PreCast Segmental Box Girder Bridge Manual

Journal

Superstructure Design of a Precast Segmental Box Girder Highway Bridge

This comprehensive and up-to-date reference work and resource book covers state-of-the-art and state-of-the-practice for bridge engineering worldwide. Countries covered include Canada and the United States in North America; Argentina and Brazil in South America; Bosnia, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France, Greece, Macedonia,

PreCast Segmental Box Girder Bridge Manual

The proposed substructure system described in this report has been developed to improve the aesthetics and reduce the construction time of the support structures for standard bridges. The form of the proposed substructures is highly attractive, and is a distinct improvement over many traditional short- and medium-span bridge substructures. The substructure system developed is particularly well-suited for precasting, although the geometric form could be cast-in-situ. Precasting would result in the increased use of high performance concrete in the substructures. The use of such concrete will bring improved durability since the high performance concrete is greatly resistant to ingress of moisture and chlorides. In addition, the greater compressive strength of the high performance concretes is utilized for reducing the handling weight and dead load of the substructure units. The bent cap units are more complex than traditional cast-in-place bent caps but appear
feasible for plant production or large-scale, cast-on-site projects.

**Precast segmental bridges**

The concept of precast segmental bridges is not new: the first application documented was from the mid-1940s, designed by Eugene Freyssinet and built over the river Marne near Luzancy in France, between 1944 and 1946. Although innovative, it also contained traditional wet concrete joints between the members. The impressive breakthrough came slightly later with the introduction of match-cast joints by Jean Muller, first for a bridge near Buffalo (USA) in 1952, and later for a bridge across the River Seine at Choisy le Roi near Paris in 1962. This opened the way for a large number of new developments in terms of design, production approaches and construction techniques, and precast prestressed concrete segmental construction became rapidly one of the most efficient and successful bridge construction methods all over the world. These developments are still evolving, but the interaction between design, production and construction is a critical factor for success: the interaction creates opportunities to optimise the scheme, but at the same time is crucial to ensure safety, especially during construction, when large weights are moved, placed and secured, frequently at substantial heights. Engineers of all disciplines involved should interact during the development and realisation of precast segmental bridge (PSB) schemes, to conclude the optimum method statement and consequently check all the intermediate steps of the method statement in terms of stress, stiffness, stability, production and constructability. With the ongoing development of the PSB concept, and consequently moving limits in terms of dimensions, it was concluded to be appropriate to develop a Guide to good practice for the PSB construction method. The present report was developed by an integrated team of engineers with roots in design, structural engineering, production and construction, and provides a valuable source of knowledge, experience, recommendations and examples, with particular emphasis on the fib Model Code for Concrete Structures 2010 and fib Bulletins 20, 33, 48 and 75. I would like to thank all the members of Task Group 1.7, all the individual contributors from outside Task Group 1.7, and the reviewers of the Technical Council of the fib for their contribution to this Guide to good practice. In particular, I would like to thank Gopal Srinivasan and Marcos Sanchez, who, apart from their own contributions, did the final editorial work for this bulletin.

**Precast Post-tensioned Segmental Box Girder Bridges in Vancouver**

This manual contains updated information on the current practices in the use, design, and construction of post-tensioning. The 6th Edition has been extensively rewritten and expanded from the 5th Edition. The Manual contains 12 new chapters that give design guidance on modern applications of post-tensioning. All of the original chapters have been totally revised and modified to reflect the current industry practices. New topics include Seismic Design, Post-Tensioned Concrete Floors, Parking Structures, Slab-on-Ground, Bridges, Stay Cables, Storage Structures, Barrier Cables, Dynamic and Fatigue, Durability, Inspection and Maintenance, and Field and Plant Certification. The Manual provides the industry standard for design and construction of post-tensioned structures. This book is an invaluable resource for practicing engineers, architects, students, educators, contractors, inspectors, and building officials. The 6th Edition of the Post-Tensioning Manual provides basic information and the essential principles of post-tensioning.

**Precast Segmental Box Girder Bridge Manual**

An extensively illustrated handbook summarizing the current state of the art of design and construction methods for all types of segmental
bridges. Covers construction methodology, design techniques, economics, and erection of girder type bridges; arch, rigid frame, and truss bridges; cable-stayed bridges; and railroad bridges.

