Chhotubhai Gopalbhai Patel Institute of Technology

Civil Engineering Department

Visit Report

Road over Bridge at Sachin Railway Station, Gujarat, India

M.Tech 1st semester Student (Structural Engineering)

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INDEX

❖ About Civil Engineering Department

The department is one of the pioneering departments since the commencement of the college in 2009. The department has qualified faculty members engaged in teaching with the aim of achieving excellence in various fields. The faculty members are specialized in different disciplines of Civil Engineering. The vision of this department is to shape infrastructure development with social focus.

Civil Engineering Department offers the Under Graduate and Post Graduate program in Structural Engineering. At postgraduate level, it independently conducts M.Tech. course in Structural Engineering approved by AICTE. The department has Sixteen Assistant Professors.

The department has been a pioneer and leader to carry out testing and challenging consultancy work in the fields of Geotechnical and structural engineering. The soil exploration techniques, bearing capacity predictions, structural engineering strength assessments are conducted in testing work approved by All India Council of Technical Education and Nuclear Power Corporation of India Ltd.

The department presents a picture of a small but fully dedicated and developed faculty contributing to all round growth of students, Institute, Industries and Society.

The graduates coming out from the Institute are well prepared with knowledge and technical information, refined with professional touch, are capable of undertaking the Civil Engineering jobs to meet the challenges of the 21st Century.

❖ History of Bridges

People have always been interested in transporting themselves and their goods from one place to another. So the rivers, mountains and valley are considered as a basic problem facing the people in their transportation and movement from one place to another. So in the beginning they thought to pass that obstruction and move away. First they used a rope or swimming and finally they reached to use a bridge that was mode of simple materials like rock, stone, timber and other materials was available at that time. The history of development of bridge construction is closely linked with the history of human civilization. The first bridges were simple beam span of stone slabs or tree trunks, and for longer spans, single strands of bamboo or vine were stretched across the chasm or oops or baskets containing the traveller were pulled across the stretched rope.

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. The obstacle to be crossed may by a river, a road, railway or a valley.

❖ Aim and Objective

Bridges have always been an important part of our environment. They have been major subjects of literature and art, both – ancient and modern. Wars have been fought over bridges and in many cases the capture of strategic structure has had a pronounced effect on the final outcome of the war, bridges have been the center of village or city life. Today the structural engineer has at his disposal the most powerful analytical tool ever imagined, the digital computer; this instrument can perform in a matter of minutes a volume of calculations that would have previously taken years.

❖ Components of a bridge

The main parts of abridge structure are as below:

- ✓ Decking, consisting of slab, girders, trusses, etc…
- ✓ Bearings for the decking.
- ✓ Abutments and piers.
- ✓ Foundations for the abutments and piers.
- ✓ River training works, like revetment for slopes at abutment, aprons at bed level, etc.
- ✓ Approaches to the bridge to connect the bridge proper to the roads on either side; and Handrails, guard stones, etc…

The component above the level of bearing are grouped as superstructure, While, the parts below the bearing level are classified as sub structure.

❖ Classification of Bridges

Bridge may be classified in many ways, as below:

- ✓ According to function as aqueduct (canal over a river), viaduct (road or railway over a valley), pedestrian, highway, railway, road-cum-rail or pipe line bridge.
- ✓ According to the material of construction of superstructure as timber, masonry, iron, steel, reinforced concrete, prestressed concrete, composite or Aluminum Bridge.
- ✓ According to the form or type of superstructure as slab, beam, truss, arch or suspension bridge.
- ✓ According to the inter span relations as simple, continuous or cantilever bridge.
- ✓ According to the position of the bridge floor relative to the superstructure, as deck, though, half-through or suspended bridge.
- ✓ According to the method of connections of the different parts of the superstructure, particularly for steel construction, as pin connection, riveted or welded bridge.

- ✓ According to the road level relative to the highest flood level of the river below, particularly for a highway bridge, as high-level or submersible bridge.
- ✓ According to the method of clearance for navigation as high-level, movable-bascule, movable-swing or transporter bridge.
- ✓ According to span length as culvert (less then 8m), Miner Bridge (8 to 30m), major bridge (above 30m) or long span bridge (above 120m).
- ✓ According to degree of redundancy as determinate or in determinate bridge.
- ✓ According to the anticipated type of service and duration of use as, permanent, temporary, military (pontoon, Bailey) bridge.

