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ANAYLSIS AND DESGIN OF SKEWED I GIRDER AND PSC BOX GIRDER BRIDGE IN MIDAS CIVIL

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Abstract - *A* bridge is a structure providing passage over an obstacle without closing the way beneath. The required passage may be for a road, a railway, pedestrians, a canal or a pipeline. Now adays, bridge deck section of Box shapes are used widely. Most of the bridges constructed are of Box girders. Method of post-tensioning in the construction of bridges is very common today. Most of the bridges are of prestressed types (mostly post-tensioned). In this work, an attempt was made to comparative study of PSC Box Girder and skewed I Girder Bridge using Midas Civil.

***Key Words*: Skew bridges, skew angle, PSC box girder, span length, seismic load, dead load.**

1.INTRODUCTION

The continuing expansion of highway network throughout the world is largely the result of great increase in traffic, population and extensive growth of metropolitan urban areas. This expansion has led to many changes in the use and development of various kinds of bridges. As Span increases, dead load is an important increasing factor. To reduce the dead load, unnecessary material, which is not utilized to its full capacity, is removed out of section, this results in the shape of box girder or cellular structures, depending upon whether the shear deformations can be neglected or not. "When tension flanges of longitudinal girders are connected together, the resulting structure is called a box girder bridge".

These days traffic caused the bottlenecked, so to distribute the traffic without any congestion and within geographical constraints, the only possible solution is when we introduce the skew and horizontal curve both. Skewed and curved bridges play vital role in intersections and interchanges. Several researches using analytical as well as experimental approaches to understand the actual behavior of skewed bridges when subjected to static and dynamic loads. With increase in the skew angle, the stresses in the girder considerably different from those in a straight girder bridge. The increase in value over average value ranging from 0% to 50% for skew angle of 20° to 50°

1.1 METHODOLOGY

MIDAS Civil is a set of new standard for the design of bridge and civil structures. MIDAS Civil enables to readily create nodes and elements. It automatically generates its model with provision of basic preliminary data gives a complete bridge model as well as the construction stages. It provides linear and non-linear structural analysis capabilities with collection of finite elements. The program yields versatility and accurate results. The post processor can automatically create load combinations as per the design code. Also, it provides various checks and load rating features- shear & torsional strengths composite plate girder design member, forces & stresses for each construction stage, max & min stress summations and MS excel format calculation report.

1.2 Model generation via. MIDAS Civil

MATERIAL PROPERTIES FOR FE500	VALUES
Modulus of elasticity	$2.05*10^{8}$KN/m²
Poisson ratio	0.3
Thermal coefficient	$1.2*10^{-5}$ /C
Weight density	76.98 kN/m³
Damping ratio	0.02

MATERIAL PROPERTIES FOR M40	VALUES
Modulus of elasticity	$3.16*10^7 kN/m^2$
Poisson ratio	0.2
Thermal coefficient	$1.0*10^{-5}$ /C
Weight density	23.6 kN/m^3
Damping ratio	0.05

TENDON PROPERTY	VALUES
Tendon Type	Internal(Post-Tension)
Material	Fe500
Duct Diameter	0.11 m
Ultimate Strength	$1.86*10^6$ kN/m^2
Yield Strength	$1.56e*10^6$ kN/m2

