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STUDY AND ANALYSIS OF RC DECK SLAB BRIDGE WITH VARYING THICKNESS

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ABSTRACT

Bridges variety in period from some meters to several kilometers. They are among the most important structures built by way of guy. The demands on layout and on materials are very high. A bridge needs to be sturdy enough to assist its own weight further due to the fact the weight of the individuals and cars that use it. The shape additionally must face up to several natural occurrences, including earthquakes, sturdy winds, and changes in temperature. Numbers of bridges have a concrete, steel, or wood framework & an asphalt or concrete route on which people and cars tour. The analysis of a 3-span lane T-beam bridge is finished by various the span of 10m, 15m, 18m, with various span/Depth ratio and quantity of longitudinal & cross girders using software program Staad Pro v8i. To gain most bending second and shear force in girder, most Stresses in slab and maximum response and second on the guide, the bridge fashions are subjected to the IRC magnificence AA Tracked loading device and concluded that with the increase in shear force, bending moment and deflection inside the girder and version of stresses in slab.

1. Analysis of Deck Slab
2. Analysis of Girders & Piers.

Keywords: Deck Slab, IRC Loading, Staad Pro, Stresses On Beam & Slab, Etc.

I. INTRODUCTION

A Bridge is a structure imparting passage over partner obstacle at the same time as not remaining the method at a lower vicinity. The required passage can also be for a street, a railway, pedestrians, a canal or a pipeline. The obstacle to be crossed can be a river, a street, railway or a valley. Bridges variety in period from a few meters to several kilometers. They are among the largest systems built with the aid of man. The demands on design and on substances are very excessive. A bridge should be robust enough to support its personal weight in addition due to the fact the burden of the individuals and cars that use it. The structure moreover has to face up to several natural occurrences, which includes earthquakes, strong winds, and modifications in temperature. Numbers of bridges have a concrete, metallic, or wood framework & an asphalt or concrete route on which individuals and vehicles travel. The T-beam Bridge is a long way and away the most unremarkably followed type in the span range of ten to 20-five meter. The shape is so named because of the foremost longitudinal girders analyses & designed as T-beams imperative with a region of the deck block, that's cast monolithically with the girders. Simply supported T-beam span of over thirty meters are rare due to the fact the loading then turns into too critical.

OBJECTIVE OF THE WORK

The analysis of a 3-span lane T-beam bridge is performed by using various the span of 10m, 15m, 18m, with various span/depth ratio and number of longitudinal & move girders the usage of software program Staad Pro v8i. To obtain most bending moment and shear force in girder, maximum Stresses in slab and maximum reaction and second at the aid, the bridge models are subjected to the IRC elegance AA Tracked loading device and concluded that with the boom in shear pressure, bending moment and deflection in the girder and version of stresses in slab.

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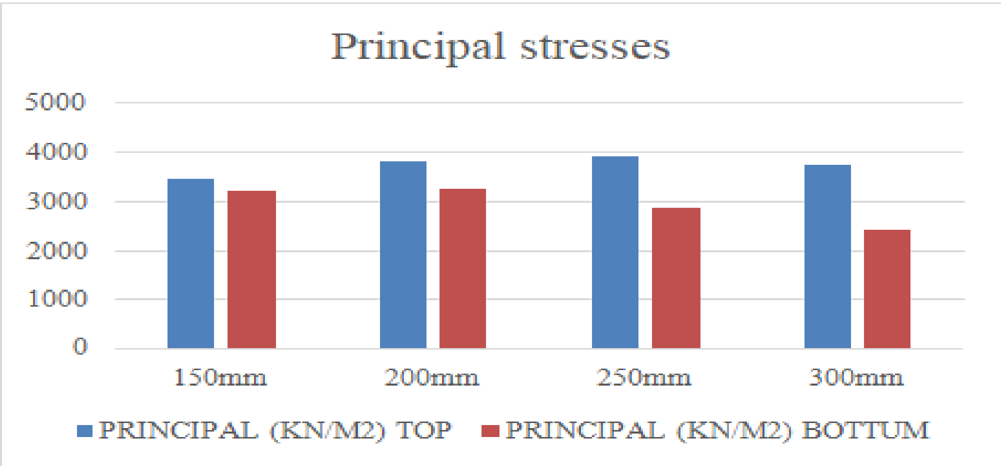
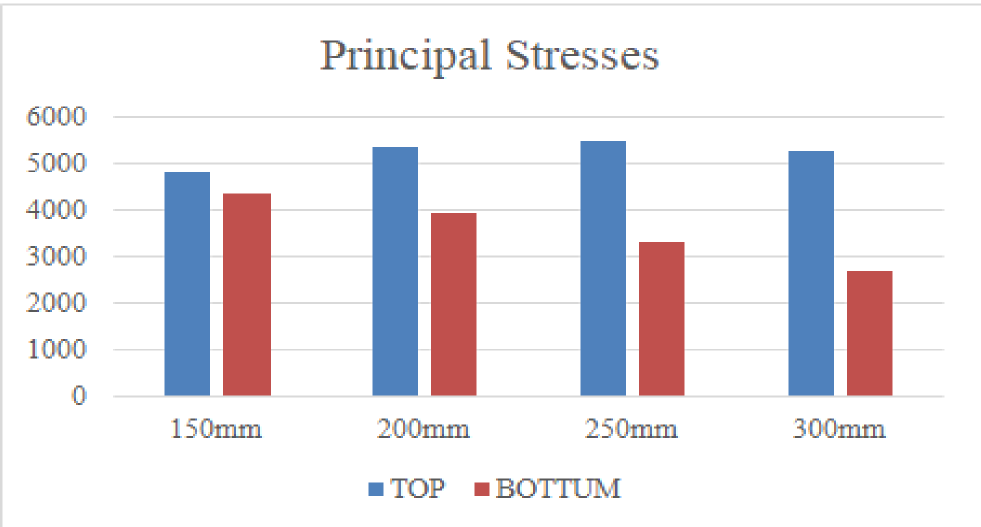
Description Bridge	
Bridge type	T-Beam Deck Slab Bridge
Span	10m,15m and 18m
Lane of Bridge	Two lanes
Carriageway Width	7.5m
No. of longitudinal Girder	6
No. Cross girder	4
Thickness of girder	500mm
Depth of girder	500mm
slab thickness	150mm,200mm,250mm & 300mm
Live load	AA Class Tracked Vehicle
Spacing of longitudinal girder	2m c/c

