AGC/WSDOT Structures Team Minutes
25 January 2008

Members

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Guests

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Topics – Tieton River Bridge Constructibility, Prestressed Girders Temporary Strand Creep, Steel BP Rail, Powder Coating Sign Bridges, Retaining Wall Barriers, SEW Moment Slab Strip Feature, Owner Designed Moment Slabs, Pile Driving Spec Modification, Fast-set Epoxy Resin, Constructibility Review Guide, Oscillator Temporary Pile Support, Shaft/Column Splice Zone Concrete, Work Bridge Pile Driving with Vibro-hammers

The meeting started at 09:00.

1. Constructability Review – Tieton River Bridges

Jeff Minnick, WSDOT SCR, provided handouts and presented the preliminary design for replacement of Bridges 12/316 and 12/317 on US-12 between Yakima and White Pass. WSDOT HQ Bridge designers were also in attendance to discuss the structural design and key SCR designers participated by teleconference. Jeff summarized the project, as follows:

- Existing bridges are 3-span, with total length of approx 150 ft. Center span is steel truss with concrete deck and approaches are concrete tee-beams.
- Replacement is due to structural deficiencies with existing bridges which are approximately 9 and 10 on the WSDOT list for bridge replacement.
- The new bridges will be built with new alignment approximately 45 ft center-to-center from the existing bridges.
- New bridges will have 32 ft roadway width, based on two 12 ft lanes with 4 ft shoulders.
- New bridge 12/316 will be 182 ft long and will be a single span, likely using WF83G girders and spread footing foundation.
- New bridge 12/317 will be 247 ft long and will be two spans (80 ft and 167 ft), likely using W42G girders and 8 ft diameter driller shaft foundation.
- The work will include rockfall blasting to improve safety of nearby steep slopes.
- Existing structures will be removed following roadway realignment onto the new structures.
- The project is scheduled to be advertised in October 2008 with work starting spring 2009.
- Fish window is June 1st – August 15th for in-water work which includes pier removal.
- The new bridge is planned to be above the groundwater and river levels but one new pier will be placed in a wetland.
- Winter work shut-down is considered for November 1st – February 28th.
- Most of the embankment materials will be rock blasted from a nearby source.
- A VE study validated the cost and design with minor changes.

As a component of the handouts provided to the team prior to the meeting, Jeff asked the following questions:

1. Is $200/sf of deck a representative cost for a concrete girder structure in a fairly remote, mountainous area where girder launching is the preferred mode of girder placement and transporting girders would require traveling a minimum distance of 130 miles?

2. Will the sites available in the plans work for pH water disposal or are there other areas and/or processes to dispose of or filter water that would work better for this project?
3. What is the preferred method of shoring to support the existing bridge and dewatering (if needed) for spread footing construction?
4. What method of water containment with a CFS of 768 for Ordinary High Water level of 2058.o ft at Br 12/316 and 2026.5 ft at Br 12/317 would be necessary to remove existing piers down to the top of the footing?
5. What construction timeframe is appropriate for the two structures; can the bridges be open to traffic before July of the second construction season?

Team discussion and response to questions included:

- Contractors believe that it is possible to truck the 182 ft girders to the site, but recommend contacting Van Dyke trucking to confirm.
- Shaft preliminary design is 30 ft to 50 ft length with 5 ft to 10 ft socket into bedrock. Consider shafts for all foundations to avoid dewatering and shoring for spread footings.
- The design team is not sure whether rock can be blasted for spread footing construction.
- $200/sf estimate includes superstructure and substructure. One Contractor noted that they would estimate closer to $300/sf based on recent work in Oregon.
- Riprap can be relocated around existing piers during the fish window.
- Contractors recommend specifying the oscillator for the drilled shaft work which must socket into rock.
- Designers indicated that water infiltration was acceptable as long as it was treated and infiltrated greater than 20 ft from the river. Based on Contractor recommendation to allow temporary storage, pH treatment, and release into the ground by infiltration, project staff indicated that they would add a detention pond. Contractors noted that the same net effect would be obtained if the water was stored in a Baker tank for treatment and released for infiltration into a pond, but the use of the pond for treatment is less expensive. The Contractors highly recommend getting specific acceptable terms from Department of Ecology before the project is advertised.
- With regard to shoring, the team recommended working with the US Bureau of Reclamation to evaluate the feasibility of lowering the river level to ensure the spread footings are not constructed in-water. Based on the difficulty of the in-water work, Contractors recommend changing the spread footings to shafts if they cannot get the Corps to lower the lower level during footing construction.
- For removal of the existing piers, Contractors recommend a barrier upstream to block flow, then turbidity curtain downstream. The team strongly recommended abandoning the existing spread footings and diamond sawing off the abutment wall.
- Demolition of the existing bridges could be done from the new bridges with the center truss cut into several pieces as necessary for trucking.

