

# Easing Congestion on Superstition Freeway

US 60 Superstition Freeway required the reconstruction of five traffic interchanges to reduce growing traffic congestion in the Phoenix metropolitan area.

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The Southeast Valley of the Phoenix metropolitan area has experienced explosive growth over the past two decades. The backbone of the area's highway system, US 60 Superstition Freeway, was becoming choked with traffic. The north-south arterial interchanges were also badly congested, causing long delays and increasing the frequency of traffic accidents.

In the fall 2000, the Arizona Department of Transportation (ADOT) retained URS Corporation ([www.urscorp.com](http://www.urscorp.com)) to design the reconstruction of five traffic interchanges—Rural Road, McClintock Drive, Dobson Road, Alma School Road,

and Mesa Drive—to increase their capacity. The project combined widening existing bridges with building new stand-alone pedestrian bridges to replace existing sidewalks.

Before reconstruction, each bridge deck provided two through lanes and one left-turn lane in each direction. Due to increasing traffic volumes and congestion, particularly during morning and late afternoon rush hours, additional left-turn lanes were needed on all of the bridge decks, and one added through lane in each direction was required on the Mesa Drive bridge.

At all locations except Mesa Drive,

the additional left-turn lanes were provided by removing one or both of the sidewalks from the existing decks and reconfiguring the decks to allow traffic to use the former sidewalk areas. The sidewalks were replaced by building new stand-alone pedestrian bridges adjacent to the existing highway bridges. At Mesa Drive, the existing deck was widened about 22 ft on each side to provide one additional through lane, one additional left-turn lane, and one new sidewalk in each direction.

Approach roadways at each location were also widened by moving one or both sidewalks outward and reconstructing the pavement areas to match



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the geometry of the new bridge deck. The crossroad widening with associated drainage and reconstruction of utilities extended approximately 1,200 ft from US 60 in each direction.

## Challenges

The principal challenges were:

- Sustaining traffic flow on both the crossroads and US 60 and maintaining access to homes and businesses during construction.
- Staging construction around numerous overhead and underground utilities including 69kV overhead electric lines, fiberoptic CATV and telephone lines, a major irrigation siphon, and numerous other smaller utilities.
- Coordinating construction with a separate design/build contract that widened US 60 concurrently with the traffic interchange improvements.

The new pedestrian bridges and the Mesa Drive widening were built over live traffic on US 60. While short-duration (overnight and weekend) closures were permitted, most of the construction took place during periods with a substantial volume of traffic. Also, the construction took place at the same time as the widening of US 60 under a major design-build contract. Substantial coordination between the two contractors was required to ensure both projects proceeded on schedule and the negative impacts of construction activities on local and free-way traffic were minimized.

## Pedestrian Bridges

The design team developed a unique precast segmental bridge design that could be erected in one weekend's closure of US 60. Each segment consisted of a trapezoidal box girder, which was precast and prestressed offsite. The segments consisted of: a 40-ft, haunched, double-cantilever pier segment post-tensioned to a single-column pier; one haunched, 20-ft abutment segment at each abutment; and two non-haunched, 78-ft drop-in segments spanning US 60.

After erection, the five superstructure segments were post-tensioned together to form a continuous two-span superstruc-

ture. The pedestrian bridges were designed with aesthetics in mind to blend with the other crossroad bridges and provide a pleasing appearance for the hundreds of thousands of motorists who pass under the structures daily. In particular, the trapezoidal sections and haunches were proportioned to complement the appearance of the adjacent cast-in-place box girder bridges with structure depths that vary from a minimum of three ft to a maximum of four ft. The result is a slender and elegant appearance, enhanced by sloped abutment faces and tapered pier columns.

The precast subcontractor, Royden Construction Company, elected to fabricate one-of-a-kind steel forms specifically for this project. The steel forms provided smooth concrete surfaces that were painted to match the other structures in the corridor.

In addition to the structural aesthetic elements, decorative fencing was added to the Dobson Road pedestrian bridges under an intergovernmental agreement between ADOT and the City of Mesa. The enhanced fencing is a gateway feature marking the boundary between Tempe and Mesa.

In all, five new pedestrian bridges were designed and built using the same forms for precast superstructure segments. These superstructures are the first of their kind in Arizona and represent a unique application of segmental concrete construction.

## Mesa Drive Widening

The design team selected precast-prestressed box girders for the widened portions of the superstructure. The use of box girders offered many benefits including: It eliminated the need to form and strip formwork for the bridge deck; it minimized the structure depth and provided the same vertical clearance as the existing




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post-tensioned box girder bridge; it provided a similar appearance to the existing bridge; and it could be erected with a single weekend closure of US 60.

The box beam superstructure featured a monolithic closure at the pier that was post-tensioned through the pier cap to form a continuous two-span structure before casting the continuous deck surface. The integral abutments of the existing bridge were designed to allow expansion and contraction below grade. These were extended with conventional seat-type expansion abutments in the widened areas, using an innovative post-erection grouting system to minimize differential deflections between the new and existing portions of the bridge.

Y-type piers were selected to harmonize with the appearance of the existing Y-piers, and abutments were sloped outward at the top to blend with the sloped abutments of the existing bridge. Together, the aesthetic components achieve a unity that offers little indication to the casual observer that the bridge has been widened.

The completion of the project resulted in five widened interchanges over US 60, including six new pedestrian bridges and one widened bridge. The project has resulted in shorter queues for left turns, reduced traffic delays, a safer road system, and a visually pleasing US 60 Corridor. 

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