GIT COURSE PROJECT

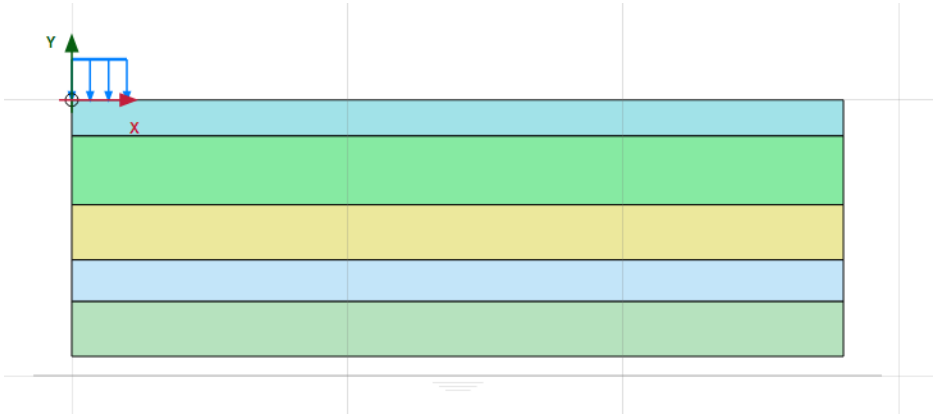
Behavior of vertical stresses in each layer with varying modulus of elasticity

Problem definition

- Understanding the stress distribution by varying E values of WMM and DBM.
- Finding the percentage distribution of stress taken my 1^{st} layer for different E values in WMM and DBM respectively.

Model

- The dimensions of the model are:-
  - Layer 1:- DBM, 130mm.
  - Layer 2:- WMM, 250mm.
  - Layer 3:- GSB, 200mm.
  - Layer 4:- Subgade, 250mm.
  - Native Soil, 100mm
- Total depth of model=930mm.
- Width=2800m
- Load applied at (0,0) and (200,0).



Material properties

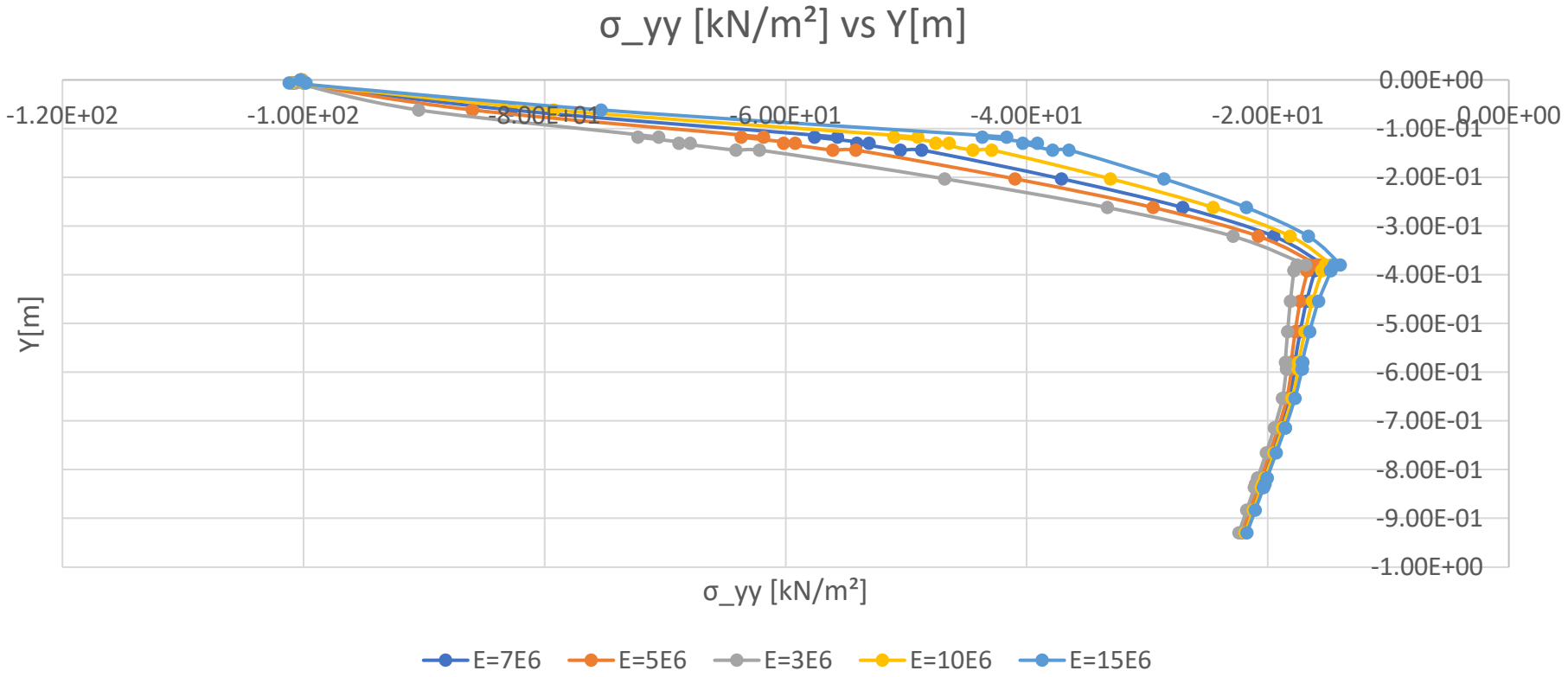
Layer	Model	Elastic Modulus (MPa)	Density (KN/m^3)	Poisson ratio (nu)	Cohesion (KN/m^2)	Friction angle (deg)
DBM	Linear Elastic	Varied (3-15*10^3)	24.5	0.3	-	-
WMM	Linear Elastic	Varied (1-7*10^3)	21.56	0.35	-	-
GSB	Mohr coulomb	500	21.56	0.35	5	35
Subgrade	Mohr coulomb	30	17.1	0.3	5	35
Native Soil	Mohr coulomb	50	17.1	0.3	5	35

