NCDOT – PCI Joint Technical Committee Meeting
MINUTES

Remote via GoToMeeting

Thursday, July 30, 2020 – 1:30 PM

Attendees:

Trey Carroll	NCDOT – SMU	thcarroll1@ncdot.gov
Gichuru Muchane	NCDOT – SMU	gmuchane@ncdot.gov
Cabell Garbee	NCDOT – M&T	cgarbee@ncdot.gov
Jason Civils	NCDOT – M&T	jcivils@ncdot.gov
Timothy Brandenburg	NCDOT – M&T	trbrandenburg@ncdot.gov
Peter Finsen	G/C PCI	pfinsen@gcpci.org
Reid Castrodale	Castrodale Engrg / G/C PCI	reid.castrodale@castrodaleengineering.com
Chris Arca	Coastal Precast Systems	carca@cpsprecast.com
Mark Perkins	Florence Concrete Products	mperkinsfcp@gmail.com
Jeff White	Prestress of the Carolinas	jeff.white@prestressotc.com
Richard Potts	Standard Concrete Products	RichardPotts@standardconcrete.org

Reid Castrodale began the meeting at about 1:30 pm. Attendance was taken from the list of connected participants.

Reid thanked Cabell Garbee for the email received regarding the recent retirement of Jason Poppe which contained information for fabricators during the transition period following Jason's departure.

1. Review Agenda

   Reid mentioned that we have a lot of topics on the agenda. Initially, the Technical Committee was to consider a small number of topics at each meeting, but it is clear that we are no longer following that. He asked Cabell whether we should add a discussion of high slump concrete, but Cabell recommended delaying any discussion of that topic until a later time since they are just beginning to collect data. Peter Finsen also recommended that we not add any items, but rather address those on the agenda. New items can be determined during the next joint meeting.

   A number of items intended for discussion in this meeting were attached to the invitation for the meeting. The items are posted on the G/C PCI website on the NCDOT-PCI Joint Committee webpage: http://gcpci.org/index.cfm/technical/NCDOT-PCI

2. Minutes of July 11, 2019 Technical Committee Meeting

   Minutes of and action items from the previous meeting were approved after it was noted that action item 19-3, which was an NCDOT action item, was completed but had not been marked as completed.

3. Review Minutes and Action Items for July 16, 2020 Joint Committee Meeting

   These were distributed for information only. Several action items were noted as being completed, which will be indicated in a revised list to be presented at the next joint meeting. No action taken.

Main Items

4. Stressing Strands in Draped Position

   Reid Castrodale indicated that this item has been on the agenda since at least 2015, and possibly since 2013. He also recognized that NCDOT has allowed stressing strands in the draped position for 2 girders, but not for

more girders. Information on this topic from the VDOT Standard Specifications, PCI MNL-116, and the *AASHTO LRFD Bridge Construction Specifications* was attached to the invitation for this meeting.

Trey Carroll indicated that he intends to schedule a meeting to discuss this topic and hopefully reach a decision.

5. Full-Length Debonding of Strands (General Notes for Girders)

Reid Castrodale indicated that a packet of information on this topic that had been previously distribute was attached to the invitation for this meeting.

Chris Arca indicated that he has just done a Type IV girder job with the full-length debonding legend on it, so it had saved him having to bother SMU with the request.

Trey Carroll indicated that they have also had several requests for full-length debonding come through in working drawings. He noted that most, but not all, requests had been approved. Their unit had used the information previously provided. The action item states that a special provision will be developed, but Trey thinks that the changes will more likely be made to the *Structure Design Manual* (SDM) and as notes added to drawings. They have all the information that they need to make the revisions.

It was agreed to leave this item on the Technical Committee agenda for the next meeting because Trey would like G/C PCI to review the proposed revisions.

6. Vertical Cracking Inspection and Marking – *Silane sealer rather than 7-day wet cure*

Cabell Garbee was not able to schedule the intended meeting, so the meeting will be scheduled soon.

7. Florida I-Beams (FIBs)

a. Strand Template

Reid Castrodale reviewed a proposed strand template for FIBs that was attached to the invitation for this meeting. The proposed template has 2 strands in the web (even number of strands in each row) and 2 in. from center of bottom row of strands to bottom of the girder but has been restricted to the same number of strands as in the FDOT template, which is 70 strands. Therefore, some potential strand locations were eliminated.

