



2017 – Sacramento Wash Crossing at Oatman Highway (Historic Route 66)

Description

Meta Fields

Other Related Url 0 Other Related Link :

https://www.fhwa.dot.gov/innovation/grants/projects/az_mohave15.cfm

Construction Schedule 0 Construction Schedule File : 2258

Specifications 0 Spec File : 2485

Abc Construction Equipment : Caterpillar 623 Scrapers (two), Caterpillar 966 Loader (one), Caterpillar 140H Motor Grader (two), 40-ton Rock Truck (two), 450-ton Hydraulic Crane (one), 550-ton Hydraulic Crane (one) high-capacity crane(s)

Miscellaneous Prefabricated : Precast approach slabs, High-strength CIP reinforced closure joints

Prefabricated Bridge Elements : MDcBs (Modular concrete-Decked steel Beams), Precast abutment caps, Precast backwalls

Contracting : Incentive / Discentive Clause

Project Delivery : Design-Bid-Build

Site Procurement : Programmatic Agreement

Longitude : -114.477592

Latitude : 34.7268715

Nbi # : 11502

State Id # : 49

Construction Equipment : Other ABC Method

Total Bridge Length Ft : 113.83

Max Span Length Ft : 112

Beam Material : Steel

Spans : One-span

Location : Rural

Owner : County

State : AZ

Year Abc Built : 2017

Other Related Url : 1

Construction Schedule : 1

Contract Plans : 3

Additional Information : [ABC-UTC August 2017 Monthly Webinar](#)

Incentive Program : AID Demonstration (\$1 million)

Funding Source : Local

Costs : Pulice Construction, Inc., of Phoenix won the Project at \$1,870,822.10, an amount 4.4% less than ADOT estimate. Pulice earned incentive payment totaling \$95,000 for meeting the contract maximum duration for full road closure. The Project was funded through a FHWA awarded \$1 million Accelerated Innovation Deployment discretionary grant and Mohave County.

Contacts : **Owner:** Steven Latoski, P.E., PTOE Director Mohave County Public Works steven.latoski@mohavecounty.us 928-757-0910 **Designer:** Kimley-Horn Dave Leistiko, P.E. Bridge Design Engineer of Record dave.leistiko@kimley-horn.com 602-906-1124 Kimley-Horn Kevin Kimm, P.E. Bridge Design Lead kevin.kimm@kimley-horn.com 602-216-1202 Kimley-Horn Raj Christian, P.E. Project Manager raj.christian@kimley-horn.com 602-371-4560 **Contractor:** Pulice Construction, Inc. Reece Green Project Manager rgreen@pulice.com 602-944-2241 **Plate Girder Manufacturing:** Schuff Steel Dave Lewis Project Manager dave.lewis@schuff.com 602-251-0314 **Drilled Shaft Foundations:** Case Foundation Joe Jannuzzi Project Manager jajanuzzi@casefoundation.com 602-357-1300 **Reinforcing:** Paradise Rebar Joel Raschke Owner joelr@paradiserebar.com 602-447-0839 **Asphalt Paving:** Pave Co. Steve Combs President steve@pavecoaz.com 602-288-8273 **Submitter:** Steven Latoski P.E., PTOE Director Mohave County Public Works steven.latoski@mohavecounty.us 928-757-0910

Stakeholder Feedback : Intense collaboration and stellar performance by FHWA, ADOT, Mohave County, Kimley-Horn and Associates, Inc., and Pulice Construction, Inc. under accelerated, challenging, and unique design and construction circumstances produced a successful Project. Cognizant on importance to exchange and document Project successes, the aforementioned stakeholders convened within a week of Project completion to review their collective approach and contribution to the Project development process. Takeaways from this important debrief and observations through the Project period of performance give a dozen important and transferable recommendations to future ABC, Accelerated Road Construction, and Prefabricated Bridge Elements and Systems (PBES) technology applications. These recommendations include:

- 1) Consider public agency pre-construction supply contracts (e.g., indefinite delivery indefinite quantity or similar) for critical construction materials, rental equipment, and supporting services that project construction contractors may use to expedite resource delivery and/or access to resources under unforeseen events.
- 2) Develop alternative details and/or specifications for PBES connections during ABC site work to enable maximum construction flexibility without quality sacrifice.
- 3) Incorporate constructability through design process to avoid, where practical, materials and methods demanding extensive handwork versus equipment placement during ABC site work.
- 4) Identify and evaluate suitability of onsite materials for project earthwork for purpose of expediting ABC site work.
- 5) Develop construction implementation (award to Notice to Proceed) schedule on basis of longest lead construction material, such as steel, required in early project critical path work.
- 6) Assess optional cast-in-place construction method for all PBES designated bridge elements for purpose of meeting quality and time specifications under ABC site work.
- 7) Plan alternate ingress and egress routes for accessing resource staging areas supporting ABC

site work.

8) Provide redundant construction material staging for ABC site work where weather or other unplanned hazards may sever access to staging areas.

