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ANALYSIS AND DESIGN OF SLAB CULVERT WITH MANUAL CALCULATIONS AND USING STAAD-PRO

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ABSTRACT

Culverts need to be provided below the surface of the ground to cross the watercourse such as streams, nallas across the edge as the road edge cannot be allowed to block the natural waterway. The culverts are also required to level the floodwaters on both sides of the earth to reduce flooding on one side of the road thereby reducing the water level and thus reducing the risk of flooding. Culverts can be different Memo such as arch, slab and box. These can be made of different materials such as bricks (bricks, stone, etc.) or reinforced concrete. In this paper we analyze the previous research work done related to our research area namely, slab culvert analysis. Reinforced concrete slab decks are often called culverts and are often used for small spaces. Slab culverts are important water structures used in the construction of highways. In India, to date culverts have been designed and constructed in accordance with the guidelines of the Indian road network according to the IRC: code 21-2000 when applying the operating pressure method. The Indian Road Congress recently introduced another code IRC: 112-2011 for designing prestress bridges and RCC bridges using a boundary condition method, future research will be done to determine how IRC-112 design differs from IRC-21 and an effort was made to study it. unspecified IRC parameters: 112 - 2011 similar span to deep (L / d) ratio.

Keywords: Slab Culvert Hydraulic Structures, (L/D) Ratio, Stadd-Pro.

I. INTRODUCTION

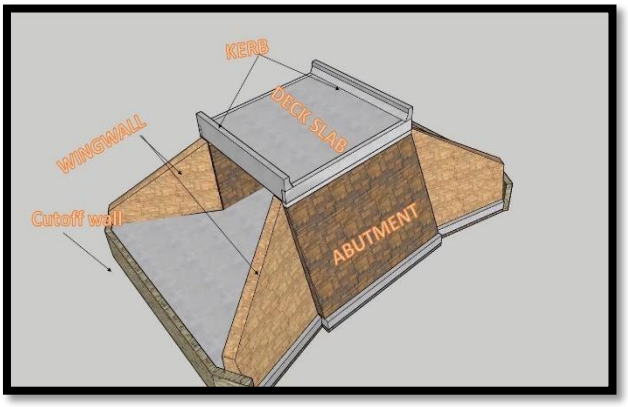
1.1 Overview

It is well-known that roads are often constructed on the embankment that come with the natural flow of floodwaters. As the flow cannot be prevented hence, some type of pumping operations needs to be provided to allow water to pass over the embankment and to take the electrical or other cables from one side to the other. The structures to achieve such a flow across the street are called culverts, small bridges and large bridges depending on the spans and also on the on the discharges.

1.2 Objective

i. The main objectives of the project are to investigate basic parameters such as shear force and culvert folding times with and without cushion.

ii. The modeling, analysis and design of the Slab Culvert and the discovery of how IRC-112 differs from IRC-21 and an attempt was made to study the unspecified IRC: 112-2011 parameters such as the span to deep (L / d) ratio.



Component Parts of Slab Culvert

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II. LITERATURE SURVEY

Eha Kolate, Molly Mathew, Snehal Mali (2014): Culverts need to be provided under the earth wall crossing the water course such as streams, Nallas etc. on the other side the edge, as the road fence cannot be blocked natural water system. Culverts are also required to measure flood water on both sides of the earth's fence to reduce the level of flooding on one side of the road thus reducing the water head as a result, it reduces the risk of flooding. This paper is about learning of other design parameters of clove boxes as an angle of the dispersion or the active width of the living load, the effect of the earth pressure and depth of pillow given over the top slab of the box culverts. Depth of pillow, coefficient of earth pressure for side pressures on walls, width or live scattering angle luggage in a box outside a pillow and a pillow structure deformation are important.

Shivanand Tenagi, R. Shreedhar (2015): Reinforced concrete slab floors are often referred to as culverts and are often used for small spaces. Slab culverts are important water structures used in the construction of highways. In India, to date culverts have been designed and constructed in accordance with the guidelines of the Indian road network according to the IRC: code 21-2000 when applying the operating pressure method. The Indian Road congress recently introduced another code IRC: 112-2011 for designing compressive bridges and RCC bridges using the boundary condition method. In this regard, current research has been conducted to determine how the design of IRC-112 differs from IRC-21 and an attempt was made to study the unspecified IRC: 112 - 2011 parameters such as the span to deep (L / d) ratio. Current research is being done on the construction of the RC slab culvert using the "operating stress method" using the "IRC: 21-2000 and the limit mode method using the IRC: 112-2011" coding data. It is noted that in the operating stress mode, the allowable L / d ratio is 13 and in the limit case, the L / d ratio of 20 is much better. The amount of material required in the boundary condition is compared to the amount of material required in the operating pressure method and it is found that concrete can be stored up to 30 to 35% using the boundary method.