Trey Carroll asked about the benefit for using the proposed template where the strands have been moved down, but more strands are not allowed. Reid explained that there is some benefit from lowering the eccentricity of the strand pattern by 1 in., but that the fabricators were concerned about bed capacity if all possible strand locations were used, which could make an 84 strand pattern possible. Chris Arca stated that increasing the number of strands to 84 also increases the potential for honeycombs to form in the bottom flange. He mentioned that they recently made some girders with 70 to 74 strands, and that it was difficult to get debonding installed. He could not imagine the difficulties if they had to use 84 strands. Trey suggested that they could add some of the lower strand positions to the template as long as the total number of strands did not exceed 70. Jason Civils mentioned that he had also seen problems trying to get the confinement bars in place with full rows of strands in the bottom flange.

Jeff White indicated that he would need to talk to his production staff to determine their preferences on strand locations and confinement bar details. In the Harkers Island girders, the confinement bars were inside the outer strands. The Harkers Island girders used a template with 2 strands in the web.

ACTION ITEM: G/C PCI to reevaluate potential strand locations for the 70 strand template, placing confinement bars inside outermost strands and provide NCDOT a new proposed template.

b. Bearing Plate

Trey Carroll sent a copy of the bearing plate from the Harkers Island project prior to the meeting which had 4 – 3/4 in. diam. x 5 in. long studs. G/C PCI provided a proposed bearing plate detail based on the FIB bearing plate detail which had 8 – 3/4 in. diam. x 2 in. long studs. This detail is similar to the FDOT FIB bearing plate, except the studs are in a single row on each side rather than being in 2 rows on each side. A packet of three details for FIB bearing plates, including a proposed G/C PCI detail, the FDOT FIB standard bearing plate detail, and the NCDOT detail that had been distributed attached to the invitation for this meeting.

Jeff White explained the origins of the G/C PCI details with the single row of strands on each side which miss the outer UA bars in the bottom flange of the bottom flange for the SCDOT continuity connection detail. Trey pointed out that using a detail with 2 in. long studs may conflict with the strands when they are placed at 2 in. from the bottom of the girder. They have also used the longer studs to engage the second row of strands. It was recommended that this detail be discussed at the upcoming PCEF meeting, although it was recognized that GDOT does not require bearing plates. Richard Potts indicated that their plant adds bearing plates to girders. He also mentioned that the FDOT bearing plates are connected to a sole plate using a screw (rather than being welded), and that the 2 in. tall studs allow the plates to be slid in from the side after the strands are tensioned with the bottom row at 3 in. from bottom. The short studs also stay out of the way of continuity steel. Jeff White noted that SCDOT generally uses their bearing plate detail for Mod-BTs for the FIBs, which has 3 studs each side. But they are open to considering other bearing plate details. He also mentioned that they are seeing a variety of bearing plate details in designs, so a standard would certainly be appreciated. NCDOT details for continuity steel for FIBs are similar to those used for Mod-BTs. Chris Arca said that they are also seeing a variety of plate details, with some projects using different details for different bridges.

ACTION ITEM: G/C PCI to evaluate proposed bearing plate detail and also the NCDOT detail considering edge distance to the studs, the length (and number) of studs, and possible conflicts of studs with strands and continuity reinforcement. Consider using 2 – 5 in. tall studs on each side rather than 4 shorter studs. Include details showing bearing plate in place along with strands and continuity bars.

ACTION ITEM: G/C PCI to add discussion of bearing plate details to PCEF meeting agenda.

c. Other Details – *Extent of Confinement Bars*

The extent of the continuity bars was discussed, where FDOT details require their use for the full length of the girder, while the LRFD design specs only require them to extend for 1.5 h from the end of the girder. Trey Carroll indicated that the Harkers Island design only used confinement bars at the ends of the girder, as required by AASHTO. Chris Arca mentioned that without specific guidance otherwise, designers are using the FDOT detail of using confinement bars for the full length of the girder. He indicated that is it a challenge to install these bars especially when the number of strands in a girder is large and it also takes significant inspection effort. Jeff White has also approached designers in design/build projects asking them to eliminate the unneeded confinement bars, but they have resisted, indicating that they will provide the bars until directed by the DOT to do otherwise. Therefore, it was requested that NCDOT distribute a design memo limiting the extent of confinement bars to the distance required by the AASHTO LRFD.

