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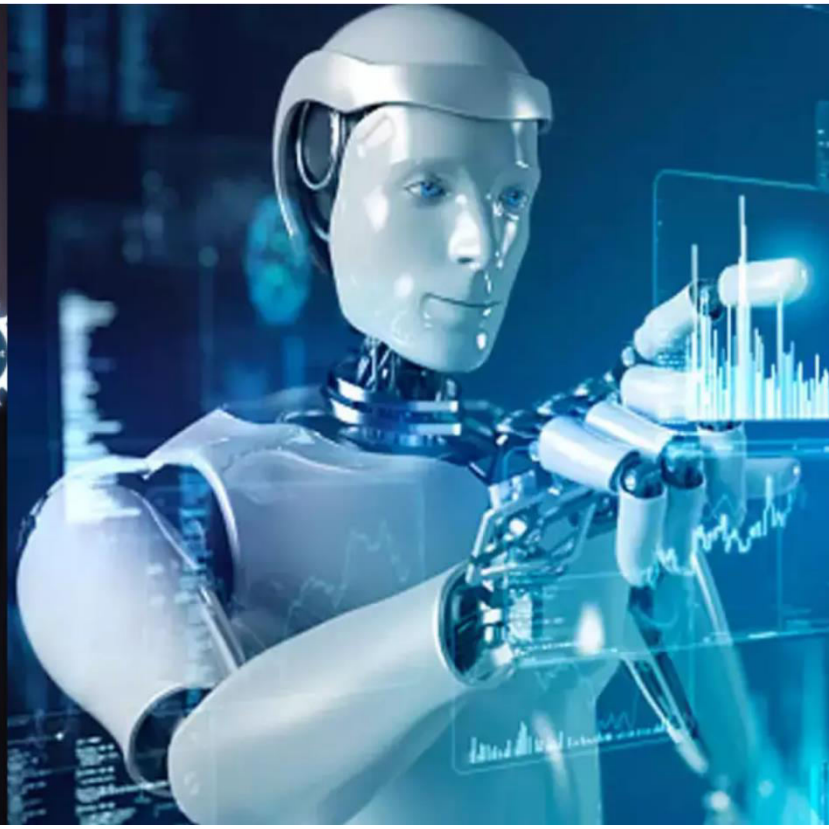

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Comparative Study on Design and Analysis of Footover Bridge

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ABSTRACT: This study presents a detailed comparative design and analysis of Foot Over Bridges (FOBs) using three different truss configurations -Warren, Lattice, and Pratt trusses for a span of 54 meters. The central objective is to evaluate each truss type's ability to safely carry pedestrian and environmental loads while maintaining structural efficiency, stability, and practical feasibility for long-span applications. The analysis is carried out exclusively using STAAD.Pro, a structural engineering software widely used for modeling and analysis. Through this platform, comprehensive evaluations of axial forces, bending behaviour, and vertical deflections are conducted for all the three truss types

KEYWORDS: FootOver Bridge (FOB), Truss Types, Pratt Truss, Lattice Truss, Warren Truss.

I. INTRODUCTION

Foot Over Bridges (FOBs) are vital infrastructural elements that facilitate safe pedestrian movement across congested roads, busy intersections, railway lines, and similar urban barriers. These elevated walkways play an important role in enhancing mobility in urban areas by physically separating pedestrian and vehicular traffic. This separation significantly improves overall safety, traffic efficiency, and accessibility, especially in high-density environments. Typically, FOBs are designed with an elevated span supported by columns or piers, allowing uninterrupted pedestrian access over obstacles without affecting the vehicular flow beneath. Key design considerations include appropriate span width, sufficient vertical clearance, and effective integration with surrounding infrastructure. Depending on their location and usage, FOBs may incorporate features such as stairs, ramps, elevators, or escalators to accommodate all users-including the elderly, individuals with disabilities, and those with strollers or luggage.

II. LITERATURE REVIEW

Naveen Ram Kumar et al (2021): This research focuses on the analysis and design of a steel truss foot overbridge using STAAD.Pro and AutoCAD software. The study specifically examines a Warren-type truss model and applies relevant loads in accordance with applicable IS codes to design the various structural sections. A suitable site for the overbridge construction was selected after considering all necessary parameters. AutoCAD was utilized to develop the detailed plan drawings, while STAAD.Pro was employed for modeling the structure and performing load analysis. Configuration of Foot over Bridge Span length - 86m, Width of Gangway - 4 m, Length of vertical member - 3m, Type of truss – Warren truss

Gousemiya Saudagar et al (2019): The primary objective of this study is to develop a lightweight footbridge design that ensures adequate strength, durability, and stiffness, without compromising on structural performance. The approach emphasizes the use of simple, practical, and efficient design methods to achieve an optimal balance between weight and safety. Structural analysis is performed using analyse software, ensuring that the design complies with the relevant Indian Standard (IS) code provisions. Configuration of Foot over Bridge Bridge span: 21m,Bridge height: 10m,Width of span: 4m Type of truss – Warren truss

V. Chandrika et al (2019): This paper presents the design and analysis of a foot overbridge constructed with cold-formed steel (CFS) box sections, utilizing STAAD Pro software for structural analysis. The main focus is on minimizing the dead weight of the structure to achieve a lightweight yet robust design, which helps improve pedestrian safety by reducing the risk of accidents between pedestrians and motor vehicles. The study emphasizes the

