Comparison between Staad and Etabs on skew bridge with different span

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Abstract - *The paper includes different techniques and the related work that has been done for skew angle on skew bridges. Work has been done to understand the effect of skew angle in skew bridges and is primarily focused on IRC 70R loading. This can be done on comparison between STAAD and ETAB* leading *design software in the market. Many design company using the ultimate in encoded software consequently venture development of the project mainly deal with the virtual analysis of the result obtain commencing the design of the bridge slab decks by using STAAD and ETAB separately. This Paper provides the detailed study of normal and skewed reinforced cement concrete bridges, various IRC loading criteria on bridges as per Indian Road Congress (IRC) 6:2014 and amendments made recently, different parameters like bending moment, twisting moment, under skew angles* 15^{θ}*.*

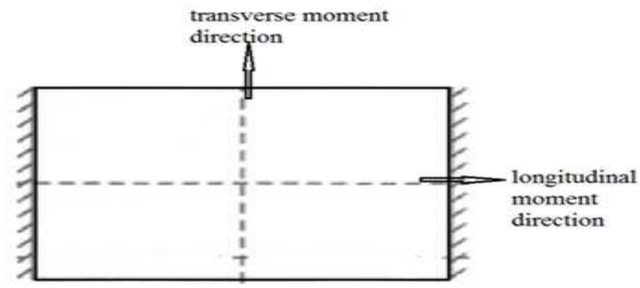
***Key Words*: Comparison, Skew Bridge, Skew Angle, Carriageway, Span length, Bending Moment, Torsional Moment, STAAD and ETAB.**

1. INTRODUCTION

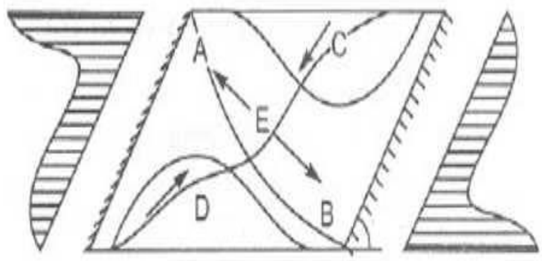
In Current century, owning headed for massive inhabitants the numbers of areas in units are diminishing gradually population were not so vast as a result they used to move vehicle in horizontal direction (Span length XX Axis), While the width as taking Z direction in R.C.C bridge deck slab we concern about all the forces that take action on a bridge, It's have weight, as well as the soil demeanor or comportment capacity. For external forces that perform on the slab, piers, and reinforcement supposed to be good enough to counteract these forces easily. The soil thought to be superior enough to distributing the load effectively to the establishment. For loose soil, we preferred deep foundation. Consequently, the use of popular software STAAD PRO and ETAB this problem will be solved easily.

Objectives of the study

The main purpose of this study-oriented project is to detailed study of simulation tools for analysis and designing of structures. Comparison of simulation implements STAAD PRO, and ETABS and analysis of skew bridge plan.



Direction of moment flow in straight bridge deck



Direction of moment flow in Skew bridge deck

2. PARAMETRIC STUDY

A simply supported, single span, two lane RC slab bridge deck is considered. The span is varied from 15, 17 and 19m and skew angle is constant at 15° to with the depth of the slab 250mm for all spans. The bridge deck is analyzed for Dead load as well as one class of live load i.e. IRC Class 70R. Comparison of critical structural response parameter of above cases is presented in the following for slabs without edge beam. A total of 40 slab deck models have been analyzed. Geometric parameter as following below

S.NO.	Span length	Width	Skew angle
1	15	7.5	15°
2	17	7.5	15°
3	19	7.5	15°

3. LOAD ON BRIDGE DECK MODELS

The vehicular live load consist of a set wheel loads and are treated as uniformly distributed loads acting at contact areas, one classes of load i.e. IRC 70R are considered for analysis. The peak values of critical structural response parameter such as longitudinal sagging bending moment and torsional moment are analyzed. Different positions of each type of loading systems are considered of IRC 6:2014

4. FINITE ELEMENT MODELING

The analysis is carried out using finite element method. The concrete slabs are modelled using four noded plate elements and without edge beams using two noded beam elements. Simple support condition is provided.