ACTION ITEM: NCDOT to have internal discussions regarding the approach to providing guidance to designers limiting the extent of confinement reinforcement.

8. Lateral Stability

Reid Castrodale reviewed the proposed Table of Limiting Spans for Lateral Stability that was attached to the invitation for this meeting. It differs from the span lengths given in Figure 11-3 in the SDM. It was noted that the recommendations for lifting loop locations shown in the proposed table conflict with the requirements in 1078-14 of the NCDOT Standard Specifications for the smaller girder sizes. The current specified location for lifting loops should be revised to allow the loops to be moved to improve lateral stability and handling stresses. Jeff White reported that he has had girders where moving lifting loops in to address lateral stability was not allowed by the designer because of the requirements in the Standard Specifications. Richard Potts discussed the need for moving in the loops for stability. Reid presented the position of WSDOT, which will be discussed at the upcoming G/C PCEF meeting, that girders as designed must be able to be successfully fabricated so the fabricator can make girder without any modifications. More information will be provided prior to the G/C PCEF meeting.

To illustrate the need for changes, Chris Arca shared a situation from several years ago where it was found that some girders could not be lifted without cracking, which had been observed by Jason Civils. This caused delays in the project and also resulted in epoxy injection of cracks on the girders. Back charges related to the delay are still being contested.

Reid presented issues that will be discussed during the next G/C PCEF meeting, including the similar GDOT table with limiting spans for lateral stability. The table has proven helpful so designers can proceed with designs without special consideration for lateral stability. Guidance must be provided. The table also indicates a recommended location for lifting loops for each section size, which allows designers to check stresses at

that location. In the past, some designers have argued that they can't know where the girders will be lifted so couldn't perform the calculations, but with the table, they would.

Trey Carroll indicated that NCDOT was using the PCI lateral stability spreadsheet for checking lateral stability of girders. Richard Potts pointed out that designers should consider stresses when the girder is lifted and that the minimum debond length should extend beyond the lifting loop location to properly address the limiting stresses.

ACTION ITEM: NCDOT to prepare revisions to the SDM and special provisions to supplement the provisions of the Standard Specifications to provide guidance to designer in properly addressing lateral stability and girder stresses when lifting.

9. Standard Operating Procedures

   It was agreed that this item should be removed from the Technical Committee agenda and placed on the Joint Committee agenda. G/C PCI has received a copy of the Standard Operating Procedures.

10. Standard Repair Procedures

    It was agreed that this item should be removed from the Technical Committee agenda and placed on the Joint Committee agenda.

    NCDOT has developed several standard repair procedures based on the types of repairs most often requested over the last few years and three more are being worked on and should be completed shortly. They are not posted on the website but have been distributed by email when completed. G/C PCI has not received any standard repair procedures.

    The Department intends to align the standard procedures with the PCI Repair Manual (MNL-137). This manual is currently in the process of being updated so it will be some time before it is completed. G/C PCI agreed to provide NCDOT a copy when the new manual is published. Richard Potts expressed appreciation for the Department preparing standard repair procedures; none of the other DOTs have developed such standard repair procedures, which are definitely helpful for fabricators. It was suggested that the standard repair procedures could be shared with the other DOTs at the next G/C PCEF meeting, along with how and why the standard procedures were developed.

    ACTION ITEM: G/C PCI to provide new version of PCI MNL-137 when published.

    ACTION ITEM: NCDOT to discuss standard repair procedures at PCEF meeting, with how and why they were developed.

11. Temporary (Debonded) Top Strands

    Information previously prepared for NCDOT on this topic was attached to the invitation for this meeting. Implementation of temporary top strands has not been urgent, but it is expected that the use of temporary top strands will become more necessary as lateral stability considerations are required. Design, detailing, fabrication, and detensioning of temporary top strands should be addressed.