- Contractor's recommended allowing increased time for the demolition to reduce the associated cost.
- Contractors and designers did not know if the trucking routes had limiting heights for girder delivery and demolished structure removal.

Action Item: No further action by the team.

2. Approval of November Meeting Minutes

There were no comments on the November meeting minutes which were approved.

Action Item: November minutes will be published to the WSDOT website. No further action by the team.

3. Prestress Girders' Temporary Strand Creep Effect

Mohammad Sheikhizadeh discussed this issue, which was covered in a previous meeting. Members requested that the bridge design include creep data for release of temporary strands at 30, 60, 90, and 120 days prior to deck placement. Bridge design agreed to this request which will be incorporated into future designs.

Action Item: No further action by the team.

4. BP Rail Alternatives to Aluminum

Ryan Olson provided a handout of the current basemap and details 2 of 2 for Bridge Railing Type BP. Ryan indicated that the 2 sheets had inconsistency on the location of the weld between the rails and the channels at their base. He also indicated that, although BP rails are now manufactured with materials other than aluminum, the standard plan provides only aluminum and should be updated to include other material alternatives. Jugesh Kapur mentioned that the material type is based on Regions' request. He agreed that both modifications would be incorporated into the standard plan sheets.

Action Item: Jugesh Kapur will have the standard plan sheets revised. No further action by the team.

5. Powder Coating Sign Bridges

Mo requested feedback on powder coat practices for sign bridges. Contractors indicated that they frequently see steel sections sent to Oregon for powder coating and that they found the use of powder coating to be cost effective compared to field painting. Team members were not aware of any difficulties with field repair of damaged powder coating. WSDOT indicated that they use a special provision for quality assurance requirements and inspect powder coating shops to ensure quality control.

Action Item: No further action by the team.

6. Retaining Wall Barrier Alternate Detail

Mo provided a handout of the revised Reinforced Concrete Retaining Wall Type 1 and 1 SW Standard Plan D-1a, which includes revisions based on feedback from the team. Ryan Olson indicated that he would review the plan to verify that the team's concerns were addressed.

Action Item: Ryan Olson will review the plan sheet and provide feedback to Mo.

7. Structural Earth (SE) Wall Moment Slab Strip Feature

Mo requested Contractor feedback on the method of forming the joint that exists on the outside face of a moment slab between its vertical barrier section and the horizontal slab section. Current plans require the joint be maintained within tolerance by good forming techniques. Team discussion included the following:

- The joint is very visible in many locations and is difficult to form regardless of form type.
- Incorporate a feature strip to hide any potential forming slips or "slobber" which can occur if the concrete paste drips under the joint.
- The issue is treated inconsistently across different project offices.
- The same issue exists with the pour strip in cast-in-place concrete box girders.
- Bridge design will review potential changes.

Action Item: Jugesh Kapur will discuss this issue with Paul Kinderman, WSDOT Bridge Architect. No further action by the team.

8. Owner Designed Moment Slabs

Following earlier discussions on this topic, team members again requested that WSDOT design moment slabs for SE Walls. Team discussion included the following:

- WSDOT cannot create a standard plan for this moment slab due to variations in type of wall between different SE Wall manufacturers.
- Contractors see extra cost in having the wall supplier design the moment slabs.
- Mo will invite a WSDOT HQ Roadway Construction representative to the next meeting to further discuss options as SE Walls are not handled by HQ Bridge Constr.

Action Item: Mo will invite a Roadway representative and add this topic to the next meeting agenda.

9. Pile Driving Specification Modification

Pursuant to significant discussion on this topic at previous meetings, Mo provided the team a handout with the proposed new language for pile driving construction requirements in Section 6-05.3(9)C of the standard specifications. The changes

incorporated qualification of each pile driving system on a project through Pile Driving Analyzer (PDA) testing, when leads fixed at top and bottom are not used. This is a reduction of PDA testing from one at each pile group to one for each system.

