ADSC/WSDOT Joint Meeting

January 24, 2019, 8:30 A.M. – 11:30 A.M.

ADSC/WSDOT Sign-In Form

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1 Team co-chair

Guest Sign-in

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1. Welcome/Review of Agenda

Michael Rosa opened the meeting and everyone introduced themselves. Mike then reviewed the agenda for the meeting.

2. Approval of Minutes

Mike asked the group if there were any revisions needed to the November 11, 2018 meeting minutes. No revisions were suggested. Mike will post the minutes to the internet.

3. Changes to Concrete Filled Steel Tubes (CFST) Special Provisions

Amy Leland presented draft specifications for Concrete Filled Steel Tubes. Concrete Filled Steel Tubes are being used more to reduce shaft diameter while meeting design requirements for stiffness. Spec elements reviewed included cleaning and inspection, manufacture of casing, and field slicing. The specifications require that after excavation the internal surfaces of the shaft permanent casing shall be clean as verified by visual inspection. Discussion was had on how practical visual inspection would be at depth and potentially underground water. The team discussed potential solutions including exempting inspection from installations that could be assured would be clean based on soil type and installation method.

Action Items: Amy will suggest additional changes to address the inspection issue.

4. Modification to SS 6-19.3(3)I

Mike asked the group how the infiltration rate for compliance with SS 6-19.3(3)I, Required Use of Slurry in Shaft Excavation, was being determined in the field. The specification requires that slurry be used when the infiltration rate reaches 12 inches in 1 hour. The specification does not consider shaft diameter and the work does not stop for a reasonable measurement while at the same time water is being removed by the grab. Jim asked for suggestions on a verifiable method for determining when slurry should be added to the excavation. This topic will be revisited at the next meeting.

Action Items: Jim will evaluate suggestions.

5. Constructability Review – SR520 Low Overhead Cut Wall at 10th Ave

This item was deferred to the next meeting.

Action Items: None

6. Shaft Inspection Form

Jim presented a shaft inspection form that will be used by WSDOT inspection staff. Currently there is not a standardized form. The form included a pour log to be filled out by the inspector. The group felt that the Contractor pour log that is required by specification should be enough. The amount of communication required during the work for the inspector to adequately fill out a separate log would likely disrupt the operation. Jim asked the group for comments. The form will be revisited at the next meeting.

Action Items: Jim will evaluate any comments received.

7. ADSC/WSDOT Joint Training – Spring 2019

The Joint Training will be deferred to next Fall.

Action Items: None

8. Action Items

Force Account Obstruction Removal rates and cost/time

Deferred to next meeting.

Project: US 101 Elwha River Bridge – Shaft Installation in Weak Rock – Review Additional Geotechnical Information

This item was deferred pending new information.

Future Projects Update

Amy presented a listing of future projects that would likely include drilled shaft work for bridges or walls. This will be an ongoing update as new projects are added.

Other Topics

Shaft Dimensions on Plan Sheets

Amy told the group that the shaft dimensions, both oscillator and conventional, were going to be removed from plans as they are already in the specifications. Amy asked for feedback. Some felt that having the information in both places was beneficial. Amy will reevaluate and let the group know the outcome.

Rock Socket Dimensions

Rock socket dimensions were discussed. The contract plans do not typically show how the interface at the top of socket and bottom of casing. The plans also typically show the socket dimension to be the same as the outside diameter of the casing. This is not practical as the drilling equipment must fit into the inner diameter of the casing. The group asked for clarification on an acceptable diameter reduction for the rock sockets.

This will be added to the agenda for next meeting.

Next Meeting March 14, 2019

ADSC/WSDOT Joint Meeting

September 13, 2019, 8:30 A.M. – 11:30 A.M.

ADSC/WSDOT Sign-In Form

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Chappelle, Chase	Michels		cchappelle@michel.us

1. Welcome/Review of Agenda

Michael Rosa opened the meeting and everyone introduced themselves. Michael then reviewed the agenda for the meeting.

2. Approval of Minutes

Michael asked the group if there were any revisions needed to the January 24, 2019 meeting minutes. No revisions were suggested. Michael will post the minutes to the internet.

3. Rock Socket Step vs. Rock Strength

Michael Rosa presented the rock socket options that had been emailed out previously to the group. One option showed a rock socket the same diameter as the casing extending into rock. The second option showed a smaller diameter CFST going into the rock and the full sized CFST stopping at the rock layer. The first option is preferred as it is difficult to place the smaller casing down in the shaft. Weak rock (3000 to 4000 psi limit) can be drilled through fairly easily. Projects with stronger rock would need to be presented to the ADSC on a case by case basis for recommendations. Typically, when going into rock, a 6 inch reduction in shaft diameter is desired to better fit the tooling within the casing. The designer should consider allowing for a reduction in cover on the cage in the reduced section. The standard drilled shaft details should show a step in the cover when drilling into strong rock layers.