    Trey Carroll indicated that the Department intends to work first on implementation of lateral stability. After that work is completed, incorporation of temporary top strands would then be addressed to avoid delay in implementation of lateral stability.

    Reid Castrodale asked producers if this approach of delaying development of guidance for temporary top strands until after development of lateral stability guidance was completed would work, or if temporary top strands were required in order to successfully implement lateral stability. Richard Potts indicated that use of temporary top strands is useful but is required only for very long beams. Chris Arca agreed.

    It was therefore agreed to leave this on the agenda for the Technical Committee, but with a note indicating that this topic would be addressed only after provisions related to design for lateral stability have been developed. This would avoid slowing progress on lateral stability implementation.

12. Standard Welded Wire Reinforcement Option for Girders

    There is interest in this topic, but it requires implementation of standard end zone reinforcement for girders to make it an economical solution. A presentation on welded wire reinforcement for girders by a supplier is being planned for a future joint committee meeting.

It was agreed that this item should be removed from the Technical Committee agenda and placed on the Joint Committee agenda. It can be reassigned to the Technical Committee at a later time if necessary.

13. Use of Strands for Continuity Connection Detail

Reid Castrodale reported that he had provided Trey Carroll with some computations related to this topic. Trey indicated that they have not had an opportunity to review these calculations. There did not seem to be a pressing need for action on this detail. It has been discussed with SCDOT for consideration as an option to the NCDOT continuity connection with rebar, since the SCDOT current detail with projecting U-bars causes problems for both girder fabrication and placement in the field.

It was agreed to drop this from the agenda. It can be added later if necessary.

New

14. Cracking along Strands in Partial Depth Deck Panels and Cylinder Piles

Tim Brandenburg described the situation where cracking had been observed along strands in precast prestressed concrete stay-in-place deck panels that were 4 and 5 in. thick, using 0.5-in.-diam. strands. Cracking was also observed in cylinder piles with 6 in. walls using 0.6-in.-diam. strands. The cracks did not appear at transfer of prestress but appeared in the products after they had been placed in storage, although some only appeared after they arrived at the project site. Attempts had been made to try to control or eliminate the cracks by adding rebar or increasing bar sizes or using welded wire reinforcement. Strands are in the center of the concrete; cracks in panels typically extended from a strand to the surface of the panel (most often to the bottom) or pile. Tim thinks that the cracking may be caused by the speed of strand cut down, so they are trying to make some changes related to that. They have also considered use of 3/8 in. strands for the panels. Reid Castrodale asked if the strands had any opportunity to get a light coating of rust, which could improve the bond and shorten the transfer length. Tim said that they are using the strand quickly, so the strands he has seen are still bright. Richard Potts suggested that they look at all handling procedures for the panels, as they had experienced some similar problems in the past that were related to handling.

This does not need to appear on the agenda for the next meeting.

15. Mandatory Strand Locations for FIBs and MBTs

Reid Castrodale discussed proposed mandatory strand locations for FIBs and Mod BTs. Proposed details and text for the SDM were attached to the invitation for this meeting. The current detail for required strands for securing stirrups are adequate for AASHTO I-girder sections, but for Mod BTs and FIBs, two more strands are required in the top flange. For girders with smaller numbers of strands, a pair of strands is needed near the bottom flange to allow stirrups to be secured at the bottom of the girder. The outside pair of strands in the bottom row are also required for securing confinement bars. A pull of 10 kips in “slack” strands is recommended rather than 4.5 kips currently mentioned in SDM Art. 6.3.1.2, and designers must show the strand pull on the drawings. The figure and notes indicate that the pull on the mandatory strands would be a minimum of 10 kips, which would allow the designer to require these strands to be pulled to the full tension if needed for the design.

Trey Carroll asked why these strands should be required rather than made optional. Jeff White explained that design/build designs may not show these strands, thinking that they can save money if they are eliminated. However, they are needed to fabricate the girders and have to be provided. They have had some issues with designers not allowing these strands to be added, and in some cases, the design/build team may require the fabricator to pay for those added strands. Chris Arca has had a designer try to charge for the added strands. Reid mentioned that the proposed SDM text requires designers to show the strand forces on the drawings, which should cause them to include them in their designs. Richard Potts indicated that the FDOT FIB details show four rebar in the top flange, but a plan note indicates that the rebar can be replaced with strands tensioned to 10 kips. Jeff and Richard added that using rebar instead of strand to stabilize the reinforcement in the girder would cost more because the added bars would have to be stabilized with chairs which would also require added labor.

