CONCRETE BOX GIRDER BRIDGE DESIGN EXAMPLE pdf

1: Box girder bridges - www.enganchecubano.com

- Example Bridge Prestressed Concrete Bridge Design Example The strand pattern and number of strands was initially determined based on past experience and subsequently refined using a computer design program.

Bridges are the key elements in any road network Use of box girder is gaining popularity in bridge engineering fraternity because of its better stability, serviceability, economy, aesthetic appearance and structural efficiency. The structural behavior of box girder is complicated, which is difficult to analyze in its actual conditions by conventional methods. The analyzed of box girder using SAP 14 Bridge Wizard and prestressed with parabolic tendons in which utilize full section. Ever since the development of prestressed concrete by Freyssinet in the early s, the material has found extensive application in the construction of long-span bridges, gradually replacing steel which needs costly maintenance due to the inherent disadvantage of corrosion under aggressive environment conditions. One of the most commonly used forms of superstructure in concrete bridges is precast girders with cast-in-situ slab. This type of superstructure is generally used for spans between 20 to 40 m. T or I-girder bridges are the most common example under this category and are very popular because of their simple geometry, low fabrication cost, easy erection or casting and smaller dead loads. In this paper study the India Road Loading considered for design of bridges, also factor which are important to decide the preliminary sizes of concrete box girders. Also considered the IRC: Analyze the Concrete Box Girder Road Bridges for various spans, various depth and check the proportioning depth. Loading on Box Girder Bridge The various type of loads, forces and stresses to be considered in the analysis and design of the various components of the bridge are given in IRC 6: But the common forces are considered to design the model are as follows: The dead load carried by the girder or the member consists of its own weight and the portions of the weight of the superstructure and any fixed loads supported by the member. The dead load can be estimated fairly accurately during design and can be controlled during construction and service. The weight of superimposed dead load includes footpaths, earth-fills, wearing course, stay-in -place forms, ballast, water-proofing, signs, architectural ornamentation, pipes, conduits, cables and any other immovable appurtenances installed on the structure. Live loads are those caused by vehicles which pass over the bridge and are transient in nature. These loads cannot be estimated precisely, and the designer has very little control over them once the bridge is opened to traffic. However, hypothetical loadings which are reasonably realistic need to be evolved and specified to serve as design criteria. There are four types of standard loadings for which road bridges are designed. IRC Class 70R loading ii. IRC Class A loading iv. Total load is , the Fig. Other information regarding Live load combination as per IRC: Thickness of Top Flange The minimum thickness of the deck slab including that at cantilever tips be mm. For top and bottom flange having prestressing cables, the thickness of such flange shall not be less than mm plus diameter of duct hole. Losses in Prestress While assessing the stresses in concrete and steel during tensioning operations and later in service, due regard shall be paid to all losses and variations in stress resulting from creep of concrete, shrinkage of concrete, relaxation of steel, the shortening elastic deformation of concrete at transfer, and friction and slip of anchorage. In computing the losses in prestress when untensioned reinforcement is present, the effect of the tensile stresses developed by the untensioned reinforcement due to shrinkage and creep shall be considered. Calculation of Ultimate Strength Ultimate moment resistance of sections, under these two alternative conditions of failure shall be calculated by the following formulae and the smaller of the two values shall be taken as the ultimate moment of resistance for design:

CONCRETE BOX GIRDER BRIDGE DESIGN EXAMPLE pdf

2: Box girder bridge - Wikipedia

This example will use the standard deck slab design as explained in the Design Guide. This design should always be used unless approval to use a thinner deck is obtained from the State Bridge Engineer.

