SGAWINGS CIVIL ENGINEERING CONSULTANT AND ADVISOR(OPC) PVT. LTD

NAME :- SANKET SANJAY MALI

SUMMER INTERNSHIP

INTERSHIP PRESENTATION

PROJECT NAME:-

❑ Etihad Rail
❑ Surat Metro
❑ SITCO
❑ Bharuch to Dahlej
❑ HORC
❑ Salempur to Sikanderpur

MENTOR :- Er. Vivek Abhyankar

SGAWINGS CONSULTANT

- SGAWings is a company which deals with civil / structural engineering – conceptual planning, analysis, design, detail drawings, cost & quantity estimation, audits of existing structures, bid (EPC / HAM) optimization. In addition to these core strengths, we do mentor, train budding engineers from various companies as well as academic institutes towards becoming a good engineering professional.

- SGA wings can be considered if you want a reliable project delivery, in Time! Apart from this we focus on quality, safety, operational ease and of course the economy. The company started its operations from a small setup from their head office at Andheri-East, Mumbai.

OUR MISSION

- ❖ To become India's one of the reliable and rank within top fifty engineering service providers by 2025.

- ❖ To help Indian construction and education sector to regain its golden era by 2030 by rendering best possible services through

- ❖ To enable the environment friendly, HSE compliant, efficient design and drawings, through operational excellence.

ROLES AND RESPONSIBLITIES

➢ Development of structural design under the guidance of senior engineers. By using structural design software like AutoCAD, STAAD. Pro to create detailed designs. Assist with the planning and scheduling of civil construction projects.

➢ Preparation of detailed calculation reports and design documentation .

➢ Provide support to senior structural engineers by conducting research, performing calculations, and handling smaller design tasks

➢ Maintain accurate records of project designs, calculations, and changes made during the design and construction phases.

➢ Keep accurate records of project activities and maintain project documentation.

➢ Continuously update knowledge of structural engineering techniques, software, and best practices through ongoing training or professional development

BOQ OF TVS Shaft

- BBS represents the bend forms and cut lengths of bars according to the construction plans.

- Bill of Quantities is a document used in tendering in the construction industry in which materials, parts, and labor (and their costs) are itemized. It also details the terms and conditions of the construction or repair contract and itemizes all work to enable a contractor to price the work for which he or she is bidding.

Principles of Structural Engineering

- Strength

  - Depends on material (Modulas of Elasticity)

   Steel   >   Concrete   >   Timber   >   soil

- Stiffness
  - Depends on Dimension
  - Stiffness Analysis implemented in STAAD.PRO
- Ductility
- Durability

ILD Using Staadpro for various spans for 70-R, CLASS-A, B and SV loading

| Span	70-R Loading		Class-A Loading		Class-B Loading		SV Loading	
	Max BM. Kn-m	Max SF. kN	Max BM. Kn-m	Max SF. kN	Max BM. Kn-m	Max SF. kN	Max BM. Kn-m	Max SF. kN
2	-81.69	-215.89	-55.9	122.98	-33.34	73.35	-84.64	-213.412
3	-144.7	-255.07	-104.34	156.51	-62.24	93.36	-144.69	-259.95
5	-312.49	-321.25	-214.28	183.35	-127.81	109.36	-393.55	-382.55
6	-425.27	-361.62	-270.17	192.28	-161.16	114.71	-541.86	-436.47
8	-685.35	-413.48	-388.05	216.78	-231.44	129.42	-967.24	-557.23
10	-1017.34	-452.39	-523.18	239.48	-306.073	143.08	-1496.8	-674.53
12	-1466.09	525.98	-688.18	260.17	-410.75	155.53	-2118.24	-789.51
15	-2142.72	-606.456	-952.27	293.75	-568.49	175.76	-3309.75	-966.03
20	-3309.74	-700	-1417.51	342.9	-879.57	205.37	-5909.9	-1261.46
30	-5761.4	-793.56	-2752.28	392.04	-1647.04	234.98	-13239.1	-1840.04
40	-8213.09	-912.99	-4064.4	434.82	-2433.53	260.61	-22091.6	-2254.98
50	-10747.1	-1107.22	-5416.86	516.84	-3689.98	309.69	-31417.1	-2554.44
60	-14729.3	-1249.57	-6900.01	591.85	-5313.57	359.96	-40856	-2757.96
70	-19497	-1373.24	-9211.44	647.72	-7232.35	413.28	-50325	2968.23
80	-25986.8	-1551.02	-11692.9	714.4	-9446.36	472.32	-60193.5	3331.707
90	-33312.8	-1705.58	-14777.9	795.71	-11955.5	513.36	-71006.7	-3809.71
100	-40667.6	-1895.25	-18605.7	873.83	-14759.9	590.39	-85972.7	-4176.39