Loading and Displacement

- Line load
  - Phase 1:- 10KN/m
  - Phase 2:- 20KN/m
  - Phase 3:- 30KN/m
  - Phase 4:- 40KN/m
  - Phase 5:- 50KN/m
  - Phase 6:- 100KN/m

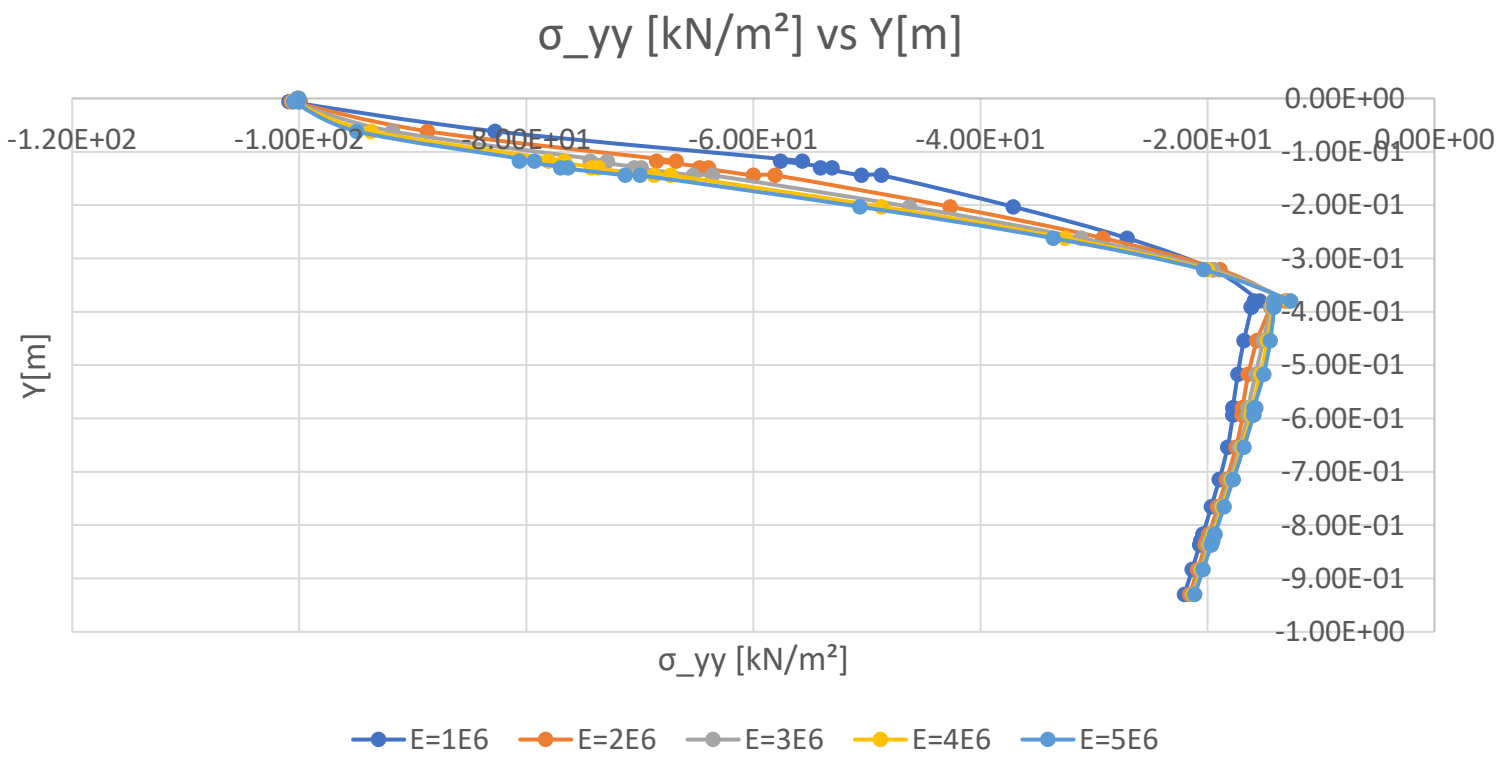
Results

- E varied for DBM (Dense Bituminous Mix)