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development of pedestrian bridges that are not only strong and durable but also economical and easy to assemble. This is accomplished by selecting appropriate CFS sections in accordance with codal provisions, ensuring both cost efficiency and structural performance. Specifically, the CFS box sections used in this project measure 300mmx300mm with a thickness of 3 mm, with beam lengths of 10 meters and column heights of 5 meters, providing an optimal balance between strength and weight**.**

Aman Kumar (2022): In this study, the design process involved both manual load calculations and structural analysis using STAAD Pro software. The analysis accounted for various loads, including dead loads, live loads, and wind pressures. A trial-and-error method was employed to optimize the steel components, ensuring that the design meets all safety and structural integrity requirements. The configuration is as follows: Bridge span: 43m**,** Bridge height: 7.5m**,** Walkway width: 3m**,** Each truss has a 3 m separation, Type of truss – Warren truss

III. OBJECTIVE

- To analyse and compare footover bridge for three different truss types – warren, lattice and Pratt.
- To investigate the performance of footover bridge structures under various loading conditions, including dead loads, live loads, wind load and seismic forces.
- To suggest the truss in terms of cost effectiveness and optimal

IV. METHODOLOGY

The Foot Over Bridge (FOB) design process began with detailed planning using AutoCAD, adhering to IRC guidelines to ensure safe pedestrian movement and efficient traffic flow. Three truss models were developed for a 54m span and 6.75m height: Warren, Pratt, and Lattice trusses. Design parameters, including bridge height and staircase dimensions, were based on IRC SP 056 to ensure vehicle clearance and pedestrian comfort. 3D structural modeling was carried out using STAAD.Pro, with careful selection of steel and aluminium based on strength, durability, and code compliance. I-sections were chosen for columns, and angle sections for other members after iterative testing to confirm load-bearing capacity. Load analysis involved applying dead, live, and wind loads according to IS 875 and IRC 6-2017, including wind directions along both longitudinal (WX) and vertical (WZ) axes. Structural evaluation of all three trusses included analysis of axial forces, displacements, stresses, and self-weight to ensure safety and serviceability. A comparative study was conducted to assess efficiency, material usage, fabrication complexity, and overall performance. The truss designs were optimized for strength, cost-effectiveness, and durability, ensuring the final FOB structure is reliable, safe, and suitable for long-term urban use.

As per IRC Code 6-2017 CL 206.3
For effective spans of over 30 m, the intensity of load shall be determined according to the equation:

$$P = \left(P1 - 260 + \left(\frac{4800}{L}\right)\right)\left(\frac{16.5-w}{15}\right)$$

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4.1 Model 1 – Warren truss of 54m span length

Table 4.1 Structure data

1	Total Span length	54m
2	Aspect	Warren truss
3	Total structure height	9.75m
4	Width of gangway and pedestrian cross	3m
5	Thickness of slab	150mm
6	Thickness of sheet (GI steel)	2mm
7	Zone	IV
8	Loads	Deadload=self-weight (1) DL (slab) = 3.75 KN/m^2 Floor finish = 1.5 KN/m^2 Live load = 3 KN/m^2 Wind load = 1.85KN/m^2

TABLE 4.2 Steel selection

Sl.no	Sections	Material	Members
1	LDISA110x110x12	Steel	Top and bottom members of cord and bottom bracing
2	ISMB 175	Steel	horizontal members
3	ISMB 200	Steel	Front and back diagonal members and vertical members
4	ISMB 300	Steel	Top and bottom diagonal members of stairs
5	LD ISA 90x90x12	Steel	Bracingmembers (coloumn)
6	ISMB 225	Steel	Columns members
7	SA ISA 90x90x10	Steel	Steps