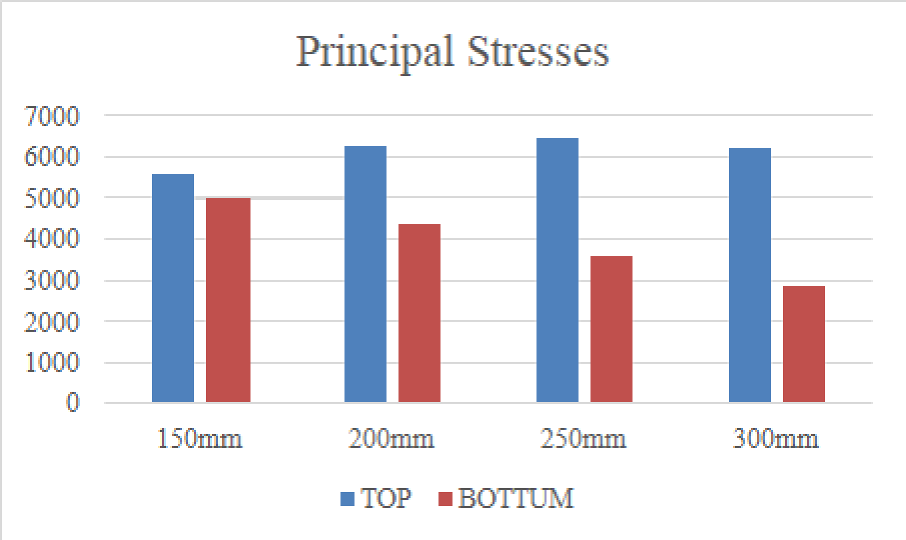
Result:-



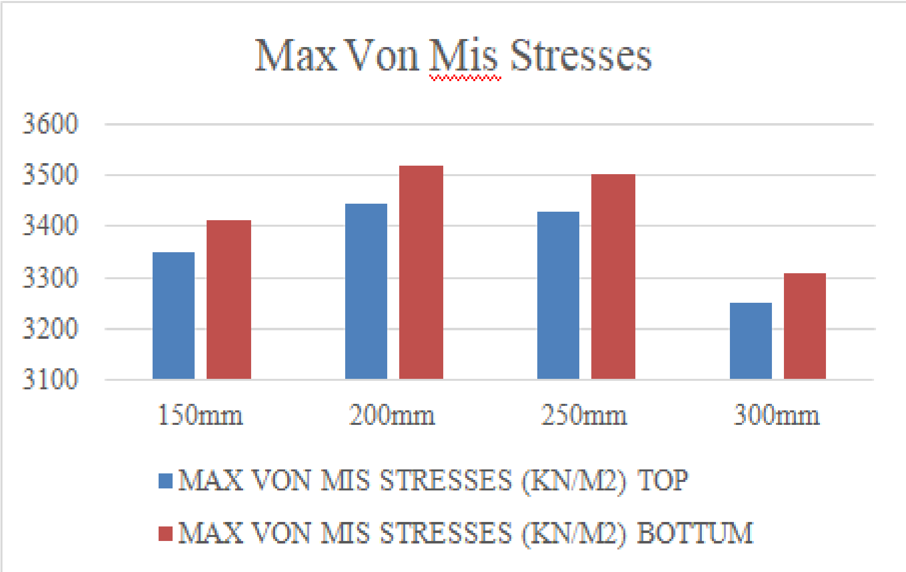
Graph 1: Principal Stresses on Deck Slab of 10m Span with varying thickness



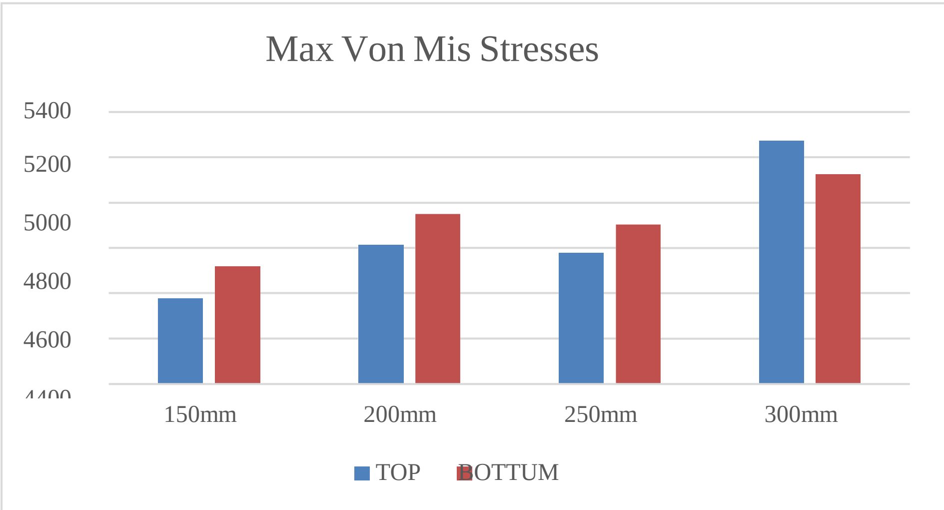
Graph 2: Principal Stresses on Deck Slab of 15m Span with varying thickness