2. MIDAS MODEL

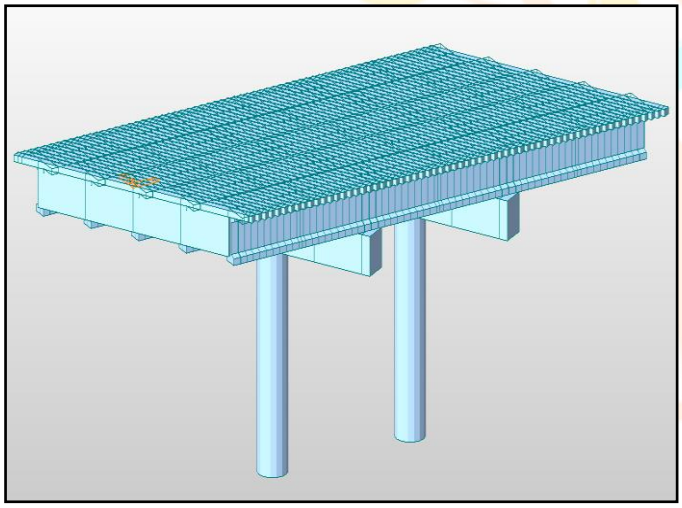


FIG -1: 3D view of 40M Skewed I Girder

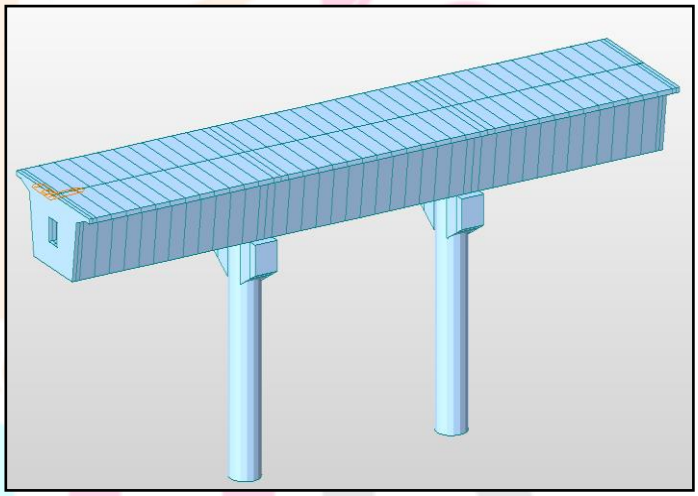
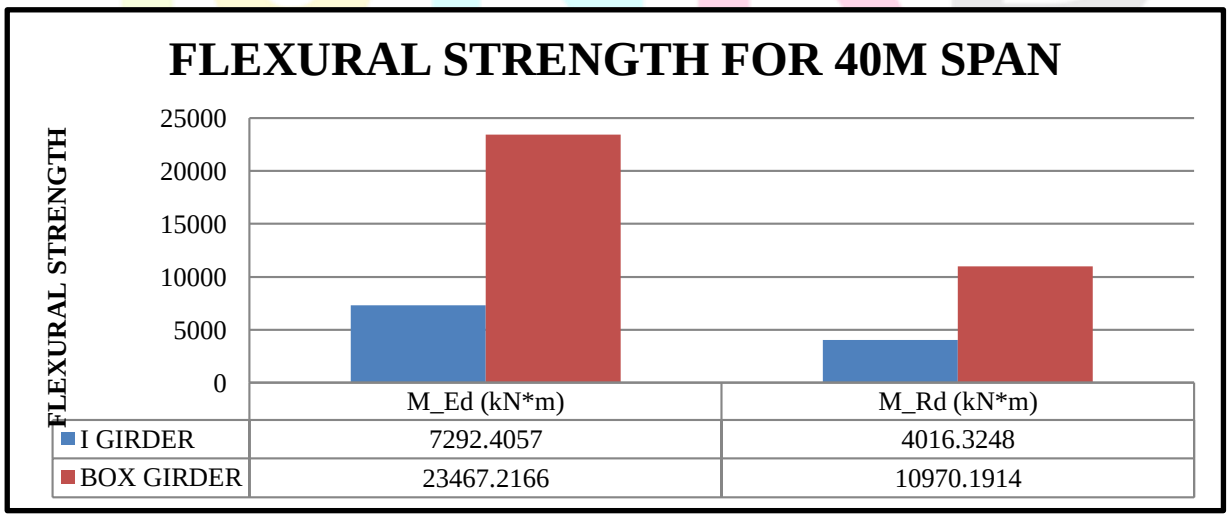


FIG -2: 3D view of 40M PSC Box Girder

3.RESULTS



art -1: FLEXURAL STRENGTH

As we know that flexural strength is the maximum stress in a material just before it yields in a bending test. It is observed that for Box Girder Bridge has more flexural strength than Skew I Girder Bridge for 40 m.

