AGC/WSDOT Structures Team
January 22, 2021
Meeting Attendees

Initials	Member	Company	Phone	E-mail
X	**Ayers, Scott**[1]	Graham Const.	206-755-0239	scotta@grahamus.com
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	Bowles, Eric	Conc. Tech.	253-383-3545	ebowles@concretetech.com
X	Cucchiara, Kevin	Quigg Bros.	360-580-0015	kevinc@quiggbros.com
X	Cuthbertson, Jim	WSDOT-Const.	360-870-1108	cuthbej@wsdot.wa.gov
X	Firth, Jeff	Hamilton Const.	541-953-9755	JFirth@hamil.com
X	Fuller, Patrick	WSDOT-AWV	206-805-2960	fullep@wsdot.wa.gov
X	**Glassford, Patrick**[1]	WSDOT-Const.	360-705-7828	GlassfP@wsdot.wa.gov
X	Griffith, Kelly	Max J. Kuney	509-535-0651	kelly@maxkuney.com
	Hilmes, Bob	WSDOT-ER	509-324-6089	hilmesb@wsdot.wa.gov
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	Khaleghi, Bijan	WSDOT-Bridge	360-705-7181	khalegb@wsdot.wa.gov
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	Moore, Stuart	Atkinson	360-340-6797	stuart.moore@atkn.com
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X	Quigg, John	Quigg Bros.	360-533-1530	johnq@quiggbros.com
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	Robinson, Eric	WSDOT-WSF	206-515-3897	robinse@wsdot.wa.gov
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	Thody, Ryan	DBM Contractors	206-870-3525	Ryan.thody@dbmcontractors.com
	Tornberg, Ben	Manson Const.	206-496-9407	btornberg@mansonconstruction.com
	Watt, Doug	CJA	425-988-2150	dwatt@condon-johnson.com
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	Welch, Pete	Granite Const.	425-551-3100	pete.welch@gcinc.com

1 Team co-chair

Guests

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Agenda

AGC/WSDOT Structures Team

Microsoft Teams Meeting

January 22, 2021 -- 9:00 AM – 12:00 PM

1	**Welcome / Review of Agenda**	Patrick Glassford / Scott Ayers
2	**Approval of Previous Meeting Minutes**	Patrick Glassford / Scott Ayers / All
3	**Project Suspensions**	Patrick Glassford
4	**2021 Focus Topics**	Patrick Glassford / Scott Ayers / All
5	**SR 9/Marsh Road to 2nd Street Widening – Constructability Review**	Masoud Kayanda
6	**Montlake Grid Deck Replacement – Constructability Review**	Nick Rodda
7	**Wishkah Mechanical Rehab – Constructability Review**	Geoff Swett

Future meeting dates: March 5, 2021; April 16, 2021; May 28, 2021

1 Welcome / Review of Agenda
Patrick Glassford / Scott Ayers

Note: The attendance roster for the meeting did not save due to a technical error. The attendee list has been created based on the note takers recollection of who attended and may be incomplete and inaccurate.

Patrick Glassford announced that Dewayne Matlock WSDOT co-chair of the group has taken another position in WSDOT. He will be working with the Gateway Program and will no longer be co-chair of this group. Patrick Glassford has assumed the co-chair role for WSDOT. Jim Cuthbertson of WSDOT will be assisting Patrick. Scott Ayers co-chair announced that he will be retiring in April. Bryant Helvey of Graham will be taking over for Scott as Graham's representative on the team, but Bryant will not be co-chair. The industry co-chair is open for a volunteer to fill and be announced at a later date, hopefully before Scott retires. Other changes – Dave Ziegler of Olympic Region WSDOT retired and Troy Watts, also from Olympic Region, has replaced Dave.

2 Approval of Previous Meeting Minutes
Patrick Glassford / Scott Ayers / All

Comments on the last meeting's minutes – None.
Posting of the minutes to the web will happen.

3 Project Suspensions
Patrick Glassford

On January 11th, the Office of Financial Management (OFM) directed WSDOT to pause advertisement for certain construction projects scheduled to be advertised between January 11 and April 30, 2021 for bids until the Governor and Legislature agree on a plan for the 2021-23 transportation budget.

- Applies to capital expansion construction projects only.
- Does not include fish passage, preservation or safety projects. WSDOT will continue to move forward on these specific types of projects as the deadline for the federal court injunction related to fish passage is imminent and preservation and safety work are critical to the safe operation of our multimodal transportation system.
- Does not affect contracts already under way.
- Continues projects in the design phase.
- While this action pauses the advertisement of contracts for bid, it does not stop other activity on those projects including planning, environmental, design, and right-of-way work needed to advance the projects to eventual construction.
- Focuses on projects funded mostly with state dollars and mostly retains WSDOT's schedule for projects spending primarily federal dollars. For WSDOT projects funded by federal dollars, it is important to note that federal fund sources have not decreased, those fund sources and their use are often provided for a specific purpose and cannot be redirected, and if paused, those fund sources could lapse.

NOTE: On January 28th, before the Note taker could finish these notes, the pause was lifted by OFM based on an agreement reached between the Legislature and the Governor. WSDOT will proceed with projects as authorized in the current budget.

