



ADSC/WSDOT Meeting Minutes

September 30, 2010

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Guests

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Meeting minutes were prepared by Mark Gaines, WSDOT Assistant State Construction Engineer, gainesm@wsdot.wa.gov.

Topics – Constructability reviews of I-90 snowshed, SR 530 Skaglund landside, Snohomish River Bridge shaft cage, and Simpson Ave. Bridge. Soldier pile soil/cement mixing specifications, Chinese CSL tubes, shaft thermal testing.

The meeting began at 8:30 AM at the WSDOT Lakewood Maintenance Office.

Agenda Items

1. Constructability Review of I-90 Snowshed

Dick Stoddard gave a brief overview and pointed out this project has been previously reviewed by the Task Force. The reason for bringing this back to the Team is because the Bridge Office is considering ways to make the shaft design more efficient. Because of potential landslide forces, these shafts have both high shear and high moment demand. Preliminary design shows the need for very heavily reinforcing (60 #14 bars, bundled). The Bridge Office believes using a concrete-filled steel tube would be a more efficient way to reinforce these shafts. They are evaluating this option for constructability. The concept construction sequence for a steel-pipe reinforced shaft would be:

- Install temporary casing to the bedrock.
- Drill shaft and rock socket.
- Test-fit steel pipe in the rock socket.
- Fill rock socket with concrete and set the pipe into the socket.
- Fill inside of pipe with concrete.
- Fill space between pipe and temporary casing with concrete and extract temporary casing.

Dick asked the Team for feedback on the proposed construction sequence and other thoughts about constructability of this system. One Member suggested cutting windows in the pipe to allow the outside and inside of the pipe to be filled with concrete concurrently. Dick responded that this wasn't desirable structurally. It was also suggested that the pipe be wet-set in a single operation. This could be acceptable if the concrete hasn't reached initial set.

There was concern from the shaft contractors about how the rest of the structure will tie in to the pipe-based shafts. Dick described that there would be a reinforcing cage at the top of the shaft that would need to lap with the steel pipe by about two shaft diameters. In response to a question, he added that this cage could also be wet-set, and that the overall shaft probably wouldn't require CSL testing. Concern was also raised about the very limited clearance between the OD of the reinforcing cage and the ID of the pipe; only about 2" of clear space is provided. Considering the tightly spaced hoops and vertical bars, ADSC recommended providing more like the standard 5" clearance between the pipe and cage.

There was also discussion about how to handle the potential overrun and underrun of quantities considering potential variations in rock elevation. One Member suggested increasing the amount of permissible overrun/underrun that is allowed before unit prices are renegotiated (Standard Specification Section 1-04.6). Some Members were fine with this, others had concerns.

The constructability review wrapped up with discussion about the PGA's that will be installed in the shaft cap. With about 60 feet of overburden in a cobble/boulder filled

environment, the contractors were concerned the anchors will wander and not maintain the plan 5'-0" spacing. ADSC suggested limiting the anchors to seven strands. There were also some concerns with the potential of grout flowing into the Lake through loose soils.

The rebar cage option and couplers violate the 5" square opening. Alan Macnab suggested using #18 bars to increase the cage opening.

Overall, the drilled shaft contractors believe that the steel pipe based shafts will be more economical and efficient than conventionally-reinforced shafts.

Action Item: Alan Macnab to provide written comments to Mo within 10 days.

2. **Constructability Review of SR 530 Skaglund Landslide**

Todd Mooney provided an overview of this upcoming project that is located between Arlington and Darrington. Globally, this is a very large slide area. The purpose of this project is to construct a soldier pile wall to stabilize a small area of this slide that is close to the state route. The area below the road has been stabilized in the past using a buttress and horizontal drains; this new project will stabilize the area above the road. The new wall is about 400 feet long and uses 43 built-up piles. Soldier piles are approximately 85 feet long with about 63 feet of embedment. The ground anchors for the wall will be about 80 feet in length and installed at a 30 degree declination.

Alan Macnab voiced concern that the water table isn't well described in the subsurface information. Specifically, they need to know if the holes will be wet or dry, and if the dense sand layer be wet or dry. The elevation of the water table will have a substantial impact on construction; if these are wet holes, casing will be required and will add to the cost and time of construction. Alan also questioned why this project was going on Ad this fall at the start of the rainy season. It would be better to put this project on Ad in the spring for construction during the dry season.

There was also discussion about access at the site. A detour road will be in place, providing 30-40 feet of access. The contractor will be required to submit a work access plan. ADSC recommended that the contract spell out what can and can't be done with respect to access.

It was recommended that WSDOT consider using driven piles rather than soldier piles. This would take the water table/shaft stability issues out of the equation. The ADSC Members speculated that a driven pile system would be significantly less expensive than a drilled soldier pile wall.

Action Item: Alan Macnab to provide written comments to Mo within 10 days.