Box girders are used for highway bridges , railway bridges and footbridges â€" different structural forms are chosen for each of these applications. The deck slab acts compositely with the steel girders. For spans in the range 45 to m, multiple girders are used, with the slab spanning transversely between the webs. For such configurations, relatively narrow rectangular steel box sections have sometimes been chosen, as shown right. However, such sections are rather small and introduce significant hazards for access for construction and maintenance and are rarely chosen now for this span range. These girders have a steel bottom flange, inclined steel webs and a narrow steel flange on top of each web. The closed cell is formed by the reinforced concrete deck slab. This form is shown right. With this configuration, material access during construction can be minimised by the use of permanent formwork or precast slabs and for maintenance the cells are larger than those for rectangular steel boxes, thus reducing the difficulties of access. With both forms, the girder depth is usually uniform at the lower end of the span range, but variable depth girders are used for longer spans. The deck slab is of nominally uniform thickness, about mm thick. This limits the transverse spacing of webs to about 4m. Open trapezoidal composite box girder during construction Variable depth trapezoidal box girders River Nene Bridge, Peterborough An alternative form used in continental Europe is a single cell trapezoidal cell steel girder with a transversely prestressed deck slab. The slab is deeper over the webs of the girder, allowing the transverse span of the slab to be up to 7m. For longer spans, twin girders usually rectangular cross section with cross girders and cantilever girders are often used. This allows two girders to support wide decks dual carriageway roads. With those longer spans the girders are very often variable depth. The roadway is then carried on a longitudinally stiffened steel top flange, commonly known as an orthotropic steel deck. Such construction is lighter but is more complex to fabricate. Long span steel box girder bridge Foyle Bridge, Londonderry [top]Cable-supported box girders For very long spans, cable stayed construction is often used in conjunction with steel or composite box girders. Steel box girders are also used as stiffening girders of suspension bridges. Box girders curved in plan Fossedyke Bridge, Lincoln [top]Railway bridges Network Rail standard box girder shown for three-box, twin track option For railways, construction depth is usually very tightly constrained and half through construction must be employed. The Network Rail Standard Box Girder type bridge that covers a span range from 21m to 39m uses trapezoidal box girders with a transverse ribbed steel deck spanning between notionally pin-jointed shear plate connections: This design is particularly suited to piecemeal crane erection during track possession. With half through construction, the deck can be either in situ concrete, partially encasing close centred cross girders , or a normal slab above more widely spaced cross girders. Stiffened steel plate construction can also be used, depending on the proposed erection method and available construction depth. For railways on new alignments, where construction depth may not be so tightly constrained, the track can be carried on a slab-on-beam composite bridge, in the same way as used for highways. The use of box girders is then particularly advantageous as their greater torsional stiffness reduces susceptibility to track twist. Construction of a composite box girder bridge for CTRL M20 Newington Bridge [top]Footbridges Box sections for footbridges Box girders are usually considered for footbridges only for spans over about 30m, and most box girder footbridges adopt an all-steel configuration. The advantage in using an all-steel configuration is that the whole cross section, including parapets, can be fabricated at the works for delivery and erection in complete spans; the weight of such spans is modest and easily handled by a mobile crane. The thickness of the top flange which also forms the floor plate will be determined by overall bending strength rather than local floor loading. The plate is typically supported by transverse stiffeners which cantilever to edge beams. Two or three longitudinal stiffeners may be provided to stiffen the floor plate when acting as the compression flange of the box. Diaphragms are needed at supports and are often provided at several positions along the length of the girder typically the third points to control distortion. Large holes will be required in the diaphragms if access is required during fabrication or maintenance. Avoidance of local buckling in compression zones and in shear requires appropriate stiffening and longitudinal stiffeners are often required. Although box sections offer high torsional stiffness, internal cross frames are usually needed to prevent distortion when one web is subject to greater shear than the other, one diagonal dimension across the cell increases and the other decreases. Bearings at supports are normally within the width of the bottom flange rather than directly under the webs and an internal diaphragm is needed to transfer the reactions. When open-top boxes are used, they have very little torsional stiffness at the bare steel stage and the narrow top flanges might be susceptible to lateral buckling a later-torsional buckling mode for the U-shaped section. It is therefore necessary to introduce some plan bracing to the top flange not necessarily over the full lengths of the spans to restrict twist and slenderness for buckling. Such bracing must avoid conflict with slab construction. For any closed cell that requires internal access to construct it or to carry out inspection and maintenance, Health and safety considerations require sufficiently large and well-placed openings that an injured person could be quickly evacuated. All internal stiffening and diaphragms must therefore be designed such that openings are big enough and that movement along the cell is unimpeded. The following design aspects are discussed in Guidance Note 1.

3: Analysis and design of prestressed concrete box girder bridge

FHWA's Post-Tensioned Box Girder Design Manual.

CONCRETE BOX GIRDER BRIDGE DESIGN EXAMPLE pdf

Love Roma 3 (Love Roma) VI-3. Grover Cleveland and Rosa Pearl (Deal Gore 68 Churchill Proceedings 2001-2003 Making the improvement of value a business strategy The World Encyclopedia of Soccer, 2006 Update The de-humanization of the artistic receptor : the George Circles rejection of Paterian aestheticism Yvon Lament the red wolf. Projections of the AIDS epidemic in San Francisco, 1994-1997 Christianity Contrasted with Hindu Philosophy: An Essay, in Five Books, Sanskrit and English Sport and recreation in Britain Sermons translated from the original French of the late Rev. James Saurin . The ten books on architecture Confident contracting! 120 Italian Renaissance Paintings CD-ROM and Book Women of the past 2006 mazda 6 repair manual Sir William Penn, knight, admiral and general at sea Big Book of Papercrafts Hot, The Men of Hot House Social networks of older people The idea of a Christian college Redefining human, redefining sport : the imago dei and genetic modification technologies Tracy J. Trothen Jazz blues chord progressions Book review for god mairriage and family Scaling the urban environmental challenge Peter J. Marcotullio and Gordon McGranahan A Day With Police Officers (Welcome Books) Catastrophic failures Dsp book by anand kumar Hon. Oliver Mowat to his constituents at Tavistock, January 15th, 1890, and also a supplementary memorand Old promises, contemporary goals, and future dreams : time for a bold plan Manuel N. Gomez Data book for heat and mass transfer Death Flies On Final (Wwl Mystery) Its Going to Be Perfect (Picture Books) Tom clancy debt of honour Endpoint Security Keeping our troth The Cambridge Companion to Carnap (Cambridge Companions to Philosophy) Nobel evening address In re Arons: the plight of the / A True Copy of the Last Will and Testament of Thomas Guy, Esq.