Looking toward the modern civilization we offer **Advance Design of Bridge** subject as an elective subject in first semester of M.Tech (Structural Engineering).

Field Visit Report

Date : 20-09-2014

Location : Sachin Railway Station

Client : Surat Urban Development Authority, Surat

Estimated Cost of Work : Rs. 41,23,35,103.93

Tendered Cost of Work : Rs. 35,08,97,173.44

Date of Starting : 18/12/2013

Schedule date of completion: 17/06/2015

Time Limit : 18 Months

Monitored by : Rachna Construction Company, Panoli

Structural Consultants : Multi media Consultants Pvt. Ltd., Ahmedabad.

TPI : Sardar Vallabhbhai National Institute of Technology, Surat

Focal person at the field : Mr. Mahendra G Chotaliya

Approach Portion

Length	Sachin Side 20 * 13+ 22*3+61.15 (Approach)= 387.15 mt Talangpur side 19.38*12 + 20*7 + 51.01 (Approach) = 423.57 **(Total 810.72 mt)**
Railway Portion	93.17 mt (to be done by Western Railway)
Width	16.50 mt
Foundation	1200 mm dia. pile M35 & 1800 mm thick Pile cap M30
Substructure	RCC Pier & Pier Cap M30
Super Structure	Precast PSC Girder M45

Service Road Side Bridge

Length	1 * 20 = 20 mt
Width	6.75 mt
No. of Bridges	2 nos.
Foundation	1000 mm dia. pile M35 & 1500 mm thick Pile cap M30
Substructure	Abutment & Abutment Cap M30
Super Structure	PSC Solid Slab M40

70 m RCC Retaining Wall

Foundation	600 mm Dia. pile M35 & 900 mm thick Pile Cap M30
Wall	RCC Wall M25

Type of Bearing : Elastomeric Bearing

Type of Expansion Joint : Strip Seal type

Crash Barrier : RCC M40, 1.10 mt ht.

Riding Surface : Bridge Portion = RCC 75 mm Wearing Coat

Objectives of the field visit

1. To get practical Knowledge.
2. To see the different structural element like deck, pier, girder, slab, retaining wall etc.
3. To know which are the different problems arise on the field during the construction of bridge.