Action Items: None. Projects should continue to be brought to ADSC if there are any questions regarding constructability.

4. Centralizer Detail with Large Clear Cover

Amy Leland presented an issue with our centralizer detail when the cover to the cage grows to ~1'-0". A recent job had a large cover to accommodate a reduced shaft diameter for the rock socket. These centralizers did not hold their shape.

The ADSC group mentioned that the rebar cage comes with the centralizers on them, so issues with the design should be addressed by the rebar manufacturer. Chuck Olney from Harris rebar had assisted in the current centralizer design. Chuck may be retired.

Amy asked if anyone has experienced any issues with the centralizers, and none were mentioned.

Action Items: None for the group. WSDOT to seek guidance from Harris Rebar.

5. Cage Reinf. Detailing – Contractor Preference

After the discussion during the last topic, Amy realized that this was not the correct group to solicit opinions on this topic.

Action Items: None.

6. Shaft Special Provision – Shaft Obstructions

Michael presented the proposed Special Provision on shaft obstructions for Jim Cuthbertson. The Standard Specification for Removal of Shaft Obstructions is intended for unknown obstructions and pays for them by force account to track time and equipment used. The East Trent Bridge Project in Eastern Region has a high risk of encountering existing timber piles from a previous bridge at the same location. However, there are no records of the bridge, and the pile locations are unknown. The Special Provision was written to pay for the removal of existing timber piles encountered during shaft installation as part of the Remove Existing Bridge pay item because they would not be considered obstructions. The issue pointed out is that this is a lump sum item and will require the Contractor to include in their bid based on an unknown quantity. It is therefore difficult to quantify, potentially passing the risk to the driller. The ADSC group feels that they should be considered an obstruction and paid through the Removal of Shaft Obstruction item. Alternatively WSDOT could add a line item for the removal and pay for the removal per each. However, when there is >25% change in the plan quantity, then a CO would be triggered which may result in tracking force account work anyway.

Action Items: The recommendation will be provided to the Specification Engineer for possible revision.

7. Action Item (a) Changes to Concrete Filled Steel Tubes (CFST) Special Provisions

Amy presented the modifications that WSDOT will be making to the CFST Special Provisions. Some changes were based on recommendations at the last ADSC meeting. These changes were made to the cleaning and welding sections of the Special Provisions.

A question was raised if the cleaning process had to be a separate event. That is how the Special is currently written. Amy said that it did not have to be a separate event. Eliminating the first few words of that section would fix this issue.

No other comments were made to the changes presented.

Malcom mentioned that he would be willing to present their lessons learned on the construction of their first CFST project, the Chehalis River Bridge. That project had multiple sizes of CFSTs, including the largest ever designed at 10’-0” diameter and 2” casing thickness.

Action Items: Amy will slightly modify the cleaning portion of the Special again. Malcom will present on their lessons learned at our next meeting.

8. Action Item (b) Modification to SS 6-19.3(3)I

Michael presented the updates that Jim made to the slurry specification. Since the revisions were not sent to the group prior to the meeting, the Contractors were not prepared to comment on them.

Action Items: Michael will send the revisions to the group after this meeting for review.

9. Action Item (c) Shaft Inspection Form

Michael presented the updated shaft inspection form that Jim made.

There were no specific comments from the group. The consensus was that TIP testing is more expensive than CSL and will most likely only be used when required per contract.

Action Items: None.

10. Action Item (d) Force Account Obstruction Removal rates and cost/time

Tom mentioned that he had sent a request out to those in the industry to see if this issue still needs to be addressed. He did not receive any response, so recommends removing from action item list.

One contractor mentioned that he would like to have a summary made on this topic.

Action Items: Tom to pursue again.

11. ADSC/WSDOT Joint Training – Spring 2020

Tom will reach out to the industry, and will put something together for our next meeting. We will need presenters and projects showing challenges as well as successes.

Action Items: Tom to contact industry, book a room, and begin planning.

Other Topics

No other topics were presented.

Next Meeting: November 14, 2019 (Thursday)

ADSC/WSDOT Joint Meeting

November 14, 2019, 8:30 A.M. – 11:30 A.M.

ADSC/WSDOT Sign-In Form

Team Members

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1. Welcome/Review of Agenda

Patrick Glassford opened the meeting and everyone introduced themselves.

2. Approval of Minutes

Patrick asked the group if there were any revisions needed to the September 13, 2019 meeting minutes. No revisions were suggested. Patrick will post the minutes to the internet. Patrick then asked for additional items to add to the agenda for the Nov. 14th meeting. Hearing no additions, the meeting moved into project reviews.

