AGC/WSDOT Structures Team
March 25th, 2016 Meeting Minutes

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1 Team co-chair

Guests

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Meeting minutes were prepared by Marco Foster.

Topics – Steel Barrier presentation (Pacific Barrier), Concrete-Filled steel tube research

1. Welcome & Review of Agenda

Mark welcomed the group and reviewed the agenda. There were a several guests in attendance so introductions were made. There were no additions to the agenda.

Action Item: N/A.

2. **Review of November meeting minutes**
Bob and Tom provided some minor comments. No other comments were provided on the November meeting minutes.

Action Item: Mark will post the meeting minutes.

3. **Pacific Barrier – Steel Temporary Barrier**
Brad Arnston and Sam Arnold of Pacific Barrier gave a presentation on a steel temporary traffic barrier product that could be used as an alternate to temporary concrete barrier customarily used to protect work zones. Sam was originally involved in the QMB barrier systems that were used in the 90's, and water filled barrier – which ended up having a short service life.

The advantage to this new product is that it is much lighter and easier to move and handle – yet it still provides the same or better protection as standard plan temporary concrete barrier. Advantages of the BarrierGuard 800 include;

- The barrier has a clear distance/scupper beneath it to allow water to flow under.
- The BarrierGuard can be stacked multiple levels which saves room.
- Because it is much lighter you can also haul much more steel barrier per load compared to concrete barrier.
- Approximately 1000 L.F. per hour can be placed compared to 500 L.F. per hour for concrete barrier.
- There are cost saving opportunities in transportation, installation and handling compared with conventional concrete barrier.

Sam spent a little time discussing the connections and pinning of the ends. Video of barrier placement to demonstrate rapid installation was viewed. This system can be installed down to a 12' radius and you can use wheels to allow manual movement of the barrier.

The steel barrier system works due to the torsional rigidity of the steel sections. Numerous examples of the barrier guard system being used nationally and internationally were viewed. The barrier guard system has been used extensively in high security situations around the world.

Scott asked what limits the service life of the product to 20 years. It is the corrosion protection system (galvanizing) that limits. The product cost is comparable to that of temporary concrete barrier. The BarrierGuard 800 is made internationally; they produce barrier in Pennsylvania and can use barrier sourced there to meet Buy America requirements.

There was some discussion amongst the team about possible spec changes to allow the steel barrier system for standard bid item for temporary concrete barrier. This barrier system has been submitted to WSDOT for inclusion on the QPL.

The team took a break to go outside and view sections of the BarrierGuard 800 that Brad and Sam had brought with them.

Action Item: No further action needed.

4. **Concrete-Filled steel tube research**

Mark introduced Professors Roeder and Lehman from the University of Washington. Professor Roeder provided an update on recent research work for accelerated bridge construction. The motive for implementing this new research is significant cost savings, design performance from better confinement of the concrete, and accelerated construction. Concrete filled steel tubes (CFSTs) are composite structural elements that provide large strength and stiffness while permitting rapid construction. In bridges, CFSTs may be used as piers, piles and drilled shaft foundations. The steel tube serves as formwork and reinforcement for the concrete fill, eliminating the need for flexible reinforcing cages, shoring, and temporary formwork and increasing safety and reducing labor. The composite action of the CFST is superior to conventional design/construction. The placement of the concrete fill may be further expedited by using self-consolidating concrete (SCC) because vibration is not required.

Recent changes in LFRD make it practical to take advantage of CFST's.

Professor Roeder discussed two alternatives for constructing ABC cap to column connection – the Embedded Ring (ER) connection and the Welded Dowel (WD) connection. Both options appear to have pro's and con's and the Professor was looking from input from the team with regards.

The ER system simply requires the column to be placed in the footing and is grouted in with fiber reinforced grout and then the column tube is filled with concrete. Professor Roeder provided two case studies to demonstrate the materials/cost that could be possibly saved by using the CFST on a bridge column in lieu of conventional design/construction.

Professor Roeder then provided some specific information and details with regards to the WD systems and options to construct and implement this system. Three alternatives were reviewed. Team members asked about setting the cap quickly (say a day later) prior to the composite column having a lot of set up time. Professor Lehman indicated that the research shows this is not concern and that composite action will still be developed.

