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Original Article

"STRUCTURAL MODIFICATION OF PLATE GIRDER BRIDGE FOR ECONOMIC OPTIMIZATION"

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ABSTRACT

Industrial development and there by heavy transport business with high speed is a need of today. Hence, It is required to design the structure as per requirements. Bridges play a vital role & a link for the means of transport between the bottlenecks. Structural stability, safety and economy are the important features for the design and selection of bridges.

The general practice is to construct the conventional plate girder bridge with constant web depth over an entire span. As an innovation, It is decided to modify the form and shape of conventional plate girder bridge. Parabolic arch bridge with minimum web depth at mid span and maximum web depth at supports was analyzed and compared with conventional plate girder bridge for economic optimization.

Conventional and modified form of plate girder bridges are categorically selected for the following fixed parameters:-

Type of Bridges →	Conventional (Conv.)	Modified – 1 (M1)	Modified – 2 (M2)	Modified – 3 (M3)
Web depth at mid span	1.40 m	1.00 m	1.20 m	1.00 m
Web depth at support	1.40 m	1.80 m	2.00 m	1.50 m

For the analysis & design of bridges by using working stress method, some fixed & variable data are selected:-

A. Fixed parameters :-					
➢ Boundary Conditions:	Simply Supported	➢ Skew angle:	$< 10^0$	➢ Seismic zone:	II
➢ Wind effect:	Neglected	➢ Loading:	Broad gauge, main line loading	➢ Flange width:	600mm
B. Variable parameters:-					
➢ Span:	10 m, 20 m, 30 m, 40 m & 50 m	➢ Web thickness:	10 mm, 11 mm, 12 mm, 13 mm, 14 mm & 15 mm		
➢ F_y:	250 N/mm^2, 300 N/mm^2, 350 N/mm^2 & 400 N/mm^2				

An analysis & design is done by using working stress method by selecting all the variables. The results obtained for all the variable parameters are compiled categorically. The data obtained are shown in tabular form. To display the comparison, graphical presentations are carried out. As an outcome, It is concluded that modified types of plate girder bridges are most economical, as compared with conventional plate girder bridge.

KEYWORDS:

A_f = Area of Flange	b_f = width of Flange	dw = depth of web
IRC = Indian road congress	M.I. = Moment of Inertia	t_w = Thickness of web

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