Basic of structural Analysis

- Statically Determinate Structure

  - Equlibrium Equation are used to Analysis

- Statically Indeterminate Structure

  - Compatibility equation are used to analysis
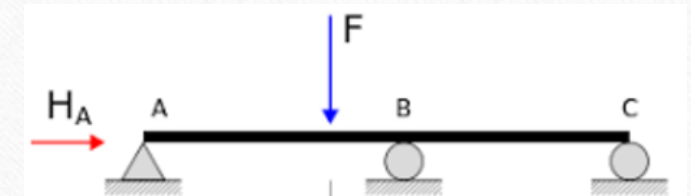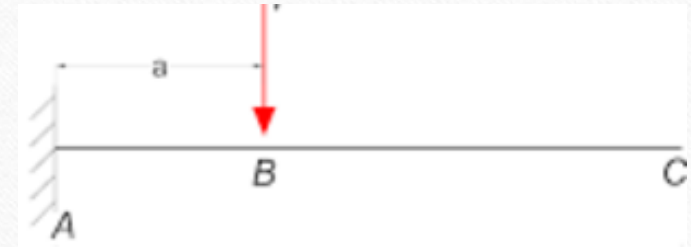
Contract

- Item Rate
- EPC Contract
- HAM Contract
- PPP Contract
- BOT

Typical flow chart how works comes to Consultant.
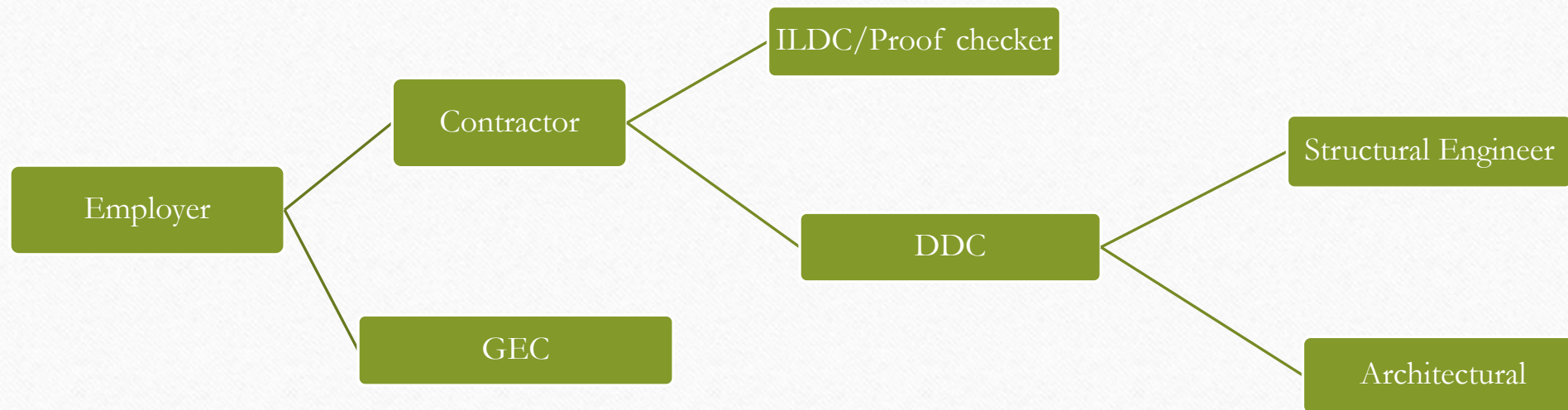
Structure Matrix of Bharuch to Dahlej

			Clearances (m)
1.	PUP (people under pass)	=	3m
2.	LVUP (light vehicular underpass)	=	4m
3.	VUP (vehicular underpass)	=	5.5m
4.	ROB (Railway over bridge)	=	6.5 to 7m
5.	CUP (cattle under pass)	=	3 to 4.5m
6.	DFCC (Dedicated freight corridor co-opertions)	=	8.5