9) Evaluate/test all materials and equipment essential to PBES placement and/or ABC site work for function as per specifications and expectations.

10) Assure suppliers local to the project site maintain capability to deliver construction materials, rental equipment, and services meeting applicable project specifications and contractor requirements during time-critical ABC site work.

11) Identify practical unplanned threats to project site and staging areas and maintain protections and contingency plans to reduce likelihood or expedite mitigation of threat.

12) Perform dry run of ABC site work sequences.

Construction Method : The drilled shafts to support the abutments were placed outside of the existing roadway limits prior to the full closure of the roadway. Cast-in-place cantilever retaining walls to retain the required roadway approach embankment were also constructed outside of the existing roadway limits prior to the full closure of the roadway. The footings on the retaining walls were reduced by using a geogrid reinforced backfill. The precast abutment caps, backwalls, approach slabs and modular decked beams were cast in one of the Contractor's project yards in Phoenix and trucked to the project site. All prefabricated pieces were delivered to a staging area near the Project site a week prior to the roadway closure. Roadway approach embankment was staged on either side of the wash prior to the roadway closure to expedite its placement within the 96-hour roadway closure window. Upon full closure of the roadway, the Contractor set the precast abutment caps and grouted them in place. While the grout for the abutment caps cured, the Contractor placed the required riprap at the face of the abutments. After a 10-hour cure on the grout, the Contractor began setting the modular decked beams and forming the closure pours. The precast abutment backwalls were erected after all the modular decked beams were in place. Within 24 hours, all prefabricated bridge elements were in place. The Contractor then continued placement of the roadway approach embankment to build up the 10-foot grade change required, including placement of the geogrid reinforced backfill at the abutments. Approximately 36 hours after the full roadway closure, the deck closure pours were placed. Approximately 54 hours after the full roadway closure, the roadway embankment was placed and the precast bridge approach slabs were placed. Paving and striping of the roadway commenced, and the roadway was reopened 87 hours after initial closure. The planned closure based on the Project contract requirements was 96 hours. Incentives and disincentives were included in the contract, and by finishing early, the Contractor was able to receive the full incentive for the Project. Bridge barriers consisted of cast-in-place, F-shape barrier that was placed behind temporary concrete barrier after opening of the roadway. With conventional construction methods, it is estimated the bridge and approach roadways would have required a 3-month full closure for construction. The Project contract included a Schedule of Incentive /Disincentive clause including corresponding completion timeframes.

Completion Timeframe	Incentive Payment	Disincentive *
0 hours to 94 hours	\$95,000	None
94 hours, 1 min to 96 hours	\$90,000	None

96 hours, 1 min to 100 hours	None	None
100 hours, 1 min to 104 hours	None	\$3,300
104 hours, 1 min to 108 hours	None	\$3,300
Every 4-hr period up to 192 hrs	None	\$3,300 x No. of 4-hr periods
192 hrs, 1 min and longer	None	None

*Deduction of from more than up to monies due

For each full or partial four-hour period after 100 hours that the work associated with the 96-hour roadway closure period is not completed and both lanes of the highway are not opened to traffic, a liquidated damage of \$3,300 would be deducted from monies due or becoming due to the Contractor up to a maximum cap of \$75,900 for completion at 192 hours (8 days). No additional disincentives would be deducted from monies due or becoming due to the contractor for completion after 192 hours, 1 minute.

Replacement Or New Bridge : The new bridge has two 12-foot wide traffic lanes and two 6-foot wide shoulders. The cross-section consists of four modular decked beam units. Each 7.83-foot wide prefabricated unit consists of two 3.5-foot deep steel plate girders cast with an 8.5-inch thick concrete deck. The modular decked beam units are supported on precast abutment caps. The precast abutment caps are supported on 5-foot diameter drilled shafts. Additional prefabricated elements consist of precast abutment backwalls and precast approach slabs. Concrete barriers were cast-in-place after the modular decked beam units were set. Closure pours utilized a high-strength concrete mix.

Existing Bridge Description : The Project represents new bridge construction. Existing conditions entail Oatman Highway crossing Sacramento Wash, a dry bed of an intermittent stream, at-grade.

Traffic Management : Conventional project construction would have required an 11-week full closure of Oatman Highway given the road's two-lane configuration and Project's 100-foot right-of-way bisecting the Havasu National Wildlife Refuge, an environmentally sensitive area. Closure in an area flanked by the Colorado River and absent of intersecting local roads demands 24-mile detour. User cost in context of vehicle operation and travel time value is estimated at \$25 per vehicle, and with Oatman Highway serving 1,350 vehicles per day, conventional construction would entail approximately \$2.6 million in road user cost.