**Computer Structural Static & Dynamic Response of Cable-stayed Bridges Having Precast Prestressed Concrete Segmental Box-girder Decks: Applications: Double plane bridge**

**Seismic Testing of Precast Segmental Bridges**

The book includes peer-reviewed contributions selected from presentations given at the Istanbul Bridge Conference 2014, held from August 11 – 13 in Istanbul, Turkey. It reports on the current challenges in bridge engineering faced by professionals around the globe, giving a special emphasis to recently developed techniques, innovations and opportunities. The book covers key topics in the field, including modeling and analysis methods; construction and erection techniques; design for extreme events and condition assessment and structural health monitoring. There is a balanced presentation of theory, research and practice. This book, which provides the readers with a comprehensive and timely reference guide on current practices in bridge engineering, is intended for professionals, academic researchers and students alike.

**Construction and Load Tests of a Segmental Precast Box Girder Bridge Model**

**Collapse analysis of externally prestressed structures**

Segmental concrete bridges have become one of the main options for major transportation projects world-wide. They offer expedited construction with minimal traffic disruption, lower life cycle costs, appealing aesthetics and adaptability to a curved roadway alignment. The literature is focused on construction, so this fills the need for a design-oriented book for less experienced bridge engineers and for senior university students. It presents comprehensive theory, design and key construction methods, with a simple design example based on the AASHTO LRFD Design Specifications for each of the main bridge types. It outlines design techniques and relationships between analytical methods, specifications, theory, design, construction and practice. It combines mathematics and engineering mechanics with the authors’ design and teaching experience.

**Bridge Construction Equipment**

**Optimization of Segmental Precast, Prestressed Concrete Box-girder Bridges**
Since the first prestressed concrete bridge was built and launched by Freyssinet in 1941, such structures have soared to greater heights due to computer-aided design and innovative materials. Rosignoli, a consulting engineer practicing in Italy and abroad, distills aesthetic/environmental consciousness.

**Formwork for Concrete**

The I-595/U.S. 441 Interchange in Broward County Florida is a four level directional interchange comprised of 19 bridges over 20 miles (32 km) of ramps and mainline roadway. Of particular interest are the third and fourth level flyover ramp bridges. These bridges are constructed of precast concrete segmental box girders, erected in balanced cantilever. The flyover ramp bridges are on a 6-degree horizontal curve and are each approximately 2000 ft. (610 m) long. Each has thirteen continuous spans ranging from 61 to 224 ft. (19 to 68 m) in length. Particular attention was given to durability of these structures. A variety of measures were taken to improve durability, including maintaining compression across all segment joints, minimizing expansion joints, detailed evaluation of thermal effects and shear lag, and consideration of future maintenance by providing for future post-tensioning and bearing replacement. Aesthetics were also given consideration during the design. While concrete box girders inherently present clean and graceful lines, several features were used to enhance the appearance of the bridge. During construction, certain revisions to the design were suggested by the Contractor to suit his particular erection capabilities. These revisions are discussed, as well as opportunities visualized for the application of precast segmental concrete box girder construction to future interchange bridges. For the covering abstract of the Conference see IRRD Abstract No. 807839.

**Developments in International Bridge Engineering**

**Bridge Engineering**

Bridge Construction Equipment provides exhaustive coverage of new and emerging bridge construction technology and modern construction methods for all bridge professionals looking to save time, labour and costs, reduce risk, and increase the value and quality of projects through mechanized bridge construction.