Summary

| | | Main Carriageway | | | | | | | | | | Service Road/Cross Road | | | | | | | | | |
| | | New | | Reconst. | | Widen | | Repair/Rehab. | | Retained | | New | | Reconst. | | Widen | | Repair/Rehab. | | Retained | |
		No.s	Area	No.s	Area	No.s	Area	No.s	Area	No.s	Area	No.s	Area	No.s	Area	No.s	Area	No.s	Area	No.s	Area
GS	VUP	6	2853.57																		
	LVUP	7	2092.46																		
	SVUP	0	0.00																		
	PUP/CUP	21	3257.89																		
Bridges	MJB	0	0.00			0	0					1	2572.50								
	MNB			7	5185.65	4	1657.80	1.00	276.95												
	FO	7	8022																		
	ROB																				
	VOP																				
Culvert	Pipe			2	38.2	39	3081.2			6	436										
	Box	3	116.50	8	331.80																
	Utility	8	4275.00																		
	Total	52	20617.41009	17	5555.65	43	4739	1	276.95	6	436	1	2572.5	0	0	0	0	0	0	0	0

No.s	550	
Area	32975.86	Sq.m
Pipe	3555.4	RMT

Modulus of Subgrade

The modulus of subgrade reaction is the ratio of the total applied structural load to the total resulting settlement.
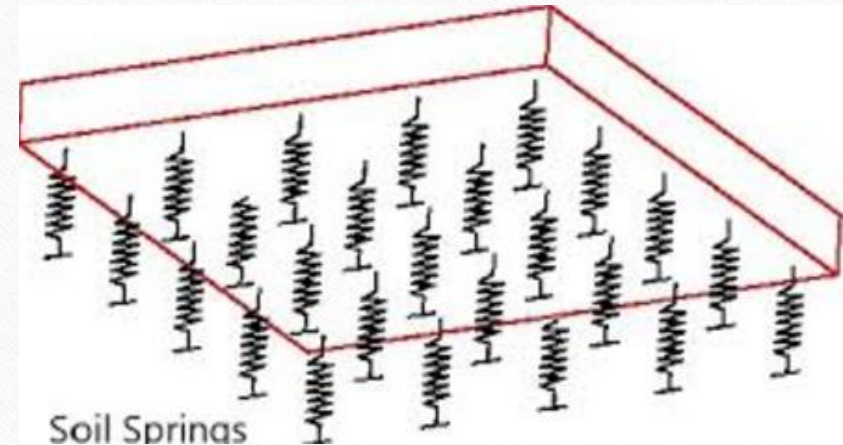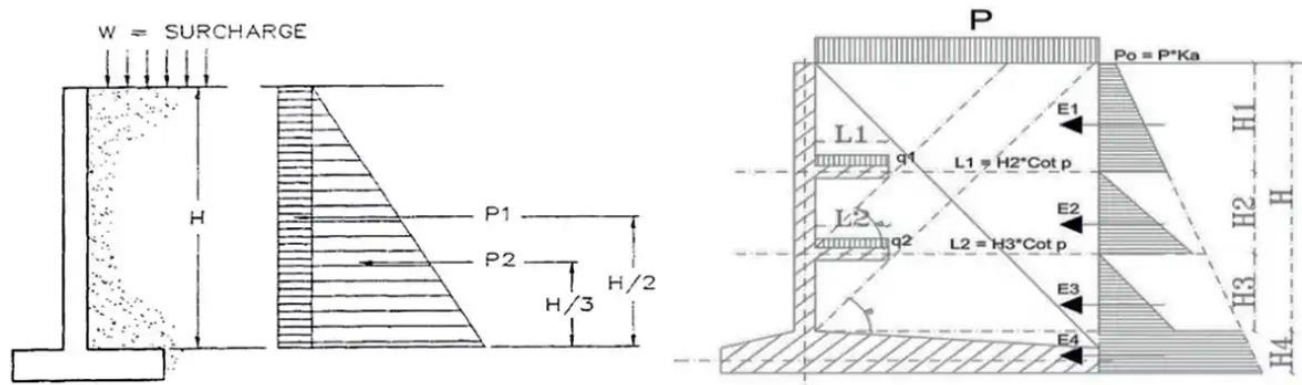
$$K = q/\delta$$

Were, K = spring constant

δ = deflection

q = bearing stress

As per Bowel's

$$KS = 40*(SF)*q_a$$

Soil Springs

❖Relief-shelve wall

- Lateral Pressure coming on wall get split into smaller wedges.