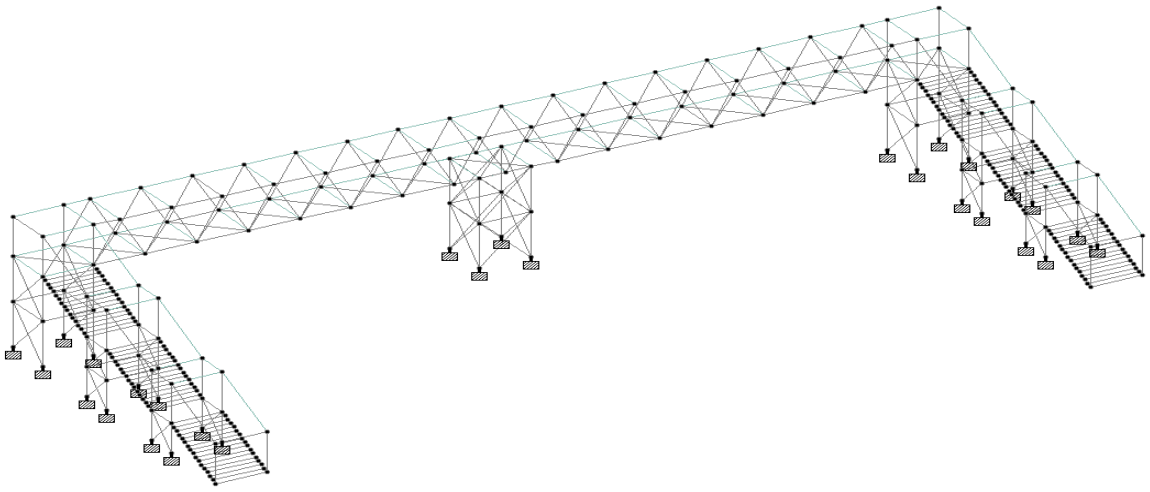

Fig 4.1 Warren Truss

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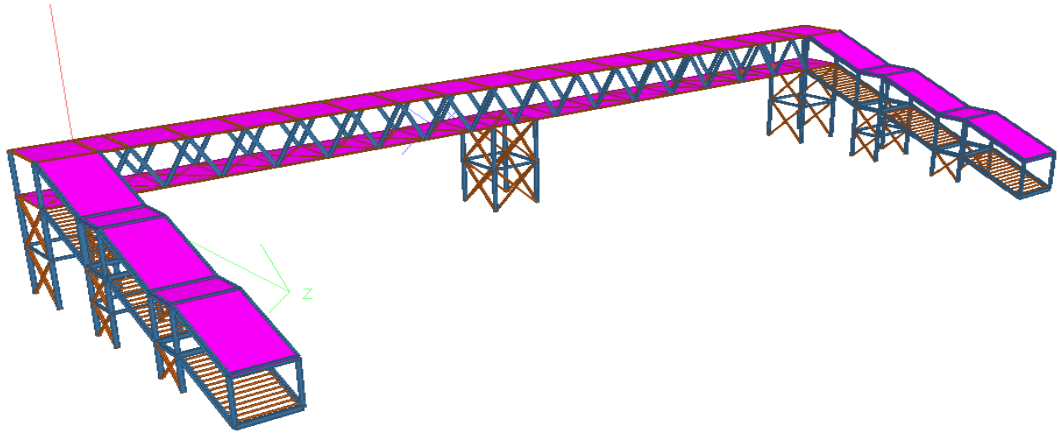

Fig 4.2 Warren Truss 3D View

Table 4.3

Node Displacement Summary

	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	283	206:1.5 DL + 1.	**6.928**	-9.905	-4.905	13.045	0.002	-0.000	0.001
Min X	148	207:1.5 DL + 1.	**-6.938**	-9.911	-4.910	13.057	0.002	0.000	-0.001
Max Y	26	9:WLZ+	-0.204	**1.359**	3.584	3.839	0.001	0.000	-0.000
Min Y	148	206:1.5 DL + 1.	6.347	**-12.200**	-5.975	14.994	0.003	-0.000	0.001
Max Z	49	208:1.5 DL + 1.	0.002	-0.512	**14.054**	14.064	0.001	-0.000	0.000
Min Z	293	209:1.5 DL + 1.	-0.198	-10.610	**-15.290**	18.611	0.002	0.000	-0.000
Max rX	148	208:1.5 DL + 1.	-0.897	-11.486	-5.350	12.702	**0.003**	-0.000	0.000
Min rX	90	209:1.5 DL + 1.	-0.227	-3.535	-5.484	6.529	**-0.002**	-0.000	0.000
Max rY	314	206:1.5 DL + 1.	3.095	-2.017	-0.820	3.784	0.002	**0.001**	0.001
Min rY	193	207:1.5 DL + 1.	-3.098	-2.018	-0.819	3.787	0.002	**-0.001**	-0.001
Max rZ	330	206:1.5 DL + 1.	3.597	-2.275	-1.082	4.391	0.002	0.000	**0.003**
Min rZ	179	207:1.5 DL + 1.	-3.601	-2.276	-1.084	4.396	0.002	-0.000	**-0.003**
Max Rst	293	209:1.5 DL + 1.	-0.198	-10.610	-15.290	**18.611**	0.002	0.000	-0.000

Table 4.4

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is giv beam end A.

				Axial	Shear		Torsion	Bending	
	Beam	L/C	d (m)	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kN˙m)	My (kN˙m)	Mz (kN˙m)
Max Fx	705	209:1.5 DL + 1.	3.375	**384.353**	1.941	-1.771	0.003	-1.481	-2.993
Min Fx	202	208:1.5 DL + 1.	3.354	**-251.530**	0.715	-0.093	-0.002	-1.513	-0.321
Max Fy	551	201:1.5 DL + 1.	0	-2.117	**19.993**	-0.035	-0.006	0.072115	15.819
Min Fy	700	201:1.5 DL + 1.	3.000	-8.689	**-21.062**	0.002	0.001	0.053	11.642
Max Fz	143	209:1.5 DL + 1.	0	27.055	8.644	**29.113**	-0.002	-21.737	6.622
Min Fz	140	209:1.5 DL + 1.	1.500	27.235	-8.664	**-29.126**	0.002	-21.746	6.639
Max Mx	384	207:1.5 DL + 1.	0	4.519	8.703	-4.096	**0.169**	2.596	21.698
Min Mx	620	206:1.5 DL + 1.	0	4.519	8.702	4.094	**-0.169**	-2.595	21.688
Max My	140	209:1.5 DL + 1.	0	27.235	-7.461	-28.495	0.002	**21.469**	-5.455
Min My	140	209:1.5 DL + 1.	1.500	27.235	-8.664	-29.126	0.002	**-21.746**	6.639
Max Mz	384	209:1.5 DL + 1.	0	11.652	12.828	-1.092	0.105	0.343	**28.553**
Min Mz	339	207:1.5 DL + 1.	0	48.237	-14.516	0.840	0.007	-0.620	**-20.766**

