

## ABC TECHNIQUES ON THE GARNET INTERCHANGE PROJECT

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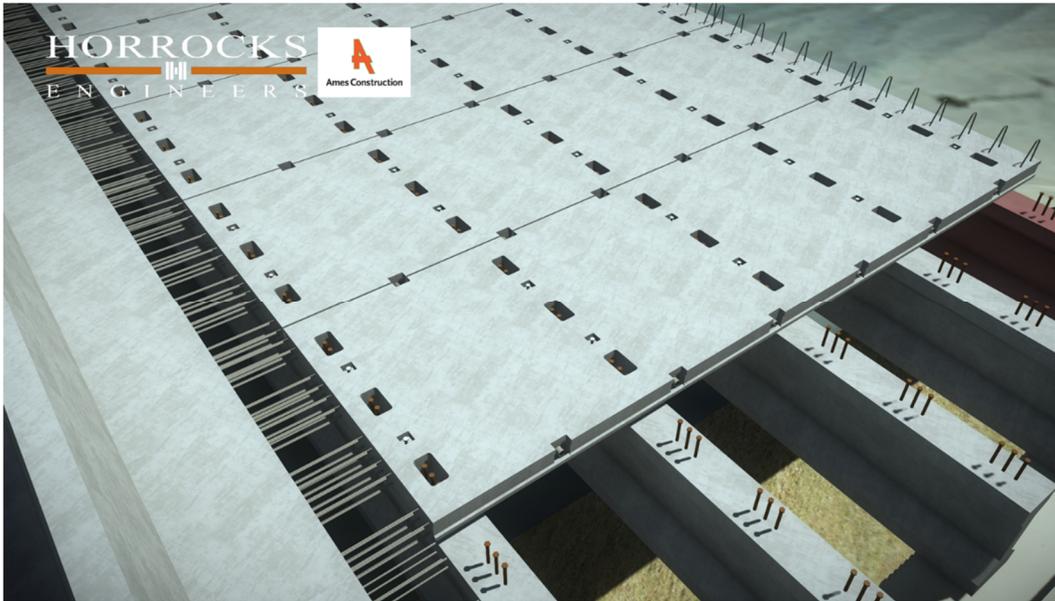
The Design-Build team of Ames Construction and Horrocks Engineers was selected by the Nevada Department of Transportation to redesign and reconstruct the I-15 Garnet Interchange and provide improvements to the US-93 corridor in Clark County, Nevada. The Design-Build team opted to utilize Accelerated Bridge Construction (ABC) techniques to meet the goals of the project through the Alternative Technical Concept (ATC) process. ABC elements at two different bridges including full depth precast concrete deck panels and precast/prestressed voided slabs were selected by the Design-Builder as the Best-Value approach.

The project included: reconstruction of the I-15 on and off-ramps to provide adequate acceleration, deceleration, and storage length for turning and merging traffic; replacement of the existing I-15 bridges to provide adequate span length to accommodate crossing roadways and adequate width for future widening of I-15 to three lanes in each direction; US-93 and frontage road intersection modifications to provide access and satisfactory traffic operation in conjunction with the adjacent Garnet Interchange; US-93 widening from 2 lanes to 4 lanes, with future widening to 6 lanes from MP 52 (Garnet Interchange) to approximately MP 57 (5 to 6 miles to the northwest), including widening of shoulders and pavement rehabilitation of the existing pavement; US-93 intersections improvements at US-93/Apex Great Basin Way and US-93/Apex Power Parkway to accommodate future economic growth in the area; US-93/Grand Valley Parkway access improvements at the US-93/Grand Valley Parkway intersection to accommodate high-volume turning traffic including a grade separated interchange bridge for southbound US-93; and a frontage road to provide a minimum of two general-purpose travel lanes to provide access to properties adjacent to US-93.



As construction of the new I-15 interchange was the critical path of the project and to reduce traffic impacts to the traveling public, full depth precast deck panels were utilized as an ABC technique resulting in significant schedule savings. Construction duration for the deck was significantly reduced as construction activities for formwork and rebar placement were eliminated. Utilizing precast deck panels reduced the number of closures to US-93 below to construct the bridge.

