2011 – South Punaluu Stream Bridge

Description

Meta Fields
Specifications 0 Spec File : 1940
Abc Construction Equipment : Conventional
Miscellaneous Prefabricated : Grouted key closure joints
Prefabricated Bridge Elements : Adjacent T beams; MDcBc (Modular decked beam – Precast decked tub beam)
Contracting : Full lane closure; Value Engineering
Project Delivery : Design-bid-build
Longitude : -100
Latitude : 21.5816669
Nbi # : 3E+12
State Id # : 159
Construction Equipment : Conventional
Total Bridge Length Ft : 170
Max Span Length Ft : 66
Beam Material : Concrete
Spans : Three-span
Location : Rural
Owner : State
State : HI
Year Abc Built : 2011
Contract Plans : 1
Incentive Program : ARR Act (ARRA - American Recovery and Reinvestment Act) - 100%
Funding Source : Other
Costs : The engineer’s estimate for the project was $ 19.0 million. The low bid was $14.6 million ($4.4M = 23% lower than engineer’s estimate). There were three bidders. The cost per square foot of bridge was $760 based on FHWA guidelines for calculation of bridge construction unit cost.
Contacts : Paul T. Santo, P.E. Bridge Design Engineer Hawaii Department of Transportation paul.santo@hawaii.gov 808-692-7611
High Performance Material : (1) Glass fiber-reinforced polymer reinforcement in edge of trideck flange on each side of the bridge and at corner of abutment seats where concrete cover is less than desirable; (2) Stainless steel reinforcement in diaphragms of trideck system, precast tub member

Contact Us | Phone: (305) 348-0110 | Email: abc@fiu.edu | 10555 W. Flagler Street, EC 3680 Miami, FL 33174

supporting a waterline, and the aesthetic bridge railings; (3) Lightweight concrete (115-pcf; 56-day compressive strength of 4,500 psi) in precast concrete cover for the precast tub supporting a waterline
Construction Method : The precast tridecks and tub member were fabricated at a precast plant and shipped to the job site. The concrete for the tridecks was required to pass a total charge not exceeding 1000 coulombs at 90 days from casting as determined by AASHTO T277.The contractor assembled a temporary prefabricated steel truss bridge adjacent to the site. Traffic was shifted to the temporary bridge and the existing bridge was closed and demolished. Drilled shafts were constructed. Pier caps were cast over the drilled shafts, with top surface of the caps conforming to the roadway cross-slope. The lower strands in the caps were post-tensioned and the ducts grouted after the concrete reached adequate strength. Cranes were used to place the tridecks directly on the concrete seats cushioned by a layer of felt. The precast tub members supporting a waterline were designed to span between the abutments and piers. Keys between beams were filled with non-shrink grout. Tridecks were connected to each other with weld ties spaced at 5 ft spacing. The deck was cast over the tridecks and into the reinforced closure joints over the piers and abutments. The upper strands in the pier caps were then post-tensioned and the ducts grouted. The deck was textured longitudinally by mechanical grooving, and the aesthetic concrete traffic railing was constructed. No deck overlay or sealant was applied. Traffic was switched to the replacement bridge, and the temporary bridge was removed. The contract time for completion of all contract items was 500 working days from Notice to Proceed. It did not include incentives / disincentives. The bridge was opened to traffic in about 24 calendar months and contract items were completed in about 32 calendar months after Notice to Proceed. Actual approved extension of time was not available.
Replacement Or New Bridge : The replacement bridge was designed for current loads and seismic standards. It has two 12-ft-wide traffic lanes, two 8-ft-wide shoulders, and a shielded walk/bikeway. The cross-section consists of ten 5-ft-wide 25-inch-deep 9,000 psi precast prestressed concrete triple-tee beams called “tridecks,” with a minimum 6.5-inch-thick cast-in-place concrete topping that increases in thickness to conform to the roadway cross slope. A precast decked tub member spanning between the abutments and piers supported a waterline. Each substructure consists of cast-in-place post-tensioned concrete caps that are supported by two 5-ft-diameter drilled shafts. This structural system replaced the original bid documents that showed precast prestressed concrete AASHTO girders through a value engineering proposal by the construction contractor. This proposal also reconfigured the placement of drilled shafts to facilitate their installation to avoid relocation of overhead power lines. See the “High Performance Materials” section below for high performance materials used in the bridge.
Existing Bridge Description : The existing two-lane seven-span continuous concrete slab bridge was 126 ft long and 26 ft wide. The substructure consisted of concrete pier caps on concrete socket piles connected to timber piles. Built in 1926, the bridge was structurally deficient and functionally obsolete and required replacement.
Traffic Management : Traffic management alternative, if constructed conventionally: extended use of detour across adjacent temporary bridge
Average Daily Traffic At Time Of Construction : 10060
Dimensions : 170-ft-long and 50-ft-wide three-span precast prestressed “trideck” adjacent T beam bridge (51 ft – 66 ft – 53 ft)
Primary Drivers : • minimized environmental impacts – deck topping did not require shoring or falsework in the streambed • reduced traffic impacts • reduced onsite construction time – precast planks were fabricated during pier construction
Impact Category : Tier 6 (longer but reduced by months/years)
Mobility Impact Time : ABC: 24 months ; Conventional: estimated 27 months

Contact Us | Phone: (305) 348-0110 | Email: abc@fiu.edu | 10555 W. Flagler Street, EC 3680 Miami, FL 33174

Project Location :

Route 83 (Kamehameha Highway) near the Punaluu Beach Park in eastern Oahu

Contact Us | Phone: (305) 348-0110 | Email: abc@fiu.edu | 10555 W. Flagler Street, EC 3680 Miami, FL 33174