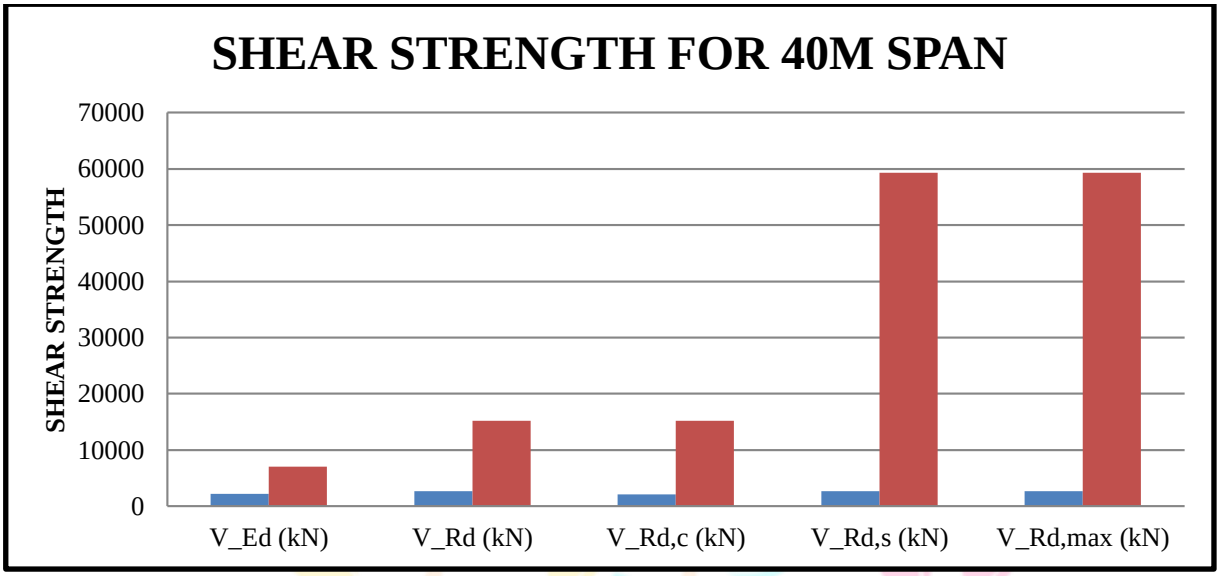
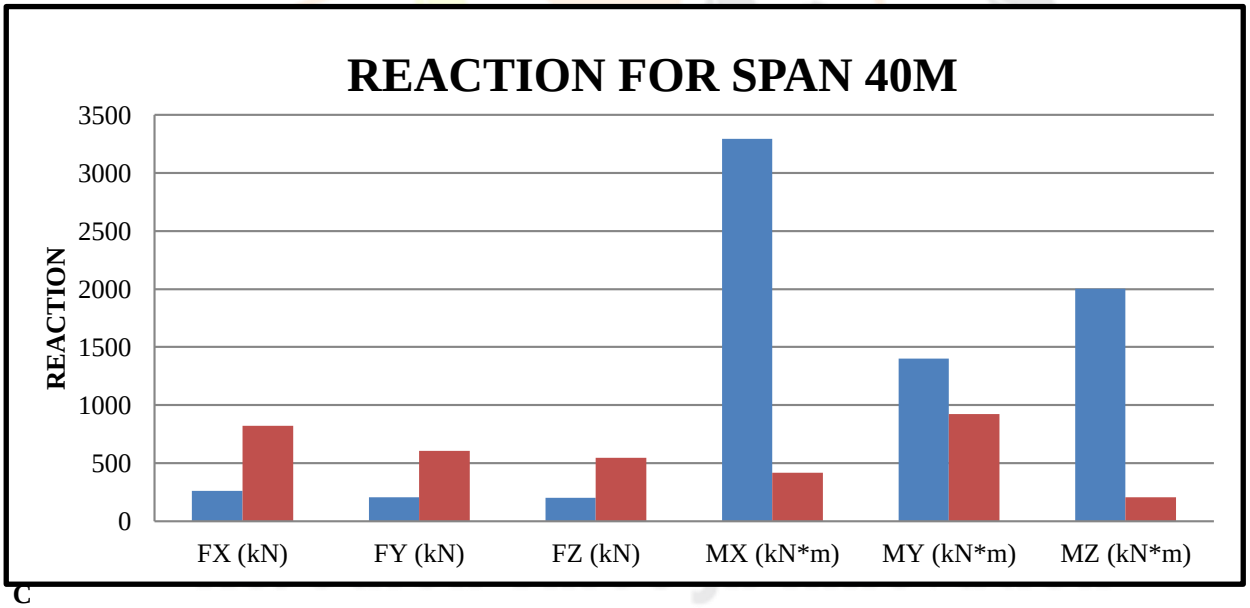


Chart -2: SHEAR STRENGTH

As we know shear strength is the strength of a material. It is observed that shear strength in Box Girder Bridge is more than Skew I Girder Bridge for span 40m.



C
hart -3: REACTION

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3. CONCLUSIONS

Following are the conclusions made from the above study.

A. Flexural strength for Box Girder Bridge is more as compare to Skew I Girder Bridge.

B. Shear strength strength for Box Girder Bridge is more as compare to Skew I Girder Bridge.

C. Under various load the reaction and moment is greater in Skew I Girder Bridge as compare to Box Girder Bridge.

D. After considering all above aspect it is seen that Box Girder Bridge is safer than that of Skew I Girder Bridge.

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