3. I-90 Kachess River Bridge Project Review

Eric Shultz presenting

The I-90/Easton Hill to W Easton I/C WB - Replace Bridge and Build Detour project between MP 67 to 70 will replace bridge 90/118N. The proposed bridge is a single span concrete bridge with precast girders. The width is 62 feet and length is 126 feet. The bridge crosses Kachess Creek. Each abutment is planned to be supported on a single row of six drilled shafts; 12 shafts total for the bridge. The shafts will be spaced at 11 ft center to center and will be 4-ft in diameter. Shaft lengths will vary as the shafts are expected to attain most of their resistance from rock sockets within the Shuksan Greenschist bedrock formation which has a sloping surface mantled by alpine till and alluvium. Rock sockets are expected to be a fixed length into the rock approximately 10 ft in length (2.5D); making the shafts roughly 30 to 50 feet in length. Spread footings are feasible at the site but shoring issues combined with in-water work windows makes the use of shafts constructed outside the normal high water line more advantageous.

During construction, temp casing will likely be required to support the alluvium, prevent caving, and minimize slurry loss. Because of boulders and cobbles exposed in the alluvium, oscillator/rotator methods are preferred for shaft construction, but conventional construction methods and even telescoping casing could be used. The team suggested detailing required temporary casing to the top of rock. The team asked why there were 6-4ft shafts instead of fewer larger diameter shafts, and the response was the smaller shafts enable construction as close to the creek bank as possible, thus shortening the bridge, and minimizing the needed equipment size. Jeff Minick, WSDOT PE, asked about

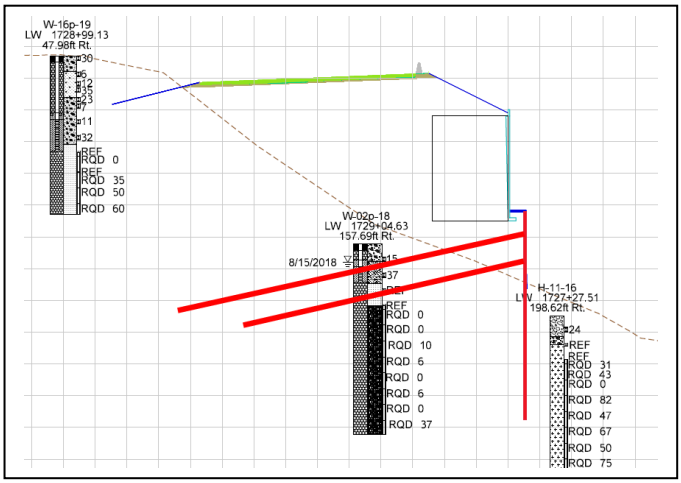
production rates. Two shafts per day was originally proposed, but a few members balked at that and felt that one shaft per day was a better number for planning purposes.

4. I-90 Composite Fill Wall Project Review
Jeff Minnick/Andrew Fiske presenting

The project is: XL5479 I-90 Cabin Ck I/C to W Easton I/C Phase 3 – Add Lanes/Wildlife Bridges, MP64.48 to 70.10.

This project has three walls that are needed to accommodate widening of I-90. Wall 1 and 2 are both approximately 1,700 ft in length and Wall 3 is about 850 feet in length. The three LE Walls, 1, 2 and 3, are fill walls with exposed heights that exceed 50 feet. The use of structural earth walls for these walls would require extensive shoring and/or temporary slopes. All three walls will be constructed downslope of I-90 on a steeply dipping, forested hillside. Much of the terrain at the toe of Walls 1 and 2 is very steep. Some sections of the existing slopes are steeper than 1.5H:1V. The subsurface conditions are characterized by colluvium, rock fill derived from the existing cuts on I-90, concrete rubble (including rebar) and bedrock. The colluvium and rock fill include boulder size material. Boulders exceeding 3 ft in diameter occur on the surface.

In order to minimize the need for shoring and/or temporary slopes, our current plan is to construct at least portions of Walls 1 and 2 by using an anchored soldier pile wall, which would support a structural earth wall. The soldier pile walls would be designed to be high enough such that the overlying structural earth walls could be constructed with minimal or no temporary cuts and/or shoring. Anticipated soldier pile wall heights are up to about 30 feet.



There is potential access from down slope via logging roads through Forest Service property. The team encouraged looking at access options from below. The thinking was that a road would need to be pioneered to provide access for soldier pile installation. The least expensive option is always the shortest road coupled with the least amount of shoring to construct it. Access seems reasonable, says the team. The team would like a 25 ft wide access bench to handle the soldier piles and drill anchors. The team would like to review the anchor installation once the design progresses a bit more. Anchor installation could be performed by drilling at the back of the bench before backfilling the soldier piles, the anchors could then be threaded through the pockets from the back side. Alternately, the wall could be backfilled to above the pocket and the anchors installed by drilling through the pockets using a boom mounted drill or basket slung drill. Additional anchor installation review and discussion is recommended.

