MINUTES

SCDOT – PCI Joint Committee Meeting

SCDOT Headquarters Building, Room 331

September 30, 2019 – 1:30 PM

Terry Koon welcomed attendees and began the meeting at about 1:35 PM.

Attendees introduced themselves and a sign-in sheet was circulated. Following the introductions, the meeting was turned over to Reid Castrodale. It was noted that the date was changed from the usual fall timeframe to this date so it could be held in conjunction with the Prestressed Concrete Bridge Design Seminar, which was being held the following day, October 1.

The following were present:

SCDOT

Terry Koon	Preconstruction Support, Co-Chair
Hongfen Li	Preconstruction Support
Marc Garrett	Preconstruction Support
Phillip Washington	Preconstruction Support
Mabel Cuellar	Geotechnical Support
Caleb Gunter	Office of Materials and Research
Steve Nanney	Construction
Beverly Hollowell	RPG-1
Jerry Phipps	RPG-2
Matthew Bishop	RPG-3
Glenn Patterson	RPG-4

PCI

Peter Finsen	Georgia/Carolinas PCI
Reid Castrodale	Castrodale Engineering Consultants, Co-Chair
Jeff White	Prestress of the Carolinas
Richard Potts	Standard Concrete Products
J. R. Parimuha	Florence Concrete Products

Academia

Minutes of Last Meeting

Minutes of the May 2, 2019, meeting were distributed prior to the meeting. The minutes were approved as distributed. Minutes and agendas, along with supporting information, are posted on the G/C PCI website.

Old Business

01-6 *SCDOT Bridge Design Manual*

Terry Koon reported that progress was being made to prepare a scope of work for the advertisement to revise the Bridge Design Manual. Steve Nanney reported that the Department is moving toward advertising for a contract to revise the Standard Specifications.

Terry also noted that Hongfen has been working on memos to bring their practice up to date with the *AASHTO LRFD Bridge Design Specifications* 8th Edition.

Terry also described their work to define structure widths for cored slab bridges that correlate with the various roadway width configurations.

09-1 *Accelerated Bridge Construction Projects*

Terry Koon reported that the final report on the Hanging Rock Creek Bridge has been completed and will be posted on the Office of Materials and Research website. Terry had forwarded the completed report to G/C PCI prior to the meeting. He did not recall any major findings. He did notice that the 70 ft cored slabs had some noticeable difference in camber between adjacent units. He figured that the difference was taken up in the asphalt wearing surface. The Modified NEXT beams had performed well in the two years it had been in service.

12-1 *Tentative Letting List*

It was noted that RGP-4 had been providing the descriptions about bridge types for the letting list. Jeff White commented that the descriptions were very helpful for them for planning purposes. Terry Koon indicated that he could send an email to RPG engineers asking them to provide that information for all projects, including consultant-designed projects. The beam type information should be available when preliminary plans are completed.

12-2 *Shop Drawings*

Electronic Shop Drawings

Terry Koon reported that there has been progress on setting standards for electronic processing of shop submittals. However, there appear to be some differences in the developing procedures compared to the procedures used for shop drawings on design/build projects. Terry would like to keep the processes the same and will seek to provide input to the process toward that end. There are other internal document handling issues that the Department is working through, but these do not affect the fabricators.

Jeff White mentioned that the last two or three projects that he has had for SCDOT have worked very well regarding the submittal of shop drawings and their quick return. So from the prestresser's perspective, the process is working well. There may be some glitches in the process as those involved in the process may change, until the process is formalized. It was recommended that if the prestressers hit a snag with the submittal process at any point, please let Terry or Steve Nanney know.

It was agreed that this item does not need to be considered at future meetings, so should not appear on future agendas. An update can be given when the new policy is in finalized.

16-2 ***UA Bars in BTs***

Terry Koon and Hongfen Li recalled that Reid Castrodale had emailed them some calculations on using strands to provide the positive moment reinforcement in continuity diaphragms. However, the Department has not made any further progress on the issue as the bridge manual has been taking a lot of time.

Terry noted that the Department was also working toward another consultant contract to update their standard drawings and details to comply with the 8th edition. It would include flat slabs, and possibly FIBs, but probably not prestressed beams. Additional discussion about the FIBs is recorded under New Business.

Hongfen shared some information from WSDOT, with the conclusion that she thinks that it would be good to allow strand extensions for the continuity connection. The question was raised regarding whether the Department would consider different details to the UA bars, especially when the bridge was curved so there is an angle change between adjacent spans that complicates erection with current UA bar details. Terry indicated that they would certainly entertain different details if requested. Beverly Hollowell reported that there had been discussion at the AASHTO T-10 meeting about a proposed research topic for further study of the strand connections for continuity. It was also noted that the UA bar details conflict with the current stud configuration on bearing plates. It is expected that these details will be developed during the revision of the Bridge Design Manual.