Relevant pile driving system parameters that will be evaluated with a single PDA test include:

- Hammer type
- Cushion material
- Pile geometry and material
- Operator
- Leads
- Pile batter
- Soil strata

Team discussion included the following:

- Fixity, defined as restricting rotation or lateral movement of the leads, is not always possible on sloped ground.
- Embedment of 20 ft into ground as qualification for bottom fixity is not useful as a substitute for bottom fixity by spotter because the spotter would still be needed to start driving.
- Team members questioned why PDA was not required for all piles if WSDOT deemed it necessary for those without fixed leads based on feedback from Bert Miner that the PDA is not related to the leads.
- Bert submitted feedback on the summary of his presentation at the November 07 team meeting and recommended lead lengths more than 3 times the hammer length to help leads hang vertical.
- Scott Ayers submitted revisions to the pile driving specification that would allow no PDA testing as long as the leads had length at least 70% of the pile.
- The specification is intended for permanent works only and should not be applied to falsework support piles.
- The function of the pile gates is to ensure concentric impact on the pile regardless of pile orientation.
- Members agree that one PDA test per driving system should ensure piles are not damaged by the driving system and meet WSDOT's requirement for quality assurance on installations.
- A few (not all) members suggest a PDA test whether leads are fixed or partially fixed.
- Members requested a clear definition of "driving system" to evaluate need for PDA testing on a large project with multiple pile installation locations.

Action Item: WSDOT HQ Construction will evaluate team feedback and provide a revised pile driving standard specification.

10. <u>Fast-set Epoxy Resins</u>

Mo provided the team a handout with WSDOT direction to its Project Engineers with regard to use of fast-set epoxy resins.

WSDOT policy is:

- Eliminate all use of fast-set epoxies.
- Evaluate qualified products list (QPL) with assistance from manufacturers to characterize epoxy resins as fast or standard set.
- Continue use of standard set epoxy resins for non-creep applications.

Team discussion included the following:

- Typical application is for resin-bonded anchors.
- There is no single standard that identifies fast-set versus standard-set but there are available creep tests that are being conducted.
- California uses magnesium-phosphate (set 45) for dowel anchors.

Action Item: No further action by the team.

11. Guidelines for Constructability Review

Jesse Beaver provided the team a revised handout with guidelines for constructability reviews along with the WSDOT Bridge Design matrix. The guidelines and the design matrix are provided to designers to organize their materials for constructability review by the team. This version incorporated several minor comments from team members.

Action Item: No further action by the team.

12. AGC Annual Meeting

Mo discussed the recently held annual meeting and noted that attendance was excellent. Members concurred and indicated that their attention is better held for the long meeting if the presentations are fresh information.

Action Item: No further action by the team.

13. Oscillator Temporary Pile Support Extraction

Mo introduced this topic and related that it has been extensively discussed at the Drilled Shaft Contractors (ADSC) meetings. The design methodology for drilled shafts requires undisturbed soils surrounding the shafts to develop a resisting wedge of soil for lateral loads on shafts. The design method uses Deep Foundation Structural Analysis Program (DFSAP) which does not allow evaluation of the effect of potential voids in the soil near the shafts as is the case if piles are driven, and plugs of soil removed, in close proximity.

Team discussion included the following:

- Add language to contracts that require piles be abandoned if used near shafts; this will clarify WSDOT requirements during bidding.
- Evaluate cost of abandoned piles and compare to cost of designing shafts to allow voids in the top 20 ft of surrounding soils.
- Note that this is an expensive requirement.

Action Item: No further action by the team.

14. Shaft/Column Splice Zone Concrete

Mo introduced the topic and requested Contractor feedback on methods used to place concrete above the top of shaft and within the zone that has both the shaft reinforcement cage and the column reinforcement cage.

Team discussion included the following:

- Concrete is poured outside cage and vibrated into the center, which is no different than pouring inside cage and vibrated to the outside, as long as the outside pour is all around the circumference.
- WSDOT is considering requiring 4000P to reduce risk of inadequate consolidation in this zone
- WSDOT was previously informed that Contractors would prefer to have all quantity of 4000P in the drilled shaft subcontractors bid items; however, team members agreed that addition of this 4000P requirement would be no problem.

Action Item: WSDOT will require use of class 4000P for the column/shaft spice zone.

15. Work Bridge Pile Driving with Vibro-hammers

Mo asked Contractors about this work in relation to impact hammer noise mitigation requirements. Contractors indicated that there is no way to get the pile capacity without some type of final impact. Members discussed conservative use of soil properties to estimate capacity, but, based on past practice, indicated that this would significantly increase risk of inadequate structural capacity for work bridges. Members recommend working with resource agencies to get approval of a minimal amount of impact driving to ensure piles have adequate bearing capacity.

Action Item: No further action by the team.

The meeting was adjourned at 12:00. The next set of meetings are scheduled for **22 Feb 08**, **21 Mar 08**, **18 Apr 08**, **16 May 08**, and **27 Jun 08**.