Kevin Cucchiara asked about DB jobs that had Request for Qualifications (RFQ) posted. He wanted to know what is happening with those. Jim Cuthbertson stated as far he knew those jobs that had received Statements of Qualifications plan to finish that process and shortlist. After that, the Agency will evaluate what to do about Request for Proposal (RFP).

There was a question about when any new funding would go into effect. This year is a budget year for all State agencies. The legislature sets the budgets and the Governor enacts them. All new budgets go into effect on July 1, 2021 and are in effect for two years. The current budgets for all agencies expire on June 30th of this year.

4 2021 Focus Topics
Patrick Glassford / Scott Ayers / All

Focus Areas for 2021

- More Constructability Reviews
  - Continue providing reviews
- Specification Revisions
  - Cast in place concrete - PT
  - AIT composite arch
  - Geofoam fill
  - Girder erection and stability
  - Slip form barrier
- Cont. Involvement in Research
  - Shotcrete bond properties (Phase 3)
- Lessons Learned
  - Fish passage – lessons learned and challenges
- Briefings
  - Fiber reinforced bridge deck

5 SR 9/Marsh Road to 2nd Street Widening – Constructability Review
Masoud Kayanda

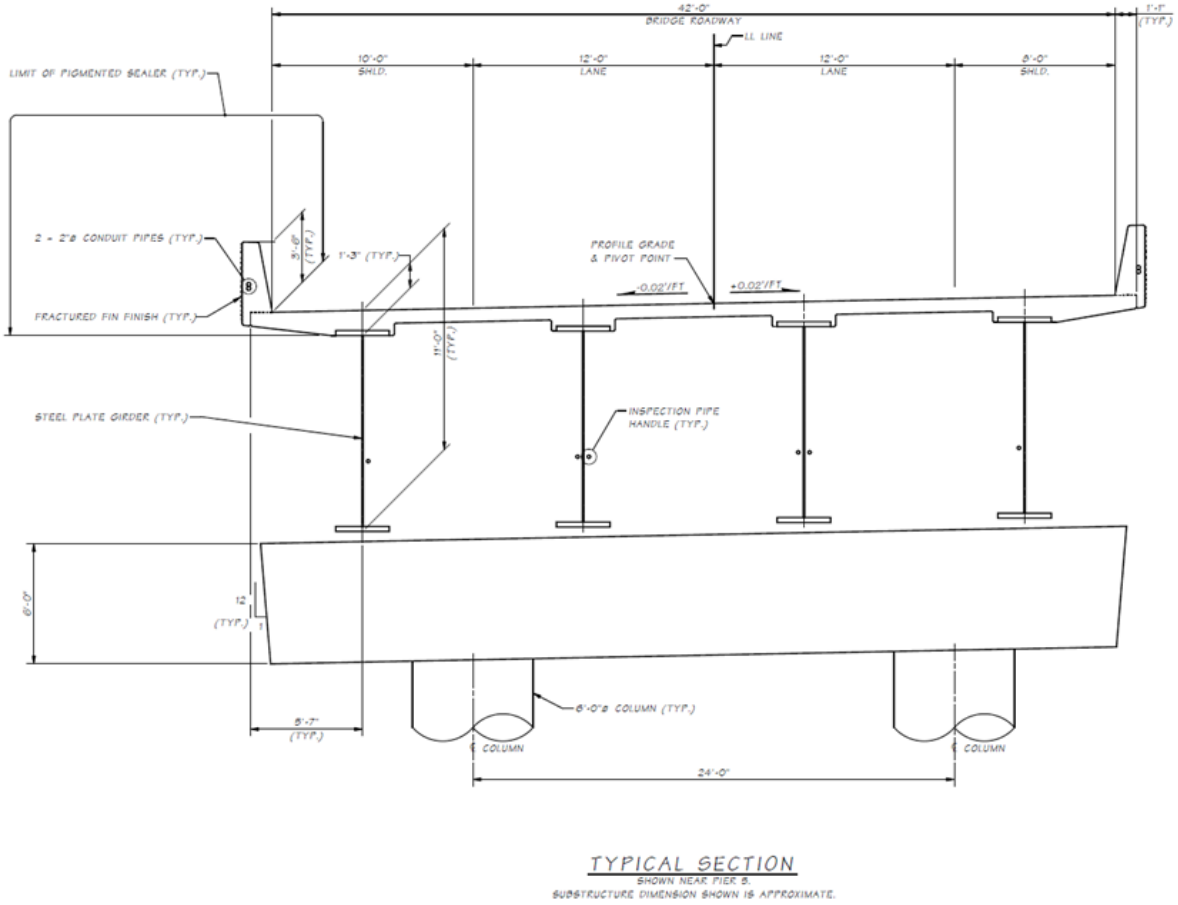
Summary of the project as presented by Masoud

The project is located in Snohomish on SR-9 between 2nd St and Marsh Rd. The project will be widening SR-9 from two lanes to four lanes. The two new lanes will be constructed west of the existing roadway and will be separated from the existing road by a median. A new bridge will be constructed over the Snohomish River next to the existing steel truss bridge. The new bridge will cross the river and the BNSF rail road lines that parallel the river. A second bridge will be constructed about ½ mile to the south where an overflow channel is present to pass flood waters.