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Table 4.5

Reaction Summary

	Node	L/C	Horizontal FX (kN)	Vertical FY (kN)	Horizontal FZ (kN)	Moment MX (kN-m)	Moment MY (kN-m)	Moment MZ (kN-m)
Max FX	403	207:1.5 DL + 1.	**116.888**	529.737	66.850	-0.306	0.440	-9.677
Min FX	401	206:1.5 DL + 1.	**-117.127**	530.268	66.880	-0.306	-0.440	9.695
Max FY	401	209:1.5 DL + 1.	-76.934	**583.394**	103.063	2.005	0.598	2.397
Min FY	403	9:WLZ+	-29.213	**-223.443**	-46.371	-1.586	0.367	0.808
Max FZ	401	209:1.5 DL + 1.	-76.934	583.394	**103.063**	2.005	0.598	2.397
Min FZ	402	208:1.5 DL + 1.	-76.682	579.705	**-100.551**	-1.984	-0.593	2.402
Max MX	404	209:1.5 DL + 1.	-10.932	-89.521	38.425	**2.773**	-0.507	0.023
Min MX	401	208:1.5 DL + 1.	10.706	-86.936	-36.049	**-2.751**	-0.502	-0.028
Max MY	137	207:1.5 DL + 1.	7.697	76.765	14.072	-0.441	**0.788**	-15.762
Min MY	138	207:1.5 DL + 1.	7.921	54.460	-5.947	0.499	**-0.784**	-16.196
Max MZ	281	206:1.5 DL + 1.	-15.144	54.648	-4.273	0.768	0.537	**21.351**
Min MZ	146	207:1.5 DL + 1.	15.163	54.354	-4.088	0.770	-0.537	**-21.380**

4.2 Model 2 – Pratt truss of 54m span length

Table 4.6 Structure data

1	Total Span length	54m
2	Aspect	Pratt truss
3	Total structure height	9.75m
4	Width of gangway and pedestrian cross	3m
5	Thickness of slab	150mm
6	Thickness of sheet (GI steel)	2mm
7	Zone	IV
8	Loads	Dead load = self-weight (1) DL (slab) = 3.75 KN/m^2 Floor finish = 1.5 KN/m^2 Live load = 3 KN/m^2 Wind load = 1.85KN/m^2

TABLE 4.7 Steel selection

Sl.no	Sections	Material	Members
1	LD ISA150x150x12	Steel	Top and bottom members of cord and bottom bracing
2	ISMB 200	Steel	horizontal members
3	ISMB 300	Steel	Front and back diagonal members and vertical members
4	ISMB 300	Steel	Top and bottom diagonal members of stairs
5	LD ISA 90x90x12	Steel	Bracing members (coloumn)
6	ISMB 300	Steel	Columns members
7	SA ISA 90x90x10	Steel	Steps

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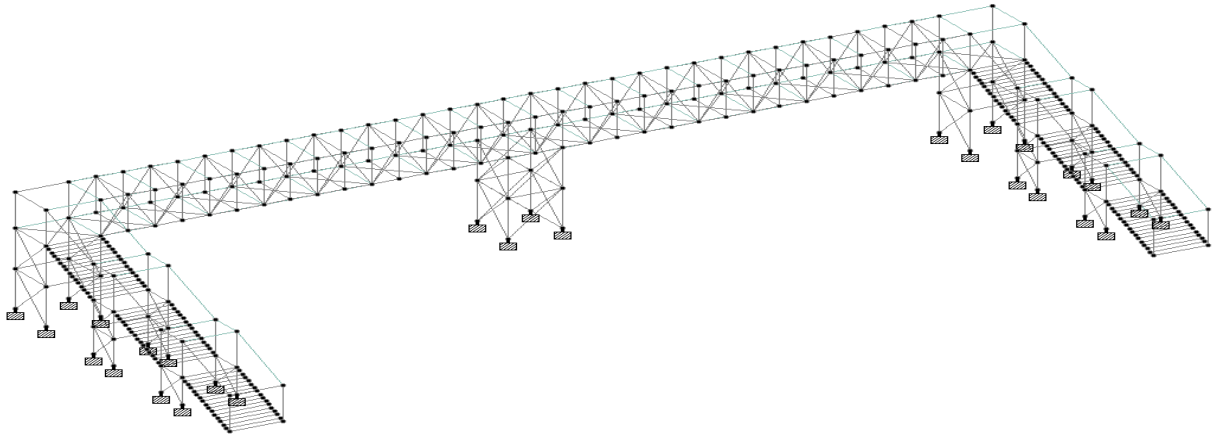

