Structural Engineering Guidance No. 21-01

Date: March 1, 2021

Distribution: All Engineering Resources

SUBJECT: ANCHORING BARRIERS OVER PRECAST PANELS

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EPG Status: Not Included

Std. Drawing Status: NA

Effective Date: Immediately for Jobs in Preliminary Design Phase

Expiration/Duration: Active until an Organizational Assessment of Field Performance Requires a Change.

1. Background and Purpose:

MoDOT started using precast panels in 1980 as an option to expedite deck construction. In 1992 precast panels became the default construction option for bridge decks. Over the years there has been a lot of interest in adding fixed barriers to existing bridge decks in order to protect vehicle or pedestrian traffic. MoDOT policy was to prohibit the use of resin-anchorered barriers over panels out of concerns with damaging the panels when drilling holes. Typically there is not enough space over a panel to fully develop a #5 bar with resin. Yet, with increasing demand due to higher traffic volumes, pedestrian accomadations and a growing inventory of decks with panels the policy has been revised as outlined in the following section.

1. Policy for Resin Anchoring Barriers over Panels

**Resin anchor attachment of barrier over precast panels is allowed if the following condition is met…**

* When adding barrier to an existing deck. Should not be allowed for new bridge decks

**…and one of the following conditions is met:**

* Posted speed of 45 mph or less
* Traffic signals or roundabouts at both ends of the bridge
* Barrier added for traffic separation
	+ Diverging diamond
	+ Engineering judgment: where resin-anchored barrier is better than no barrier for safety and outweighs potential maintenance costs
* Barrier added to protect new sidewalk
	+ In the event of collision damage, it would be easier to repair deck in exterior bay
	+ Barrier is not expected to deflect significantly if the deck is in good condition

**Parameters if allowed:**

* Limit embedment of resin anchor to 5 inches (depth of CIP concrete minus ½”)
	+ The 5” embedment may not develop the full capacity of the reinforcing bar
	+ Due to the embedment restriction, the minimum ultimate pullout strength is not required to meet Sec 1039
	+ Barrier is expected to perform somewhere between the standard Type C bridge barrier that uses resin anchors and the standard Type C roadway barrier that uses dowels embedded 6 inches
* Use standard reinforcing in barrier (#5 @12”) and resin anchors should match
* Use note on plans stating that resin anchors shall not be embedded into precast panels
	+ Damage to precast panel from a collision is not expected if anchor does not extend into the panel
	+ Most of the force will likely go into the CIP overtopping and may cause deck cracking and lost capacity over time
* On the Bridge Plans the following note is recommended to replace standard note I2.3.
	+ The embedment depth in concrete for the resin anchor systems shall be 5 inches.

The SPM or SLE should contact the Assistant State Bridge Engineer to add any structures that use this option to the Bridges with Innovations List for future observation.