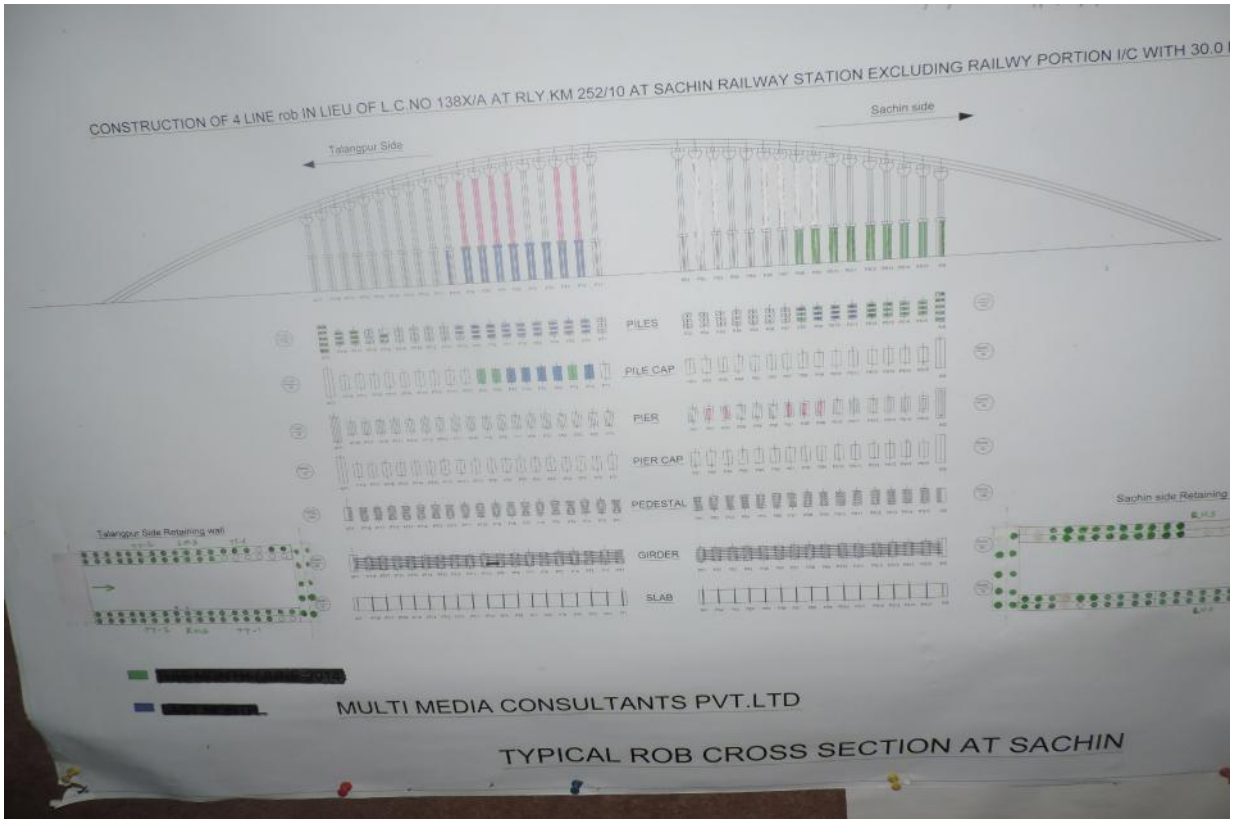
Methodologies:

1. Direct Observation
2. Discussion with the focal person at the filed.

M&E Tools Used

1. Drilling Machine (MAIT Machine)
2. Hammer
3. Trimme Pipe
4. Bulldozer
5. Welding Machine
6. Hopper
7. Needle Vibrator
8. Hydraulic Jack and etc.

Construction of 4 lane ROB at Sachin Railway Station Excluding Railway Portion



Typical ROB Cross Section at Sachin

MIX Design.

For 1 m^3 of concrete:

Trial No.	2	2	2	2	2
Grade of Concrete	M-25	M-30	M-35 Pile	M-40	M-45
Type of Cement	Sanghi OPC G-53	Sanghi OPC G-53	Sanghi OPC G-53	Sanghi OPC G-53	Sanghi OPC G-53
Cement (kg)	365	380	410	450	500
Water (Liters)	164.25	167.20	176.3	171	170
White Sand(kg)	423	419	408	403	395
Black Sand (Kg)	343	339	330	327	319
10 Dn (kg)	403	399	388	384	376
20 Dn(kg)	846	837	815	807	789
Water cement Ratio	0.45	0.44	0.43	0.38	0.34
Admixture (kg) Sika LT-10	4.380	4.560	4.920	4.500	4.500
Observed Slump (mm)	90	95	160	80	90
Compressive Strength (N/mm^2) (28 days)	33.69	40.89	44.23	49.90	54.90

Trial No.	3	4
Grade of Concrete	M-35 PILE	M-35 PILE
Type of Cement	Ultratech OPC G-53	Sanghi OPC G-53
Cement (kg)	420	420
Water (Liters)	172.20	172.20
White Sand(kg)	408	408
Black Sand (Kg)	330	330
10 Dn (kg)	389	389
20 Dn(kg)	817	817
Water cement Ratio	0.41	0.41
Admixture (kg) Sika LT-10	5.00	5.00
Observed Slump (mm)	160	170
Compressive Strength (N/mm^2) (28 days)	45.40	45.10

Note: As per Tender clause D.7.5.2 we recommend proportion of Trial Pile grade.

Detail of Mix Design for $1m^3$ of Concrete.