Graph 3: Principal Stresses on Deck Slab of 18m Span with varying thickness



Graph 4: Max von mis Stresses on Deck Slab of 10m Span with varying thickness



Graph 5: Max von mis Stresses on Deck Slab of 15m Span with varying thickness

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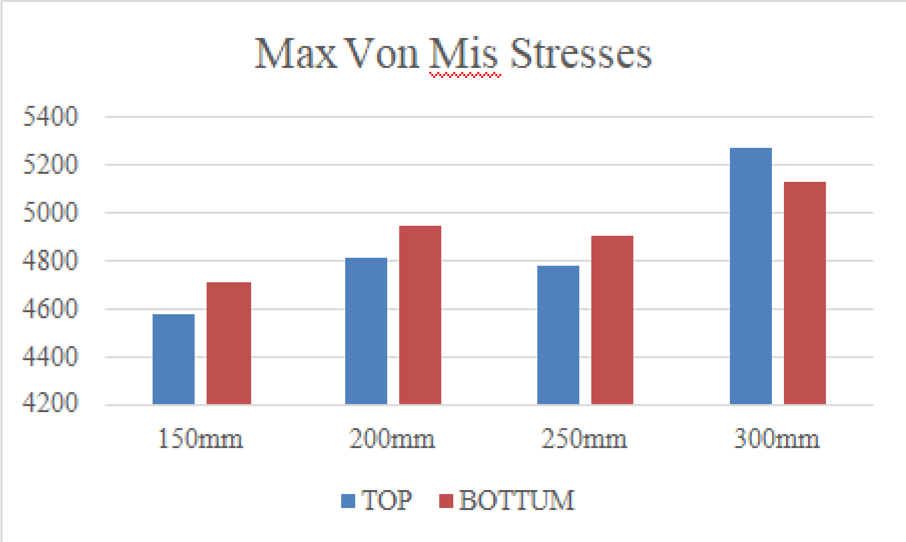
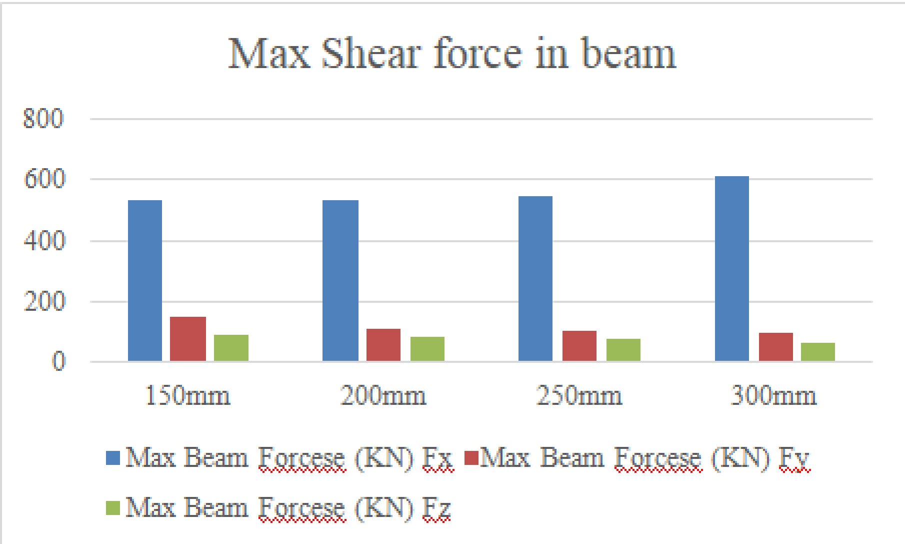
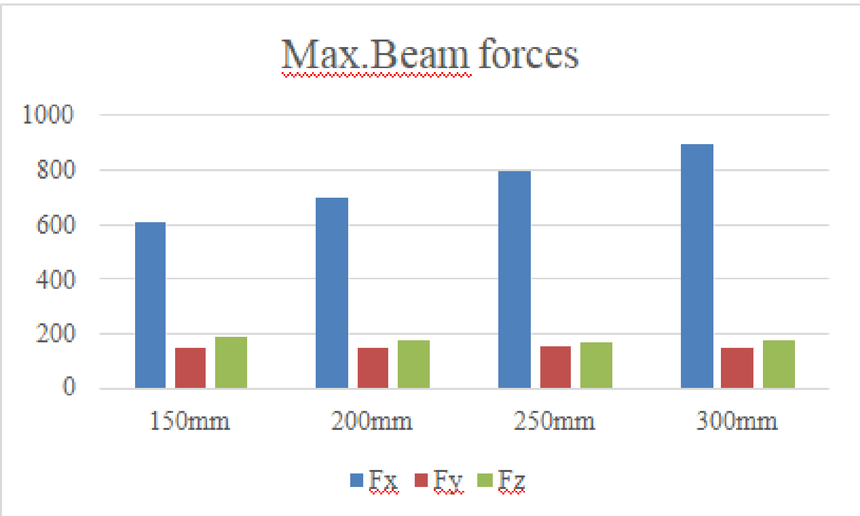