Seismic performance tests of CFST and reinforced concrete columns were reviewed; the seismic performance of CFST appears to be slightly better.

Questions asked of the team;

1. Do the Contractor's see significant cost savings for drilled shaft application?
   There was some open discussion with regards to structural field welding of the jackets. It was acknowledged that the reduced the size of CFST shafts would provide cost savings – however reduced diameter size may have a negative impact on shafts designed for skin friction. It was also discussed that there is significant cost associated substructure work and that having the required equipment idle during structural welding may add cost. There was then some open discussion about spiral welds.
2. Do the Contractors think there is time/cost savings with the CFST columns?
   The question was asked if the tubes could be filled with a lower strength concrete. Lower strength concrete would most likely not have the required properties needed structurally. It was recognized that the weight of the pier caps should be much less as the cap would not need to accommodate the larger diameter columns required for conventional reinforced concrete construction. The idea of monolithic connections was discussed.
3. Which of the 3 alternative discussed for the WD system is preferred.
   The Contractors generally agreed Alternative A appears most favorable.

There was some open discussion about WSDOT allowing the use of this design in the future. It is possible that WSDOT would provide alternative designs to allow economics to decide if CFST is more cost effective than RC construction. There would be some added cost for the Bridge Office to develop both design but then the Contractors could really evaluate and bid which approach is most cost effective.

Action Item: Bijan will be invited to the next meeting to discuss further.

5. <u>Future meeting Dates and Agenda Items</u>

The remainder of today's agenda items will be discussed at the May 6th meeting since there was no time remaining today. Another future agenda item will be FA Drilled shaft obstruction item and how contract time should be addressed.

Mark quickly asked Team members for feedback on Apprenticeship. Contractors are already removing Foreman and superintendents hours. Specialized Subs are a problem for the primes – they are having a difficult time getting some of the subs to meet apprenticeship requirements.

Action Item: <u>Mark</u> asked Scott if the AGC could provide a list of subs that typically do not employ apprenticeship.

<u>Adjourn</u>

Future meeting dates: May 6th, & June 17th.

AGC/WSDOT Structures Team
November 18th, 2016 Meeting Minutes

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Guests

Attendee	Company	Phone	E-mail
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Meeting minutes were prepared by Marco Foster.

<u>Topics</u> – Update on HQ Construction Office Org; Update on Partnering Training; SS 2-09.3(3) B Excavation; Temporary Footing and Mudsills; Grade 80 reinforcing steel; Contract time for shaft obstruction removal; concrete deck temp requirements; Robotic bridge deck removal; Shotcrete research update; dewatering foundations/use of seals.

1. **<u>Welcome & Review of Agenda</u>**

Mark welcomed the group and reviewed the agenda. The Mukilteo team has decided to move their project forward as a Design-Build project so they cancelled out on their requested constructability review today. There were a couple of relatively new members so introductions were made.

Action Item: No action required.

2. **Review of September 23rd Meeting minutes**
Bob Hilmes provided a comment last week with regard to tolerance on precast drainage elements. After some clarifying discussion with the team– it was determined that tolerances for fit up should be increased – however the requirement for pre-fit-up at the fabricators shop be maintained. Bob's concern (shared and agreed by the team) is that a flat surface at the fabricators yard does not replicate the inconsistencies you will experience in the field on less than perfect subgrade. Perhaps pre-fit up should be done on sand or gravel bed to better replicate the conditions that will be experienced in the field?

Tom noted a couple of typos at the end of the minutes that should be corrected.

Action Item: Mark will make corrections to the meeting minutes and post them the web. He will also review the specification and look to see if changes are needed to the pre-fit-up requirements.

3. **Changes to the HQ Construction Office Organization**
Mark provided an updated table of organization to the team. Neal Uhlmeyer will be Joining the team and will provide support for SW Region. Neal will also be supporting the development of electronic documentation. Neal has many years of field experience managing a project office for the Olympic Region. Jerry Moore will be assuming the rotational position that was formally filled by Colin Newell. Jerry will support a portion of NW Region and also NC Region. The need for additional staff is driven by increasing workload associated with the Connecting Washington funding package and the likelihood of more project delivery using design-build.