Ajay R Polra, Prof. S. P. Chandresha, Dr. K. B. Parikh (2017): A reinforced concrete box lattice consists of a bottom slab, a top slab and two vertical side walls that are monolithically formed and form a single closed rectangular or square cell. Multi-cell box culverts are obtained by inserting one or more of the middles straight walls. If the outflow from the stream is large, the box-reinforced box boxes are a suitable bridge structure. When the load capacity of the soil is low, the culvert of one box becomes worse because it requires a higher thickness of the slabs and walls. In such cases, more than one box can be built next to monolithically. This paper deals with the study of the parameters of the design of clove boxes as a result of the co-operation of the ground pressure, the angle of dissolution of the live load and the depth of the pillow given over the slab of the clove boxes. The coefficient of earth pressure of lateral pressure on the walls, pillow depth, width or angle of disposal of live loads in a non-pillow box and a structural adjustment pillow are important factors in designing a box culvert.

Vasu Shekhar Tanwar, Dr. M. P Verma, Sagar Jamle (2018): He has researched using the Staad Pro software the culvert is subject to certain conditions and provides values in the form of graphs and tables where migration is reduced and reduced during bending it is shown. The result is the use of a software result that you get to know about the bending time and the rejection of the rejection being the smallest percentage taken. Changes in the structure of the flammable part get a positive response. This analysis of the paper increases the pressure level in the combustible component and the cutting costs decrease with the increase in the combustion component. Systemic pressures are low and provide a positive response to structural change. The result is a paper that gives a graph and its variance in values in relation to stress using the flammable part the amount of stress decreases in different conditions.

Afzal Hamif Sharif (2016), Conducted research using the short-term distribution method and Staad pro software. Compare and check all the bridge safety features. The results are the advantage of the culvert box and their important design and duration depending on the size of the cell and the number of cells.

Ms. Patil M.B. 1, C.M. Deshmukh2, Dr. C. P. Pise3, Y.P. Pawar2, S. S. Kadam, D. D. Mohite2, S.V. Lale2 (March-2016), Explained in their study that the behavior of a composite structure is strongly influenced by the properties of its components. The use of concrete slab in steel grid uses concrete strength in compression and high steel strength. Solid materials such as steel are equally more load-bearing than materials such as concrete. If there is no connection then things will behave independently, leaving good results, but if they are connected

enough things act as one complete structure. In this study they determined three bands that can work effectively on composite bridges and their analysis is done using software.

H. Maximos, et al., (2010) summarize the evaluation process to assess the effects of fatigue on rigid concrete box (RC) and resultant recommendations made (AASHTO). The test results show a good distribution of load resistance between the two reinforcing strips in the culvert section of the box.

21. B.N. Sinha and R.P. Sharma (2009) provided a comprehensive discussion of the provisions in Coding, consideration, and modification of design elements. Research has concluded that cross drainage box operating at higher altitudes has many advantages compared to slab culvert.

22. H. Chanson (2000) Review the hydraulic structure of the culvert. This paper introduces a new approach to teaching hydraulic design to students of civil and environmental engineering in the degree curriculum. The hydraulic design of the culvert was introduced as part of the complete design approach. The paper outlines engineering design techniques where individual innovation and innovation are required.

23. Shivanand Tenagi and R. Shreedhar conducted research on the RCC slab culvert using the codes IRC 112 - 2011 and IRC 21- 2000. The RCC slab enclosure was analyzed and designed for IRC uploads as standard specifications and L / S savings rates. d was found in both the moderate condition and the functional stress method. The study concluded that the required concrete capacity is below the boundary condition method and a L / d rating equal to 20 for the boundary condition method and 13 for the operating pressure method may be acceptable for design.

III. CONCLUSION

• In one of the indicators Practical scope methods, recommended in IRC: 112 for the analysis of slab type bridges, lead to safer construction as it provides more bending times than STAAD using the grinding method commonly used by bridge designers.

• It is noteworthy that, in the construction of the slab culverts using the IRC pressure operating system: 21-2000, an L / d rating of 11 to 13 may be accepted, an L / d rating of 13 is much better.

• It is noteworthy that, in the construction of a slab collage using a boundary condition method according to IRC: 112-2011, an L / d rating of 18 to 20 may be accepted, an L / d rating of 20 is much better.

• In the case of the design of Tee-Beam bridges using the boundary condition method as per IRC: 112-2011, it is noted that, an L / d rating of 12 to 14 may be accepted. The preferred L / d ratio is 14.

• In the case of the design of Tee-Beam bridges using the pressure method of operation according to IRC: 21-2000 it is noted that, an L / d rating of 9 and 10 may be accepted. The preferred L / d ratio is 10.

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