Fig 4.3 Pratt Truss

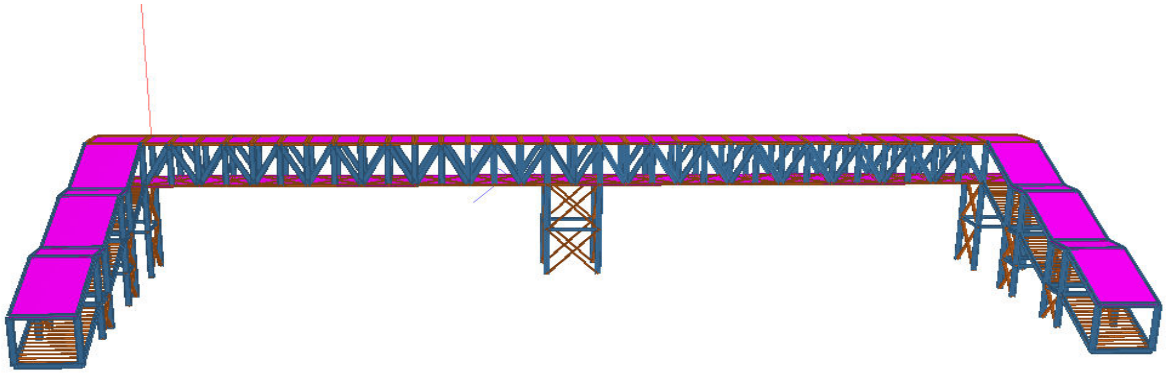

Fig 4.4 Pratt Truss 3D View

Table 4.8

Node Displacement Summary

	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	232	206:1.5 DL + 1.	**11.065**	-11.614	-6.853	17.444	0.003	0.001	-0.000
Min X	95	207:1.5 DL + 1.	**-11.048**	-11.663	-6.688	17.402	0.003	-0.001	0.000
Max Y	29	9:WLZ+	0.026	**1.357**	14.088	14.153	0.002	-0.000	-0.000
Min Y	12	201:1.5 DL + 1.	0.187	**-46.448**	-1.130	46.462	0.001	0.000	0.000
Max Z	240	208:1.5 DL + 1.	0.857	-0.320	**21.228**	21.247	0.001	0.001	-0.000
Min Z	231	209:1.5 DL + 1.	3.128	-13.848	**-30.774**	33.891	0.003	0.001	-0.001
Max rX	339	201:1.5 DL + 1.	-0.454	-2.859	-0.817	3.008	**0.015**	0.000	0.011
Min rX	341	201:1.5 DL + 1.	-0.511	-2.344	-0.820	2.535	**-0.016**	-0.000	0.011
Max rY	348	201:1.5 DL + 1.	0.220	-0.965	0.150	1.001	0.001	**0.003**	0.002
Min rY	347	201:1.5 DL + 1.	0.323	-1.274	-0.676	1.478	-0.001	**-0.003**	0.002
Max rZ	339	201:1.5 DL + 1.	-0.454	-2.859	-0.817	3.008	0.015	0.000	**0.011**
Min rZ	10	201:1.5 DL + 1.	-0.395	-40.850	-0.835	40.860	-0.015	0.000	**-0.014**
Max Rst	12	201:1.5 DL + 1.	0.187	-46.448	-1.130	**46.462**	0.001	0.000	0.000

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Table 4.9

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is give beam end A.

				Axial	Shear		Torsion	Bending	
	Beam	L/C	d (m)	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kN·m)	My (kN·m)	Mz (kN·m)
Max Fx	63	201:1.5 DL + 1.	3.354	**470.580**	-0.827	-0.444	-0.005	-0.974	2.596
Min Fx	62	201:1.5 DL + 1.	3.354	**-471.787**	3.386	0.160	0.001	0.129	-5.114
Max Fy	9	201:1.5 DL + 1.	0	-47.015	**132.701**	0.188	-0.182	-0.104	102.566
Min Fy	663	201:1.5 DL + 1.	1.500	-6.033	**-120.635**	-0.042	0.226	-0.080	98.619
Max Fz	188	209:1.5 DL + 1.	0	0.909	2.947	**10.379**	0.007	-14.283	4.511
Min Fz	188	208:1.5 DL + 1.	0	0.014	3.579	**-9.010**	0.007	12.252	5.696
Max Mx	535	201:1.5 DL + 1.	0	17.249	64.428	-0.305	**0.296**	0.105	49.105
Min Mx	8	201:1.5 DL + 1.	0	13.842	-58.891	0.007	**-0.274**	-0.094	-46.670
Max My	188	209:1.5 DL + 1.	3.000	-1.120	2.947	7.854	0.007	**13.067**	-4.331
Min My	188	209:1.5 DL + 1.	0	0.909	2.947	10.379	0.007	**-14.283**	4.511
Max Mz	9	201:1.5 DL + 1.	0	-47.015	132.701	0.188	-0.182	-0.104	**102.566**
Min Mz	9	201:1.5 DL + 1.	1.500	-47.015	131.919	0.188	-0.182	0.179	**-95.899**

Table 4.10

Reaction Summary

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kN·m)	MY (kN·m)	MZ (kN·m)
Max FX	345	207:1.5 DL + 1.	**122.492**	607.813	97.074	0.071	-0.112	-9.169
Min FX	343	206:1.5 DL + 1.	**-124.361**	568.510	88.477	0.091	0.241	7.938
Max FY	345	207:1.5 DL + 1.	122.492	**607.813**	97.074	0.071	-0.112	-9.169
Min FY	346	7:WLX+	-33.208	**-132.312**	21.717	0.037	0.283	1.998
Max FZ	73	201:1.5 DL + 1.	3.982	579.755	**105.124**	-0.667	0.463	-8.547
Min FZ	74	201:1.5 DL + 1.	3.669	490.085	**-107.115**	0.678	-0.470	-7.916
Max MX	346	209:1.5 DL + 1.	31.909	172.990	-17.686	**1.709**	0.016	-5.275
Min MX	345	208:1.5 DL + 1.	44.409	243.950	27.240	**-1.593**	-0.094	-5.627
Max MY	343	209:1.5 DL + 1.	-101.415	533.842	94.463	1.650	**1.107**	5.408
Min MY	76	207:1.5 DL + 1.	7.076	33.431	-4.978	0.582	**-1.114**	-12.797
Max MZ	219	206:1.5 DL + 1.	-14.374	42.820	0.741	0.493	0.911	**17.712**
Min MZ	84	207:1.5 DL + 1.	14.527	42.953	0.790	0.494	-0.929	**-17.925**