Main Bridge Details

The main bridge over the river is planned to be a composite bridge structure. The longest spans of the bridge will be steel plate girders, but conventional prestressed concrete girders will be used for the shorter spans. There are two abutments and six interior piers planned; two of which fall within the Snohomish River and are in alignment with the existing steel truss' piers. Total structure length is approximately 1220 feet with the main river span being 300 ft. The photo below shows the concept, but does not show all of the correct pier locations.

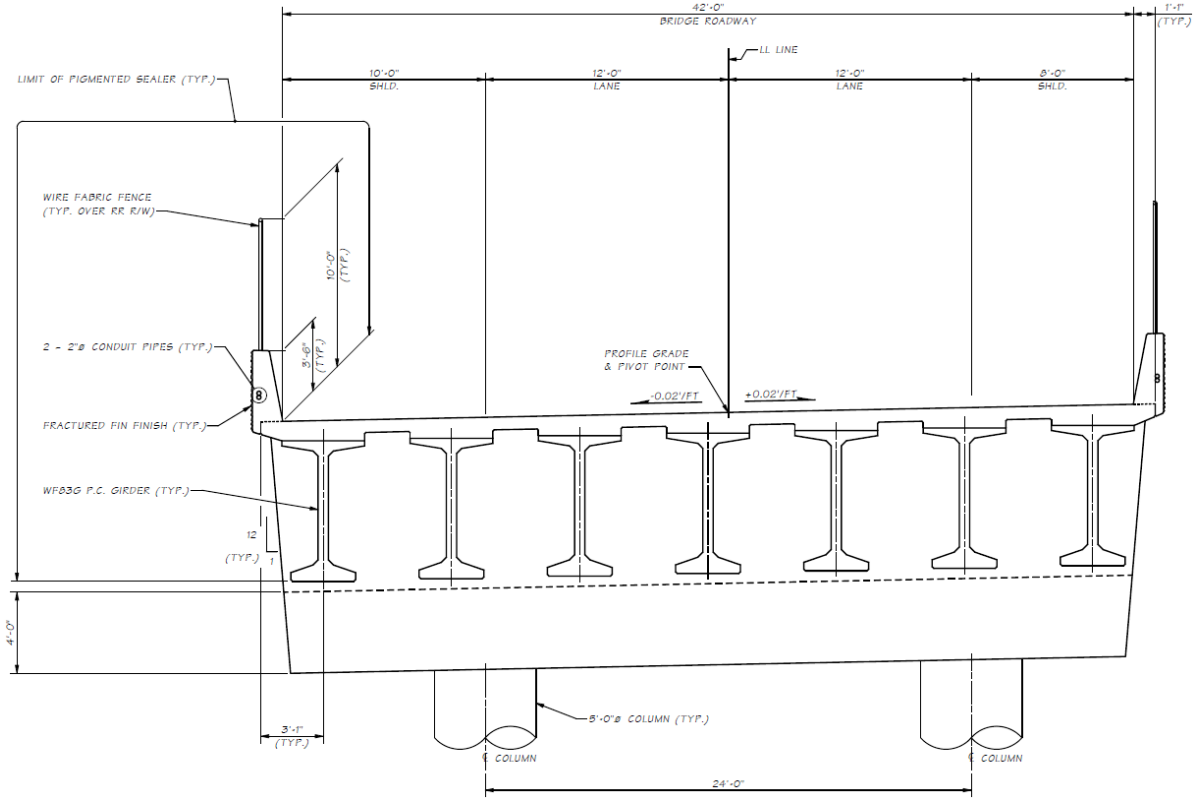
The 300 ft main span over the river will likely have four plate girders with a web dimension of approximately 10 ft. The roadway width is planned for 42 ft; overall structure width will be 48 ft to 50 ft. The main span piers will be supported on two columns per pier which in turn will likely be shaft supported. Eight to ten foot diameter shafts are expected to be integral with 6 to 8 foot diameter columns. The hydraulics section wants to keep the shaft column transition below the river bottom elevation to help limit backwater and scour. Pier construction is expected to occur from work trestles constructed from each bank. Driven piles for the trestles are expected and are being discussed with permitting agencies. Since piles are on the table for work trestles, there is also talk of using piles for foundation support instead of the shafts. Piles offer some benefit over shafts, but also have some detriments to be discussed later.