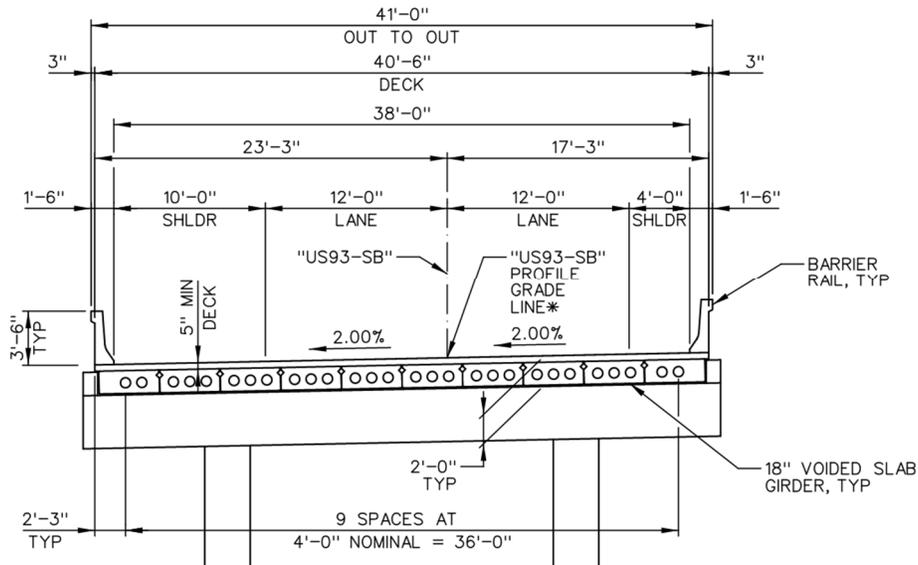
Precast deck panels were also used at the approach slabs providing a consistent deck panel layout the full length of the bridge. Phased bridge construction and demolition were required to maintain two lanes of traffic during the entire duration of the project.



ABC techniques helped the Design-Build team achieve the project goals by aiding in the following:

- New abutments were built underneath existing structures and were protected during demolition. The entire substructure was constructed in a single phase resulting in schedule savings and reduced impacts to adjacent US-93. With foundations in place, the second phase of bridge construction took half the time as the first phase.
- The traffic shift of I-15 was minimized increasing safety for the traveling public and construction staff. No temporary detours, shoofly's, or overbuild of the structure were required to maintain I-15 traffic throughout construction.
- Clearance envelope of US 93 under I-15 was not reduced at any point during construction.
- Due to use of ABC components only short duration off-peak closures of US 93 were required during girder and deck panel placement. Deck panels reduced closure time associated with traditional CIP deck construction and reduced US-93 traffic allowing Republic Services to continue their adjacent 24/7 garbage services without detours.
- Engineer, contractor, and fabricator worked together to develop the details in the plans which established clearances and tolerances for construction.
- One lesson learned on this project was to work directly with grout providers to establish the proper material, prep and placement to address environmental conditions of the project site. Grout placement took place in the summer which led to extreme temperatures in the deck panels and shrinkage issues during the grouting process while following typical grouting practices.
- Overall construction only took 9 months to complete due to Accelerated Bridge Construction techniques saving 6 months of schedule.

Another ABC technique was utilized at the US 93/Grand Valley Parkway bridge consisting of a precast/prestressed voided slab superstructure, which eliminated the need for deck forming and significantly reduced the structure depth resulting in significant cost and schedule savings to the project. Construction duration for the deck was significantly reduced since the need to place deck formwork was eliminated. In addition, only one mat of reinforcing steel was required in the deck reducing the time needed for rebar placement by half.



Utilizing the shallow 2-foot structure depth resulted in shorter retaining walls, and less embankment for an overall net-zero project earthwork balance. The use of voided slabs also eliminated the need for deck forming. For long-term durability, a 5" cast-in-place concrete topping was used in addition to transverse post-tensioning and longitudinal shear keys.

The use of Accelerated Bridge Construction (ABC) techniques allowed the Design-Build team to meet the goals of the project through the speed and constructability benefits of ABC. A collaborative commitment between the Design-Builder, fabricator and owner was achieved on this project allowing the team to deliver a fast-paced and complex project with ABC solutions.