Control Panel for Batching Plant at Sachin

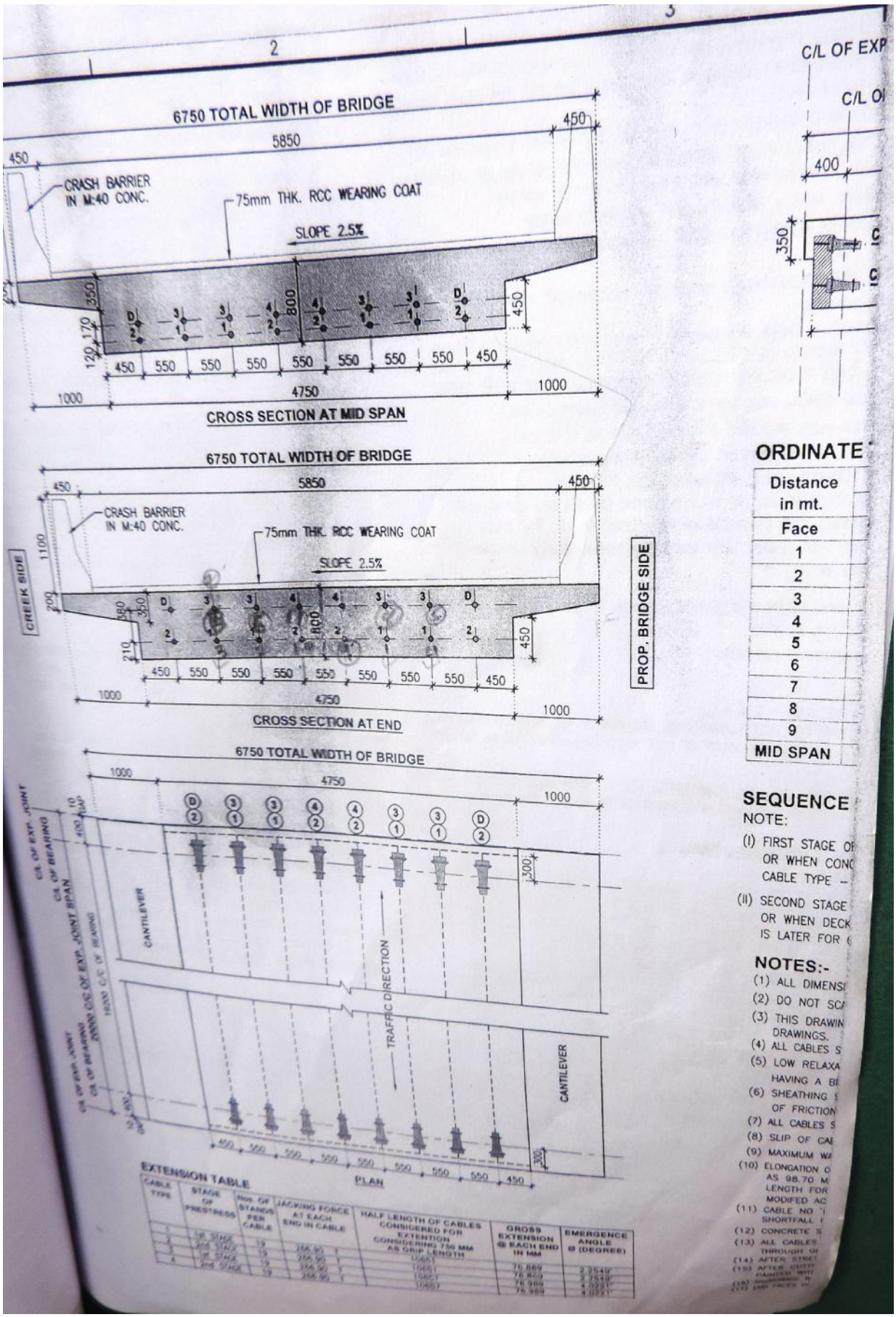
Compression testing machine
(Cube Testing)

Cable cone

Bridge Pear

Bearing , Tendon and Tendon Cap for Bridge

Tendon (Cable)



Cross Section of Bridge Deck and Girder

Discussion with Chotaliya Sir

Refreshment for students

Group Photo at Refreshment time

Group Photo at RMC Plant at Sachin