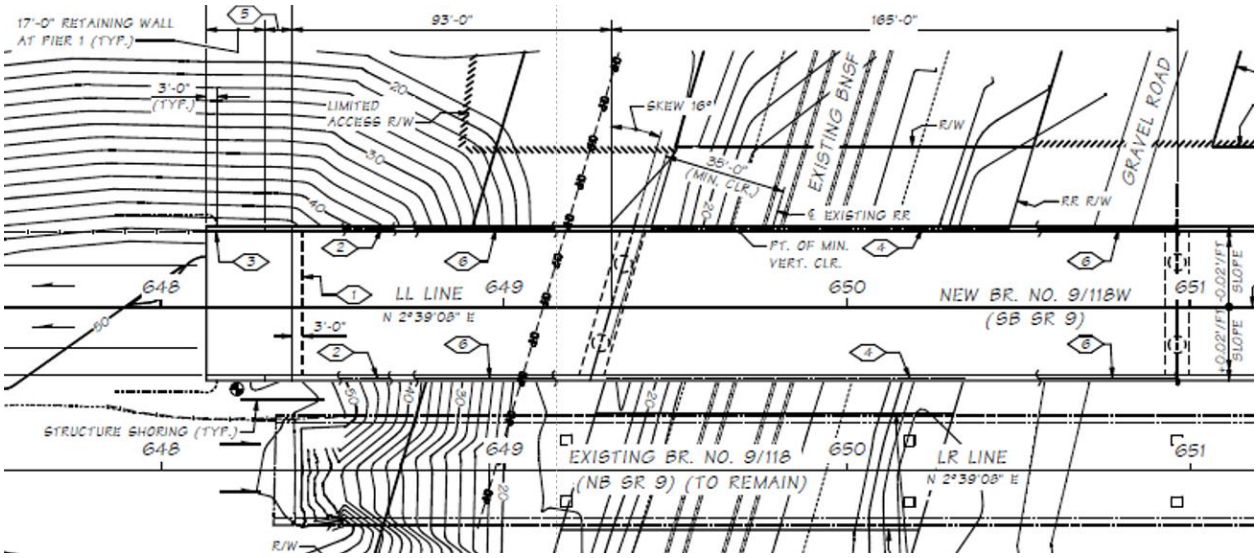
TYPICAL SECTION
SHOWN NEAR PIER 8.
SUBSTRUCTURE DIMENSION SHOWN IS APPROXIMATE.

Above is the concept for the structure at the main span and below is a view of the north and south riverbanks where the two new piers will be constructed for the new main span.

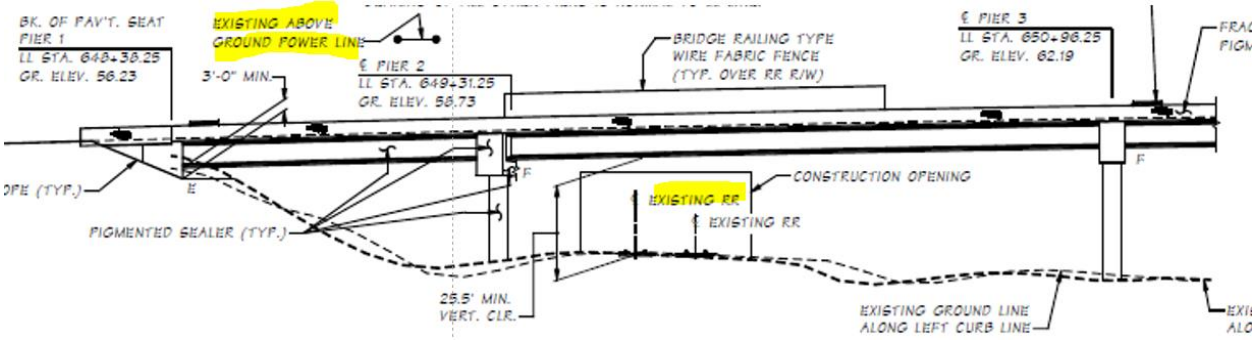
Multi-season construction is expected, and currently the plan is to leave the trestles in place over the winter, but this is still being developed. The bridge office would like to design the structure so that launching can be an option for the steel spans. Over land, concrete girders will likely be used and crane setting of girders will likely be employed. Here is a concept for the rest of the structure; the part south of the river.

