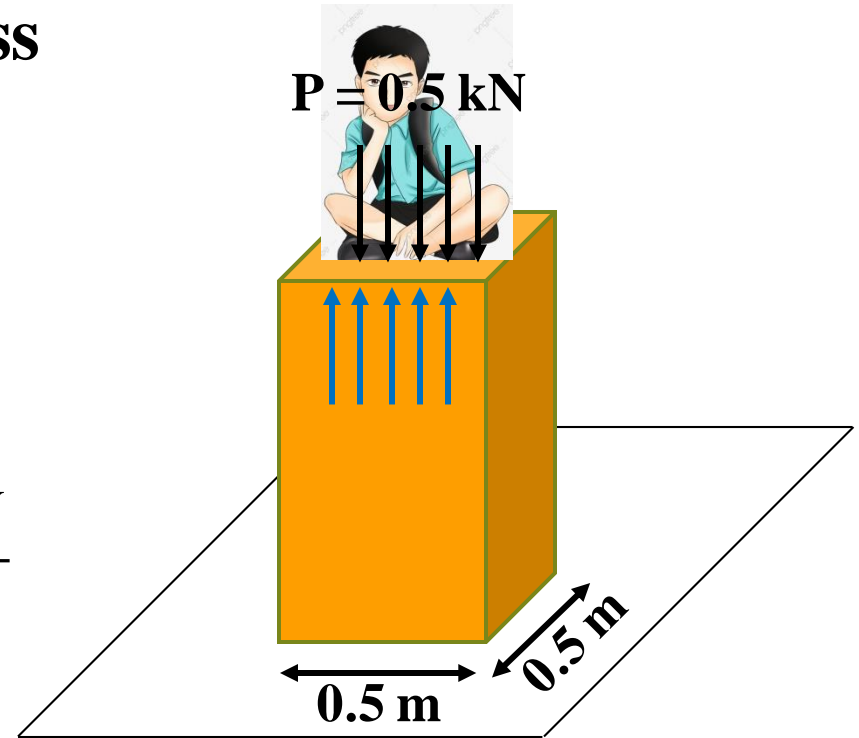
Remote sensing /  
GIS

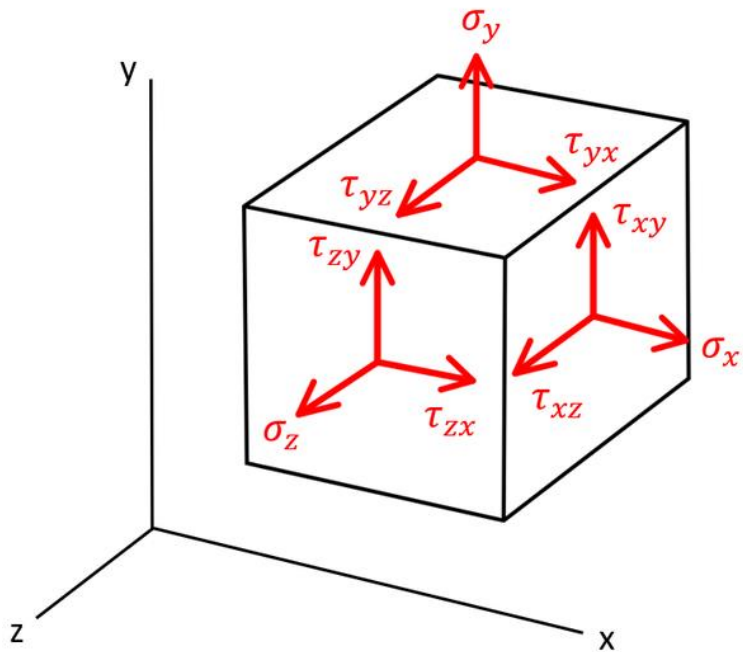


# Stress

A resistance force per unit area offered against the deformation due to application of an external load.

