

Seismic Assessment of Simply Supported Vs. Continuous Concrete Girder Bridges

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ABSTRACT:

A metro framework is a railroad transport framework in a urban range with a high limit, recurrence and the level detachment from other activity. Metro System is utilized as a part of urban areas, agglomerations, and metropolitan territories to transport extensive quantities of individuals. A lifted metro framework is more favoured sort of metro framework because of simplicity of development and furthermore it makes urban regions more open with no development trouble. A lifted metro framework has two noteworthy components dock and box brace. The present investigation concentrates on two noteworthy components, wharf and box brace, of a lifted metro auxiliary framework. Ordinarily the dock of a metro connect is composed utilizing a power based approach. Amid a seismic stacking, the conduct of a solitary dock hoisted connect depends for the most part on the flexibility and the removal limit. It is essential to check the pliability of such single wharfs. Power based strategies don't unequivocally check the uprooting limit amid the plan. The codes are presently moving towards an execution based (dislodging based) outline approach, which consider the plan according to the

objective exhibitions at the outline organize. Execution of a dock composed by a Direct Displacement Based Design is contrasted and that of a power based planned one. The outline of the wharf is finished by both power based seismic plan strategy and direct dislodging based seismic outline technique in the initial segment of the examination.

Keywords: Elevated Metro Structure, Bridge Pier, Box Girder Bridge, Direct Displacement Based Seismic Design, Performance Based Design, Force Based Design

I. INTRODUCTION:

A metro framework is an electric traveler railroad transport framework in a urban territory with a high limit, recurrence and the level division from other activity. Metro System is utilized as a part of urban communities, agglomerations, and metropolitan zones to transport expansive quantities of individuals at high recurrence. The review partition enables the metro to move uninhibitedly, with less interferences and at higher general paces. Metro frameworks are ordinarily situated in underground passages, hoisted viaducts above road level or level isolated at ground level. A hoisted metro auxiliary framework

is more favored one because of simplicity of development and furthermore it makes urban territories more open with no development trouble. A raised metro auxiliary framework has the favorable position that it is more monetary than an underground metro framework and the development time is considerably shorter.



Figure Typical Elevated Metro Bridge

SIGNIFICANCE OF THE STUDY:

A power based seismic outline approach is routinely used to plan the metro connect wharf. Amid a seismic stacking, the conduct of lifted extensions depends for the most part on the flexibility and the uprooting limit of the wharf. It is vital to check the flexibility of such single docks. Power based techniques don't expressly check the removal limit at the outline arrange. The codes are presently moving towards an execution based (relocation based) plan approach, which consider the outline according to the objective exhibitions at the plan organize.

OBJECTIVE:

- To examine the execution of a dock composed by Force Based Design Method (FBD) and Direct Displacement Based Design (DDBD) Method.
- To examine the parametric conduct of a Curved Box Girder Bridges.

Scope of the work

- The present investigation is constrained to those useful cases that run over in a lifted metro venture.
- concerning the geometry of the wharf considered, the present investigation is restricted to o Rectangular dock cross area o Single wharf auxiliary framework o Reinforced solid dock.

II. LITERATURE REVIEW:

This writing audit concentrates on plan of metro connect dock and furthermore survey on inquire about identified with box support spans. The writing audit is separated into two fragments. To start with section manages the outline of the wharf and the second part bargains box support. The initial segment of the section audits Design of Metro Bridge Pier by Force Based Design (FBD) Method and Direct Displacement Based Seismic Design (DDBD) Method.

Komatsu and Nakai (1966, 1970) exhibited a few investigations on the free vibration and constrained vibration of on a level plane bended single, and twin box-support spans utilizing the key condition of movement alongside Vlasov's thin-walled shaft hypothesis. Field tests on spans energized either by a shaker or by a truck going at different rates demonstrated sensible

understanding between the hypothesis and exploratory outcomes.

Bazant and El Nimeiri (1974) ascribed the issues related with the disregard of curvilinear limits in components used to show bended box shafts to the loss of progression toward the end cross areas of two aide components meeting at an edge. They built up a skew-finished limited component with shear misshapening utilizing straight components and received a more precise hypothesis that takes into consideration transverse shear distortions.