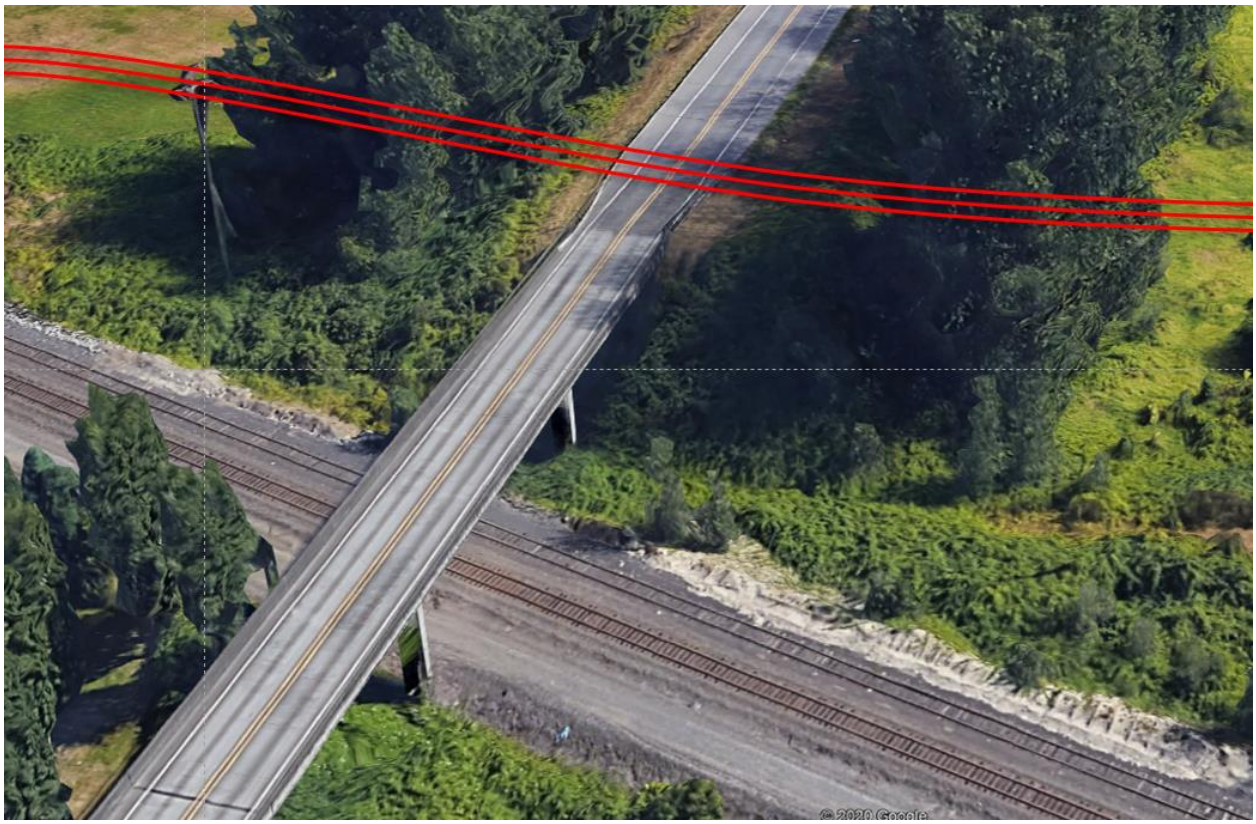


The south end of the bridge must pass over BNSF railroad and under PSE power. Here is a plan view for the south abutment and railroad area.



Here is the corresponding elevation showing the R/R and OH power with a photo of the area below.





There are a number of constraints for the construction:

- Fish window for in-water work
  - August to October
- Environmental concerns
  - Work in the river, close to wetlands and floodplain
- Need to keep mainline SR9 and local street open
  - Limited and long detours
- Work next to existing truss bridge
  - Maintain existing clearances of navigable channel
- Work next to and over railroad line
- Aerial PSE transmission lines

The following are the questions that the project office has for the team:

1. Can the work trestle and piers be installed within the fish window?
2. Is steel girder launching the most effective method?
3. Can large cranes crawl down next to the work area?
4. How can work be done close to aerial PSE power lines?
5. Lightweight material vs regular embankment fill in the approach embankments?
   - ➔Styrofoam/concrete or gravel fill
   - ➔Constructible adjacent to existing embankment/bridge
6. Drilled shaft vs driven piles?
   - ➔For overflow bridge and piers outside the river

<u>Team Discussion</u>
The team discussion did not follow the questions in an orderly fashion. The team jumped from topic to topic as new issues were raised and the discussion flowed.

The fish window was discussed as being the beginning of August to end of October, 3 months duration. Ryan Olson wanted to know if additional fill could be placed off the end slope of the north abutment to

facilitate launching, and Jeff Firth wanted to know if temporary falsework can be placed to facilitate launching. Masoud stated: Yes. Fill can be placed and also a temp bent, but there is an access Rd at the toe of the embankment that Snohomish County uses as well as a trail. Those need to remain useable.

Jeff Firth wanted to know if you can put a temporary bent in the river to help with launching, but Masoud thought he was asking about river pier construction and explained that the project was going through the environmental application now. They plan to build a work trestle and isolate the work area from the river. The work trestle discussion caused Jeff Firth to ask: Are there limits on the piles in the river or guidelines from the agencies? Masoud responded with: We are still working with the agencies, we don't have an approval yet, but we have asked. Anthony Mizumori of the Bridge office clarified that they were planning on approximately 100 piles total in the river; in two trestles; one from each bank, but not a trestle across the entire river. Neil Hunt wanted to know what the gap width was that is left to span. Masoud stated, we are thinking about 200 feet.

The conversation topic changed at this point to discuss access from the south side of the river, specifically along the western side of SR-9. There is a depression and trees immediately west of SR9. It was asked if the trees could be cut and the depression filled. Masoud stated he thought that fill could be placed but they are still working with the environmental agencies. The question was asked if the trees had to be saved. Masoud indicated the property to the east is an airstrip, and the trees are encroaching into the flight path. The airstrip wants the trees removed. He thought tree removal would be granted.

Geoff Swett of Bridge asked why piles were being considered instead of drilled shafts. Amy Leland explained that shafts are expected to be upwards of 200 feet in length, and that Geotech has identified a gravel layer about halfway down the shaft length. The gravel layer is too thin to support the shafts, but there is a high likelihood that piles could bear in the unit cutting the foundation depth roughly in half. Neil Hunt recommend that they do a test pile program to make sure the concept will work and that the piles will not punch through the layer. There was talk about if the test pile program would be best executed before the contract is let, or if it should be part of the contract for the bridge construction. Jim Cuthbertson stated that the Standard Specifications already require a test pile at each pier which is supposed to be driven prior to the Contractor ordering all the piles, but most contractors usually order before that is completed due to material procurement times. Geoff Swett stated he thought WSDOT might do the test program as a separate contract before letting main contract. Cuthbertson stated there are some issues with that, as the equipment may differ between the two contractors doing the work, one for test pile program, the other for bridge construction. Neil Hunt thought that WSDOT could specify equipment to get around that issue. Scott Ayers thought WSDOT was setting themselves up for a change order and delays if they did the test pile program as part of the contract. If the piles didn't stop in the dense layer the material quantities would double and procurement delays could happen. He is an advocate for a pre-contract test pile program. A pre-contract test pile program could also assist in the bridge design as you would have pile specific information you could use in the design making it a more efficient design.