ELASTIC MODULUS	25000 Mpa
POISSON'S RATIO	0.2
DENSITY OF CONCRETE	25kN/m2

5. RESULTS AND DISCUSSION

The FEA results are obtained and presented in terms of critical structural response parameter such as longitudinal sagging bending moment and torsional moment in the bridge deck models due to the applied wheel load. The variations of the critical structural response parameter due to changes in skew angle are presented in the following.

STAAD

5.1 Bending Moment and Torsional Moment (M_x , M_y and M_{xy})

It is observed that the when the span length increases at the constant skew angle the dead load and wheel load bending moment and torsional moment is to be decreased in STAAD Pro. This is because the force flow between the support lines is through strip area connecting the acute angled corner, as span length increases strip area is also increases therefore moment decreases.

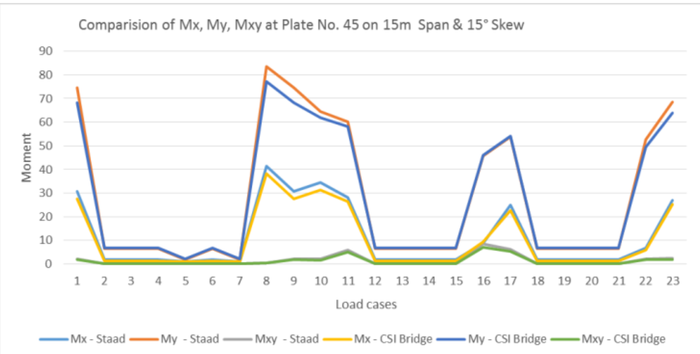


Chart -1: Moment versus Load Cases at plate 45 on 15m span and 15°Skew Angle

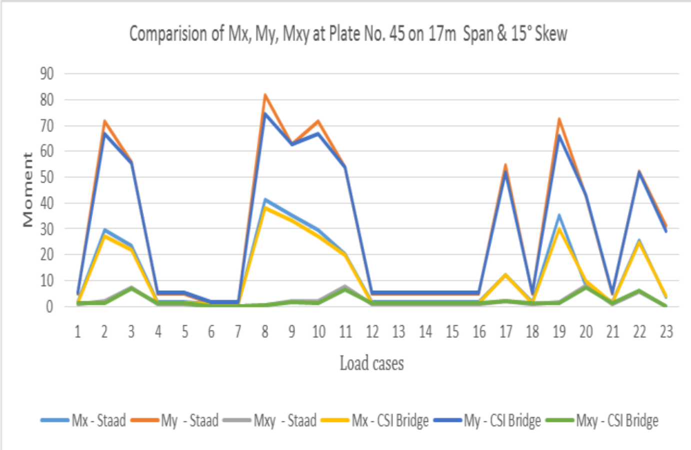


Chart -2: Moment versus Load Cases at plate 45 on 17m span and 15°Skew Angle

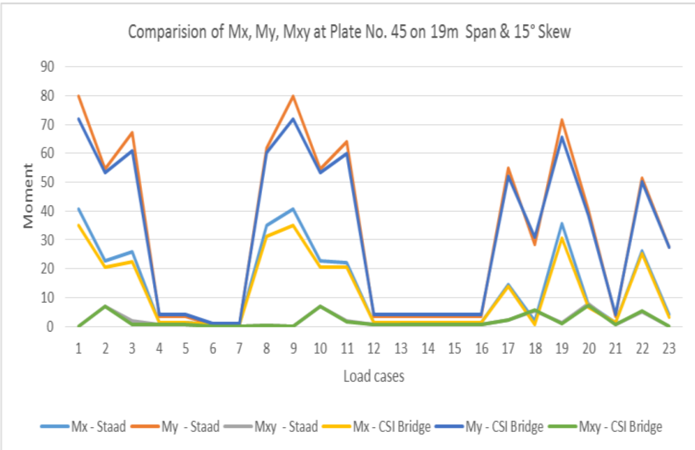


Chart -3: Moment versus Load Cases at plate 45 on 19m span and 15°Skew Angle

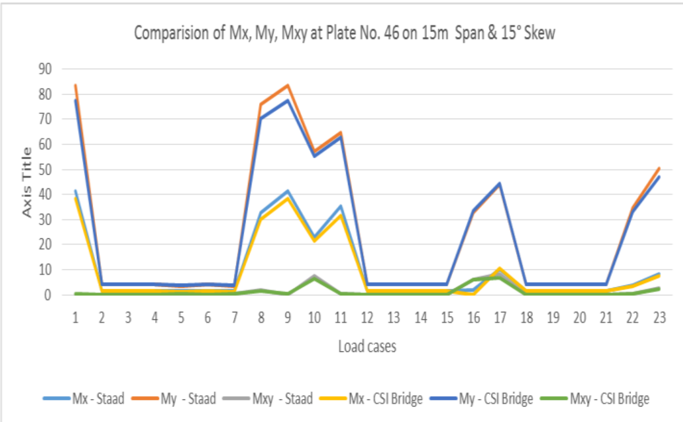


Chart -4: Moment versus Load Cases at plate 46 on 15m span and 15°Skew Angle

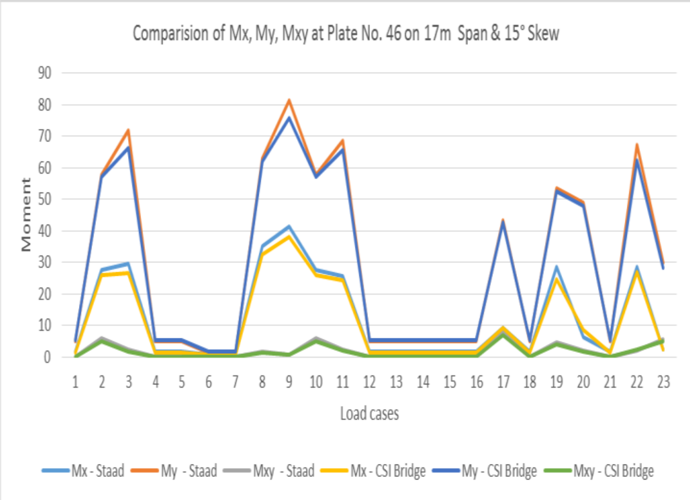


Chart -5: Moment versus Load Cases at plate 46 on 17m span and 15°Skew Angle

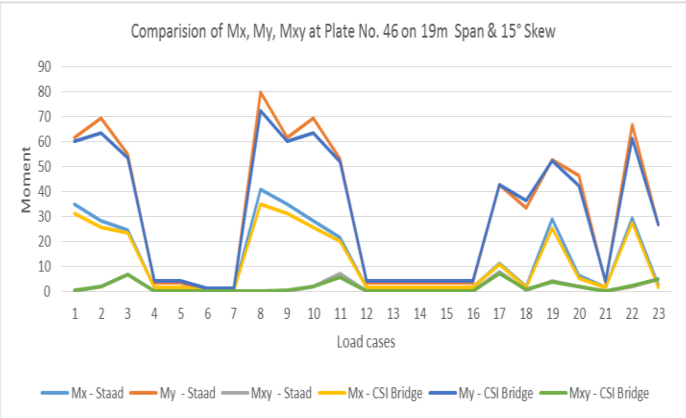


Chart -6: Moment versus Load Cases at plate 46 on 19m span and 15°Skew Angle

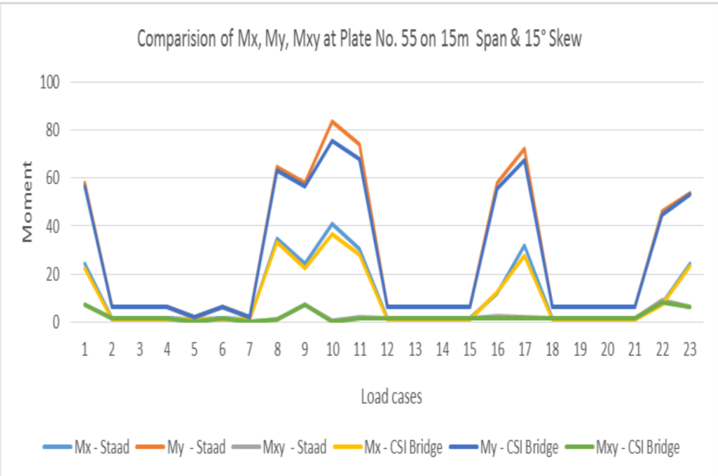


