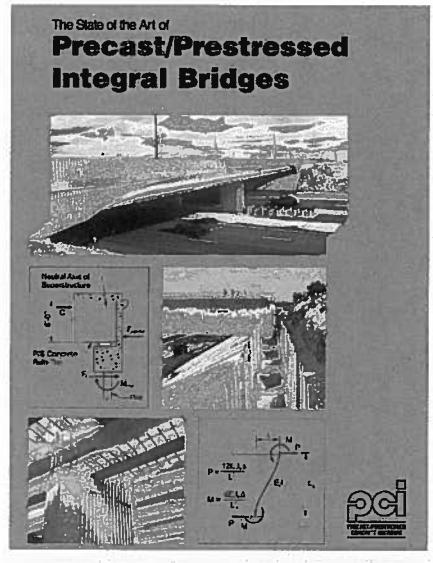
ABSTRACT OF PCI TECHNICAL PUBLICATION

The State of the Art of Precast/Prestressed Integral Bridges

This new publication from PCI, *The State of the Art of Precast/Prestressed Integral Bridges*, is a response to the growing popularity of integral bridge design and the need to provide practical technical information on this important subject. The document was prepared by the PCI Committee on Bridges, Subcommittee on Integral Bridges. This subcommittee was formed with the express purpose of preparing this publication.



Traditional precast, prestressed concrete bridges make use of expansion joints and expansion bearings to accommodate superstructure movements. Maintenance problems are inherent in these bridges, however, because of leaking expansion joints and frozen bearings. An effective solution to these problems is to eliminate the expansion joints on the bridge and make the abutments and possibly the interior piers integral with the superstructure. Expansion and contraction movements due to such items as temperature are accommodated by using flexible piling and incorporating relief joints at the ends of the approach slabs. Integral bridges have the added benefits of improved structural integrity, longer term serviceability, smoother riding surface, and lower initial cost.

The publication comprises eleven chapters. These are: 1. Introduction; 2. Integral (Jointless) Bridges; 3. Superstructure Design; 4. Abutment Design; 5. Pier Design; 6. Analysis Considerations; 7. Survey of Current Practice (throughout the United States and Canada); 8. Case Studies Summary; 9. Conclusions; 10. References; and 11. Bibliography.

In addition, the Appendix presents five case studies that illustrate the design principles. These are: The U.S. Highway 75 Viaduct in Nebraska City, Nebraska, a six-span highway structure with AASHTO Type III girders and spliced bulb-tee girders that replaced a 50-year-old steel girder bridge; the I-469 Bridge Over I-69 in Fort Wayne, Indiana, a two-span structure that incorporates precast, prestressed bulb-tee I-girders with no joints in the bridge decks; the Menauhant Road Bridge, near Cape Cod, Massachusetts, a five-span highway structure spanning Green Pond and comprising 3 and 4 ft wide, 21 in. deep (0.9 and 1.2 m x 533 mm) continuous prestressed concrete deck beams and concrete pile bents; Deer Creek Industrial Park Access Bridge, Barboursville, West Virginia, a three-span continuous highway bridge with AASHTO Type IV prestressed concrete beams and hammerhead piers as intermediate supports; and Tennessee State Route 50 Over Happy Hollow Creek, a nine-span continuous curved structure with a superstructure of precast, prestressed concrete bulb-tee girders designed as simple spans for noncomposite dead loads and continuous spans for live loads and composite dead loads.

The chapters on design and analysis cover concepts, methodologies, and details for superstructures, abutments, and piers of various types, and is well illustrated to provide clarity to the discussions and examples. Subjects include superstructure details at integral abutments, continuity at piers, accommodating superstructure movements at abutments and piers, abutment configurations, resistance of integral abutments to passive pressures (caused by thermal movement), example problems and solutions, analysis and design of semi-rigid piers, and other important topics.

Chapter 7 presents detailed results of a comprehensive survey by the Subcommittee on Integral Bridges on the state of current practice in the United States and Canada. The departments of transportation in all 50 U.S. states and the ministries of transportation in nine Canadian provinces were surveyed, as well as 17 bridge design consultants. The survey questionnaire solicited information on each organization's experience with integral bridges, geometric restrictions, design criteria and methodology, applications to curved bridges, research, and lessons learned.

The 100-page publication, designated publication number IB-01, is $8\frac{1}{2}$ x 11 in. in size. The cost of the book is $25.00 for PCI members and $50.00 for non-members. To place an order or for more information, contact PCI headquarters at (312) 786-0300 or visit the web site at www.pci.org.