It was asked if both foundation options could be in the contract, shafts or piles. Kelly Griffith thought that would be very cumbersome and difficult to do. He recommended doing the test pile program first, but if that can't happen, set the contract up for really deep piles. The Ad date is the last quarter of 2022; there may not be enough time for a test pile program pre advertisement.

Geoff Swett then brought the conversation back to launching. Assuming there is work trestle extending out about 50 feet from each bank, Geoff wanted to know if the contractors could reach out to the middle of the river to install a temp pier to catch the nosing of the launched girders so they didn't have to span the entire distance of the river, or maybe avoid the nosing altogether if an assist crane could reach the ends of the launched girders. Anthony Mizumori stated he is still working on the launching design, but he expected a nosing may be needed. He was not planning on requiring launching in the contract, but the contractors could do that if they wanted. Right now there are three spans of steel girders, with four lines of girders. It was asked if you could launch two girders, then two more, or would you launch all four at once. Anthony stated you could do two and two, or all four at once. With all four at once, he thought maybe the contractor would use the middle two, extended out front with a nosing to guide the operation.

Masoud wanted to know the team's thoughts on lightweight fill at the approaches. Lightweight fill is part of the VE study recommendations to limit settlement and minimize any ground improvements necessary for seismic stability. There are liquefiable soils present and lateral spread is a design issue. With limited right

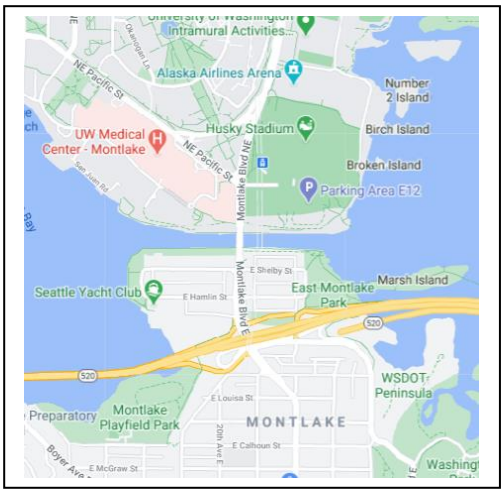
of way, it was thought that lightweight fill may limit access and interfere with the contractor's ability to stage cranes and do launching. Foam would need to be protected and would need load distribution slabs or something like that. Cellular concrete was suggested as an alternative to foam. It was also recommended to choose just one type of lightweight material. Don't use multiple types, pick one and stick with it. Cuthbertson asked if the launching could be done from the existing fill, shove the girders across, and then place the lightweight fill afterward. Kelly thought it may be possible if you can deal with the grade differential. Anthony stated the grade is actually pretty favorable for this, as the girder height is pretty close to the added fill height that is necessary. Kelly was concerned about WSDOT including enough time in the contract to allow for this option.

Amy Leland wanted to discuss the placing of the girders under the power lines and over the R/R. With the power lines there, it was stated there is no way to do a single crane pick. You would have to use two cranes but in order to do that you need to get the girder down under the power lines. The power lines would need to be de-energized during girder setting. Use of a trolley system was discussed, but it would still likely require two cranes. Neil Hunt wanted to avoid using hydraulic jacking to lift girders if at all possible. It was asked if this part of the bridge could be cast in place thereby avoiding girder sets altogether. With the R/R and the need to keep a construction opening functional, this option was not popular with the bridge office or project office.

Amy Leland also wanted to know if the fish window was enough time to construct the work trestles, shafts, and columns at both piers? The team thought it was only possible if they worked both sides of the river at the same time. The time is really short in their opinion.

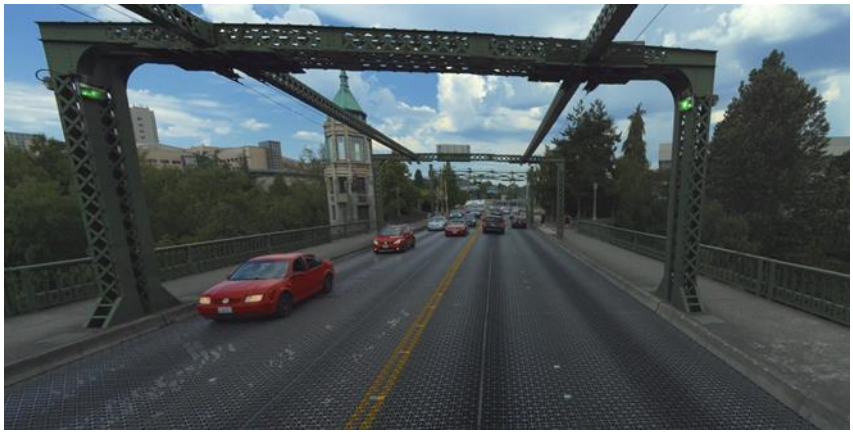
6 Montlake Grid Deck Replacement – Constructability Review
Nick Rodda

The Montlake bridge is a two leaf bascule bridge over the Montlake Cut between Lake Union and Lake Washington; just south of the University of Washington. Some of the constraints associated with the project include: The corridor is heavily used and has frequent traffic jams plus marine openings to pass boats. SR-520 is just to the South and there is a DB project underway on 520 to build a lid and the west approach south bridge to the floating bridge.