There was discussion of the details used by NCDOT where the continuity connection bars are usually left straight when the girders are cast and are then bent up after the headers are removed. They are certainly open to different options. And this is not just an issue for fabricators, but also for contractors. The limit of bar size that can typically be bent after casting the girder is generally a No. 5 or 6. Richard Potts indicated that TennDOT allows preheating the strand before bending which facilitates bending. He also noted that the strands have to be overbent – so it is best to select the strands toward the edges of the flanges to bend where overbending is possible. After bending the strands, the ends are tied together for shipping.

The stud layout on bearing plates was also discussed. The Department is considering using 3 rows of 2 studs rather than 2 rows of 3 studs where there are studs at the center of the girder that conflicts with the current UA bar details.

Reid Castrodale asked if there was anything that the fabricators could do to assist the Department as they consider these issues. Terry suggested that they would certainly like to see details from other states, so please forward any of interest to them. There was also discussion of "poor boy" continuity details and "link slab" details that are used to make the deck continuous while the girders are not continuous at an interior pier. The Department is interested in considering such details.

17-1 ***Debonded Strands***

The new design provisions related to debonding strands were briefly discussed. Reid Castrodale has slides in his presentation for the seminar to discuss these provisions in detail and provide a few examples.

Debonding in Bottom Row

SCDOT does not currently allow debonding of any strands in the bottom row. This is not required by the LRFD provisions, as illustrated by a figure included in the recently adopted provisions that will appear in the commentary in the 9th edition when published.

Terry Koon mentioned that Dr. Brandon Ross at Clemson is conducting research on debonding possibly as part of an NCHRP project, but his research has not yet reached a point where he is ready to move forward with work to develop recommendations for SCDOT policy. Terry expects that they will consider the new AASHTO debonding criteria as the new Bridge Design Manual is being developed.

Richard Potts suggested that debonding be continued past the lift points in the beam. Design programs typically consider only the condition of the beam supported at the very end or at the center of bearings. So, when the beam is lifted, which is often 6 to 9 ft from the ends for longer beams, stresses will not be exceeded. Richard recommended that the debonding be extended 3 ft beyond the lift points to allow peak stresses to decrease. The discussion continued into the topic of lateral stability, which is recorded under New Business.

Full Length Debonding

Reid Castrodale mentioned that he will be covering this concept with a few slides in the seminar presentation the next day. The concept is included in the notes and details on the NCDOT standard drawings for cored slabs and box beams, but they have also allowed its use for girders when requested. G/C PCI has developed a recommended note to allow the concept for girders. If DOT policy allows this approach, the Department can realize the cost savings on the project since fabricators can bid the project using full length debonding. Otherwise, the project must be bid without full length debonding, which will result in increased costs.

17-2 ***Prestress Design Seminar***

The SCDOT Prestress Design Seminar is scheduled for the following day – Oct. 1, 2019. When Peter Finsen checked the registrations prior to the meeting, there were currently 102 registrations with 38 SCDOT staff. A similar seminar will be presented for GDOT in Atlanta on Oct. 3, 2019. Terry Koon indicated that while an email message from the registration platform stated that handouts could be downloaded from Dropbox, the SCDOT attendees will be blocked from accessing those files. Beverly Hollowell indicated that the handouts have been downloaded to an internal SCDOT drive. Peter Finsen distributed a few copies of the agenda for the seminar.

Terry Koon has agreed to be on the panel for the discussion at the end of the seminar. Reid plans to email a short list of topics to the panel members to prepare them prior to the panel discussion.

The Department had expressed interest in having a plant tour. It has not been arranged to be part of the seminar. It is hoped that it can be held in 2020.

Peter Finsen also mentioned the inspectors workshop that was held for NCDOT. GDOT is also interested in having such a workshop. The workshop was based on the PCI repair manual that is currently being updated. G/C PCI would be glad to meet with SCDOT to define the content of the workshop.

17-3 ***Standard SIP Form Clip Insert Details***

Terry Koon reported that Jeff White had sent him information on the NCDOT specifications but that they had made no progress on moving the item ahead. Terry indicated that he would try to move this issue forward after checking with the Construction and Materials offices.