Graph 6: Max von mis Stresses on Deck Slab of 18m Span with varying thickness



Graph 7: Max shear force in beam on Deck Slab of 10m Span with varying thickness



Graph 8: Max shear force in beam on Deck Slab of 15m Span with varying thickness

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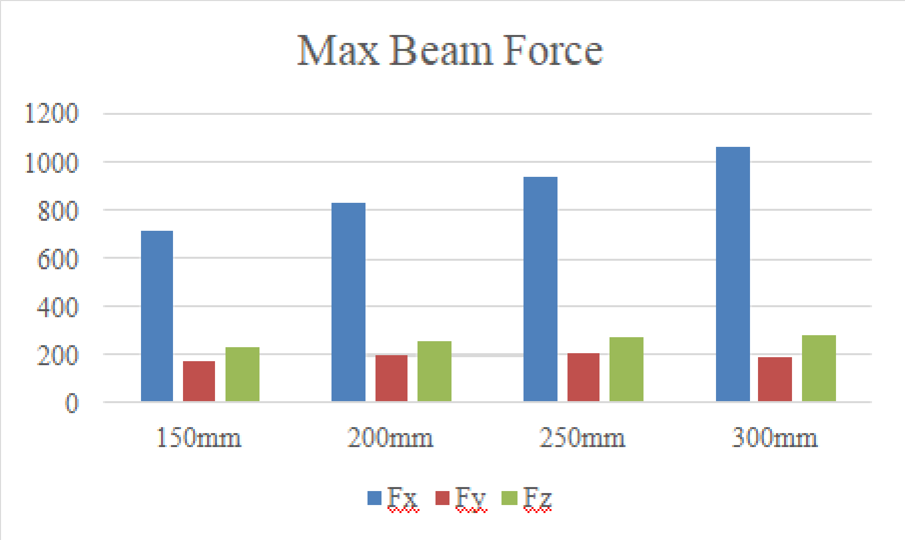
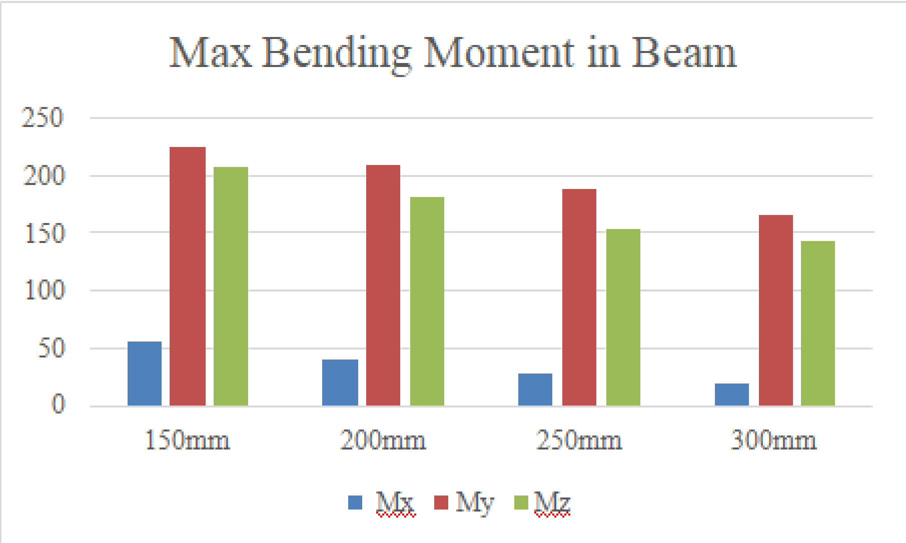
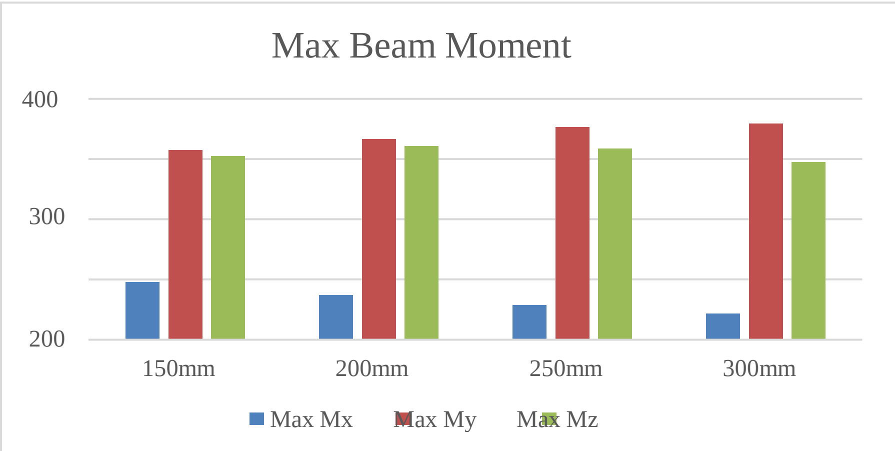


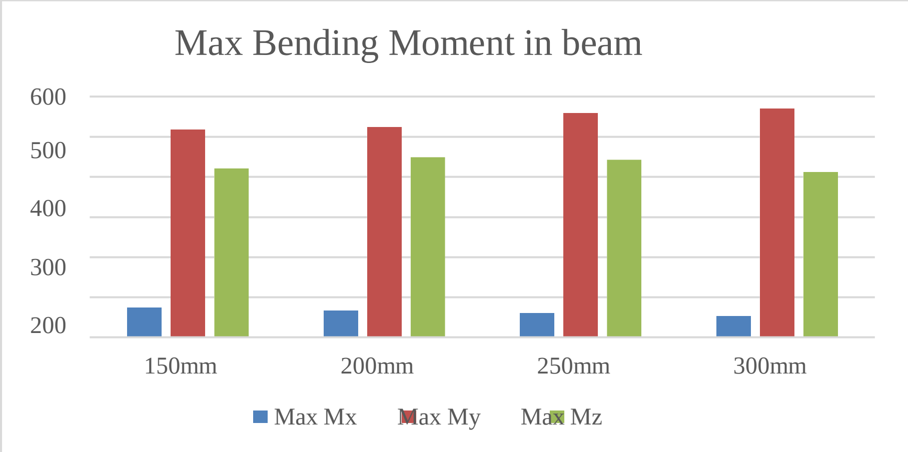
Graph 9: Max shear force in beam on Deck Slab of 18m Span with varying thickness



