Lessons Learned

Parkview Avenue Bridge over US 131

Pier Construction

During placement of pier caps, to align reinforcement with the corrugated ducts in the pier cap to establish the connection, a construction worker had to stay in a bucket truck more than 20 ft in the air (Figure 1a).

Pier erection is an issue with grouted post-tensioned ducts or sleeves. Caps than span a maximum of three columns can reduce the likelihood of alignment issues. Wide bridges can be designed with two cap pieces and an expansion joint. If necessary, the caps can be connected with a cast-in-place closure pour. The caps can be designed to work without the closure pour for dead load, thereby allowing erection of the superstructure prior to placement and curing of the joint.

Deck Construction

All 48 full-depth deck panels were placed over the beams in four days. Post-tensioning duct misalignments were observed after placing all the panels and aligning the shear pockets in the panels with the shear stud locations on the beams (Figure 1b). After evaluating several alternatives, the 48 panels were re-cast; the re-casting resulted in a two-month delay. When the new panels were placed on the girders, about 20 percent of the shear studs did not align because of girder geometric tolerances. This necessitated drilling new holes on the girder top flange. In addition, ad hoc changes to the original design details at the abutment that were made during construction may compromise durability of the structural system.

It is important to specify and enforce tolerances. Welding shear studs onto plates embedded in the girders after deck erection can eliminate shear stud misalignment issues. The post-tensioning alignment is a specification issue, requiring specification of a tight tolerance measured from a common working point. Also, 2-inch-diameter round ducts have more forgiveness since they can accommodate more than the typical four strands per duct.

1(a) Pier cap placement

1(b) Post-tension duct misalignment

Fig. 1. Pier cap placement and post-tension duct misalignment (Photos courtesy of MDOT)

Note: Additional lessons learned are documented in the paper “A Precast Bridge System for Rapid Construction Applications,” by Bruce L. Campbell, P.E., Parsons Corporation, 2010 FHWA ABC Conference CD-ROM.