17-4 ***Rubbing Prestressed Concrete Girders***

The silica exposure limitations being implemented by OSHA, which have been addressed in the plants with dry rubbing procedures for girders, were described since this is a new issue for Caleb Gunther. GDOT's approach to wet rub girders without following with a dry rub has been successful. NCDOT has also observed the process at the Standard Concrete Plant in Savannah and was satisfied with it. JR Parimuha indicated that they are also doing the procedure, so SCDOT can come to view it in their plant if they would like to. Caleb indicated that he didn't think that the procedure would be a problem as long as there was no prohibition in the specifications. Terry Koon reminded us that rubbing girders is not required by the specifications. Therefore, it was agreed that the current situation is good as long as inspectors understand what is required.

It was agreed that this item does not need to be considered at future meetings.

New Business

19-1 *FIBs*

This discussion is a continuation of the discussion related to continuity connection bars. Since this is a continuing discussion item, it is added as a new topic for future agendas.

As SCDOT standards for use of FIBs is developed, Hongfen Li indicated that she wants to allow more flexibility for design to get the greatest efficiency possible. Therefore, she would like to allow draping and debonding for FIBs.

19-2 *Lateral Stability*

This discussion is a continuation of the discussion related to debonded strands. It was agreed to add this as a new topic for future agendas.

The location of lift points should also be addressed properly in the design guidance, allowing for consideration of lateral stability. Specification requirements or standard plan notes should be reconsidered in light of lateral stability that is now an issue for the more slender girders being designed.

The approach taken by GDOT to address lateral stability was to introduce a table of maximum span limits for different girder sizes. Lateral stability only needs to be addressed by the designer when the girder length exceeds the limits in the table. The table, which is taken from the GDOT *Bridge and Structures Design Manual*, Rev. 2.7, dated August 10, 2018, is reproduced here:

3.4.2.8 Beam Lengths

The maximum beam lengths for the PSC beams are:

- 50 feet for AASHTO Type I Mod. beams
- 65 feet for AASHTO Type II beams
- 85 feet for AASHTO Type III beams
- 125 feet for 54” Bulb Tee beams
- 135 feet for 63” Bulb Tee beams
- 150 feet for 72” and 74” Bulb Tee beams

AASHTO Type II beams are preferred for span lengths between 40 to 50 feet.

If the above maximum beam lengths are exceeded under an alternate bidding process, the engineer of record is responsible for performing a beam stability analysis.

The maximum beam length limits that appear in the table above were computed using the assumption that the beam is lifted at 1.5 × the beam height from the end of the beam.

Reid Castrodale agreed to forward a draft copy of the PCI spreadsheet on lateral stability design to Terry Koon as well as information from the WSDOT Bridge Design Manual and Standard Specifications, which provides the method and parameters to be used to evaluate lateral stability for both lifting and transportation. In their approach, the designer is responsible to consider stability, although the contractor is still responsible to get the girder to the site. A major goal of the WSDOT design approach is that the girder should be able to be constructed as bid, considering both stability and stresses during handling and transportation. Terry Koon indicated that they would like to look at this as part of the development of the Bridge Design Manual.

Reid Castrodale mentioned that the longest single-piece prestressed girder was just fabricated by Concrete Tech in Tacoma, WA. It is 223 ft long at the centerline, but with the skew, it is about 230 ft long. It is lightweight concrete (the lightweight aggregate is Stalite) for shipping. There is an article on the girders in the Fall 2019 issue of *ASPIRE*.

For Information

SCDOT Preconstruction Updates

Mabel Cuellar reported that there is a change in the Geotechnical Retaining Structures Manual that may affect PS piles, where lateral spreading is an issue. In those conditions, the piles may have to be designed and detailed with greater shear capacity in order to resist the lateral spreading loads. The greater shear capacity would be provided by increasing the quantity of spiral reinforcement. She offered to send a preliminary copy of the provisions for review, which are similar to Caltrans and WSDOT procedures.

Mabel and Terry Koon also explained that they are working with Jeff Sizemore in the Geotechnical Design Group to consider use of FHWA's GRS-IBS system in which cored slabs or box beams, and possibly prestressed concrete girders, may be set directly on the geosynthetic reinforced soil (GRS) that is contained by precast concrete wall elements. While this system has been used in some other states, SCDOT is considering it now for use for low volume roadways to provide an economical solution. There may need to be some special considerations for precast concrete elements used in bridges that employ this system.

Terry Koon reported that the 2nd version of the Supplemental Design Criteria for Low Volume Bridge Replacement Projects (PCDM11) has been completed and is available online in the list of Preconstruction Design Memos: https://www.scdot.org/business/pdf/PreconstructionDesignMemos/PCDM-11.pdf.