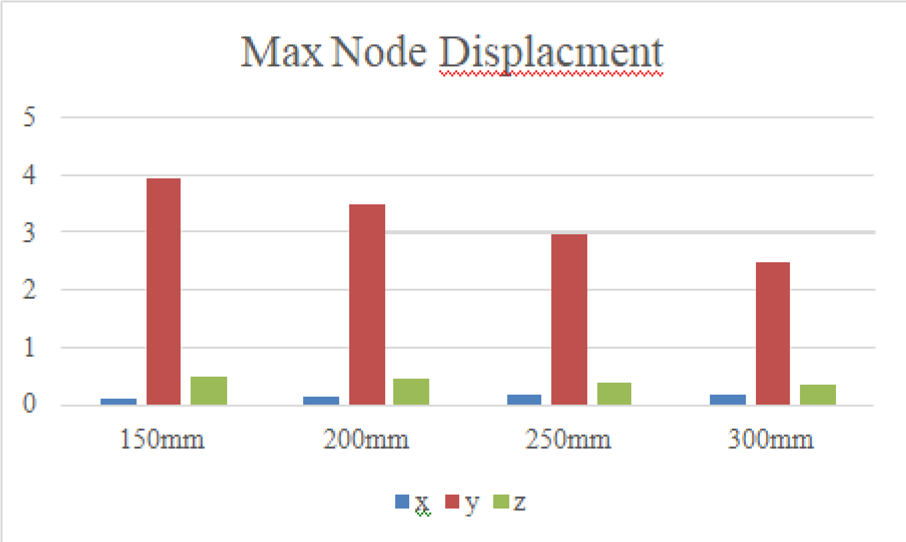
Graph 10: Max Beam Moment in beam on Deck Slab of 10m Span with varying thickness



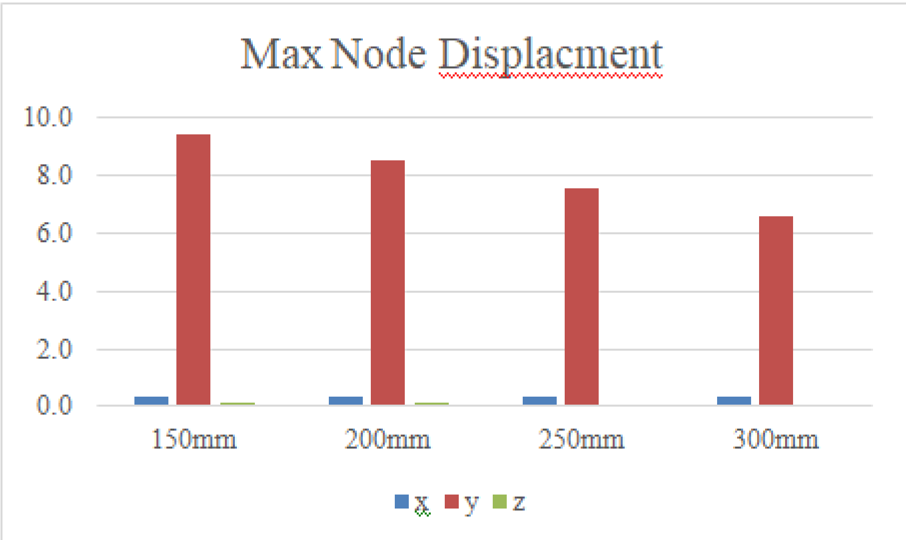
Graph 11: Max Beam Moment in beam on Deck Slab of 15m Span with varying thickness



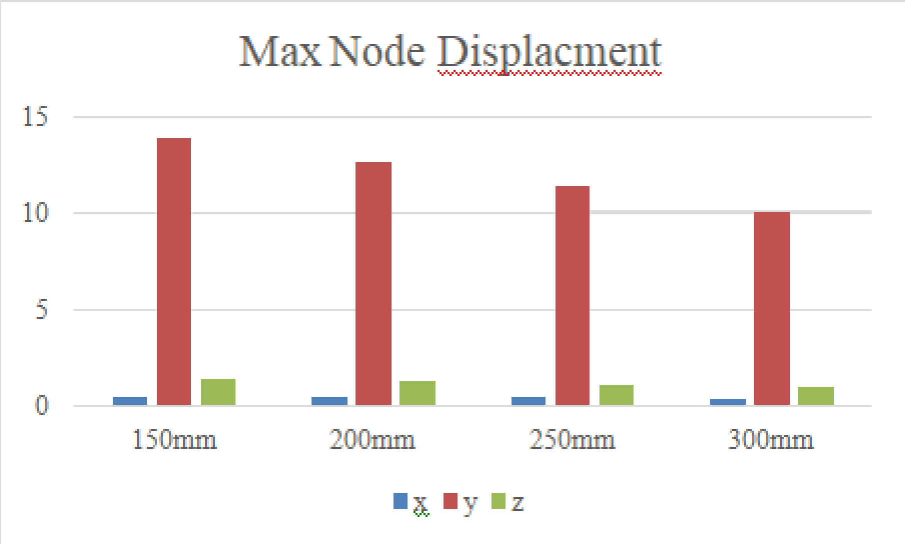
Graph 12: Max Beam Moment in beam on Deck Slab of 18m Span with varying thickness