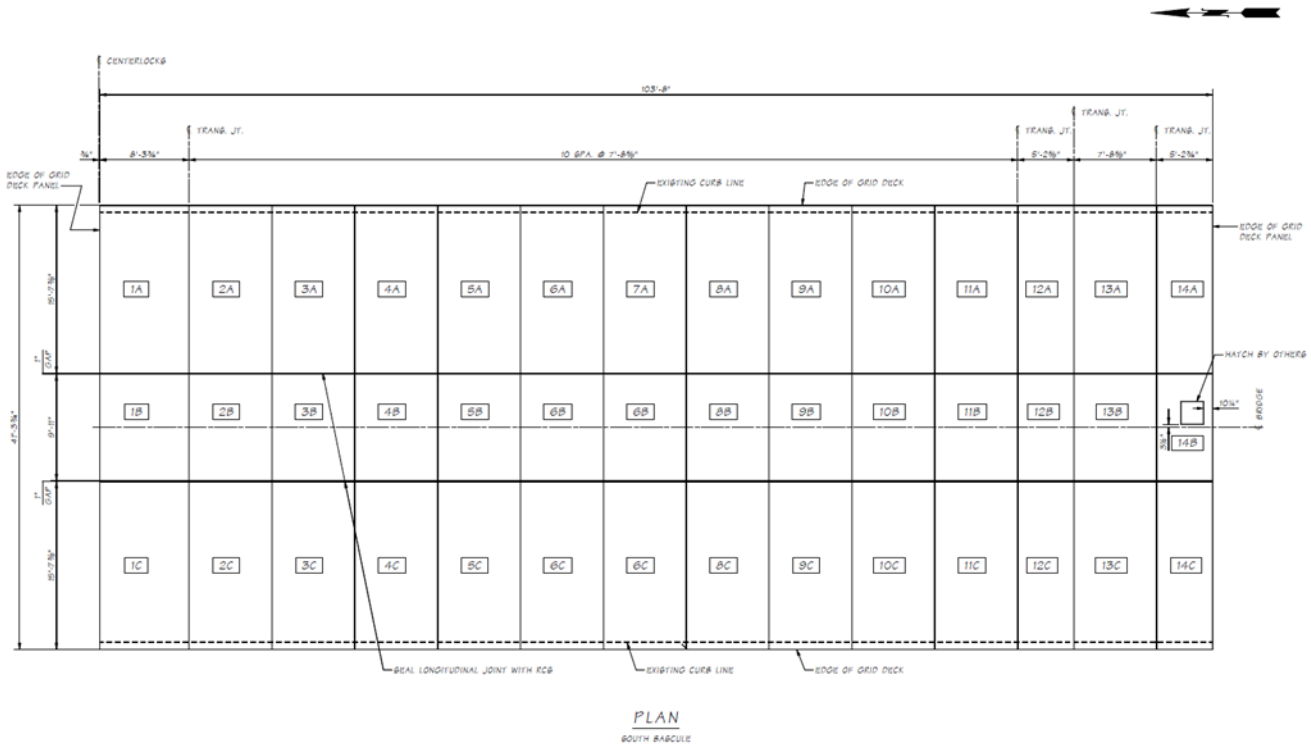
The current deck is a steel grid installed in 1999 and is a welded 4-way style. After about 10 years we started having issues. We have replaced some panels, but this project proposes to replace all 84 deck panels and add six lines of helper stringers to help better support the deck and reduce fatigue. There are sidewalks on the bridge and a concrete curb that is clamped to the current deck. The plan is to keep the sidewalks but replace the curb with a new steel curb. The panels have been procured by WSDOT and will be provided as part of the contract. The bridge will have the center locks rehabilitated. The deck work is planned for a continuous 14 day closure, but marine traffic must be able to pass. The plan is to only open one leaf to pass boats so the other leaf can be worked on without interruption. Under a Temporary Rule Change, single leaf openings will be allowed. Openings will be limited to 4 specified times per day during the continuous closure. Times will be advertised in a Notice to Mariners.

View of deck, curbs, and sidewalk.