Samaan et al. (2007) displayed a dynamic investigation of bended consistent various box support spans, utilizing the limited component technique, to assess their common frequencies and mode shapes and test tests are directed on two nonstop twin-box brace connect models of various ebbs and flows to substantiate the limited component demonstrate. led a nitty gritty investigation of box brace connect cross-segments in particular Rectangular, Trapezoidal and Circular and furthermore exhibited a parametric report for redirections, longitudinal and transverse

twisting anxieties and shear slack for every single cross-segment.

III STUDY OF A PIER DESIGNED BY FBD AND DDBD:

The geometry of wharf considered for the present investigation depends on the outline premise report of the Bangalore Metro Rail Corporation (BMRC) Limited. The wharfs considered for the investigation are situated in the lifted metro station structure. The compelling stature of the considered wharfs is 13.8 m. The docks are situated in Seismic Zone II, according to IS 1893 (Part 1): 2002. The demonstrating and seismic investigation is completed utilizing the limited component programming STAAD Pro.

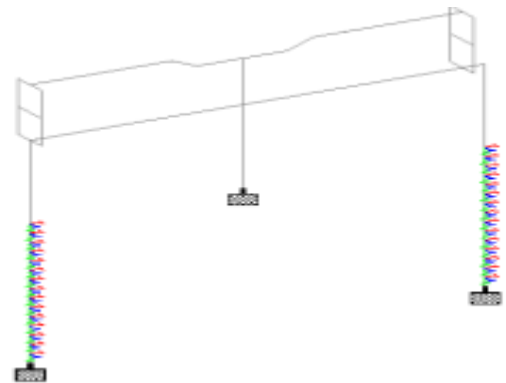


Figure Typical Pier Mode

MATERIAL PROPERTY FOR PIER:

Properties of Concrete	
Compressive Strength of Concrete	60 N/mm ²
Density of Reinforced Concrete	24 kN/m ³
Elastic Modulus of Concrete	36000 N/mm ²
Poisson's Ratio	0.15
Thermal Expansion Coefficient	1.17 x 10 ⁻⁵
Properties of Reinforcing Steel	
Yield Strength of Steel	500 N/mm ²
Young's Modulus of Steel	205,000 N/mm ²
Density of Steel	78.5 kN/m ³

Poisson's Ratio	0.30
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IV STUDY ON BEHAVIOUR OF CURVED BOX GIRDER BRIDGES:

Parametric investigation of box support spans utilizing limited component strategy is depicted in this part. The parameters of box support spans considered in this investigation are range of ebb and flow, traverse length, traverse length to the sweep of ebb and flow proportion and number of boxes. The different reactions parameters considered are the longitudinal worry at the best and base, shear, torsion, minute, redirection and crucial recurrence. Numerical examination completed by is utilized for approval of the limited component show. The parametric examination is completed, utilizing 60 connect models, to explore the conduct of box support spans.

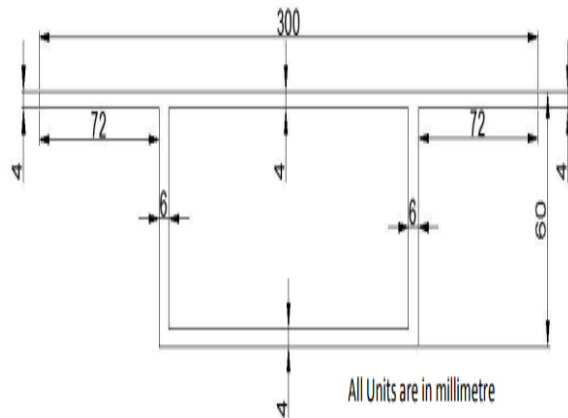


Fig:Cross Section of Simply Supported Box Girder Bridge

Limited ELEMENT Modelling

The limited component displaying system embraced for approval contemplate is utilized for the present examination. The displaying of Box Girder Bridge is completed utilizing Bridge Module in SAP 2000. The Shell component is utilized as a part of this limited component model to discretize the scaffold cross area. At every hub it has six degrees of flexibility