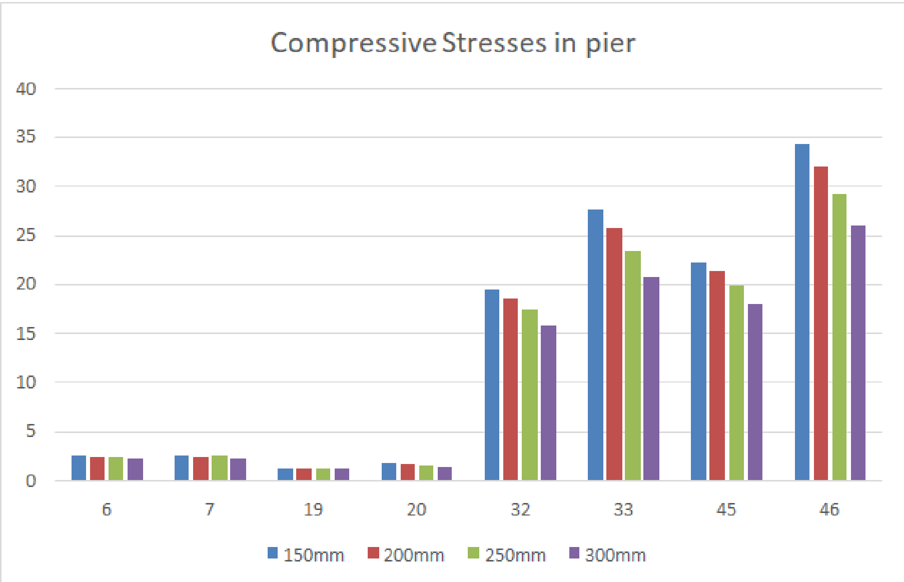
Graph 13: Node Displacement on Deck Slab of 10m Span with varying thickness



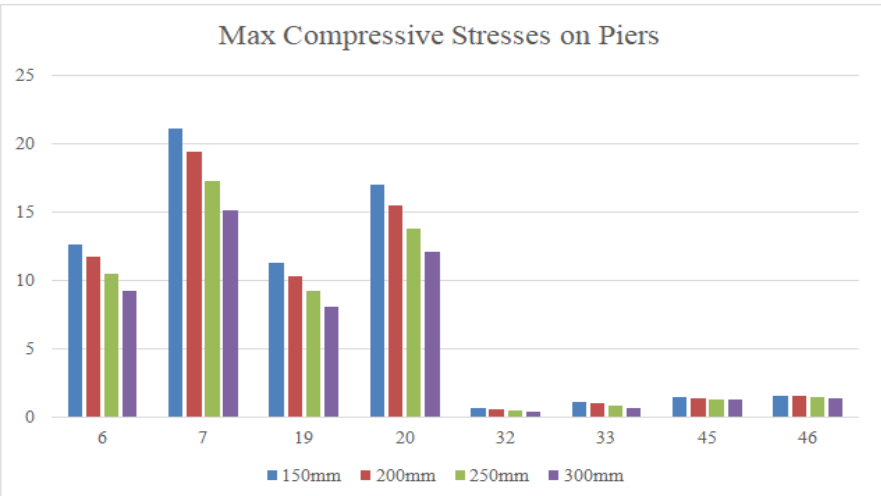
Graph 14: Node Displacement on Deck Slab of 15m Span with varying thickness