Brian Aldrich will be joining the HQ Construction office to support bridge construction issues. Mark anticipates Brian will chair the ADSC and AGC structure teams in the future. Mark would continue to participate as time allowed.

Action Item: No action needed.

4. **WSDOT's Partnering Training update**
Marco provided an update on efforts to develop and provide Partnering Training. In conjunction with Connecting Washington Funding package – the Legislature earmarked $50k for the development of Partnering Training. WSDOT currently posts a Partnering field book to the HQ Construction office web site but very few people are aware of its existence. There was some open discussion amongst team members on their past experience with Partnering principles and general agreement that

younger staff in both WSDOT and with the Contractors may not have been through a Partnering workshop.

Marco has determined that Utah DOT is a leader in utilizing Partnering and has a robust Partnering Training program. The consultant that has helped Utah develop and provide this training has indicated she would be willing to assist WSDOT with the effort.

The tentative plan is that joint training will be provided next March. The training would be described as Partnering 101 and it would be a one-day class – possibly offered more than once (once east of the Cascades and twice west of the Cascades). Allowing local agency staff was also discussed.

Mark G then expanded the conversation to discuss our current Prime Contractor Performance Report (PCPR) process and that the current form is being updated for DB projects. The current PCPR is not well suited for Design Build contracting. Mark also noted that we should update how Contractors provide feedback to the PE offices. For the review process to truly be constructive the process needs to result in 2-way dialogue. There were some open discussion and specific examples discussed.

Action Item: Marco and Mark to provide Partnering and PCPR updates at the next meeting.

5. **Action Items**

a.) Standard Specification 2-09.3(3)B Excavation

Mark reminded folks on the history of this topic. Basically, current standard specification refers to the Geotechnical Design Manual (GDM) and the GDM requires that any excavation over 4 feet needs to be reviewed and approved by an Engineer. Charlie proposed that the Contractor submit a Type 1 drawing for shallow excavations and a Type 2E drawing for deep excavations. Mark Frye has expressed concern in the past and commented that this approach does not address situations where excavations are close to structures. Mark G. suggested a modification to the proposed changes that would allow this approach provided the excavation is not next to sign structures or retaining walls. Mark will work with Mark Frye to try and come up with the list of acceptable and unacceptable situations.

There was some open discussion with regards to other options and scenarios.

Action Item: Mark will send a draft to the team before next meeting.

b.) Temporary Footings and Mudsills.

Mudsills. The plate test has been eliminated because it did not take into consideration global stability. California requires the Contractor to provide a test to demonstrate adequate capacity. Charlie advocated allowing the Contractor to develop their own test and calculations in lieu of referencing the GDM with would end up requiring a Geotechnical Engineer.

There was some open discussion. The team was unanimous that the responsibility for the design of the mudsill should be given to the Contractor. It was also generally agreed to allow the Contractor the flexibility to determine what test should be used to validate design assumptions. Mark stated that he would try to get Mark Frye to attend an upcoming meeting for further discussion.

Action Item: Mark will look at potential revisions and will work to bring Mark Frye to a future meeting.

6. **Grade 80 reinforcing steel in drilled shafts**
Mark discussed WSDOT plans to detail both 60ksi and 80ksi rebar details for shaft cages. Providing both sets of details will allow WSDOT to evaluate which option is most economical and preferred by industry. The Contractors did not express any concerns over the proposal.

Action Item: No action needed.

7. **Contract time for shaft obstruction removal**
Mark discussed our plans to revise the standard specifications to allow unworkable days for critical path impacts when dealing with obstructions for drilled shaft work. Currently – contract time is not extended for obstruction removal until 100% of the FA bid item is used. On a large project, this could result in a significant amount of time and impact. There was open discussion with regards to FA and extended overhead. The Contractors suggested that the proposed spec change is better than what we are currently working with – however – the FA would not compensate them for extended overhead.

It was decided that the bigger FA and extended OH topic should be passed on to the WSDOT/AGC Admin team.

Action Item: Mark will add the unworkable day change into the January amendment.