The design team asked about soldier pile diameter. With rock sockets, they wanted to make sure there would be no issue with drilling the rock. Thirty or 36-inch diameter holes seemed feasible to the ADSC team. The design team asked if the colluvium boulders

would affect equipment selection. The ADSC team didn't think there would be any unusual equipment demands. ADSC expressed concerns about how the boulders would be paid for. The design team committed to bring the job back to the team to discuss the anchors, anchor testing, and boulders once the design is more developed. At that future meeting, production rates can be discussed as well.

The design team asked about the lagging and facing options. They mentioned that they were thinking of using precast concrete panels for the lagging since the wall is a fill wall. The ADSC team said don't do this. The placement tolerance for the soldier piles has to be very precise with precast panels, and the lead time for panel delivery can be 12 weeks. If the spacing isn't right long delays can easily happen to acquire new panels that fit. Shotcrete facing over temp timber lagging was preferred over the precast panels. CIP concrete could also be used.

The team asked about constructing a temp cut and possibly nailing it to provide the necessary width to construct a SE wall only, essentially eliminating the soldier pile wall. The design team is considering that, but other recent large SE wall designs on I-90 were controlled by global stability in a seismic event. With the steep slopes, and very large walls global seismic stability may be very difficult to attain with reasonable SE reinforcing lengths; making the soldier pile option more advantageous.

5. SR6 Two Tribs DSM Project Review
Trevor Jones presenting

The project is: XL5238 SR 6/Two Tributaries to Chehalis River - Fish Passage MP 46.32 to 46.59. This project will remove two fish barriers along SR 6 included in the federal court injunction. A 22-foot span split-box culvert is proposed to replace the existing culvert at MP 46.39. A 125-foot full span bridge is proposed to replace the existing culvert at MP 46.50.

Patterned deep soil mixing (DSM) is being proposed beneath the bridge footing to improve the bearing resistance, mitigate settlements, and resolve liquefaction issues.

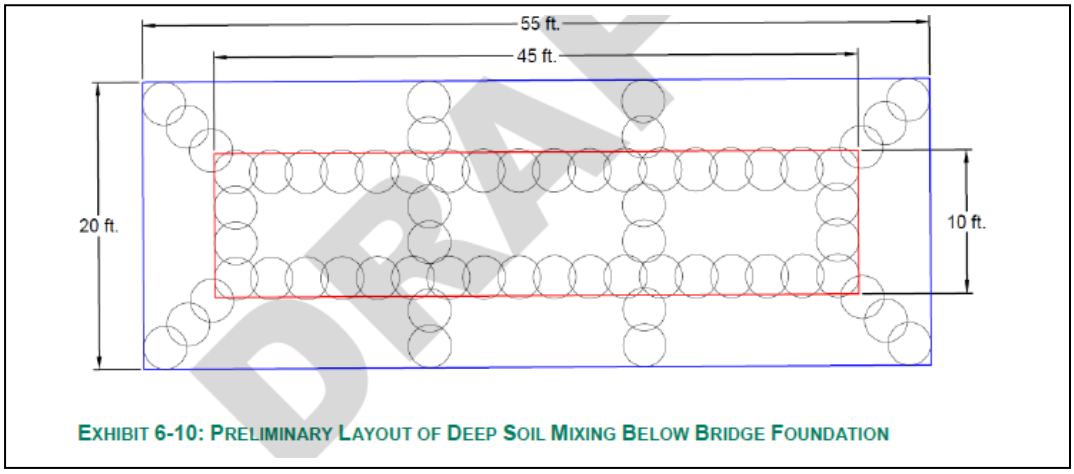


EXHIBIT 6-10: PRELIMINARY LAYOUT OF DEEP SOIL MIXING BELOW BRIDGE FOUNDATION

About 128 DSM columns are proposed, 64 at each abutment. DSM columns will be 3 ft diameter and roughly 25 - 35 feet in length, extending about 3-feet into the underling ESU 3 soils. Soil types are as follows:

ESU 2 – Alluvium: ESU 2 consists mostly of very loose to loose silty sand with localized medium dense zones. The borings encountered an apparently thin discontinuous layer of elastic silt at the culvert location and a fat clay lens at the proposed bridge location. The elastic silt and fat clay layers are very soft to soft. ESU 2 extends from the bottom of the embankment fill (ESU 1) or ground surface next to the embankment down to about elevation 160 feet at the proposed bridge location and elevation 155 feet at the proposed culvert location. The SPT N-values in ESU 2 ranged from about 0 to 28 bpf, but 80% of the N-values in this ESU were less than 10 bpf.