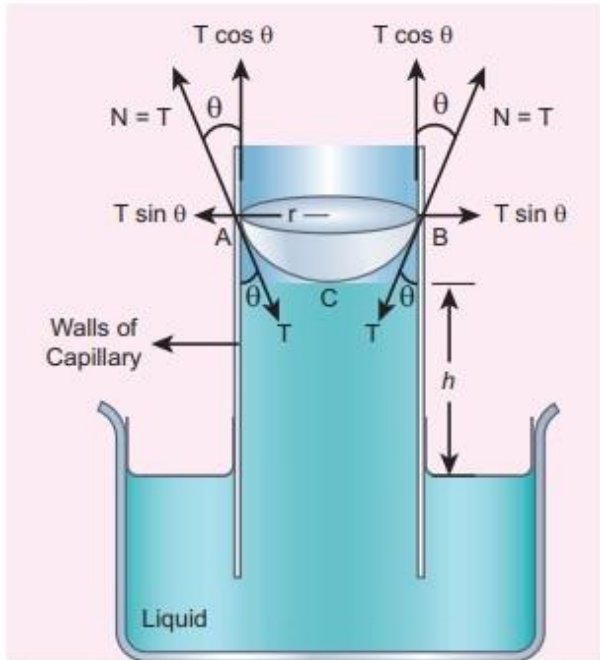
$$\text{Stress}(f) = \frac{P}{A} = \frac{0.5\text{kN}}{0.5\text{m} \times 0.5\text{m}} = 2 \frac{\text{kN}}{\text{m}^2}$$