**Prestressed Concrete Bridges**

Throughout the last decades, the increasing development of the urban metropolis and the need to establish fundamental infrastructure...
networks, promoted the development of important projects worldwide and several Multi-Span Large Bridges have been erected. Certainly, many more will be erected in the next decades. This international context undoubted

**Continuous Prestressed Concrete Girder Bridges**

**Construction and Load Tests of a Segmental Precast Box Girder Bridge Model**

**Post-tensioning Manual**

**Concrete Box-girder Bridges**

**Design and Construction of the I-595/u.s. 441 Flyover Ramp Bridges**

The traveling public has no patience for prolonged, high cost construction projects. This puts highway construction contractors under intense pressure to minimize traffic disruptions and construction cost. Actively promoted by the Federal Highway Administration, there are hundreds of accelerated bridge construction (ABC) construction programs in the United States, Europe and Japan. Accelerated Bridge Construction: Best Practices and Techniques provides a wide range of construction techniques, processes and technologies designed to maximize bridge construction or reconstruction operations while minimizing project delays and community disruption. Describes design methods for accelerated bridge substructure construction; reducing foundation construction time and methods by using pile bents Explains applications to steel bridges, temporary bridges in place of detours using quick erection and demolition Covers design-build systems' boon to ABC; development of software; use of fiber reinforced polymer (FRP) Includes applications to glulam and sawn lumber bridges, precast concrete bridges, precast joints details; use of lightweight aggregate concrete, aluminum and high-performance steel

**Bridge Launching**

This book explores the fundamentals of the elastic behaviour of erected precast segmental box girders (SBG) when subjected to static load, as well as the construction process (casting and erection work) involved. It analyzes and compares the experimental results with those obtained using the finite element method and theoretical calculations. A short-term deflection analysis for different loads is obtained by determining the maximum deflection, stress and strain value of single span precast SBG under a variety of transversal slope. The outcome of this work provides a better understanding of the behaviour of precast SBG in terms of structural responses as well as defects, so that maintenance work can then be focused on the critical section at mid span area specifically for the bridge project longitudinally and transversely. The book is of interest to industry professionals involved in conducting static load tests on bridges, and all researchers, designers, and engineers seeking to
validate experimental work with numerical and analytical approaches.

**Multi-Span Large Bridges**

The Texas Department of Transportation designs typical highway bridge structures as simple span systems using standard precast, pretensioned girders. Spans are limited to about 150 ft due to weight and length restrictions on transporting the precast girder units from the prestressing plant to the bridge site. Such bridge construction, while economical from an initial cost point of view, may become somewhat limiting when longer spans are needed. This project focused on developing additional economical design alternatives for longer span bridges with main spans ranging from 150-300 ft, using continuous precast, prestressed concrete bridge structures with in-span splices. Phase 1 of this study focused on evaluating the current state-of-the-art and practice relevant to continuous precast concrete girder bridges and recommending suitable continuity connections for typical Texas bridge girders; the findings are documented in the Volume 1 project report. This report summarizes Phase 2 of the research including detailed design examples for shored and partially shored construction, results of a parametric design study, and results of an experimental program that tested a full-scale girder containing three splice connections. The parametric design study indicated that for bridges spanning from 150-300 ft, continuous precast, prestressed concrete girder bridges with in-span splices can provide an economical alternative to steel girder bridges and segmental concrete box girder construction. The tested splice connections performed well under service level loads. However, the lack of continuity of the pretensioning through the splice connection region had a significant impact on the behavior at higher loads approaching ultimate conditions. Improved connection behavior at ultimate conditions is expected through enhanced connection details. Recommendations for design of continuous spliced precast girders, along with several detailing suggestions are discussed in the report.

**Accelerated Bridge Construction**

**Construction of Precast Segmental Box Girder Bridge Using Overhead Gantry**

Prestressed concrete decks are commonly used for bridges with spans between 25m and 450m and provide economic, durable and aesthetic solutions in most situations where bridges are needed. Concrete remains the most common material for bridge construction around the world, and prestressed concrete is frequently the material of choice. Extensively illustrated throughout, this invaluable book brings together all aspects of designing prestressed concrete bridge decks into one comprehensive volume. The book clearly explains the principles behind both the design and construction of prestressed concrete bridges, illustrating the interaction between the two. It covers all the different types of deck arrangement and the construction techniques used, ranging from in-situ slabs and precast beams; segmental construction and launched bridges; and cable-stayed structures. Included throughout the book are many examples of the different types of prestressed concrete decks used, with the design aspects of each discussed along with the general analysis and design process. Detailed descriptions of the prestressing components and systems used are also included. Prestressed Concrete Bridges is an essential reference book for both the experienced engineer and graduate who want to learn more about the subject.