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4.3 Model 3 – Lattice truss of 54m span length

Table 4.11 Structure data

1	Total Span length	54m
2	Aspect	Lattice truss
3	Total structure height	9.75m
4	Width of gangway and pedestrian cross	3m
5	Thickness of slab	150mm
6	Thickness of sheet (GI steel)	2mm
7	Zone	IV
8	Loads	Dead load = self-weight (1) DL (slab) = 3.75 KN/m^2 Floor finish = 1.5 KN/m^2 Live load = 3 KN/m^2 Wind load = 1.85KN/m^2

TABLE 4.12 Steel selection

Sl.o	Sections	Material	Members
1	LDISA110x110x12	Steel	Top and bottom members of cord and bottom bracing
2	ISMB 175	Steel	horizontal members
3	ISMB 200	Steel	Front and back diagonal members and vertical members
4	ISMB 300	Steel	Top and bottom diagonal members of stairs
5	LD ISA 90x90x12	Steel	Bracing members (coloumn)
6	ISMB 250	Steel	Columns members
7	SA ISA 90x90x10	Steel	Steps

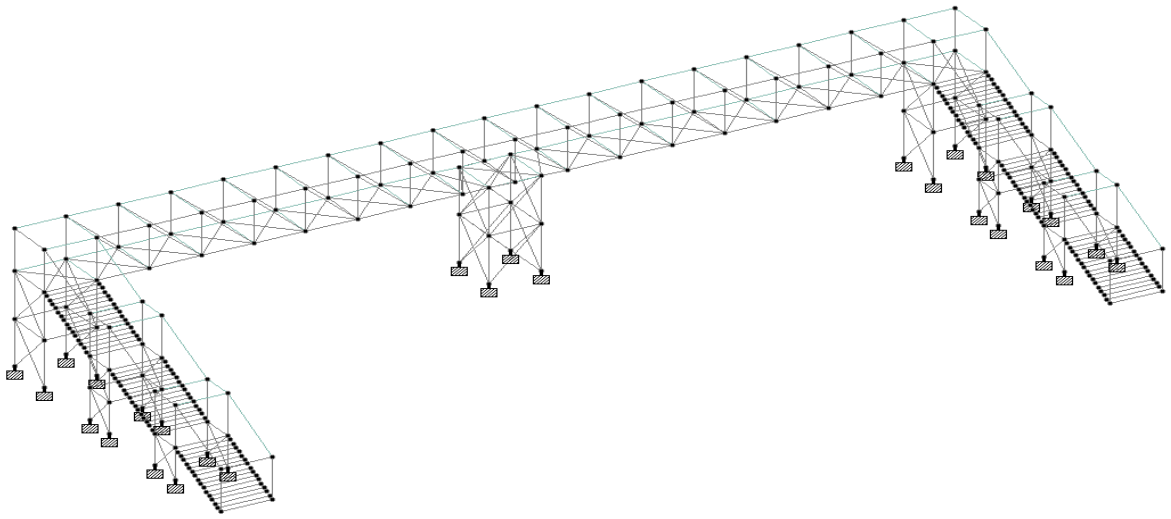

Fig 4.5 Lattice Truss

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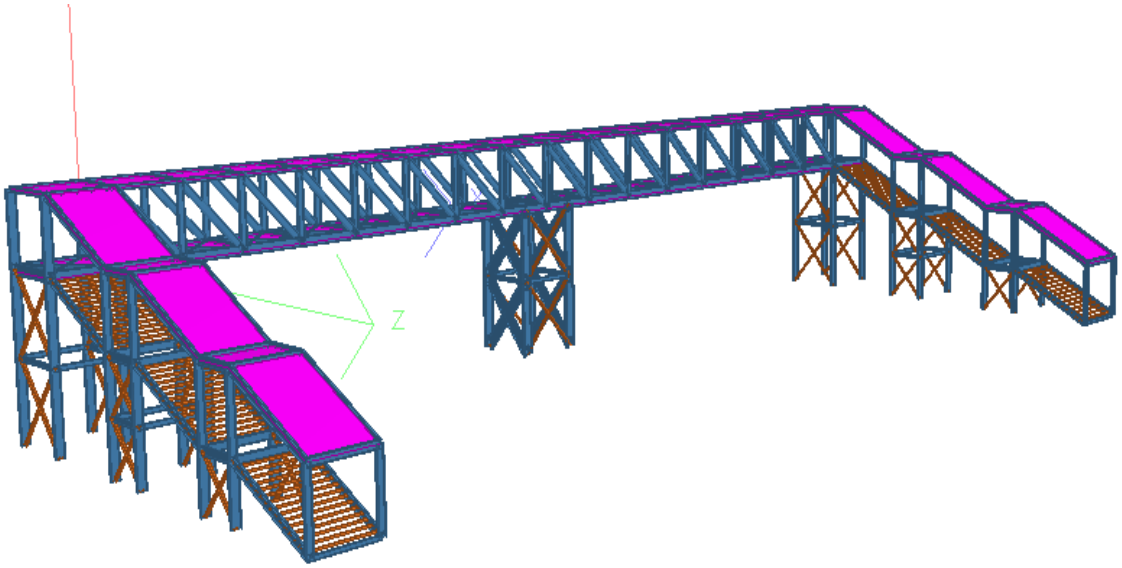