ESU 3 – Gravelly Alluvium: ESU 3 consists primarily of dense to very dense, silty sand, poorly graded gravel, and well graded gravel. Each boring at the proposed bridge location encountered ESU 3 from below the alluvium to the bottom of the boring. The deepest boring (H-2p-18) termination depth was 121.5 feet below the surface. SPT Nvalues ranged from 24 to more than 100 bpf, and were typically greater than 50 bpf.

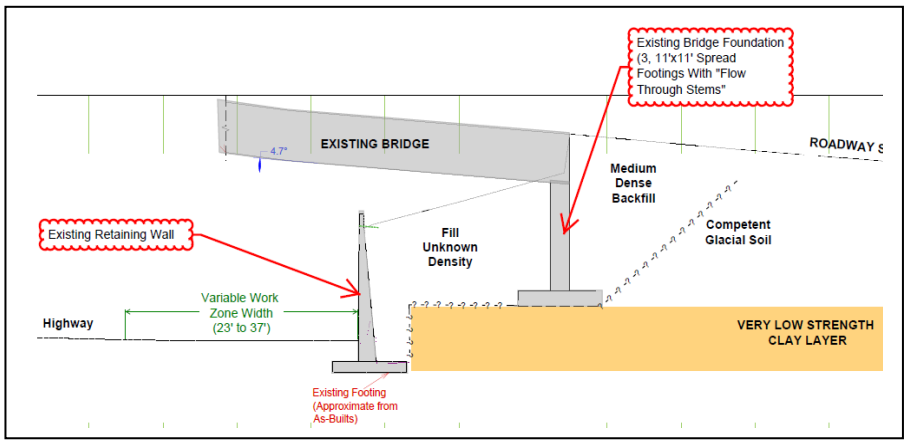
The design team wanted to gain an idea of equipment size. The team thought that a 200,000 ft-pound drill rig would be used, probably something similar to a Bauer BG26 or Watson 4300. Rigs of this size are typically 40-ft in length, crawler mounted, and weigh around 150 kips.

To construct the bridge footing structural shoring will be needed. The team recommended keeping the DSM column edge 4 to 5 feet away from the face of the shoring. Based on the number of DSM columns the team thought there was 3 weeks to a month's worth of DSM work.

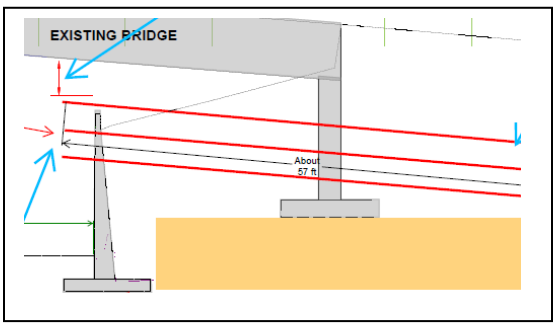
Spoil containment would typically be by trenching to a settlement pond. The DSM ejecta would be allowed to flow to the pond via gravity, allowed to settle and firm up a bit (48 hours), then be moved to offsite disposal. With paddle mixing, the design team should plan on about 30% of the treated DSM volume becoming spoils. If a cutter soil mixer is used ejecta could be 50 to 75% of the volume. Because of the high groundwater, spoil pond placement may be an issue. The pond will need to be above the groundwater and below the work platform to facilitate drainage.

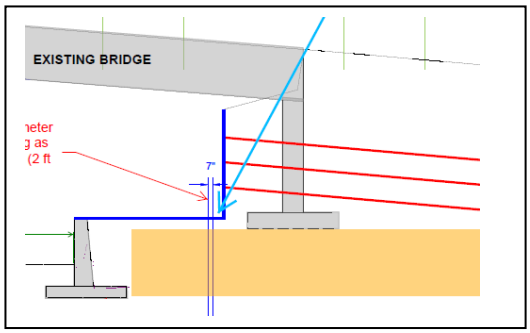
6. SR520/I-5 Interchange Project Review
Andrew Fiske/Shannon & Wilson presenting

The bridge for 10th Ave. crosses over SR-520. The 10th Ave bridge is spread footing supported in fill and the abutment is a spill-through type abutment. At the time of bridge construction, a retaining wall was constructed to contain the end slope. The bearing elevation of the abutment footing is above SR520. The project needs to widen 520 towards the