- Base width is required almost half of conventional wall. Even SBC of soil required is less.

- Total cost saving is upto 15% to 30%.

Alignment Plan of SITCO

ALIGNMENT PLAN

Structure Matrix of SITCO

sr.no		Length		Area	
1	VR/VL 1 to 12	294.26		4996.1	sq.m
2	VP 1to 4	90		1530.0	sq.m
3	VP 5	30		510	sq.m
3	VR/VL 13 to 17	150		2550.0	sq.m
4	VR 18 to 23	142		1207	sq.m
5	VL 18 to 20	76.2		647.7	sq.m
6	VL 210to 41	599.03		8983.8734	sq.m
7	DP 1 to8	164.74		1400.29	sq.m
8	EP 1 to 6	88.5		567.55	sq.m
9	EP 7 to 8	30		255	sq.m
10	LP 1 to 12	291.19		2702.447	sq.m
11	SL 1 to 9	240		2040	sq.m
12	SR 1 to 11	271.5		2307.75	sq.m
13	SP 1 to 49	1389.59		11922.015	sq.m
14	VL 12 to vp 1	21.24		361.08	sq.m
15	VL 17 to VP 5	30		510	sq.m
16	VR 23 to ROB	13		110.5	sq.m
17	ROB to LP12	18		153	sq.m
	Total	3939.25	m	42754.3	sq.m

sr.no		Length		Area	
1	ROB TRUSS	92	m	1932	sq.m
2	RP	54.03	m	1134.63	sq.m
	Total	146.03	m	3066.63	sq.m

HORC pkg-4(Tunnel Gantry)

- Tunnel Length 4.7 km
- Width = 10.065m
- Height = 10.977m

X-SECTION

LONGITUDINAL SECTION
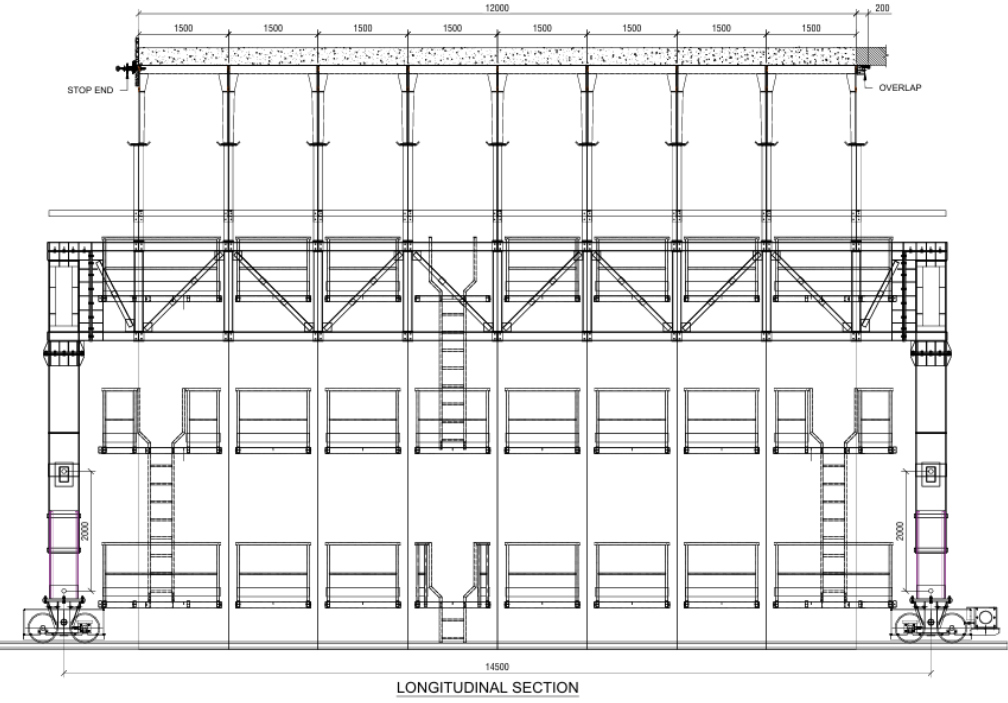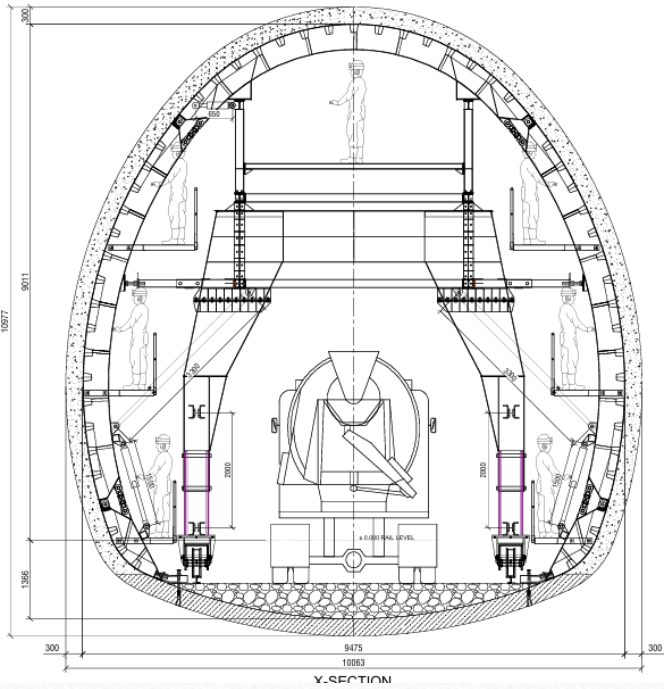
❖Formwork Design for Tunnel Gantry

