2010 â?? Ben Sawyer Swing Bridge

Description

Meta Fields

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Project Location :

SC 703 over the Intracoastal Waterway in Charleston

Mobility Impact Time : ABC: 12-day closure ; Conventional: 8-month total bridge closure
Impact Category : Tier 3 (within 2 weeks)
Dimensions : 1,154-ft-long and 36.5-ft-wide 13-span bridge (two 70 ft â?? 86 ft â?? 70 ft continuous approach units each end and 247-ft-long bolted steel through-truss swing span)
Average Daily Traffic At Time Of Construction : 14100
Traffic Management : Traffic management alternative, if constructed conventionally: 11.5-mile detour
Existing Bridge Description : Named after former SCDOT Chief Highway Commissioner / Executive Director (1926 to 1940), the historic two-lane bridge was built in 1945 to connect the towns of Sullivanâ??s Island and Mount Pleasant over the Atlantic Intracoastal Waterway. The swing-span truss and approach spans were deteriorated and required replacement.
Replacement Or New Bridge : The public requested that the new superstructure be similar in aesthetic appearance to the existing bridge and maintain the navigational channel clearances. Accordingly the new swing span is a 640-ton center-pivot modified Pratt through-truss with top and bottom chords at the same elevation as the existing truss, and with new electrical and mechanical systems. It matches the appearance of the original swing span except that the roadway was widened to accommodate two 14-ft-wide lanes instead of the existing 12-ft lanes, and one 5.5-ft-wide sidewalk on the harbor side instead of the two existing 2.5-ft-wide sidewalks. The 7-inch-thick Exodermicâ?¢ replacement deck consists of a 2.875-inch-thick steel grid with 4.125-inch-thick precast lightweight reinforced concrete composite topping. The cross-section of the approach spans consists of two 5.75-ft-deep steel plate girders spaced at 23 ft (with floor beams), with an 8-inch-thick lightweight concrete deck.
Construction Method : The new swing span was constructed offsite at the former Navy Base in North Charleston approximately two miles from the bridge site. The Exodermicâ?¢ deck panels were shop cambered to the specified roadway cross-slope crown. Approximately 7,000 sq ft of panels were placed on the truss prior to casting the concrete. The sidewalk is composed of aluminum deck panels, and the steel railing is similar in appearance to the old swing span. The six approach spans on each end of the swing span were built on temporary false work adjacent to the existing bridge on the south side while traffic was maintained. The approach spans were conventionally constructed with lightweight reinforced concrete decks on steel girders. The existing substructure was rehabilitated. Single-lane closures from 9 pm to 5 am were required prior to the 10-day bridge closure. 10-day Closure (this period was extended to 12 days):The Intracoastal Waterway was closed to marine traffic from February 7, 2010 to February 18, 2010. Its closure began just before the swing span was lifted from its temporary supports in North Charleston on barges and traveled under the Cooper River Bridge through the harbor to the bridge site. The bridge was closed, and the existing approach spans were transversely shifted onto temporary supports adjacent to the existing bridge piers. The six new approach spans on one end were simultaneously pulled 30 ft transversely along horizontal tracks onto the existing piers that had been retrofitted with seismic isolation bearings. The six new spans on the other end were then also pulled into position as a unit. Each approach was moved in approximately 24 hours using post-tensioning jacks with jack stroke limited to three inches each pull.The barges then brought the new swing span from its nearby holding location and lifted the existing swing span off its pivot pier. The barges then backed up, lowered the old span, rotated 180 degrees, moved back in, and lowered the new span into position. The old swing span was then barged back to the pier in North Charleston for demolition. The existing approach spans were demolished on their temporary supports adjacent to the new bridge.After the new bridge was on the original alignment, several days of additional work were required prior to opening the bridge, for example, grinding the deck for improved rideability, completing electrical and utility connections, and testing mechanical and electrical equipment on the swing span. No deck overlay was applied.The contract included an incentive of $2,500 per hour for completing the work under the total bridge closure time of less than 168 hours (seven days). A maximum payment of $120,000 (48 hours) was specified. However, damage to the

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