Chart -7: Moment versus Load Cases at plate 55 on 15m span and 15°Skew Angle

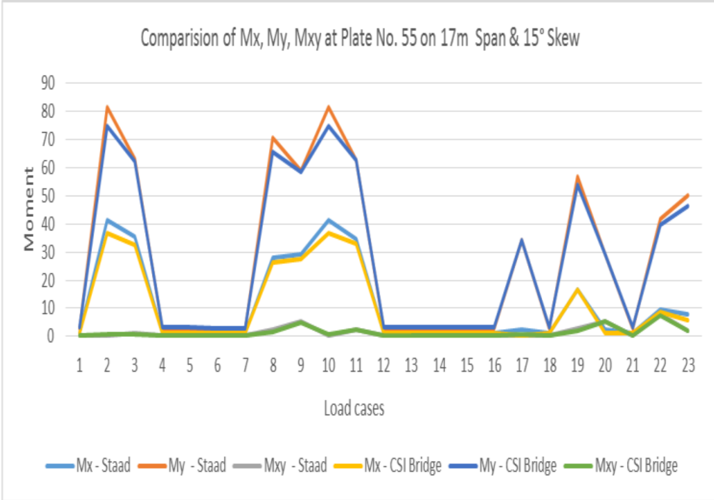


Chart -8: Moment versus Load Cases at plate 55 on 17m span and 15°Skew Angle

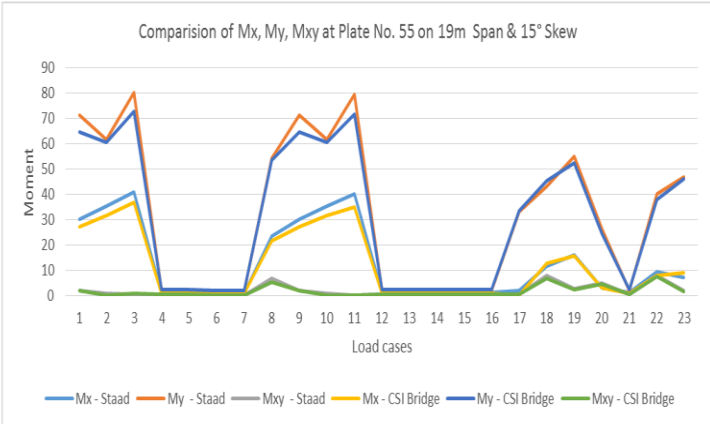


Chart -9: Moment versus Load Cases at plate 55 on 19m span and 15°Skew Angle

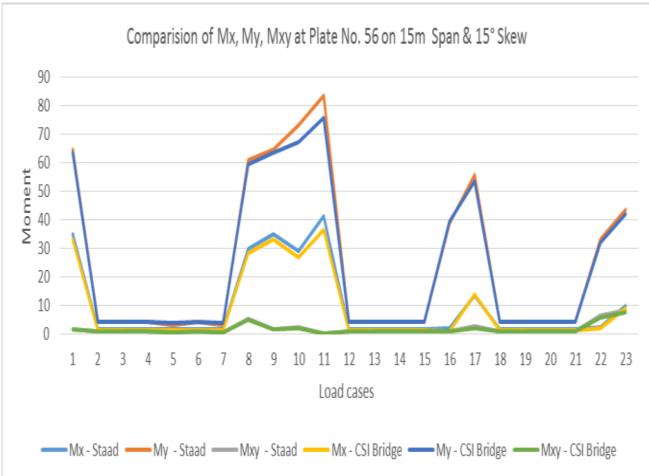


Chart -10: Moment versus Load Cases at plate 56 on 15m span and 15°Skew Angle

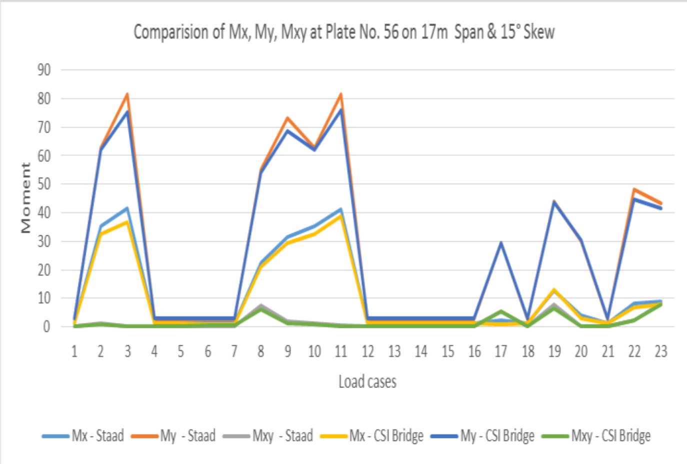


Chart -11: Moment versus Load Cases at plate 56 on 17m span and 15°Skew Angle

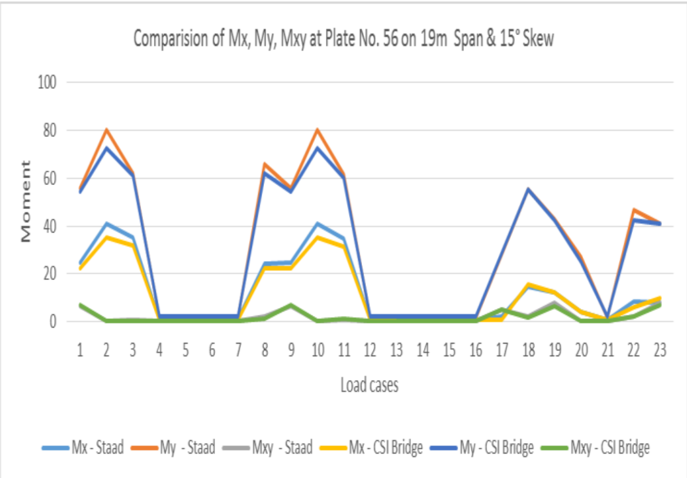


Chart -12: Moment versus Load Cases at plate 56 on 19m span and 15°Skew Angle

3. CONCLUSIONS

1. Considerable torsion of deck slab
2. At constant skew angle for varying span length the torsional bending moment gradually shift toward obtuse/acute angle
3. At different load cases at different plate i.e.(45,46,55,56) the longitudinal bending moment(M_x , M_y) is continuously increasing as increasing the span length in both the software STAAD and ETAB
4. The torsional moment by both the software will give same result i.e. M_{xy} firstly decrease and then increase as the span length increase, except some plate such as plate number 56
5. In plate 56 the torsional moment the rate of change increase in STAAD but ETAB result is similar as above point 4
6. In both the software i.e. STAAD and ETAB the ETAB give more appropriate result in compare to STAAD

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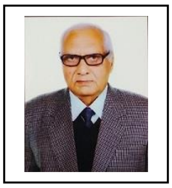
BIOGRAPHIES



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