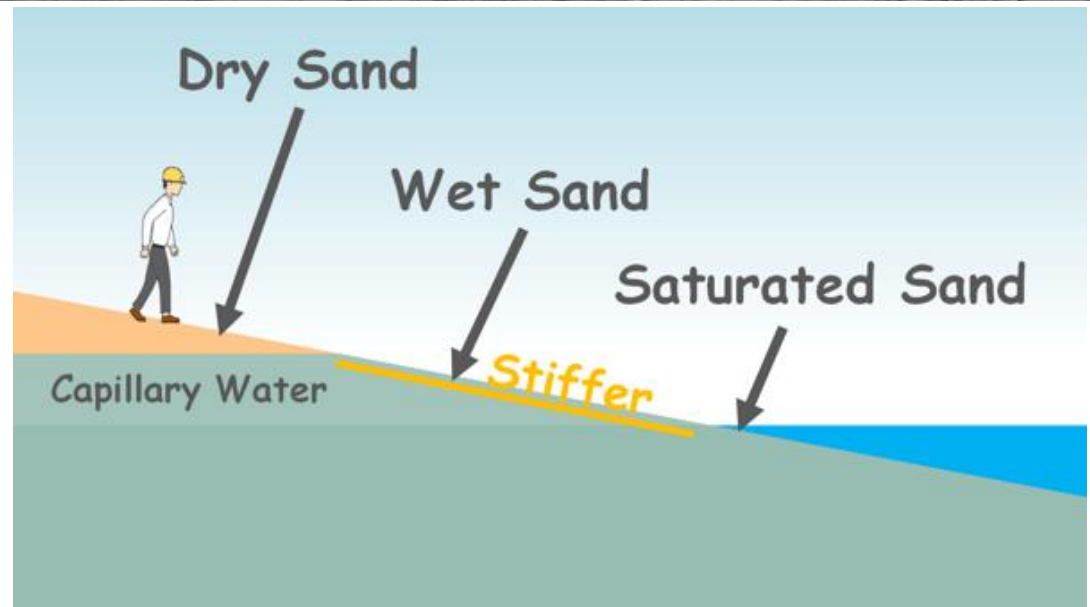




# Capillary Rise !!!



$$h_c = \frac{4 T_s \cos \alpha}{d \gamma_w}$$



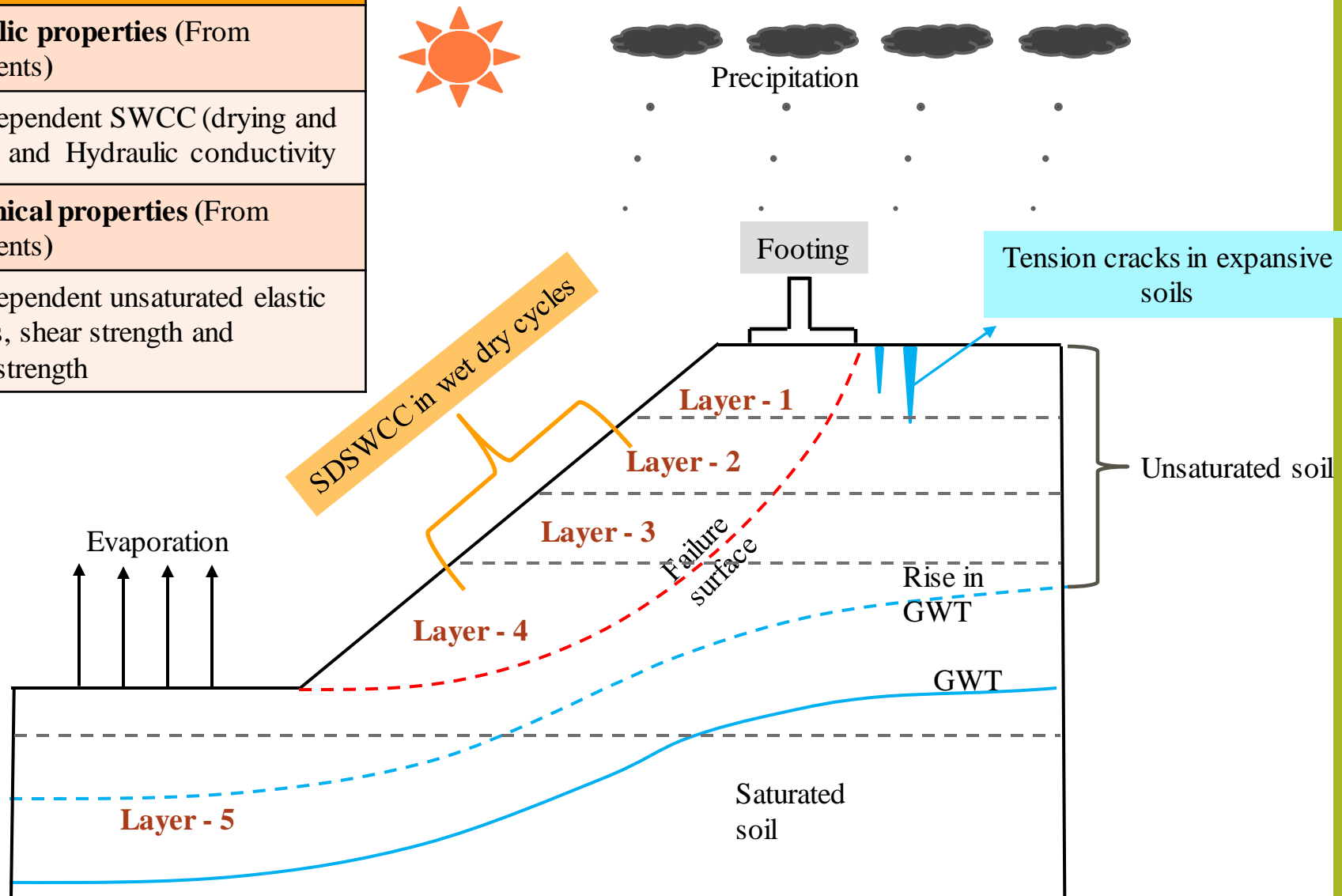
## Input Parameters

**Hydraulic properties** (From experiments)

Stress dependent SWCC (drying and wetting) and Hydraulic conductivity

**Mechanical properties** (From experiments)

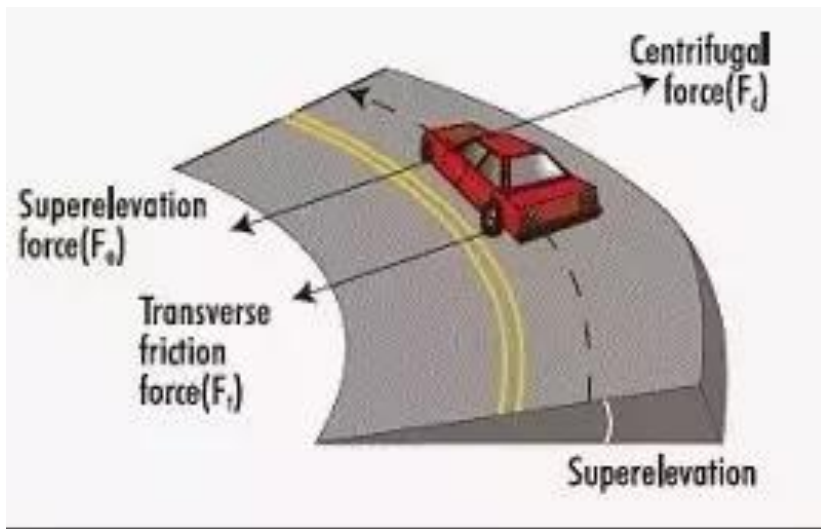
Stress dependent unsaturated elastic modulus, shear strength and Tensile strength





# Super Elevation

Rise of outer edge of pavement with respect to inner on a horizontal curve



Design Speed ???



