



Florida Department of Transportation Research Prefabricated/Precast Bridge Elements and Systems (PBES) for Off-System Bridges BDK83 977-13

The Federal Highway Administration (FHWA) “Every Day Counts” initiative aims at improving transportation construction in three major areas: shortening overall project delivery time, enhancing safety, and protecting the environment, both on and around construction projects. Important to Every Day Counts is Accelerated Bridge Construction (ABC), defined as construction that innovates in planning, design, materials, and methods in a safe and cost-effective manner to reduce onsite construction time of new bridges or when repairing or rehabilitating existing bridges. Among the seven facets of ABC, such as contracting methods and geotechnical solutions, this project focused on prefabricated bridge elements and systems (PBES). To prefabricate is to manufacture sections, especially in a factory-like setting, so that they can be easily transported to and rapidly assembled on the construction site.

Over half of Florida’s nearly 12,000 bridges are maintained by the Florida Department of Transportation (FDOT); the others, called off-system bridges, are maintained by local and county entities. PBES is especially attractive because of the challenges bridges in Florida face: a humid, salty environment; a generally aging infrastructure; rural locations; and consistently heavy traffic loads. With PBES, most or all bridge components are fabricated offsite where controlled settings help ensure higher quality and increased durability of the elements. PBES benefits the traveling public, as well, because it reduces construction-related road hazards, the need for detours and temporary structures, and impact on the environment.

In this project, Florida State University researchers compiled and examined PBES techniques in use in the U.S. – focusing on



Precast members are assembled onsite for Minnesota’s Center City Bridge.

application to off-system bridges – with the goal of determining what to implement in Florida. PBES standards were reviewed for a number of details, such as presence of post-tensioning, joint types, design load, and inspectability.

The way bridges are constructed without prefabrication provides a necessary basis for understanding the advantages of PBES methods. With this in mind, the researchers conducted an extensive review of prefabricated construction, both for individual bridge elements and for prefabricated systems, in which all the components that make up a bridge are created offsite. In both approaches, components can be fabricated and assembled offsite as well, further reducing construction time at the site.

The researchers reviewed department of transportation (DOT) Web sites for every state seeking PBES designs and standards. From this search, they identified PBES systems in several states for in-depth review: Alabama, Minnesota, a Northeast consortium of states, and Texas. The systems consisted of double tee beams, inverted tee beams, and adjacent box beams. The researchers detailed pros and cons of each system for Florida and provided links to standard drawings from all state DOTs, which will be helpful in developing standards and bridge construction/design practices. This project lays the foundation for implementation of this cost- and time-saving approach to bridge construction.