

**What the Innovation is**

Precast substructure units are bridge abutments and wing walls that support the bridge superstructure elements and retain earth fills at the ends of the bridge opening. These bridge elements in the past have been most commonly constructed with cast-in-place concrete techniques, requiring forming and curing times that extend the total construction time for the bridge. Use of precasting to fabricate the substructure units is a unique innovation, yielding major benefits to the business of building bridges.

**Why it is Innovative**

Precast substructure units are an innovative approach to bridge construction because of their dramatic impact on the ease and timeliness of construction. On a bridge southeast of Denver, the use of precast substructure units allowed the bridge substructure to be completely constructed in less than 48 hours, compared to a more typical timeline of weeks, or even months to complete a bridge substructure. The substantially reduced construction time translated into a more efficient construction; and reduction of detour time, therefore minimizing the inconvenience to the traveling public, and minimizing the duration of reduced safety inherent in detours. In addition, precast units are fabricated in a controlled environment, resulting in a level of quality that surpasses that of the cast-in-place field constructed units.

**Where and When it Originated, Has Been Used, and is Expected to be Used in the Future**

Lawrence Construction and Wilson & Company (Lawrence Wilson) first used pre-cast substructure units in the Mitchell Gulch Bridge Replacement Project. The 40 ft. single span bridge is located on SH 86 a few miles southeast of the Denver, Colorado metro-politan area. Lawrence Wilson recognized an opportunity to apply innovative precasting methods of design and construction to fast-track the bridge construction. The result was an entire bridge replacement accomplished in a weekend (48 hours). Many commuters traveled over the old bridge on their way home on Friday night and traveled over the new bridge to work on Monday morning without ever experiencing a construction slow down or detour. The role that precast substructure units played in the process of this fast-track project was crucial. Ninety percent of the Mitchell Gulch Bridge was pre-cast, including substructure units, such as wing walls and abutments, as well as the more commonly known precast deck units.

The demand for fast-track projects is becoming greater as the benefits to the contract-ing agency and the public become readily apparent. Recently, the American Association of State Highway & Transportation Officials (AASHTO) spearheaded an initiative called, "Get In, Get Out, and Stay Out", which seeks to encourage quality construction practices that minimize the economical impact and safety risks associated with lengthy bridge closures. Precast substructure units align perfectly with the philosophy of building structures quickly while maintaining a high level of quality. They are expected to be the forerunner of many more projects that will aid the construction industry, transportation workers, and the public overall.

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**Innovation Illustration**  
**PreCast Substructure Units**



Before: This 49-year old bridge was rated as one of Colorado's ten worst. Precast Substructure Units were used in the construction of the new bridge.



Placement of Precast Substructure Elements

**Assembly of Precast Substructure Units**

