The existing Estrella Freeway Bridge over US60 and the BNSF Railway was constructed in 2000 but only provided two travel lanes in each direction. The ultimate goal was to widen the existing bridge to provide six travel lanes in each direction with the associated widening of the SR303 Loop freeway. This bridge widening was to provide both the interim interchange solution and be compatible with the future ultimate interchange configuration. The existing SR303L Bridge over US60 and the BNSF Railway northwest of Phoenix is a four-span, CIP post-tensioned concrete box girder superstructure integral with the piers. This project involved the design and widening of an existing cast-in-place (CIP) post-tensioned concrete box girder bridge using a combination of precast/pre-tensioned and CIP concrete elements that are post-tensioned for continuity. The bridge widening was selected and configured for structural compatibility with the existing bridge and for construction over the active US60 traffic and the BNSF Railway.

**Sustainability Objectives**

Long service life and low maintenance are provided by the durability of steel reinforced concrete. These are essential properties necessary for the high traffic volumes, particularly the truck traffic, which this bridge will experience over its design life.

**INNOVATIVE APPROACHES**

A conventional approach could have been to widen the bridge with an identical CIP post-tensioned concrete superstructure. However, changed conditions, primarily the increased traffic on US60, made traditional CIP concrete construction undesirable over US60. This project utilized a “hybrid” spliced precast concrete girder approach to provide compatible structural behavior to the maximum practical extent. In lieu of an “in-kind” CIP widening, this widening process utilized Precast Bridge Element Systems (PBES), specifically precast girders, to eliminate the CIP falsework over US60 traffic and reduce construction time. The selected method combined AASHTO girders post-tensioned with CIP concrete pier tables to mimic the structural behavior of the existing bridge. CIP concrete was used near and over the piers where structure behavior compatibility was more critical. The two structure types (CIP and PBES) were spliced and post-tensioned to provide continuity and comparable structural behavior to the parent bridge. Spliced connections between CIP and precast elements were located where design moments were low and where shoring towers could be placed without significant impacts to US60.

**REASONS FOR CHOOSING REINFORCED CONCRETE**

Steel reinforced concrete was essential for this project to provide similar structural behavior between the widened portion of the bridge and the existing bridge. It is also a familiar building material in this area, utilizing locally available precast/prestressed AASHTO girders combined with post-tensioned and reinforced concrete structural elements. Steel reinforced concrete also provided aesthetic flexibility necessary to transition between the precast and the (CIP) cast-in-place elements as well as matching the aesthetics of the existing bridge. Reinforced concrete effectively allowed multiple structure types, some portions constructed 15 years apart, to be merged and combined into one cohesive durable bridge structure.