

ABC Project Highlights

Project Name: I-15 CORE; 200 South Bridge over I-15
Project #/PIN #: MP-I15-6(178)245 / 7037
Year Constructed: 2011
ABC Element(s): Precast Superstructure
Placement Method: Self Propelled Modular Transporters (SPMT)
Contracting Method: Design-Build

Project Description: The bridge is a two span steel plate girder structure with a lightweight concrete deck. Each span is 162 feet 6 inches, for a total length along the control line of 325 feet. The bridge crosses I-15 at a 49 degree skew and is 68'-10" wide. All supports are skewed at 49 degrees. The length of bridge from acute corner to acute corner is approximately 410 feet. The substructure is on piles and the abutments are integral. The bridge is constructed approximately 300 feet from the final location and moved into place using Self Propelled Modular Transporters (SPMTs).

200 South (Lindon) crosses I-15 at a very high skew and on a sharp vertical curve with the crown essentially at the center of the center bent. The approach slabs each have a grade of approximately 7.0%.

A two span steel plate girder option was chosen due its light weight and its ability to follow the profile grade line. The superstructure uses 6 girders at 12'-6" spacing with a 3'-2" overhang. The structure depth is approximately 5'-7" including a 10" deck. The girders use 70 ksi steel in the flanges over the bent and 50 ksi steel everywhere else. The framing plan uses staggered perpendicular cross frames up to near the bent. Near the bent the cross frames go to a continuous line across the bent with each line intersecting the girder at the column. The bent does not have a cap. Each girder sits directly on a 4' square column. The high skew and large girder spacing made the girder spacing along the bent approximately 19 feet. The elimination of the bent cap more than made up for the additional column(s). The bent is located between northbound and southbound traffic. UDOT has a design exception in place to allow the inside shoulders to be reduced to 9' around the columns. The girder/column connection uses an innovative interlocking sole plate and masonry plate detail which allows seismic loads to be transferred into the column while allowing girder rotation and transverse movements due to temperature effects. An oversized sole plate allows for setting tolerance during the bridge move. Each sole plate sits on a steel reinforced elastomeric bearing pad.

The foundations consist of 12" concrete filled pipe piles driven approximately 150 feet through soft clays and tipped in a medium, dense, silty, sand. The abutments are made integral after the move.

The superstructure was built on temporary foundations on the east side of I-15. The temporary substructure consists of H-pile supports framed together with relative bearing seat elevations matching the final bearing seat elevations.

Once the superstructure and substructure were complete the bridge was moved to its final location. The bridge was moved as a two span unit. Critical move issues are associated with the grade changes on I-15 and the vertical curve on 200 South.

Due to the steep vertical curve on 200 South combined with the high support skew the abutment bearing seat elevations vary up to 4'-9" (far more than the 1'-6" useable stroke on the SPMT units). The actual SPMT stroke is slightly over 2' but some of the stroke is used up in the lifting process and some is held back as a factor of safety. To get the bridge past the high corner, the bridge was moved in over the low corner on abutment 1 and in front of the high corner on abutment 3. The bridge was then moved directly along the control line to slot the bridge into place.

The length and width of the bridge combined with a normal 2% cross slope also requires some minor grade modifications during the move. During the move the bridge had to pull out into I-15 and rotate over the center median. Some minor temporary grading was required so the SPMT stroke is not exceeded during the rotation.

The SPMT system used a gravity connection to the bridge. Four lines of SPMT supports were used (two lines per span). Stability during the move was provided by large pipe braces. The pipe braces consisted of two K braces per span between the SPMT lines with a single diagonal brace between the K braces. The K braces were made of 36" and 24" tubes and the distance between SPMT lines was approximately 108 feet. Additional stability was also provided by the configuration of the SPMT hydraulic systems.

