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Pre-Cast RCC Underpass Box Structure for Railway Track Crossing

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Abstract: The intersection of railway track and the road at the same level is referred to a level crossing. In the urban areas the level crossing are generally monitored by qualified railway personnel who monitor the train movement and close the level crossing gate to stop the interfering road traffic but such closing of gates leads to congestion in road traffic and also causes loss of time to road users. Road under bridge and road over bridge are considered as solutions for avoiding level crossings of roads and railway track. There are 3 main methods in construction of road under bridge. Box pushing method, Cut and cover method, Rolling technique using RH girder. In this we discuss about the implements, soil friction, effects required, capacity of jacks and there uses, skew angles and at square angles.

Keywords: Quality Assurance, Quality Control

I. INTRODUCTION

With the increase of railways and roadways, there are bound to be few places where they intersect each other and as these intersects appear we have to provide few crossing between them , traditionally we provide either an overpass or signal crossing in them , the major drawbacks of these techniques are that they require a large amount of time to be constructed and during this time the railway track are to be shut down , and as the increasingly busy schedule of the railways its becoming more and more difficult to keep the tracks closed and on the other hand the problem with traffic signals is that they come with a risk factor , signal crossing are prone to accidents , many of human lives are lost due to accidents occurred at a train signal crossings . As an accident happens this causes the loss of human live as well as a delay in the train schedule also the trains cannot run on a tight schedule and many trains on a same track numerous time a day. Even if one train is getting behind schedule by few minutes then all rest of the trains also lag behind so once incident causes all the upcoming trains to fall behind which causes huge loss of time as well as monetary loss as many business are very time depended and cannot afford late delivery. The traffic signals also causes traffic jams which further increases inconveniences to the average user, suppose there is a medical emergency and the ambulance has struck in a traffic signal at a train crossing which may cause loss of human life.

II. LITERATURE REVIEW

1. Dr. Mohankar.R.H, Dr. Ronghe.G. N provided a discussion on "Analysis and Design of underpass RCC bridge"

Dr. Mohankar.R.H, Dr. Ronghe.G. N provided a discussion on "Analysis and Design of underpass RCC Bridge" and said that the Underpass RCC Bridge is very rarely adopted in bridge construction but recently the Underpass RCC Bridge is being used for traffic movement. In this paper, the analysis of the underpass RCC Bridge is carried out. The analysis of this underpass RCC bridge is done by considering fixed end condition. Finite Element Method (FEM) analysis is performed and results are presented. Comparison of different forces between 2D and 3D models for fixed end condition is provided.

2. Mulesh k. Pathak (2014)9 has carried out study on performance of RCC box type superstructure in curved bridges.

The study provides multiplication factors for all the parameters for varying degree of curvature (i.e. 10° to 90°) W.r.t. a straight bridge (0°) and for varying spans (between 15m to 30m). These can be useful to simplify the analysis by considering straight bridge instead of curved bridge, in which multiplication factor is used multiply to the corresponding action of the straight bridge. This can be very much useful in the preliminary design of the section.

3. Dr. Abdul-Hassan (2014)8 has made study on optimal design of reinforced concrete box culvert by using genetic algorithms method.

This paper shows the optimal design of reinforced concrete box culvert based on minimum cost. It is found that the genetic algorithms GAs optimization method is a suitabl method that can be used to obtain the minimum cost (i.e. optimum design) of

reinforced concrete box culvert. It is important for any optimization problem using genetic optimization method to carry out the convergence studies to investigate the capability of establishing the optimum design with or without initial population and governing population size.

4. D.Vamshee Krishna (2015)7 studied the modelling and analysis of RCC bridge using parametric study of soil structure interactions.

In this paper, the analysis of the underpass RCC bridge is carried out. The analysis of this underpass RCC bridge is done by considering fixed end condition and the soil structure interactions at different sections are presented. Comparison of different forces with results at different sections of the model for fixed end condition is provided. In this study a 2D model can be effectively used for analysis purpose for the loading condition mentioned in IRC: 6, "Standard Specifications and Code of Practice Road Bridges" The Indian Roads Congress and Directorate of bridges & structures (2004), "Code of practice for the design of substructures and foundations of bridges" Indian Railway Standard**.**

Y. Vinod Kumar and Dr. ChavaSrinivas

Y. Vinod Kumar and Dr. ChavaSrinivas (2015)3 have presented a complete study of box culvert by using computational methods such as Grillage analysis and Finite element method. Grillage analysis is versatile in nature and can be applied to verity of bridge decks having both simple and complex configurations with ease and confidence. Grillage analysis has done by most commonly using software STAAD Pro. Their main objective was to know the behavior of box culvert and variation of stresses in terms of Shear force and bending moment values.