Fig 4.6 Lattice Truss 3D View

Table 4.13

Node Displacement Summary

	Node	L/C	X (mm)	Y (mm)	Z (mm)	Resultant (mm)	rX (rad)	rY (rad)	rZ (rad)
Max X	220	206:1.5 DL + 1.	**5.419**	-0.334	-0.116	5.430	0.000	0.000	0.000
Min X	85	207:1.5 DL + 1.	**-5.505**	-0.345	-0.118	5.517	0.000	-0.000	-0.000
Max Y	230	207:1.5 DL + 1.	-2.596	**1.297**	-0.107	2.904	-0.000	0.001	-0.001
Min Y	30	201:1.5 DL + 1.	-0.484	**-12.355**	-0.985	12.404	-0.001	-0.000	0.000
Max Z	26	208:1.5 DL + 1.	0.172	-1.281	**10.960**	11.036	0.001	0.000	0.000
Min Z	60	209:1.5 DL + 1.	0.156	-0.931	**-12.829**	12.864	-0.001	-0.000	0.000
Max rX	56	208:1.5 DL + 1.	-0.133	-7.538	10.584	12.994	**0.001**	0.000	0.000
Min rX	47	213:1.2 DL + 1.	0.008	-6.834	-2.662	7.334	**-0.002**	-0.000	-0.000
Max rY	346	207:1.5 DL + 1.	-1.165	0.035	-0.009	1.166	-0.000	**0.001**	0.001
Min rY	348	206:1.5 DL + 1.	1.178	0.044	-0.019	1.179	-0.000	**-0.001**	-0.001
Max rZ	8	201:1.5 DL + 1.	0.229	-4.594	-0.327	4.611	-0.000	-0.000	**0.002**
Min rZ	10	201:1.5 DL + 1.	-0.148	-4.663	-0.286	4.674	-0.000	0.000	**-0.002**
Max Rst	30	209:1.5 DL + 1.	-0.177	-9.300	-11.792	**15.020**	-0.002	-0.000	0.000

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Table 4.14

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is give beam end A.

				Axial	Shear		Torsion	Bending	
	Beam	L/C	d (m)	Fx (kN)	Fy (kN)	Fz (kN)	Mx (kN-m)	My (kN-m)	Mz (kN-m)
Max Fx	56	201:1.5 DL + 1.	0	**430.549**	-6.422	0.033	-0.002	-0.124	-21.277
Min Fx	59	201:1.5 DL + 1.	0	**-422.345**	-1.184	-0.072	-0.001	0.286	0.299
Max Fy	660	201:1.5 DL + 1.	0	-8.006	**172.792**	0.136	0.013	-0.099	144.253
Min Fy	9	201:1.5 DL + 1.	0	158.052	**-170.231**	0.014	-0.014	-0.01025	-110.631
Max Fz	396	209:1.5 DL + 1.	0	-4.607	-2.720	**7.399**	-0.005	-9.385	-6.329
Min Fz	171	209:1.5 DL + 1.	3.000	3.742	2.497	**-7.585**	0.003	-9.683	-4.990
Max Mx	247	207:1.5 DL + 1.	0	6.702	-0.202	-4.542	**0.091**	2.428	-1.372
Min Mx	478	206:1.5 DL + 1.	0	6.667	-0.227	4.517	**-0.090**	-2.406	-1.519
Max My	98	208:1.5 DL + 1.	0	127.309	0.193	-7.069	-0.004	**9.148**	2.836
Min My	171	209:1.5 DL + 1.	3.000	3.742	2.497	-7.585	0.003	**-9.683**	-4.990
Max Mz	661	201:1.5 DL + 1.	0	151.209	152.809	-0.134	0.022	0.019	**153.968**
Min Mz	660	201:1.5 DL + 1.	1.500	-8.006	172.792	0.136	0.013	0.105	**-114.934**

Table 4.15

Reaction Summary

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	FX (kN)	FY (kN)	FZ (kN)	MX (kN-m)	MY (kN-m)	MZ (kN-m)
Max FX	343	207:1.5 DL + 1.	**113.435**	556.006	72.525	-11.000	2.200	-36.618
Min FX	341	206:1.5 DL + 1.	**-115.522**	562.741	72.464	-11.430	-2.209	37.369
Max FY	341	209:1.5 DL + 1.	-54.974	**606.765**	112.592	4.673	0.405	9.689
Min FY	344	10:WLZ-	-18.854	**-231.859**	54.658	7.824	-0.221	2.473
Max FZ	343	209:1.5 DL + 1.	51.508	597.059	**113.536**	5.233	-0.385	-8.504
Min FZ	342	208:1.5 DL + 1.	-46.608	543.911	**-109.747**	-3.684	-0.383	7.803
Max MX	342	209:1.5 DL + 1.	7.484	-138.563	50.041	**19.832**	0.358	1.242
Min MX	341	208:1.5 DL + 1.	1.778	-86.304	-48.634	**-18.664**	-0.325	2.241
Max MY	341	207:1.5 DL + 1.	62.325	-42.280	-8.506	-2.561	**2.288**	-25.440
Min MY	343	206:1.5 DL + 1.	-64.517	-48.614	-8.222	-2.129	**-2.296**	26.193
Max MZ	341	206:1.5 DL + 1.	-115.522	562.741	72.464	-11.430	-2.209	**37.369**
Min MZ	343	207:1.5 DL + 1.	113.435	556.006	72.525	-11.000	2.200	**-36.618**