8. **Concrete deck temperature requirements.**
This topic was raised by Scott. Contractors are struggling to meet the 75-degree temperature requirements for bridge deck concrete. Mark spent some time explaining why the temperature requirements are included in our specification and the research that supports this requirement. On a recent project – one of the team members suggested it cost approximately $30/CY to add ice to cool the concrete and meet specification. Another Contractor suggested this may not be adequate to meet the requirement.

The team requested this issue be taken back to WACA so that the Concrete suppliers are very clear about the temperature requirement. It was also noted that the concrete pump is also increasing the temperature of the concrete by as much as five degrees.

The option of using a night pour in lieu of holding the 75-degree requirement was discussed. The Construction manual would need to be updated to insure this gets discussed at pre-deck pour meetings.

Action Item: Mark will invite WACA to our next AGC meeting to discuss further.

9. **"Robotic" bridge deck demolition**
There is new equipment/technology available to that can assist in controlling deck removal. Our current specification limits hammer weight to 30 lbs. The robotic equipment could be used for demolition work, however the hammer used by the robotic equipment exceeds 30 lbs. In order to allow the robotic equipment, changes to our specifications would be needed to allow larger hammers. Mark had some video of the operation that he shared with the team. The Contractors did not feel the current 30lb restriction was working as well as WSDOT hoped. Laborers get tired because using the smaller hammers takes longer.

Charlie asked if the length of the bar to be spliced could be reduced by using UHPC at the splice location?

Action Item: Mark will review this topic further and get back to the team.

10. **Update on Shotcrete Research**
Mark provided an update of the research WSU has done on shotcrete to date. Then went on to describe the work that will be part of the proposed Phase II research. The following issues are anticipated to be investigated in-depth in Phase II:
    - Cracking in shotcrete (causes and mitigating strategies, including curing practices and mixture designs with shrinkage reducing admixture, silica fume, fibers, etc.)
    - Best curing practices (wet curing, curing compounds, lab vs. field comparisons, etc.)
    - Short and long term performance (field test methods, effect of air contents of different construction stages)
    - Cost/schedule benefits of using shotcrete (vs. CIP concrete)
    - Potential for other shotcrete applications such as fish passage work.

It was noted that the Bridge Office has included permanent shotcrete on at least 2 more projects.

Action Item: Mark to provide an update at the next meeting.

11. **Dewatering foundations/use of foundation seals**
Kelly asked to discuss Standard Specification Section 6-02.3(6) that states the following:

When a foundation excavation contains water, the Contractor shall pump it dry before placing concrete. If this is impossible, an underwater concrete seal shall

be placed that complies with Section 6-02.3(6)B. This seal shall be thick enough to resist any uplift.

His concern is that this potentially requires significant work to achieve, however there is no mechanism for payment if a seal is ultimately required. He also noted that it isn't clear whose responsibility it is to determine if pumping to dry out the excavation is "impossible". Is this a call that the Contractor makes, or is it the responsibility of the Engineer? If a seal is required, is the Contractor supposed to absorb this added cost?

He discussed a specific example where he was trying to keep the excavation dry with several very large pumps but could not maintain a dry excavation. How does the Contractor bid this?

Mark agreed to review this specification to see if improvements can be made.

Action Item: Mark will work on reviewing this specification and will provide an update at the next meeting.

12. **WSDOT/AGC Lead team meeting**
Mark closed the meeting by providing an update from the AGC lead team. Items discussed included;
- Changes at the executive level
- Report out from each team
- DBE update (mentor/protégé) Charlie said that LS contracts are very challenging to obtain the DBE participation. The industry is saturated. WSDOT needs to consider GFE more.
- Certified Inspector program
- WSDOT succession planning
- Legislation
- eConstrcution
- Annual AGC meeting is at Alamore Golf course January 5th

Mark also provided information to direct Contractors on where they can go to review upcoming project list and what type of delivery is proposed to deliver the work. Susan Fell is currently developing a DB contract for the SW Region.

FHWA is requesting comments on proposed Buy America changes. Mark requested the team to please review the language and provide comment as it appears some of the proposed changes would be onerous.

Next meeting dates: January 27th, March 10th, April 21st, June 2nd .