6. Bhise D. M. and Kalwane B. U., 2015. Analysis of push back Bridge. International Journal of pure and applied research in engineering and technology, ISNN: 2319-507X, 3(8), pp.354-361.

Manisha D. Bhise (2015) Analysis of resistance Bridge: The plan steps of RCC Box clarified in this paper. Configuration has been inspected by 2D outline with different burden blends and soil firmness. Significance of RCC box type underpass additionally portrayed

III. OBJECTIVES

- ❑ To Use precast structure instead of cast in situ
- ❑ To Analysis of structure shall be done in SAP2000-
- ❑ To estimates of design Underpass box structure
- ❑ To compare with cast in situ construction

- Check its durability in Environmental conditions
- Check time taken in construction
- Check its Quality
- Curing conditions

IV. ROLE OF ISO-9000 IN CONSTRUCTION

ISO (International Organization for Standardization) 9000 facilitates the implementation of standards, activities, systems, responsibilities etc. The advantage of ISO-9000 are, it improves quality image of the company. It gives marketing advantage. It improves efficiency, reduces wastage. It ensures customer satisfaction.

What is ISO-9000? ISO-9000 is a series of international standards for quality management and quality assurance system. ISO-9000 is a series which are continuously updated. ISO-9000 Quality Management and Quality Assurance Standards- Selection and Uses.This standard provides a guideline for selecting the appropriate standard from ISO 9001 and 9002 as follows,

ISO-9001- Model for quality assurance in design/development, production, installation and servicing. ISO-9002- Model for quality assurance in production and installation.

The difference between ISO-9001 and 9002 is essentially of design. If the organization designs buildings as per customer's requirements, then the organization can go in for ISO 9001.

ISO-9000 quality system standard describes what the requirement of quality oriented system is. It does not set out special requirements.

Whether a company employs 10 or 10000 people, the principle of ISO-9000 can be applied. ISO-9000 in simple word means "DO WHAT YOU SAY AND WHAT YOU DO."

V. QUALITY ASSURANCE AND QUALITY CONTROL

A. IMPLEMENTATION IN CONSTRUCTION SECTOR - QUALITY ASSURANCE

The Surveillance function will generally include:

- Monitoring laboratory and field testing of construction material and completed works. Reviewing contractor's compliance with specifications, requirement for construction methods and personals.
- Monitoring or performing pre-operational tests or both.
- Preparing and maintaining quality assurance manuals.The administrative

functions will include:

- Initiating, analyzing and approving design clarification or changes in contract documents.
- Documenting all project related tests, inspection and visits by official visitors.
- Maintain photographs of construction progress and other relevant construction events.
- Maintain record of job oriented communication like telephonic conversation memorandum and letters etc.

B. IMPLEMENTATION IN CONSTRUCTION SECTOR - QUALITY CONTROL

Quality control can be maintained by the utilization of sound engineering practice, professional attitudes, good construction practices and quality. In the context of engineering structures. It may be understood as a function of making men, materials, machines and methods operate at the standards calculated to ensure that the end result of the construction conforms to the prescribed specifications as well as meets the owner/users requirement.

Quality control is a management activity applied to the construction processes to set purposes. Purpose in this case being achievement of prescribed standard of performance and cost. To achieve optimum quality at minimum cost, we have to consider all the factors that help to build quality into a product or service.

In the construction industry where majority of works are executed by the contractor the responsibility of quality control is in the hands of the contractor and he is responsible to the designer and the owner for this.

The main problems facing the development of construction projects and structures are the technological advancement of their fabrication, the improvement of their quality, reliability and factory finishing- These problems can be solved by developing and applying efficient and continuous quality control at each stage of production and by testing products and structures using the latest instruments and machines. In the present day competitive market of construction industry if a contractor has to survive, he should be able to meet the quality requirement of the owner/user and satisfy his needs as well as meet the conformance standards. The various process involved to be able to meet the above requirement should be cost effective.

VI. Result

We designed an underpass box in SAP-2000 software with taking the dimensions of underpass box as 10M span 8m width and 7M height and applied the maximum load of train that is 18000 KN with taking the factor of safety of 1.5. We got the Deform shape and moment diagram of the underpass precast box, which is safe to pass the train from the underpass box with the maximum load of the train. The designed underpass box is
safe to carry the maximum load of the train.

VIII. CONCLUSION

The time taken to install the precast underpass box is less than the time taken for cast iron structure.

The maximum load of train (freight + passenger) can pass through the underpass box structure.

Cast iron structure is economical with respect to underpass box structure, but it is less Durable then the precast structure.

Precast structure required heavy duty machines then cast iron structure.

REFERENCES

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