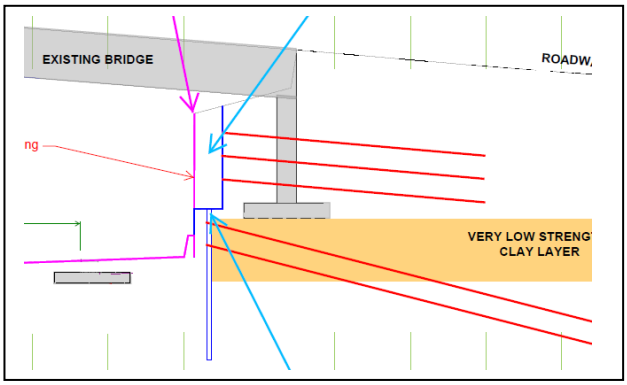
abutment. This will be a temporary condition for approximately 6 years, until the bridge can be replaced with a lid in a subsequent phase of 520 construction. The 10th Ave, bridge needs to remain in service and serviceable until the future construction. The design team is thinking about installing soil nails through the face of the existing wall, threading the nails through the abutment columns, then removing the existing wall and trimming the soils nails to the face a new wall.





There is 4 ft clear from the bottom of the box girder bridge to the top nail. The ADSC team thought that was acceptable. Nails would be inclined at about 5-deg. The ADSC thought that was also doable. The ADSC team thought it would be better to remove a portion of the current wall, and have a temporary slope rather than drill through the wall. The ADSC thought that the drill would most likely be supported on an excavator boom and would have a mast length of about 20 feet. They wanted to make sure that there was enough separation from 520 to account for the boom length and minimize bar splices. The current work zone is tapered, 23 feet wide at one end and 37 feet wide at the other. The 23 feet is probably too tight, and will require temporary lane closures. The team should consider 30 ft as the minimum width needed. A major concern was the containment of fly-rock during drilling. Blankets or shielding of some sort will likely be needed to prevent fly-rock from hitting 520 traffic. Injection Bore Anchors were proposed as a good solution to solve rod length issues and fly-rock issues. Another alternative that was suggested was to do low clearance soil nail wall construction on a bench above the existing wall directly adjacent to the abutment. They need about 15 ft for a bench width, but there may not be enough vertical clearance to accomplish this. Face stability is a concern with this option given that the end slope fill is likely not well compacted.

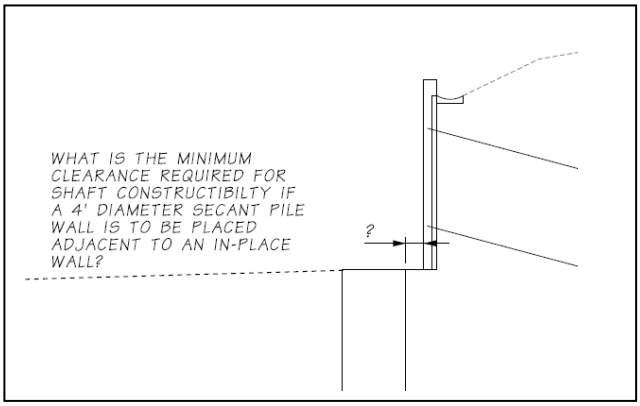
Further complicating the design of this wall, is the Seattle clay that is present beneath the bridge footing. The modeling that the geotechs have completed shows that the bridge will not be stable when the clay is cut into. Additional shear elements are needed to prevent strain in the clay, loss of soil strength, and global failure. Seven inch diameter, vertical, micropiles are being proposed. The micropiles are depicted in the right most figure above. Because of the OH clearance, casing joints in the micropiles will be necessary. The ADSC team did not think that micropile installation would be an issue, provided they did have 10 ft or more of vertical clearance, casing joints, and at least 18-inches clear to the face of the soil nail wall. After the



micropiles are installed, nailing and excavation would continue. There would probably be two rows of long nails that would also help restrain the tops of the micropiles. As shown in the image to the right.

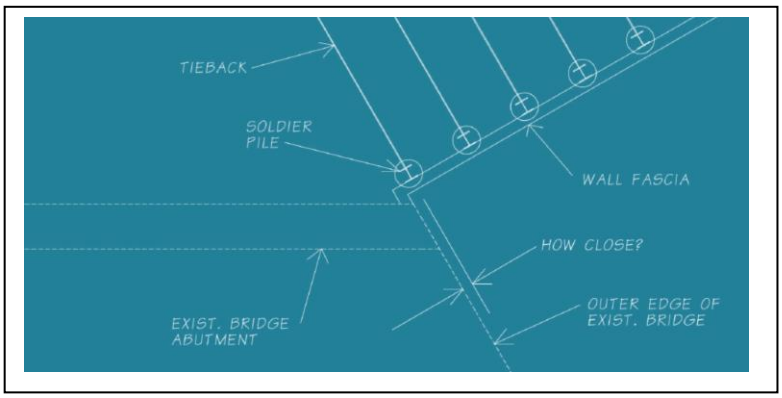
The ADSC recommended trying to maintain at least 2 feet of separation between the lowest nail and the excavation base. Where there is a bench between micropile wall and upper soil nail wall, it was recommended to place a 1:1 shotcrete wedge to make the bench not habitable.