- ACI 347 $\qquad$ $P = c_w * c_c * (7.2 + (785 R / T + 17.8)$

Were,

P = pressure on formwork

c_w = unit weight coefficient

c_c = chemistry coefficient

R = Rate of displacement of concrete

T = Temperature of concrete during pouring

❖ CIRIA Report 108

This report provides guidance on calculating concrete pressures on formwork

$$P_{max} = D[\,C_1\sqrt{R} + C_2 K\sqrt{H - C_1\sqrt{R}}\,]$$

Were, c_1 = Coeff depends on size and shape of formwork
c_2 = Coeff dependent on the constituent material of concrete
H = Vertical form height
K = temperature coefficient
R = rate of concrete rise

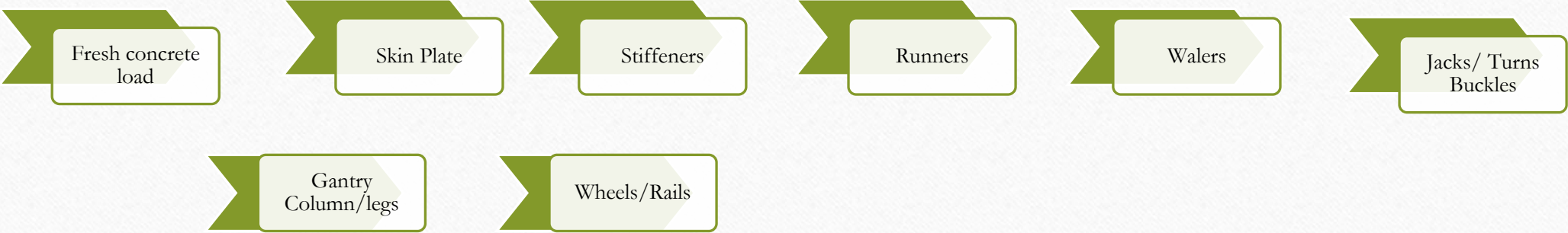## Concrete Pressure on Formwork

- **As per ACI formula**

Pressure on formwork = 38.68 kN/m2

Pressure on formwork remain varying upto certain height

$$P = \ddot{Y} * H$$

H = 1.48m upto this height pressure continuously increase after that it remains constant.

Load transfer mechanism within gantry

Fresh concrete load → Skin Plate → Stiffeners → Runners → Walers → Jacks/ Turns Buckles

Gantry Column/legs → Wheels/Rails

Load considered on Gantry.

