



2006 - Graves Avenue over I-4

Description

Meta Fields

Project Summary : Self-propelled modular transporters (SPMTs) were used to remove and replace spans in nighttime closures.

Project Location : Graves Avenue over I-4 northeast of the city of Orlando in Central Florida

Mobility Impact Time :

- ABC - Graves Avenue: 8-month closure; Interstate 4: 4 partial-night closures
- Conventional - Graves Avenue: 12-month closure; Interstate 4: 32 nighttime closures

Impact Category : Tier 1 (within 1 day)

Dimensions : 286-ft-long and 59-ft-wide two-span full-width decked prestressed concrete beam bridge (143 ft $\times$ 143 ft); individual span roll-in; 1,300-ton self-weight per span

Average Daily Traffic At Time Of Construction : 67800

Traffic Management : extended use of 5-mile detour [Average Daily Traffic Count, 2006 - Graves Avenue: 21,100; Interstate 4: 67,800]

Existing Bridge Description : The existing two-lane four-span prestressed concrete beam bridge was 215 ft long and 30 ft wide. It consisted of four AASHTO Type III beams in each of its 37-ft-long end spans and five AASHTO Type III beams in each of its 70.5-ft-long middle spans. Built in 1958, it was replaced with a widened structure and to accommodate the widening of I-4 from four to six lanes.

Replacement Or New Bridge : The replacement bridge has two 12-ft-wide traffic lanes, and a 10-ft-wide shoulder and 5-ft-wide sidewalk on each side. The cross-section in each span consists of eight 78-in-deep Florida bulb-tee beams at 7.61 ft spacing with 8-inch-thick composite concrete deck. The substructure consists of conventional cast-in-place reinforced concrete abutments and piers with pretensioned concrete driven pile foundations. The superstructure was designed for conventional construction; minimal structural design changes were required to field change the use of SPMTs into the contract.

Construction Method : This project was the first use of SPMTs to move bridge spans that cross a US Interstate highway. The beams for the two replacement spans were pretensioned concrete beams fabricated offsite, shipped to the staging area a quarter mile from the bridge site, and erected on the temporary supports that were identical in relative elevation to the onsite pier configuration. The beams were designed as simple span for both dead load and live load. Intermediate diaphragms were added at midspan. The full-depth cast-in-place concrete deck was designed based on strip analysis and did not include post-tensioning. Because of the upward thrust due to beam rotation, additional longitudinal reinforcement was added across the interior support, as typically done in decks in Florida. Expansion joints were located at each span end of this bridge. Placement of the deck concrete was stopped 5 ft from each side of the interior support to facilitate installation of the spans; the closure pour provided a continuous deck with good rideability. Bridges in Florida are profiled, ground as needed, and transverse-grooved after the entire deck has been placed. *Removal of Existing Spans:* Before the middle span removals, the contractor removed the two end spans of the existing bridge using conventional means since they were outside the I-4 traffic lanes. SPMTs with 360-ton capacity were used to remove the two 250-ton middle spans over I-4. One six-axle SPMT unit was prepositioned in the median under one end of the existing span over I-4 East. On January 9, the outside lane of I-4 East was closed from 10 pm to midnight to position the second six-axle SPMT unit under the other end of the span. At midnight, a 20-minute rolling roadblock began. A cross-frame connecting the two SPMT units was attached and the span was lifted six inches off its supports. The span was then moved a quarter mile down I-4 East to the staging area. From lift-off to arrival at the adjacent site took less than half an hour. The process was repeated two nights later for removal of the existing span over I-4 West. Its removal required two rolling roadblocks. A rolling roadblock on I-4 West provided the time required for the SPMTs to lift the span off its supports, drive it slightly west on I-4 West, and then rotate 90 degrees and drive into the median. At that point a rolling roadblock on I-4 East began. The span was driven onto I-4 East, rotated 90 degrees, and driven down I-4 East to the staging area while I-4 West traffic was opened. Less than an hour was required from the start of the first rolling roadblock until the span arrived at its demolition site. *Installation Of Replacement Spans:* Concurrent construction of the substructures onsite and the superstructure at the staging area took place from January to June. The