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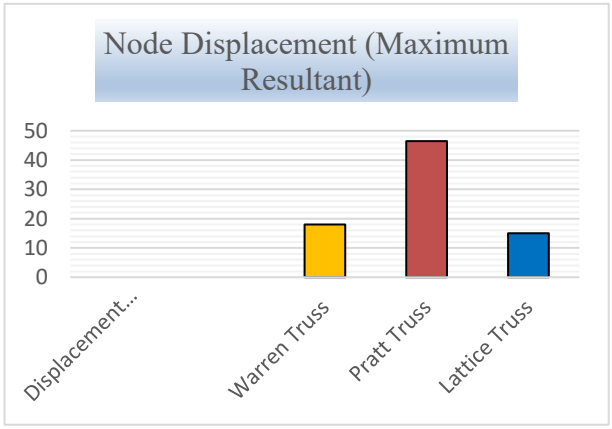
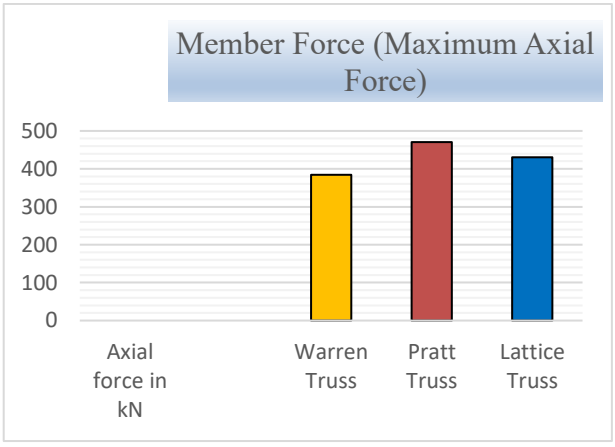
V. RESULTS AND DISCUSSION

Table 5.1: Comparison Table of 54m Span Length Warren, Pratt and Lattice Truss

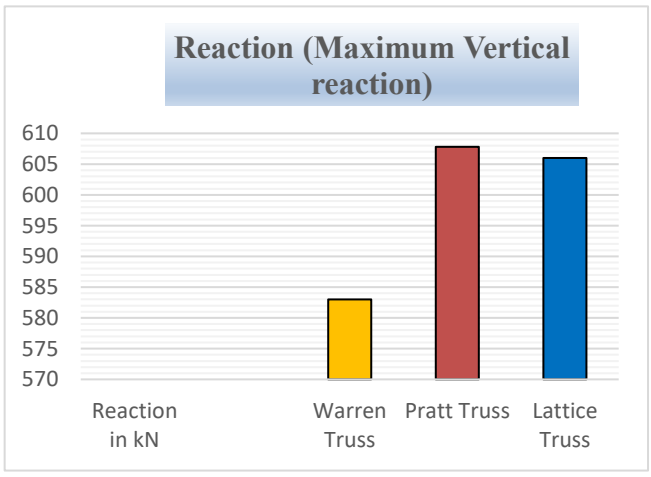
PARAMETERS	WARREN TRUSS	PRATT TRUSS	LATTICETRUSS
Node Displacement (Maximum Resultant)	18 mm	46.462 mm	15.020mm
Member Force (Maximum Axial Force)	384.353 kN	470.580 kN	430.549 kN
Reaction (Maximum Vertical reaction)	583 kN	607.813 kN	606 kN
Total weight of Steel Truss	492.457 kN	800.769 kN	573.266 kN



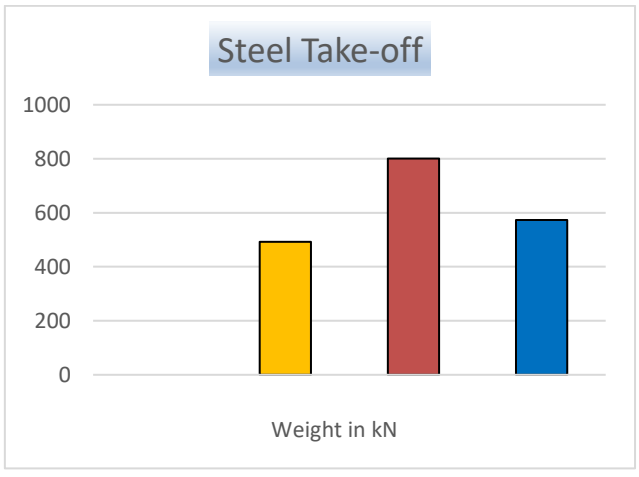
5.1Chart of Node Displacement of Warren, Pratt and Lattice Truss



5.2 Chart of Maximum Axial Force of Warren, Pratt and Lattice Truss



5.3 Chart of Maximum Vertical reaction of Warren, Pratt and Lattice Truss



5.4 Chart of Steel Take-Off of Warren, Pratt and Lattice Truss

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VI. CONCLUSION

For a span of 54 meters, the Warren Truss is preferred over the Lattice and pratt Truss due to its superior performance in terms of deflection and overall structural stability. While all truss types exhibit comparable vertical reactions and axial force distributions, the Warren Truss offers a significant advantage in weight reduction. This lighter configuration not only enhances deflection control but also contributes to lower transportation and construction costs.

Considering these benefits, the Warren Truss is the more efficient and cost-effective option for this span length.

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