Graph 15: Node Displacement on Deck Slab of 18m Span with varying thickness



Graph 16: Compressive Stresses in Piers 10meter span Bridge



Graph 17: Tensile Stresses in Piers 10meter span Bridge

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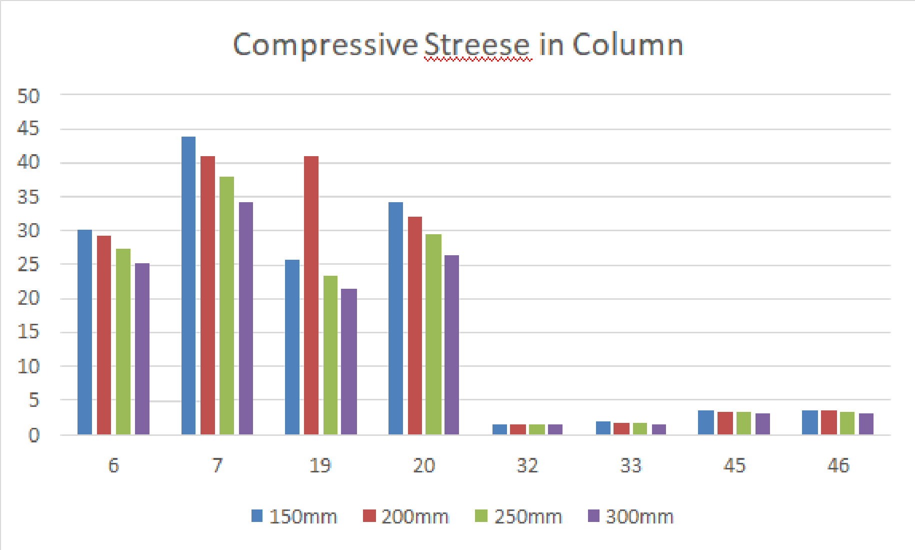
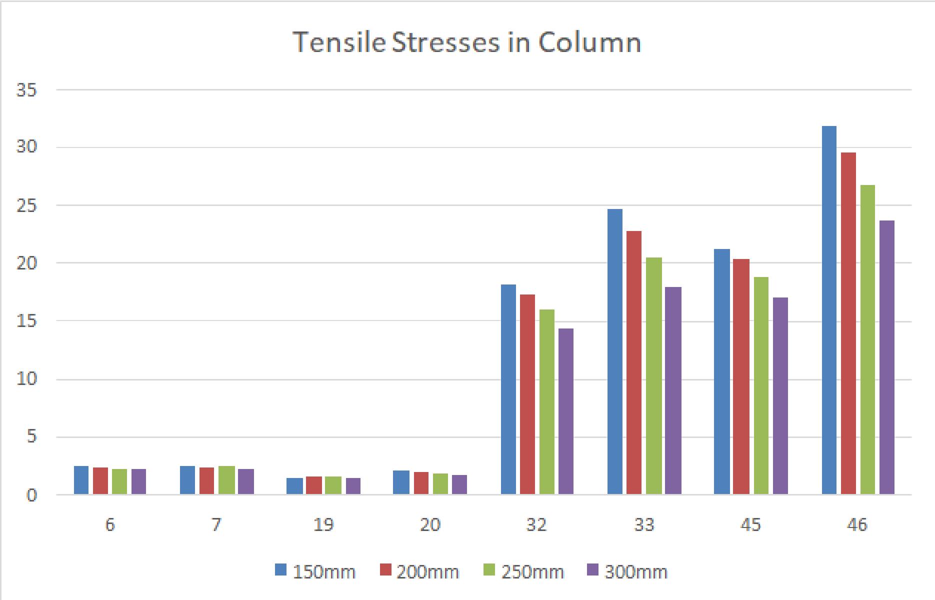
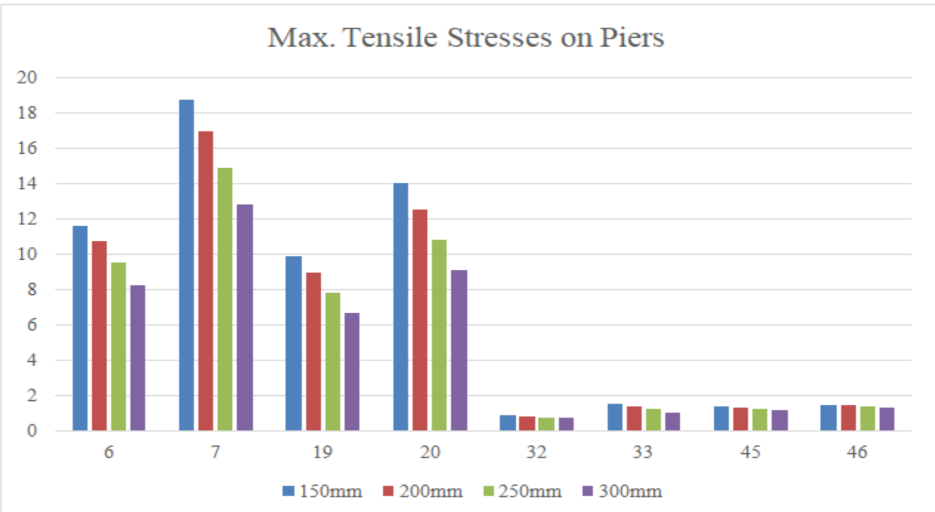




Graph 18: Compressive Stresses in Pier in 18meter span bridge



Graph 19: Tensile Stresses in Pier in 18meter Span bridge

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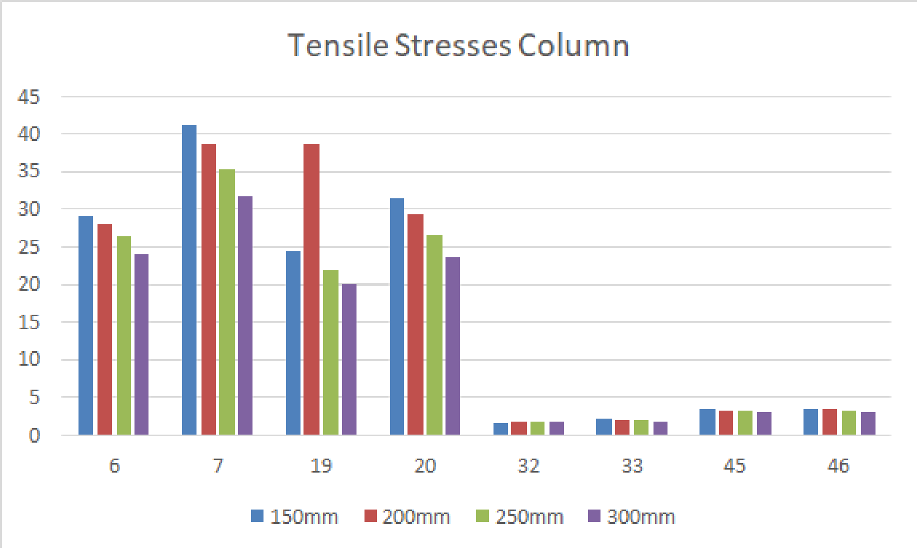
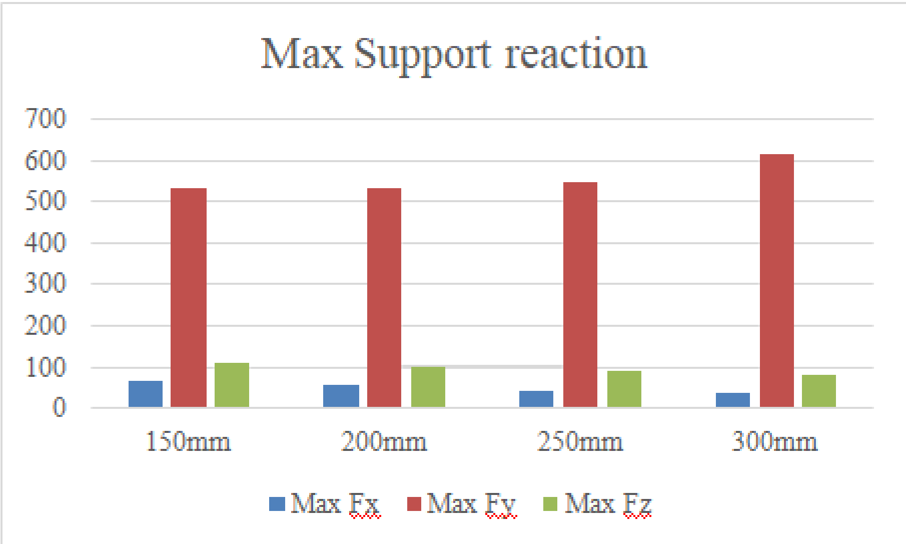
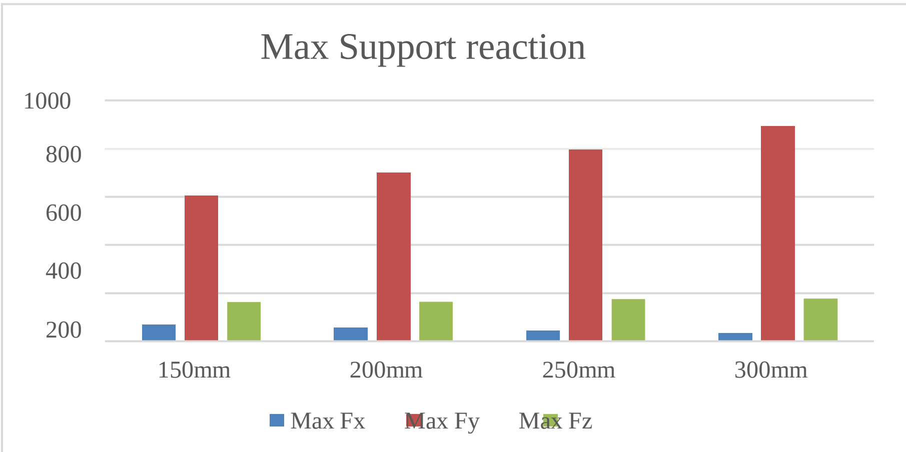