# Design of Super Elevation

$$e = \frac{E}{B}$$

$$e = \frac{0.75(v^2)}{gR}$$

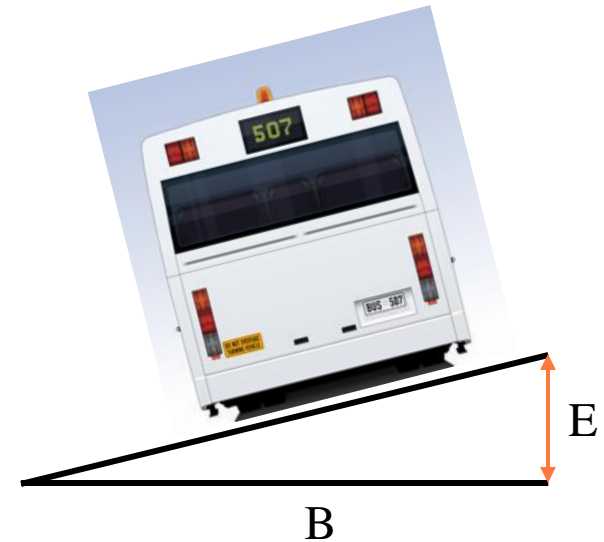
$e \leq e_{\max}$

$$e + f = \frac{v^2}{gR}$$

$f \leq 0.15$

$$e + f = \frac{v^2}{gR}$$

**DESIGN SPEED OF VEHICLE**



# Landslides



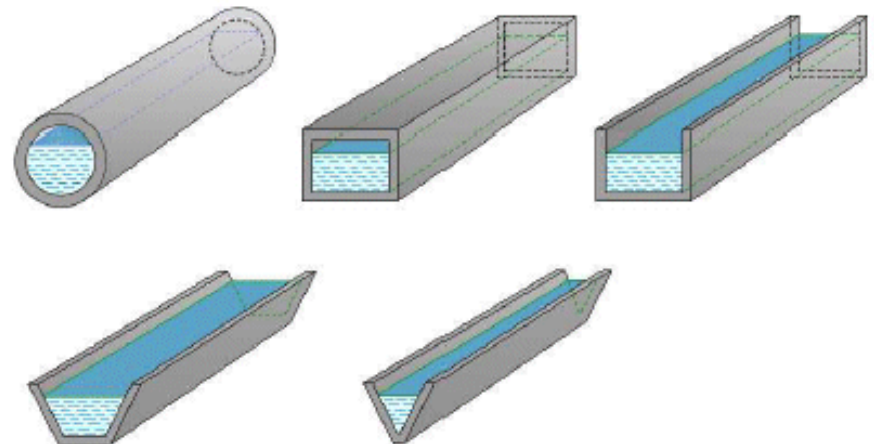
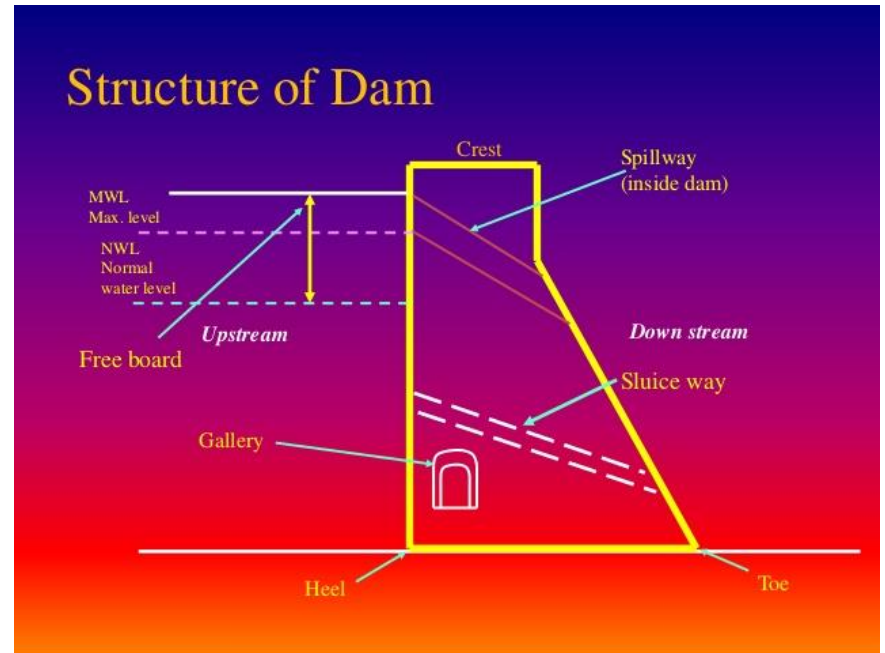
*Dehradun: View of a road connecting Dehradun and Mussoorie that caved-in following heavy rainfall, in Dehradun, Tuesday, Aug. 11, 2020.*