3. **Snohomish River Bridge Shaft Cage Constructability**

This drilled shaft project uses structural H-piles to replace some of the conventional reinforcing in the shaft cage. Mo confirmed that WSDOT will need CSL testing performed on this shaft. There was concern from ADSC that the structural steel will affect the CSL test. Mo replied that the CSL equipment vendor has indicated that steel in the path of the CSL signal doesn't affect the response time appreciably. ADSC also raised concerns about the weight of the reinforcing cage with the structural steel members. With the H-piles, these cages weigh as much as 170,000 pounds. It was suggested that the beams could be vibrated or wet-set into the shaft concrete after placement but prior to initial set. It was also suggested that spirals larger than #6 bars are not available. If larger rebars are needed, they must be welded hoops.

Action Item: Alan Macnab to provide written comments to Mo within 10 days.

4. **Simpson Ave. Bridge Shaft Construction Sequence**

ADSC asked for a couple of clarifications on the upcoming Simpson retrofit project. How does WSDOT expect the casing to be pushed into the dense gravel layer? Mo responded that the contractor is permitted to drill ahead of the casing by two feet to relieve it. This method may be necessary to install the 36" diameter casing. Another ADSC Member asked if the 36" diameter casing were taken to tip, could the tip of the shaft be raised up? Mo responded that the project should be bid per the contract plans. Any proposal to change the casing from what is shown in the plans would need to be handled by CRIP and/or change order after contract award.

Mo thanked the ADSC Members for their support and assistance in putting together the Simpson Emergency Repair contract. Al Rasband reflected on the tight timeframe in which the Simpson details needed to be reviewed. For future constructability review projects, he asked if the information could be sent to all ADSC Members rather than through Alan for distribution. Mo responded that he would be happy to distribute in whichever way ADSC prefers. However, he asked that we receive only a single response back that reflects the views of all Members. Alan agreed to work with the other ADSC Members to establish a distribution list. The list will be provided to Mo for distribution of future constructability packages.

Action Item: Alan Macnab to coordinate with the other ADSC Members and provide Mo with a distribution list for future constructability review packages.

5. **May Meeting Notes Review**

There were no comments on the May meeting notes.

Action Item: Mike Niemi to post the May notes to the web site.

6. **Action Items**

➤ **Barrier transition cap details at sign Bridge Shafts**

It appears this issue has been resolved by the Bridge Office. Mo will get a copy of the latest plans and distribute to the group for their review.

Action Item: Mo to provide latest details to Team for their review.

➤ **Concrete fall research report**

ADSC has provided this report to Mo. He will review and get back to the Team and the next meeting.

Action Item: Mo to review report and discuss with the Team at next meeting.

➤ **Soldier pile soil/cement mixing specifications**

Mark Etheridge provided Mark Frye with information on soldier piles installed using soil/cement mixing. Mark Frye reviewed the information, but said the information wasn't very detailed. The report he reviewed was from 1999; he asked if there was anything more current. From the information in the 1999 report, Mark Frye would have concerns with this type of system.

Mark E. discussed that a good application for this system is in limited access areas where it is difficult to get concrete. Mark F. pointed out that our specifications don't preclude this for temporary shoring. It was also discussed that for non-tie back walls, we currently set the piles in CDF. Mark E. believes the soil/cement mixing provides much greater strength than CDF. There would be limitations to soil/cement mixing. For example, it wouldn't be appropriate for use in clay soils.

Mo asked Mark E. if he would be willing to work on a BSP/GSP for soldier piles installed using soil/cement mixing. Mark E. agreed to work on this and keep Mark F. in the loop. He will provide draft specifications for review at the next meeting.

Action Item: Mark E. to work on soil/cement mixing specification. Draft copy will be provided for review and the next Task Force meeting.

➤ **Request for equipment costs**

Mo wasn't able to get to this yet, but he will work on it shortly.

Action Item: Mo to work on this and update Team at the next meeting.

Other Items

Al Rasband gave a report on his experience with the new Chinese-made CSL tubes. Its performance has not been good. Malcolm found that the tubes were thin-walled, easily damaged, and had leaky joints. Malcolm is no longer pursuing use of these tubes.

Mark G. asked about PVC end caps for CSL tubes. Some projects have been using steel caps even though our specifications require PVC caps. The ADSC Members reiterated that PVC caps should be used to facilitate repair in the case of shafts with soft bottoms or other issues at the tip.

Mo and Mark G. summarized the recent thermal testing that was done on Manette. Mo also explained that if and when we shift to thermal testing, we can use PVC tubes rather than steel tubes. He asked if ADSC would prefer PVC over Steel. Alan agreed to discuss this with the other Members and get back to Mo.

Some of the drilled shaft contractors expressed concern about getting paid for force account work even after the rates have been agreed on. After some discussion, Mo responded that this was a contract administration issue that needs to be handled at the prime contractor/WSDOT Project Office level.

Action Item: Alan to review and let Mo know if PVC or steel tubes should be used for shafts that use thermal testing in lieu of CSL testing.

The meeting was adjourned at 11:30 am. Future meetings are scheduled for November 18th and January 6th.