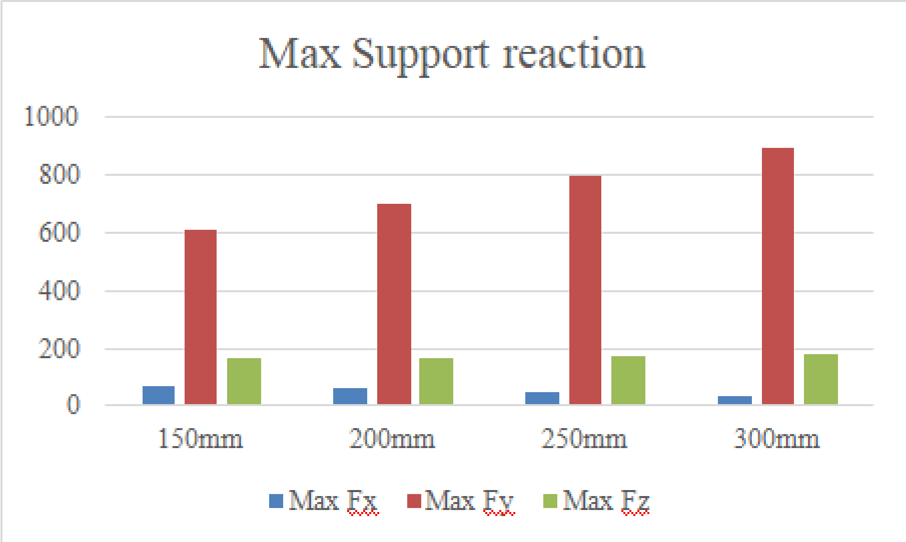
Graph 20: Tensile Stresses in Piers 15meter span Bridge



Graph 21: Max Support reaction on Deck Slab of 10m Span with varying thickness



Graph 22: Max Support reaction on Deck Slab of 15m Span with varying thickness



Graph 23: Max Support reaction on Deck Slab of 18m Span with varying thickness

II. CONCLUSION

It concludes that Principal pinnacle and backside stress on the deck slab increase significantly with time and high pressures increase but the lower pressures decrease with the thickness of the deck slab thickness from 150mm to 300mm.

1. It concludes that Von Mis high and rear stress on the deck slab rises sharply with the length of the rising span. In the short term (up to 10m) von mis stresses rise to 250mm, but slab depth kept at 300mm von mis stresses will decrease. When the height rises by 15m to 18m and the depth varies from 150mm to 300mm the pressure also increases with the depth of the slab but is much smaller at the curve maintained at 300mm.

2. Removal of the node in the Y direction direction downwards will increase with increasing span length. It sees that it doubles on the 15m span bridge and three times on the 18m bridge compared to the 10m span bridge. While the removal of the Node from Y to the bottom will decrease with the depth of the slab rising from 150mm to 300mm throughout the considered time in the study. The negligible differences observed in X and Z.

3. It concludes that the Maximum shear force on the Longitudinal and the cross girder will increase if you increase the length of the bridge area by 10m to 15m and 18m. While the size varies from 150mm to 300mm the cutting power I will reduce.

4. Similarly, the maximum bending moment in the Longitudinal and the crossing band will increase as you increase the length of the bridge form by 10m to 15m and 18m. While the size varies from 150mm to 300mm per minute I will reduce it.

5. The maximum support response increases with increasing span length and will decrease with increasing deck slab from 150mm to 300mm

6. The compressive and solid pressures on the pools will increase with the length of the span while the thickness of the deck slab thickness both pressures will decrease.

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