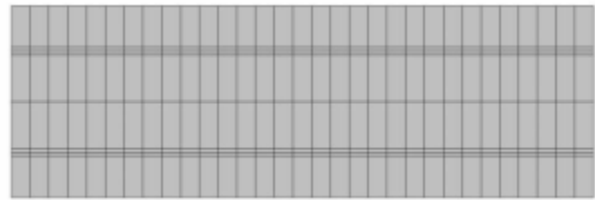


Figure: pan

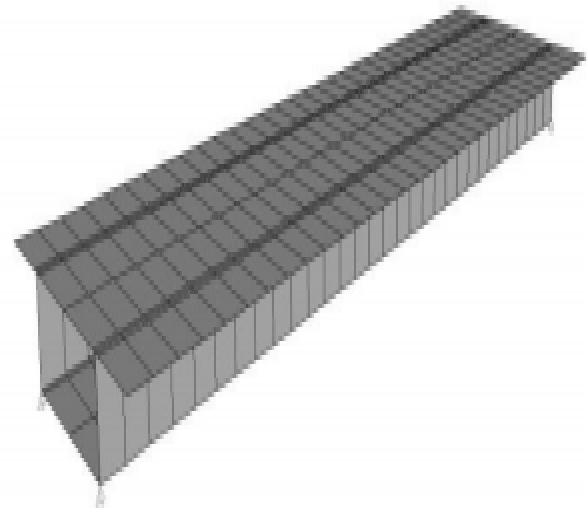
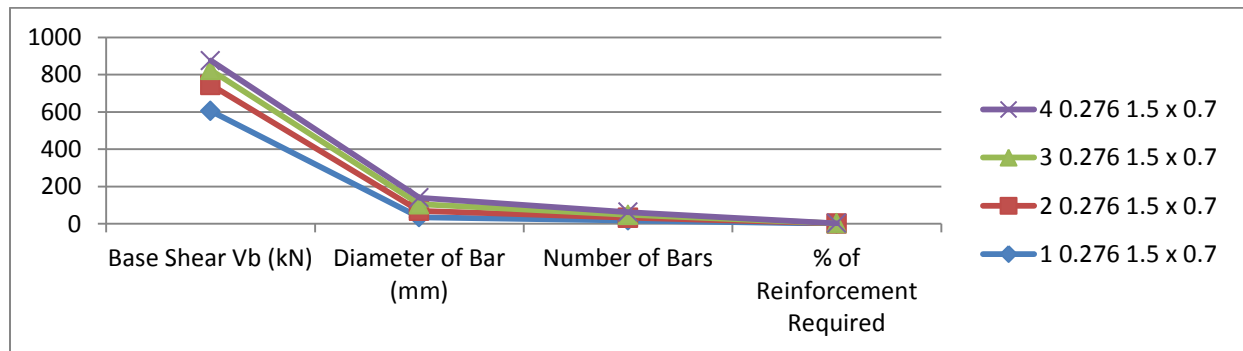


Figure: 3D Model 3D Model Discretized of simply supported Straight Box Girder Bridge

Table: Reinforcement Details as per Direct Displacement Based Seismic Design

Displacement Ductility	Drift Limit (m)	Cross Section (m)	Base Shear Vb (kN)	Diameter of Bar (mm)	No of Bars	% of Reinforcement Required
1	0.276	1.5 x 0.7	605	35	18	1.2
2	0.276	1.5 x 0.7	140	35	15	0.6
3	0.276	1.5 x 0.7	80	35	15	0.6
4	0.276	1.5 x 0.7	50	35	15	0.6



Graph different variations Reinforcement Details as per Direct Displacement Based Seismic Design

V CONCLUSION:

A metro framework is an electric traveller railroad transport framework in a urban territory with a high limit, recurrence and the level detachment from other movement. A lifted metro framework is the most favoured type of metro structure because of simplicity of development and less cost contrasted with different sorts of metro structures. The execution evaluation of chose outlined dock demonstrated that, Force Based Design Method may not

generally ensure the execution parameter required and in the present case the dock just accomplished the objective required. in the event of Direct Displacement Based Design Method, chose dock accomplished the conduct factors more than focused Values. These conclusions can be viewed as just for the chose wharf. For General conclusions substantial quantities of contextual investigations are required and it is dealt with as an extent of future work. The parametric examination on conduct of box

brace spans demonstrated that, As the sweep of ebb and flow builds, reactions parameter longitudinal worries at the best and base, shear, torsion, minute and redirection are diminishes for three sorts of box support scaffolds and it demonstrates very little variety for principal recurrence of three sorts of box brace connects because of the steady traverse length..

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