Average Daily Traffic At Time Of Construction : 1350

Dimensions : 113.83-ft-long and 38.83-ft-wide single-span modular decked beam bridge; 0 degree skew

Primary Drivers : Reduced traffic impacts, reduced onsite construction time, improved work-zone safety, improved site constructability, minimized environmental impacts, maintain essential services. Project team members worked together throughout the process to minimize potential risks during the closure. The design and construction teams were in constant communication during the bridge construction at its temporary location in Phoenix. Completing the fabrication and temporary assembly in Phoenix, AZ provided many benefits including:

- Both the design and construction firms are based in Phoenix which provided all necessary resources without the added expense of working out of town.
- Engineers and inspectors regularly visited the temporary site and were quickly able to resolve any issues that arose during fabrication. Dry fitting the bridge in a controlled environment helped to mitigate potential risks of final assembly.

- Fabricating and assembling the bridge at its temporary location was a dress rehearsal for the 96-hour closure window.

The Team was also able to overcome the challenges of working in a rural environment by enlisting subcontractors and suppliers that had a presence in the area or could easily mobilize to the site. These firms have a proven history of meeting project schedules and achieving high quality results. The Contractor's 60-year history in Arizona helped to secure the best firms. Additionally, the Contractor was able to identify and subsequently contract with local firms that were vital to the success of a remote project. The material suppliers were brought on board at an early stage and worked with both the design and construction team to develop concrete mix designs that would achieve the rapid set time necessary yet could be workable with over a one-hour travel time. The work area was constrained by environmentally sensitive areas on both sides of the new bridge location, thus greatly limiting the work area. This factor was thoroughly analyzed in the planning stages. A nearby abandoned Arizona DOT port-of-entry was used to stage the bridge components to maximize the available working area, and the Contractor only brought components in as needed in the sequencing of construction. The bridge construction and roadway work needed to occur simultaneously to meet the schedule. Two earthmoving equipment and personnel spreads were used to eliminate the equipment needing to continually pass through the bridge construction site. This allowed more working area for the structures crews and cranes and accelerated the roadway construction. Also, eliminating the earthmoving equipment transversing the structures area which had numerous carpenters working around the clock helped to minimize safety risks.

Impact Category : Tier 2 (within 3 days)

Mobility Impact Time : ABC closure of 87 hours vs. 3-month full closure for conventional construction. Project construction cost was wholly returned in benefit realized through user cost savings in vehicle operation and personal time attributed to 24-mile detour avoidance. At \$33+ thousand daily, the application of an ABC method using PBES reduced potential user costs under traditional bridge construction from \$2.6 million to \$135K (95% reduction) through the applied Every Day Counts innovations. Mohave County and ADOT carried out a post-construction survey of property owners in the nearest Census Designated Places to the Project site: Golden Shores, Arizona and Topock, Arizona. ADOT mailed surveys in May 2017 to 1,502 property owners, and the County received 146 survey responses marking 9.7% response rate. The survey found majority user satisfaction with the Project's overall impact to traffic and Project overall results. Of particular note, 56 percent of respondents answered "yes" to the question "If Accelerated Bridge Construction costs more, would you support your tax dollars being allocated to implement it on future projects?"

Project Location : Oatman Highway approximately 1 mile north of Interstate 40 Exit 1 in the Topock area.

Project Summary : Mohave County, Arizona – the fifth-largest county by area at 13,311 square miles in the contiguous United States – maintains 48 miles of Historic Route 66 (a.k.a. "Oatman Highway") comprising part of the longest contiguous section of Route 66 operating today. Its westernmost section approaching California crosses the Sacramento Wash point of discharge into the Colorado River, draining watersheds across 1,300-plus square miles. Summer monsoon conditions have proven the 90-year Oatman Highway's inadequacies as a low-water dry wash crossing at Sacramento Wash, a crossing crucial to commuter and tourist traffic. Storm-driven closures have precipitated numerous swift-water rescues and underscore corridor operational and reliability challenges due to a 24-mile detour as Oatman Highway provides the lone connection along the only highway paralleling the Colorado River and bisecting Mohave County's proverbial west coast. The County's need for an all-weather crossing at Sacramento Wash coupled with its array of traffic, environmental, site and area characteristics precipitates perhaps the most dynamic demand for ABC technologies including

Prefabricated Bridge Elements (PBE) to which the County secured a merit-based \$1 million Federal Highway Administration (FHWA) Accelerated Innovative Deployment grant award toward applying ABC solutions promoted through the FHWA Every Day Counts Program. The resulting \$2.96 million Oatman Highway Bridge Project – the first ABC project for Mohave County – delivered through stellar partnership with Arizona Department of Transportation and FHWA yielded numerous successes central to ABC and PBE benefits answering Project demands. These include (1) user cost savings at \$33+ thousand daily in context of 4-day (87-hour actual) maximum hard closure versus 11-week traditional Project construction – an aggregate benefit value exceeding Project construction cost, (2) contractor convenience and labor efficiencies in fabricating the bridge superstructure outside of the Project’s rural locale, and (3) largely controlled environment in Project prosecution that reduced weather impact, bettered work zone safety and duration thereof and collectively made more effective use of work time, thus improving safety, quality, convenience, and cost.