**Soil Nailing !!!**



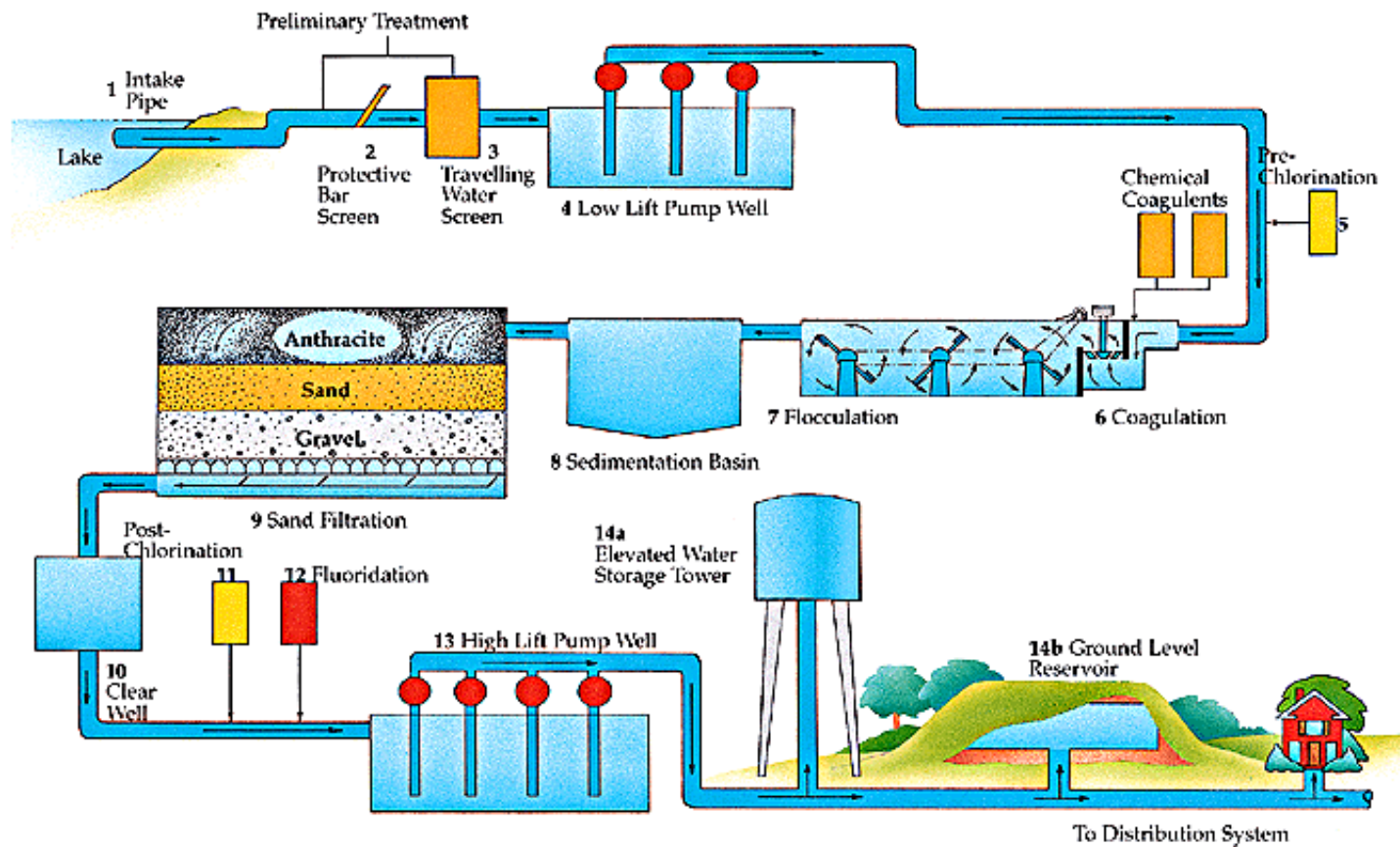


# Dams and Canals



# Fresh Water Treatment Unit

## WATER TREATMENT PLANT SURFACE WATER SUPPLY



# Conclusions

**C**

**C**onstruction of all the structures on planet earth with proper analysis and design of having combination of forces and quality of materials

**I**

**I**rrigating the farm lands of the country having the knowledge of **duty and delta.**

**V**

**V**aluation of existing structures and Estimation of structures well before beginning the project.

**I**

**I**nvestigation of sub-surface and design proper foundation to carry the load of super structures

**L**

Laying of highways, railways, runways, tunnels

**Engineering**

Application of fundamentals of basic science to solve the realistic field problems through advanced technology.





Thank  
you



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