**Launched Bridges**
Bridge Engineering Handbook, Second Edition

Over 140 experts, 14 countries, and 89 chapters are represented in the second edition of the Bridge Engineering Handbook. This extensive collection highlights bridge engineering specimens from around the world, contains detailed information on bridge engineering, and thoroughly explains the concepts and practical applications surrounding the subject. Published in five books: Fundamentals, Superstructure Design, Substructure Design, Seismic Design, and Construction and Maintenance, this new edition provides numerous worked-out examples that give readers step-by-step design procedures, includes contributions by leading experts from around the world in their respective areas of bridge engineering, contains 26 completely new chapters, and updates most other chapters. It offers design concepts, specifications, and practice, as well as the various types of bridges. The text includes over 2,500 tables, charts, illustrations, and photos. The book covers new, innovative and traditional methods and practices; explores rehabilitation, retrofit, and maintenance; and examines seismic design and building materials. The second book, Superstructure Design, contains 19 chapters, and covers information on how to design all types of bridges. What's New in the Second Edition: Includes two new chapters: Extradosed Bridges and Stress Ribbon Pedestrian Bridges Updates the Prestressed Concrete Girder Bridges chapter and rewrites it as two chapters: Precast/Pretensioned Concrete Girder Bridges and Cast-In-Place Post-Tensioned Prestressed Concrete Girder Bridges Expands the chapter on Bridge Decks and Approach Slabs and divides it into two chapters: Concrete Decks and Approach Slabs Rewrites seven chapters: Segmental Concrete Bridges, Composite Steel I-Girder Bridges, Composite Steel Box Girder Bridges, Arch Bridges, Cable-Stayed Bridges, Orthotropic Steel Decks, and Railings This text is an ideal reference for practicing bridge engineers and consultants (design, construction, maintenance), and can also be used as a reference for students in bridge engineering courses.

Steel Box Girder Bridges

Construction of Precast Segmental Box Girder Bridge Using Overhead Gantry

This book is an essential purchase for all those involved in bridge construction and innovative building techniques, such as bridge owners, design offices, bridge consultants, and construction equipment suppliers.

Handbook of International Bridge Engineering

Recent projects executed in the Greater Vancouver area have demonstrated that precast post-tensioned segmental box-girder bridges may be successfully applied to moderately sized medium-span structures. Advantages include rapid, economical constructions; shallow construction depth; and favourable aesthetic qualities. Low life-cycle costs resulting from high-quality factory-produced concrete girders and longitudinally post-tensioned deck slabs are an additional benefit. Three bridges illustrating the range of application of this bridge building system are presented. It is shown how a variety of span configurations as well as curvature in plan may be tackled. Suggestions are made for economical application of this construction method. For the covering abstract of the Conference see IRRD Abstract No. 807839.
**Design of Pier Segments in Segmental Hollow Box Girder Bridges**

Inhaltsangabe: Introduction: This dissertation is an investigation into the behaviour of externally prestressed structures, focusing on bridge box girders, at the ultimate limit state. The main objective is the ductility and the tendon stress increase up to failure of externally prestressed structures. Their behaviour will be compared to internally prestressed structures. The dissertation may have valuable information for the first stages of the design process for medium span bridges as the study is concerned about the overall safety and efficiency of prestressed concrete bridges by the means of ductility. The aim is also to provide information about the tendon stress at failure, which is required for the detailed design.

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**Seismic Performance of Precast Segmental Bridge Superstructures**

**Analysis of Precast Segmental Box Girder Bridges**

**Precast Segmental Box Girders**

**Construction and Design of Prestressed Concrete Segmental Bridges**

**Concrete Segmental Bridges**
**Prestressed Concrete Segmental Bridges**

**Design of a Precast, Segmental, Balanced, Cantilever, Box Girder Bridge**

**A Precast Substructure Design for Standard Bridge Systems**

With chapters culled from the acclaimed Bridge Engineering Handbook, Bridge Engineering: Substructure Design focuses on the various components comprising and affecting bridge substructures. These include bearings, piers and columns, towers, abutments and retaining structures, footings and foundations, and bridge hydraulics. For each component, the...