Switching topics, the Design team presented a second issue where they needed to construct cylinder pile wall's shaft next to an upper soil nail wall. The ADSC recommended that they maintain 3 ft clearance between edge of shaft and wall face.



In another variation, rather than doing a soil nail wall on top, it was postulated to just do a cylinder pile wall, but the upper soils have drainage concerns. The design team asked about using permeable concrete as lagging shafts with every other shaft being structural. The ADSC discouraged relying on permeable concrete long term. More conventional drainage construction like trenching in a drain behind the wall and then daylighting the drainage through weep holes or a drain tile was recommended instead.

The last issue on this project is related to soldier pile shoring with anchors next to a bridge abutment. The ADSC recommended rotating the beam or moving the beam 3 feet from the corner. Moving the beam would mean that lagging would need to be attached to the bridge by some means.



7. Mission to Ermina Project Review
Amy Leland presenting

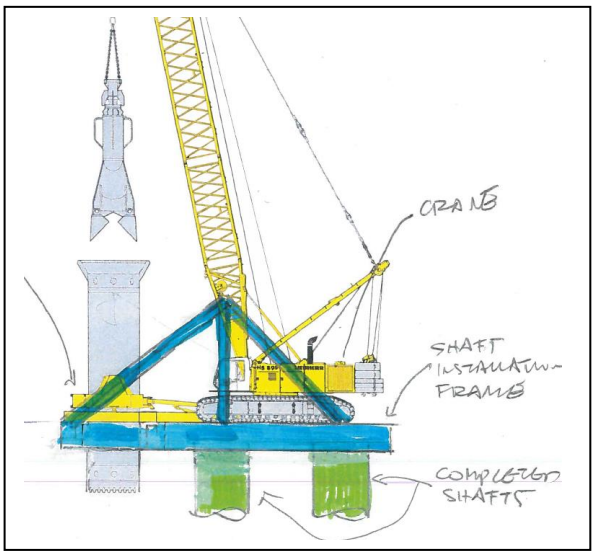
The project is: XL5905 US395 NSC Sprague Ave to Spokane River Phase 1 – Mission to Ermina in Spokane

This will be a 9 span viaduct structure. Each pier will have two 10 ft diameter drilled shafts. Diameter is controlled by the column architectural requirements. Shafts will be 50 feet in length, roughly. Soils consist of gravels and sands that are poorly graded with

significant cobbles. ADSC thinks temporary casing is a good idea so required casing will be used. ADSC was also in favor of requiring the oscillator for this project.

8. Sound Transit Duwamish Crossing Foundation Construction Tait McCutchan presenting

Sound Transit needs to construct a crossing over the Duwamish. Their consultant HNTB has developed a shaft construction concept that is based upon a movable platform. Essentially, the first in water shafts would be constructed from shore or a near shore work bridge. Once the first shafts are completed, a platform would be temporarily installed on the top of the shafts. The drill rig would then be placed on the platform and the next outward shafts would be constructed. As the shaft work progresses, the drill rig and platform would be moved from shaft to shaft. The shafts are 8 ft in diameter and are projected to be 200 ft in length. The platform will only be big enough for the drill rig, a support crane will not fit on the platform. The cantilever forces are a concern as well as the weight of the platform. Another concern is the time that it will take, as each shaft may need to cure to develop sufficient strength to withstand the moments applied. The team thought there were no fatal flaws with this approach, but they also felt there are other options that were more conventional in nature. It was also suggested to let the contractors solve the means, method, and constructability issues with this construction sequence.



9. Concrete Filled Steel Tube (CFST) Installation / Teeth Configuration Jim Cuthbertson presenting

On a recent project, Steamboat Slough, the contractor proposed twisting the casings into the ground with the drill rig. While reviewing the Contractor's installation proposal, the foundation designers had concerns the CFST cutting teeth would overcut the foundation element and reduce skin friction. The foundation soils were very dense and the designers had concerns that the soils would not collapse back against the casing, resulting in a voided annular space.

ADSC stated that the overcut is dependent on the diameter of the casing and the type of cutting teeth applied. In general, the overcuts are either 12 mm (0.47 in) for shaft diameters of 8 feet and greater or 7 mm (0.27 in) for shaft diameters less than 8 feet. The overcuts essentially add 24 mm or 14 mm to the diameter, respectively. Designers need to plan on overcuts when designing CFSTs. If skin friction loss due to overcut is a concern, it was suggested to pull back the casing a bit (10 feet or so) or excavate below the casing tip to construct a portion of the foundation with concrete bonded to the excavation sidewall for maximum skin friction. Compression demands would not necessitate reinforced concrete, but tensile demands would require reinforcing in the concrete portion.

