



ADSC/WSDOT Meeting Minutes
10 September 2009

Team Members

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Guests

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Meeting minutes were prepared by Jesse Beaver, WSDOT Assistant State Construction Engineer, BeaverJ@wsdot.wa.gov.

Topics – Feedback from ADSC West Coast Chapter; Constructability Reviews for Local Agencies; Constructability Review of U-tube tunnel Shafts on the Holgate To King Project; Constructability Review T-Street Ground Improvement; Criteria for Rebar Cage Lifting; Soldier Pile Handling Provisions; New Centralizer Schemes; Use of Pea Gravel for Temporary Soldier Piles; Wet Setting Permanent Ground Anchors; Synthetic Slurry Disposal; Sand Content Limits; Contractor Qualification with New Equipment; Thermal Testing for Shaft Integrity

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

1. Feedback from West Coast ADSC Chapter

Alan Macnab relayed a request from the West Coast Chapter of ADSC to continue to the annual inspector training. Al indicated that the chapter had received requests from local agencies, based on their attendance at past trainings.

Action Item: Mo will pursue approval for further training within WSDOT and report back to the team.

2. Constructability Reviews for Local Agencies

Alan relayed a request from ABKJ to review the constructability of foundations for a pedestrian bridge for the City of Seattle. The request came late in the design process, Alan asked if this type of review could and should come before the team. Discussion indicated that the team was willing to review constructability for local agencies provided the quantity did not overwhelm other important agenda items.

Action Item: The team will discuss this available constructability review service at the annual inspection training which typically includes representatives from local agencies.

3. Constructability – Shafts for the U-tube tunnel on the Alaskan Way Viaduct Holgate to King Contract

Mo provided the team a plan sheet from the upcoming H2K contract that had a drilled shaft with a W27x258 steel beam (H-pile) as the core reinforcement. Team discussion included the following:

- With the beam in place, the contractor would have to use 2 tremie pipes which would result in frequent anomalies.
- Members were unable to identify a need for the shear studs shown on the h-pile.
- Use of SCC would help to fill around the h-pile, but there are significant concerns with flash set.
- CSL testing would work ok, but there would be a lot of anomalies.
- The team considers the design to be fatally flawed from a constructability standpoint.

Action Item: No further action.

4. Review and Approval of June Meeting Minutes

Members requested the following revisions and approved the minutes with their inclusion:

- Item viii change hasn't been done. This change is to allow pea gravel use for temporary soldier pile fill.
- AWV bullet - fix "and" to "an"
- CRC bullets - Second to last bullet, change "cased & open" to "oversize casing cleaned out"

Action Item: WSDOT will revise the June minutes and post to their website.

5. Constructability Review – T-Street Ground Improvement

The WSDOT design team presented the project and requested feedback on the range of required ground improvement scenarios. Designers asked the team to focus on utilities and ground improvements.

Project details included the following:

- Work includes jet grouting, stone columns, retaining and walls
- Site constraints include existing 24", 60", and 72" sanitary sewers.
- The site includes deep layers of liquefiable soils.
- Sequence – bypass sewers, then improve the ground.
- Constraints include:
 - Work is constrained to 10ft clear under I-5 in some locations
 - Wetlands
 - Existing bridge foundations, some with timber piles
- There is an available 8 page technical memo that was used to select appropriate ground improvement technique at each location.
- There is an artesian aquifer 40ft-80ft deep with pressures up to 30ft above the ground surface; cement treatment will not be feasible at the aquifer locations.
- Must ensure grout doesn't enter sewers.
- Goal is area replacement, not densification to resist liquefaction.

Team discussion and recommendations included the following:

- Members questioned the designers on preferred sequence with respect to shoring and sewer removal.
- Consider re-routing I-5 ramp to get headroom.
- Soil-cement mixing costs 1/3 to 1/2 as much as jet grouting but requires very high overhead clearance.
- Rammed aggregate piers (RAP) are not the same as stone columns; team members consider RAP to be inferior methods.
- Stone columns are much less costly than jet grouting, even with predrill through dense upper soils.
- Members had no concern with spreading for compaction grouting.
- Contractors asked for estimates to validate order of magnitude.
- One member contributed the following estimates for design use:
 - Stone column ~ \$25/LF
 - Soil-cement mixing ~ \$125/CY
 - Jet grouting ~ \$250/CY
 - Jet grouting with low overhead clear ~ \$350/CY
 - Compaction grouting ~ \$20/CF drill plus ~ \$10/CF compact
- Members requested Appendix B of the technical report.

- Members indicated that there would be area replacement issues, say, between jet grouting with 14ft diameter areas and 3ft diameter stone columns.
- Construction of stone columns in silts @ liquid limit can reduce the strength of surrounding silts; Malcolm Drilling will provide information on the strength decrease.