- Self weight

- Fresh Concrete Pressure

- Platform load

- Travelling Trolley

- Load Combination

Steel Sections used for Gantry

- **Formwork**
  Skin Plate = 8 mm thk
  Omega Stiffeners = 100*110*10mm thk
  Runners = 10mm thk Plate.
- **Walers** = ISMC 250 B/B
            ISHB 200
- **A-Frame**
  Horizontal members = 0.9*0.9m *0.02m thk
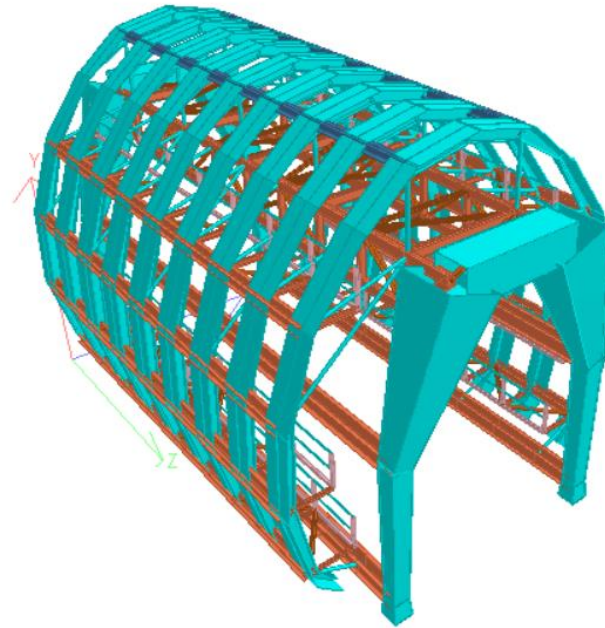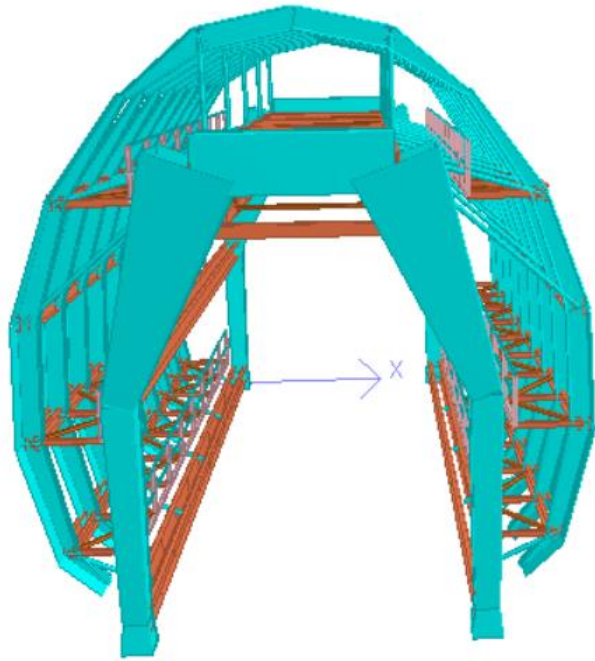
  Inclined members = 0.5*1.38m *0.02m thk

  Vertical members = 0.4*0.5m *0.02m thk
- **Jacks** = 75 mm Dia

Steel Sections used for Gantry

- Travelling trolley =

  Horizontal members = ISMC 225 F/F

  Inclined members = ISA 75*75*10 B/B

  Vertical members = ISMC125 F/F

- Platform =

  Horizontal members = ISMC 100

  Inclined members = 75*75*10

  Hand rail = 40 mm Dia with 3mm thk

STAAD Model of Tunnel Gantry -

Temporary BOQ of Tunnel Gantry

Sr.no.	Gantry component	Weight *(kg)*
1	Formwork	37640
2	Walers	5908
3	Travelling trolley	4507
4	Gantry portal	21327
5	Miscellaneous	1576
	Total =	70958 Kg

- **Structure Matrix of Salempur to Sikanderpur**

  After study on Plan and Profile and TCS of NH727B its structure matrix is shown below

	New	Recon.
MJB	41837.5	-
ROB	28875	-
MNB	2565	-
SVUP	525	-
LVUP	1500	-
VUP	750	-
Box Culverts	2050.1	-
Total =	78102.6	m^2

Total deck area =	76052.5	m^2
Box culvert =	2050.1	m^2
Hume pipe =	429.7	m

Conclusion -

❏ Internship helped me to for personal and professional growth**.**
❏ Internship helped me to get some amount of command on technical software's.
❏ Internship helped me to clear my basic concepts.
❏ Internship helped me application of theoretical knowledge in practically.

THANK YOU !!