The first version only allowed use of cored slabs and flat slabs, while the new version also includes steel and prestressed concrete beams, so all traditional superstructures can be used (although box beams are not listed). The maximum bridge length is still 210 ft, but the individual span length limit has been removed because it was found that elimination of interior bents may justify the use of the longer span elements. The intent of the criteria is to allow greater flexibility in the design of the structure and to simplify

design effort by eliminating significant seismic, roadway, and hydraulics activities. Otherwise, the bridge design is consistent with standard bridge designs.

Precast Concrete Pavements

Richard Potts mentioned that the PCI Precast Concrete Pavements Committee has become part of the Bridge Producers Committee. They would be willing to come to SCDOT to present precast concrete paving concepts. The minutes indicated that Aly Hussein was to provide the name of the SCDOT pavement design engineer, who is Jay Thompson. He is the person to approach to discuss precast pavements.

Ultra-High-Performance Concrete

Richard Potts gave a brief report about the ongoing PCI-funded research project to advance the implementation of ultra-high-performance concrete (UHPC) for both bridge and building applications. The first phase has been completed where UHPC was successfully produced using local materials at six precast plants, and that report will be published. Using optimized cross-sections that take advantage of the high compressive and tensile strength of the material, cost-effective solutions have been developed that can compete with conventional high-performance concrete on a first cost basis. The cost of local UHPC can get down to about $1000/cy. Durability of UHPC is very good. Terry Koon related that he had attended the UHPC International Symposium in Iowa in 2017, and that he was impressed with the potential of the material.

Beverly Hollowell reported on UHPC discussions at the AASHTO T-10 meeting at the PCI convention. They had reported that a domestic source of steel fibers was expected to come online soon.

Terry Koon mentioned that their research on developing local UHPC by Clemson was available online. It was supplied to the contractor for the Hanging Rock project, but they did not use it. The UHPC material report may be posted on the TC3 website, rather than the SCDOT website. Terry indicated that in the demonstration project they realized that more direction needed to be provided in the specifications about installation and use of UHPC.

It was agreed that UHPC can be discussed under the ***9-01 ABC*** item, so a new item is not needed.

SCDOT Out-of-State Travel

Terry Koon mentioned that getting approvals for out-of-state travel is still a challenge and may take a month or two. It is very helpful to be able to submit a request for travel for approval as early as possible. They need the date, location, and a general description of the meeting to get the approval process started, but having an agenda to accompany the request is a great help.

PCI Convention and National Bridge Conference

There was discussion about plans for sponsoring travel to future PCI activities. It was agreed that it would be most beneficial if the DOT personnel could attend the convention with the Precast Show. Beverly Hollowell agreed that they would prefer to attend the Precast Show rather than the PCI Committee Days. She also mentioned that two presenters and possibly two of the moderators did not even show up for the National Bridge Conference at Committee Days. It was noted that one of the moderators had recently had surgery and could not attend. Jeff White said that he would be sending out a questionnaire seeking input from those who attended Committee Days, and that the responses would be shared with PCI.

The next PCI Convention and The Precast Show will be in Fort Worth, Texas, from March 3 to 7, 2020, although G/C PCI will not be sponsoring DOTs to attend this year. It has not yet been decided whether the next National Bridge Conference will be at the 2020 PCI Committee Days or at the 2021 Convention with The Precast Show.

Research

No report.

Next Meetings

The next joint meeting is scheduled for Thursday, May 7, 2020, at 1:30 p.m. The date for the fall meeting is normally in November. Terry Koon prefers the first half of the month. The meeting was tentatively set for November 12, 2020.

The next G/C PCEF Committee meeting is scheduled for Thursday, February 6, 2020, in Atlanta, GA. SCDOT will check into trying to travel to the meeting. G/C PCI will plan to have the agenda out soon for that meeting to assist SCDOT with their travel arrangements.

The meeting was adjourned at 3:50 P.M.

Action Items

From prior meeting:

- Reid Castrodale agreed to forward to SCDOT some examples for details and calculations for using strands for the continuity detail. - COMPLETED
- Aly Hussein agreed to send contact info for OMR Pavement Design lead to G/C PCI. – OBTAINED DURING THIS MEETING
- Terry Koon agreed to work toward standard SIP steel form clip size and spacing.

From this meeting:

- Terry Koon agreed to send an email to RPGs asking them to provide bridge type information to be included on the Tentative Letting List.
- G/C PCI to provide details related to continuity connections or joint elimination from other states for consideration by the Department.
- Reid Castrodale agreed to forward a draft copy of the PCI spreadsheet on lateral stability design to Terry Koon as well as information from the WSDOT Bridge Design Manual and Standard Specifications, which provides the method and parameters to be used to evaluate lateral stability for both lifting and transportation.