Action Item: Malcolm Drilling will provide WSDOT with literature describing loss of strength in silts and their liquid limit during construction on stone columns.

6. Criteria for Rebar Cage Lifting

Mo provided the team with the revised new WSDOT language for steel reinforcing assembly and installation plan that will be added to the drilled shaft special provision and used in all future WSDOT contracts. Division 5 of the AASHTO Bridge Construction specification, balloted recently, was also updated to include this submittal process.

Action Item: No further action.

7. Soldier Pile Provisions for Handling

Defer to the next meeting.

Action Item: Mo will add to the agenda for the next meeting.

8. New centralizer Schemes

Members noted that there have been no recent problems with the new centralizer details following modification of the weld detail.

Action Item: No further action.

9. Allowing For Use of Pea Gravel in Temporary Soldier Piles

This topic is ongoing from previous meetings. Team discussion included the following:

- WSDOT prefers to use lean concrete or controlled density fill (CDF) rather than pea gravel.
- There are concerns with pea gravel columns 20ft below excavations allowing communication between underground water, such as aquifers.
- DBM says prohibiting it in the spec doesn't lead to any valid exceptions.
- Members asked WSDOT to consider case-by-case, due to potential construction cost savings.
- WSDOT will revise GDM process to allow identification of cases where it is permissible and trigger insertion of a related BSP that the Bridge office will write.
- Members asked WSDOT to review the standard specification to ensure it is consistently biddable.

Action Item: WSDOT HQ Geotech will review the process of recommendations for temporary shoring. WSDOT HQ Bridge will write a BSP allowing use of pea gravel for temporary shoring. WSDOT HQ Construction will ensure the standard specification permits this process.

10. Wet Setting Permanent Ground Anchors (PGA)

Members reviewed this process and agreed that it is a poor practice that should be prohibited.

Action Item: Mike Bauer will revise the specification to prohibit this practice.

11. Synthetic Slurry Disposal – Course of Action

Scott Carey discussed his work on behalf of the team to facilitate disposal of slurry. Scott provided a handout with a disposal plan. Scott discussed past issues including spilling concrete on the ground and whether or not synthetic slurry use will be allowed and the current issue of chemical treatment of slurry. To address these issues, and to avoid a potential long-term review by the Department of Ecology (DOE) that could affect current construction activities, Scott and Mo created the following plan moving forward, in sequence:

- Write a white paper on the drilled shaft construction, use, and synthetic slurry process.
- Research groundwater affects from slurry migration.
- Look at materials standards such as NSF Standard 60 and ANSI Standard 61.
- Take these results to DOE and The Department of Fish and Wildlife.

Team discussion included the following:

- Sparging, which is bubbling CO₂ to lower pH or use of dry ice, are approved by DOE as Best Management Practices (BMPs) in the Western Washington Stormwater Management Manual.
- Sparging also breaks down polymer, mostly separating it from water.
- Anionic polychromides have been disposed of in waterways based on bio-assay results indicating they are innocuous.
- The white paper will be drafted between Sheikhezadeh, Tuttle, and Macnab. Mo will provide the first outline at the next meeting.
- There are concerns about the use of flocculants making water slurry have to be treated as if it were synthetic slurry.
- CO₂ treatment is unpredictable and can lower pH too much.

Action Item: Mo will provide an outline for the white paper at the next meeting.

12. Sand Content Limits

Mo relayed his experience on a recent contract where the onsite driller QC required a lower sand limit than the contract requirement of 1% maximum, based on his desire to avoid soft

tip. Consequently, WSDOT requested team feedback on this risk. Members noted that properly constructed shafts don't typically experience soft tips as proof of the efficacy of the spec and requested it not be changed.

Action Item: No further action.

13. Contractor Qualification with New Equipment

The current drilled shaft specification doesn't require the contractor to have used the specific equipment that they propose, provided the equipment is adequate. This allows an experienced driller to, for instance, switch to an oscillator on a given contract when they have no experience with one. WSDOT is going to require that the Contractor have experience with the equipment they intend to use. This qualification will be by the type/class of equipment.

Action Item: WSDOT will revise the specification and provide it to the team for comment prior to implementation.

14. Update on Thermal Testing for Shaft Integrity

MO provided the notes from Professor Mullins presentation on this research and field testing project. Team discussion included the following:

- Consider slump loss issue if temp casing is dead-pulled; although vibro-hammer helps this and prevents a case of 'slip-forming'.
- Team disagrees that the first concrete that is placed in the shaft is never sent to the top of the shaft.

Action Item: Mo will keep the team informed of new developments with the testing.

Next Meeting: November 12th, 2009, 8:30 AM at the Lakewood Maintenance Facility. This date was later changed to November 5.