



2011 - South Punaluu Stream Bridge

Description

Meta Fields

Project Summary : Replacement bridge consists of precast prestressed concrete adjacent T beams (triple-tee beams called "tridecks").

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

Mobility Impact Time :

- ABC: 24 months
- Conventional: estimated 27 months

Impact Category : Tier 6 (longer but reduced by months/years)

Dimensions : 170-ft-long and 50-ft-wide three-span precast prestressed "trideck" adjacent T beam bridge (51 ft x 66 ft x 53 ft)

Average Daily Traffic At Time Of Construction : 10060

Traffic Management : extended use of detour across adjacent temporary 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.

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.

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.

High Performance Material :

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- Page 4
- 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
 - Stainless steel reinforcement in diaphragms of trideck system, precast tub member supporting a