Patrick Glassford and Eric Schultz asked the group if the drilling contractors could provide torque readouts from oscillator equipment for some jobs with stiff soils. Skin

friction could then be back calculated and provide a better feel for the actual friction between the soil and casing. The group mentioned that the oscillator readouts are in bars of downward pressure. Lance Rasband said he would start obtaining that data.

10. Changes to Shaft Plan Details

Amy Leland presenting

Amy has been going through the Bridge Design Manual and the plan sheet libraries that the structural detailers use when preparing contract plan sheets. Amy wants to begin dimensioning the outer diameter of the shaft reinforcing along with the shaft diameter rather than showing shaft diameter and concrete cover. The ADSC had no objection to this change.

Amy also asked if the group wanted to review and revise Table 7.8.2-1 in the BDM. The team thought that they had recently revisited the table within the last couple years, and that it should be good.

Associated with the table there are three instances where the metric size casing does not align well with the English dimension. For the 10 ft (9.84), 5 ft (4.92), and 4 ft (3.94) shafts the metric shaft diameter is slightly less than the English designation as shown in the parenthesis next to the English dimension above. Amy wants to alter the drilled shaft specification language (6-19) so that it states for those sizes the minimum shaft diameter shall be the English diameter dimension minus 2 inches.

Amy will be adding a note to the plan sheets allowing cage casters for centralizers. WSDOT previously could not do this due to sole source concerns, but FHWA recently changed their policy on the sole source issue. Cage caster centralizers are now allowed. Note: Cage casters need different spiral or hoop spacings from what we normally require.

Table 7.8.2-1 Shaft Casing Geometric Tolerances

Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H
Nominal (Outside) English Casing Diameter		*Maximum Increase in Casing Inside Diameter	*Maximum Decrease in Casing Inside Diameter	Maximum English Casing Diameter	Nominal (Outside) Metric Casing Diameter		
Feet	Inches	Inches	Inches	Inches	Meters	Feet	Inches
12.0	144	6	0	150	3.73	12.24	146.85
11.0	132	6	0	138	3.43	11.25	135.0
10.0	120	6	2	126	3.00	9.84#	118.11
9.5	114	6	0	120	3.00	9.84	118.11
9.0	108	6	0	114	2.80	9.19	110.23
8.0	96	6	0	102	2.50	8.20	98.42
7.0	84	6	0	90	2.20	7.22	86.61
6.5	78	6	0	84	2.00	6.56	78.74
6.0	72	6	0	78	2.00	6.56	78.74
5.5	66	6	0	72			
5.0	60	12	1	72	1.5	4.92#	59.05
4.5	54	12	0	66	1.50	4.92	59.05
4.0 **	48	12	0	60	1.5	4.92	59.05
4.0**	48	12	1	60	1.2	3.94#	47.28
3.0	36	12	0	48	1.00	3.28	39.37
3.0	36	12	0	48	0.915	3.00	36.02
2.5	30	12	0	42			
2.0	24	12	0	36	0.70	2.30	27.56

Horst suggested that WSDOT consider using hollow bars for CSL tubes rather than black schedule 40 pipe. There are several domestic manufactures of the bars. Amy is willing to look into the possibility.

11. Flocculants for Dropping Solids out of Water Column
Lance Rasband presenting

There have been several jobs recently where flocculants are being rejected when they are being used to remove suspended particles from water slurry. Currently the flocculants are not listed on the QPL. Jim Cuthbertson and Patrick Glassford will look into the issue in more detail. NSF 60 floccs are being requested by the reviewers.

12. ACTION ITEMS

a. Concrete Filled Steel Tubes (CFST) – Chehalis River Bridge Lessons Learned (Malcolm)

On Hold for now

b. Modification to SS 6-19.3(3)I (Jim Cuthbertson)

On Hold until John Tuttle can participate too. Slated for next meeting.

c. ADSC/WSDOT Joint Training – spring 2020 (Tom Armour)

Target Date – Tuesday, April 21, 2020

Location - Bothell Operators Union hall if possible. Tom will coordinate with operators to see if the hall is available.

Topics – Varied topics like years past, shafts, soldier piles, anchors, nails, and slurry. Tom will reach out to people and solicit topics. He will try to have a preliminary agenda filled out for the next meeting.

d. Force Account Obstruction Removal rates and cost/time (ADSC/Tom)

Tom still working the issue.

13. Next Meetings: January 9, 2020; February 20, 2020; April 2, 2020