Results

- E varied for WMM (Wet Mix Mecadam)



Observation

- Bituminous Layer
  - With Varying E of DBM

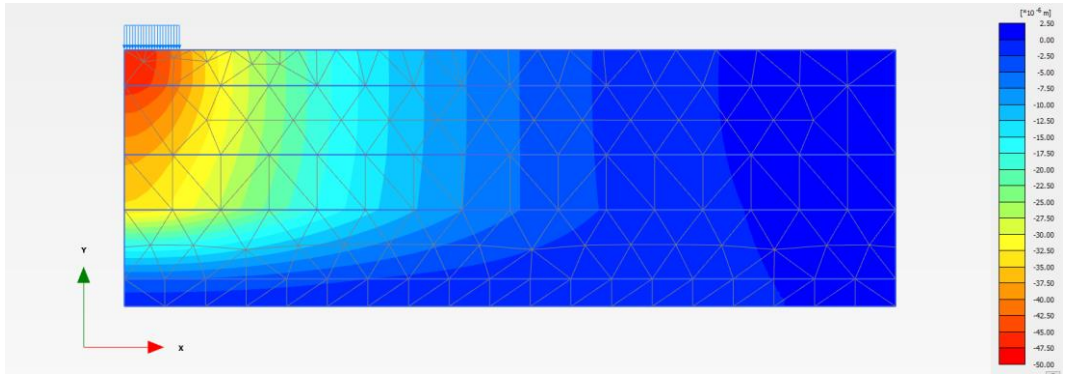
E value of DBM	Stress at the bottom of DBM
3E6	67.9
5E6	59.2
7E6	53.1
10E6	46.4
15E6	39.1

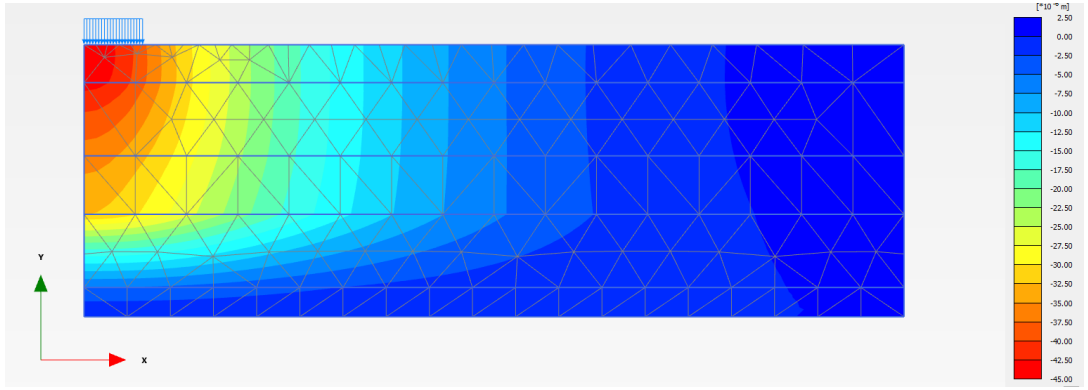
Observation

- Bituminous Layer
  - With Varying E of WMM

E value of WMM	Stress at the bottom of DBM	Stress at the bottom of WMM
1E6	53.1	15.4
2E6	63.9	13.1
3E6	69.9	12.8
4E6	73.7	11.6
5E6	76.3	11.21

Settlements





Observation

- $\sigma_{(zz)} = \frac{3Q}{2\pi} \frac{1}{\left(1+\left({}^{x}/_{r}\right)\right)^{\frac{5}{2}}}$
- $S_e = \int \epsilon_z dz = \frac{1}{E_s} \int \left(\delta p_z - \mu \delta p_z - \mu_s \delta p_y\right) dz$
- The first equation is **Boussinesq Equation.**
- The second equation depicts the settlement in shallow foundation.
- $S_e = Elastic\ Settlement$
- $E_s = elastic\ constant\ of\ soil$
- $\mu_s = Poisson's\ ration\ of\ soil$

Reference

- Compaction quality control of pavement layer by Uma Shankar, Hari Prasad.

End

By:-

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