Trey also asked why 10 kips is required rather than 4.5 kips on the added strands. Richard and Chris indicated that 4.5 kips is not enough to keep the strands from sagging, especially for a long bed, and some means may be required to hold the strands with lower tension in their intended location. The GDOT standard

is for 10 kips in these strands. Jason Civils suggested that if the designer did not consider these strands, they could possibly be full-length debonded.

ACTION ITEM: NCDOT to have internal discussions regarding proposed details and revisions to SDM for changes related to mandatory strand locations and tension in “slack” strands.

Other

16. Future Prestressed Concrete Bridge Design Seminar

    It was agreed that the Prestressed Concrete Bridge Design Seminar should be delayed until conditions improve and face to face meetings can once again be held.

17. Update on Status of Bridge Program

    This topic was discussed at the previous joint committee meeting on July 16, 2020, so no report given.

18. PCEF Meeting – August 13, 2020, 10 AM to 4 PM

    It has been agreed that this PCEF meeting will be held remotely using GoToMeeting. Additional materials will

New Items

The meeting was adjourned around 3:30 pm.

Action Items from NCDOT – G/C PCI Technical Committee Meeting

Items are numbered in the order in which they appear in the minutes.
Completed items appear in a separate table that follows.

Year-No.	Description	Responsibility	Due Date	Completion Date
	G/C PCI Items			
19-6	Pursue production of a video for detensioning of temporary top strands.	G/C PCI		*Table for now*
19-8	Inform NCDOT when there is a project where strands could be stressed in the draped position or consider making a video to share with the Department.	G/C PCI		
20-1	Reevaluate potential strand locations for the 70 strand template, placing confinement bars inside outermost strands and provide NCDOT a new proposed template.	G/C PCI		
20-2	Evaluate proposed bearing plate detail and also the NCDOT detail considering edge distance to the studs, the length (and number) of studs, and possible conflicts of studs with strands and continuity reinforcement. Consider using 2 – 5 in. tall studs on each side rather than 4 shorter studs. Include details showing bearing plate in place along with strands and continuity bars.	G/C PCI		
20-3	Add discussion of bearing plate details to PCEF meeting agenda.	G/C PCI		
20-6	Provide new version of PCI MNL-137 when published.	G/C PCI		
	NCDOT Items			
19-1	Develop ~~special provision~~ guidance on full-length debonding of strands. Send to G/C PCI for comment.	NCDOT SMU		
20-4	Have internal discussions regarding the approach to providing guidance to designers limiting the extent of confinement reinforcement.	NCDOT SMU		
20-5	Prepare revisions to the SDM and special provisions to supplement the provisions of the Standard Specifications to provide guidance to designer in properly addressing lateral stability and girder stresses when lifting.	NCDOT SMU		
20-7	Discuss standard repair procedures at PCEF meeting, with how and why they were developed.	NCDOT SMU		
20-8	Have internal discussions regarding proposed details and revisions to SDM for changes related to mandatory strand locations and tension in “slack” strands.	NCDOT SMU		

Completed Action Items

NCDOT – G/C PCI Technical Committee Meeting

Year-No.	Description	Responsibility	Due Date	Completion Date
	G/C PCI Items			
19-2	Send Trey Carroll the analysis of section property changes with full-length debonding that was presented at the PS Design Seminar in Nov. 2018.	Reid Castrodale		11/5/19
19-4	Send Trey Carroll end zone reinforcement standards for FIB girders.	Reid Castrodale		11/5/19
19-5	Send Trey Carroll calculations for bent up strands.	Reid Castrodale		11/5/19
19-7	Send Trey Carroll GDOT requirements for lateral stability.	Reid Castrodale		11/5/19
	NCDOT Items			
19-3	Send G/C PCI the Standard Operating Procedure when completed, to attach to the minutes.	Cabell Garbee		