CONCRETE SEGMENTAL BRIDGES FOR THE ALBUQUERQUE "BIG I" (OWNER'S PERSPECTIVE)

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ABSTRACT

The Big I construction project was the largest transportation project ever constructed in New Mexico. Precast concrete segmental bridges were constructed for the curved "fly-over" ramp bridges in the Albuquerque "Big I" interchange. The precast segmental bridges are the first of this type built in New Mexico. A total of eight (8) precast segmental bridges were built at the junction of I-25 and I-40.

Photo 1 "Big I"

INTRODUCTION

The "Big I" interstate-to-interstate interchange in Albuquerque is located at the junction of I-40 & I-25. It is the busiest interchange in New Mexico with an ADT of approximately 300,000 vehicles per day. The project upgraded the "Big I" interchange to 5 levels, added frontage roads parallel to the main lines and upgraded the four mainline legs for some distance each side of the interchange. The design was completed in about 18 months. The

schedule called for 24 months of interstate traffic disruption. Traffic disruptions began in June of 2000. The project was completed in May of 2002 or approximately 1 month ahead of schedule. There are a total of fifty-five (55) bridges within this project of which eight (8) are "fly-over" bridges. These "fly-over" bridges support both one and two lane curved elevated ramps. Approximately 320,000 square feet or 7.4 acres of bridge deck is required for these segmental "fly-over" ramp bridges.

The segmental bridge-casting yard was set up adjacent to the site. The first segment was cast around June 1st, 2000. The first segment was erected in August 2000. In October of 2001 the final segment was erected on the last bridge: the west to north "fly-over". All concrete segmental bridges were constructed using the balanced cantilever method of erection. The traffic impacts from the "fly-over" bridge construction required minimal shoring during construction. As a result, this project progressed very rapidly and was quite exciting to watch.

The "Big I" project bids were due on January 27, 2000. Five bids were received with the low bid of $221,847,235.40 from Twin Mountain Construction Co., a Kiewit Construction affiliate. The segmental concrete bridges bid near $83 per sq. foot. The contractor was told to proceed in mid February 2000. The project progressed at a record pace.

The eight (8) segmental "fly-over" bridges range in overall length from 600 feet to 2500 feet with a maximum span of roughly 200 feet. The segments are all single cell constant depth segments. All joints are match-cast and erected with epoxy in the joints between the concrete segments. Two standard segment shapes are being used, one for the single lane bridges and one for the double lane bridges. The segments were designed to have a maximum weigh of 60 tons, but were changed to 85 tons upon request of the contractor. 663 concrete segments were cast from June 2000 through July 2001. Segment erection began in August 2000. The segments were erected through October 2001.

The segmental casting yard had 5 casting beds, 3 double-lane casting beds (2 for the regular segments and 1 for the pier segments) and 2 single lane-casting beds (1 for the regular segments and 1 for the pier segments). The casting yard was located adjacent to the "Big I" project site. Normally 3 segments were cast per day; however there were days when 5 segments were cast.

The "Big I" project progressed very quickly. The segmental bridgework was on an extremely rapid schedule. Each segmental bridge pier is a single cast-in-place column supported on a large single drilled shaft foundation that allowed for rapid construction of the substructure. The segmental bridge superstructure design kept the segments very uniform. Uniformity and "straight forward" design details have allowed the contractor to move the segmental portion of the project work along very quickly. The owner provided a site, which allowed the casting yard to be set up immediately. The short four span, east to north ramp, had all segments erected in 8 calendar days. Some of the various permitting work was done during the design phase of the project, which has allowed the contractor to get to work without delays. The designer, owner and contractor worked very closely together.

The contractor requested changes to the segmental bridge superstructure. These changes were mostly due to the contractor having equipment that would lift 85-ton segments instead of the 60-ton segments in the plans. A good working relationship of all parties have allowed many of these requests to be incorporated into the project. The main players that allowed changes to be incorporated into the project were URS Corporation, Twin Mountain Construction Company, Finley McNary Engineers, Inc., the Federal Highway Administration and the New Mexico State Highway & Transportation Department. Working together, with the goal to get these segmental bridges built in a short time frame, has worked well as all involved parties have remained focused yet flexible.

Precast concrete segmental & steel plate girder bridge options were considered in the 1998 type study for the "fly-over" ramps. With the need to build the bridges over traffic, these two bridge type options best fit the "Big I" project needs. Precast concrete segmental bridges were chosen for the ramp bridges on this project. Costs of the two bridge type options were almost identical. The reasons that concrete segmental bridges were chosen over steel plate girder bridges follow:

1. More New Mexico labor was utilized with the precast segmental option than the steel option. New Mexico has no local steel fabricating shops capable of fabricating steel girders for bridges on this project.
2. The precast segmental ramp bridges were determined to be more aesthetically pleasing than the steel girder ramp bridges.
3. The construction quality control of the concrete segments was performed locally.
4. The schedule for fabricated item deliveries was better controlled with the precast segmental option. The scheduling problems associated with manufacturing, delivery and fabrication of steel were eliminated with the precast segmental option.
5. The precast segmental bridges were constructed in a relative short time. The use of the balanced cantilever construction method proved to be very quick.
6. An integral wearing surface was incorporated within the precast segments, which will allow for future bridge maintenance activities.

Photo 2 "Big I"

CONCLUSIONS

Precast concrete segmental "fly-over" ramp bridges will serve New Mexico well for many years to come. Everyone is quite excited with the new precast segmental bridges in Albuquerque, New Mexico. The decision to build precast segmental concrete bridges for the "fly-over" ramps on the "Big I" project was the right choice.