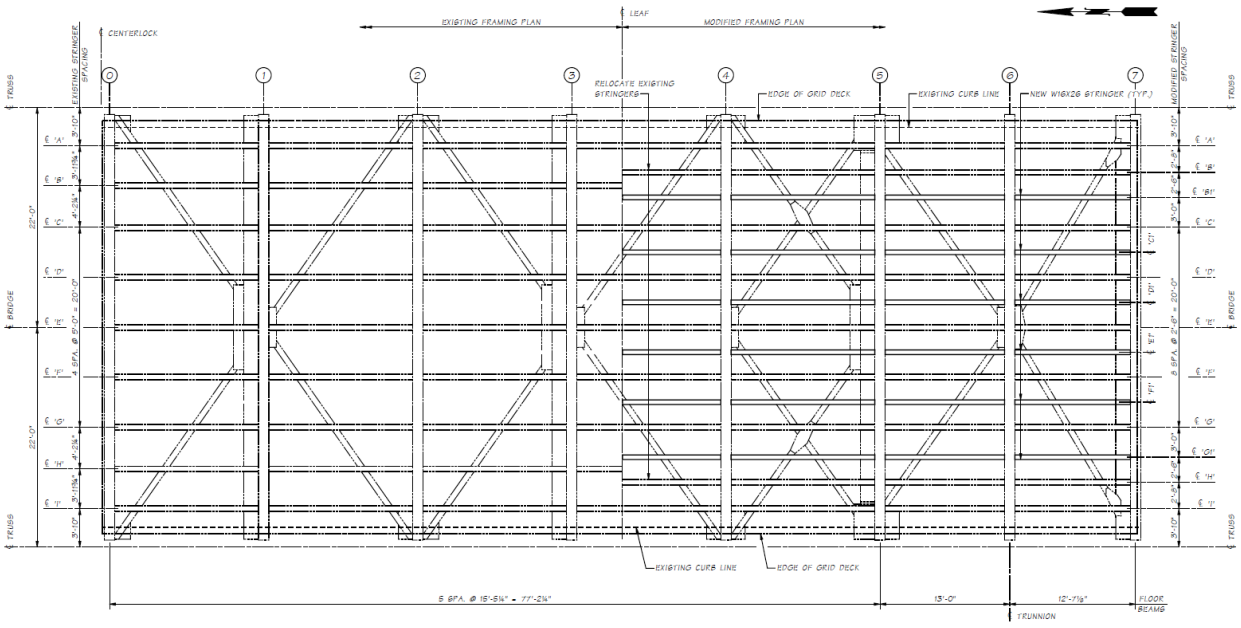


View of partially opened bridge.

From curb to curb (transverse), there are three panels. There is a center panel that is about 10 feet and two longer panels, one to each side. Those on the east side of the bridge are designated as A panels, those on the West side are C, and the middle is a B panel. The panel layout is shown below.



Floor beams generally fall at every other panel joint. There is a floor beam at the center lock and the next floor beam is between panels 2 and 3. The next is at 4 and 5 and so on. To install the new stringers, two adjacent panels must be removed at the same time to gain access. For example panels 1 and 2 would both be removed, 3 and 4, and so on. The figure blow shows the current stringer configuration on the left. They are spaced about 5 ft apart. The figure on the right shows the added helper stringers spaced about 3 ft or less.



The proposed construction sequence is as follows:

1. Unbolt and remove existing panel
    a. Two adjacent panels must be removed at a time
2. Modify/Install stringers
    a. Installed to match profile

3. Test fit new panels
    a. Mark hole locations for existing stringers
    b. Layout hole locations for new stringers
4. Remove panels and drill holes in panels
5. Install panels and mark hole locations in new stringers
6. Remove panels and drill holes in new stringers
7. Install panels and bolt them down

Question:
Is a 14 day continuous closure enough time to complete installation?

Kelly Griffith asked if the open leaf had to be up all the time limiting access. Nick stated that would be up to the contractor but with the leaf open there is a weight limit that can be applied to the down leaf. You need the interlock engaged to have more load on the bridge. Because of that, he expects contractors will only open the bridge when they need to. The assumption is four openings per day just long enough to clear vessels, maybe 15 to 20 minutes each or until boat traffic clears; probably at specified times.

Jeff Firth did some quick math, 14 days for 84 panels, which is 6 per day or one panel every 4 hours. He wanted clarification on how the panels will be attached. Nick stated there is a bearing bar that runs the full width of the panel which is welded to each of the panel's main bars. The panels get bolted down though the bar to the stringers. All panels will be bolted down.

Neil Hunt asked if abatement would be required. Nick said there would probably be a need for that given the structure is 100 years old. The original floor beams may have lead paint. The steel from 1999 and newer should be lead free. Bridge thought the angles and floor beam could be prepped outside of the 14 day closure.

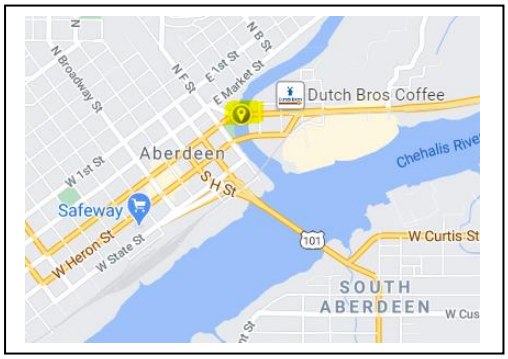
The need for scaffolding was brought up depending on what work was needed outside of the 14 day closure. If scaffolding were used, it would need to not preclude operation of the leaf.

The consensus is that 14 days might be enough time, but they really want to see the connection details to be sure.

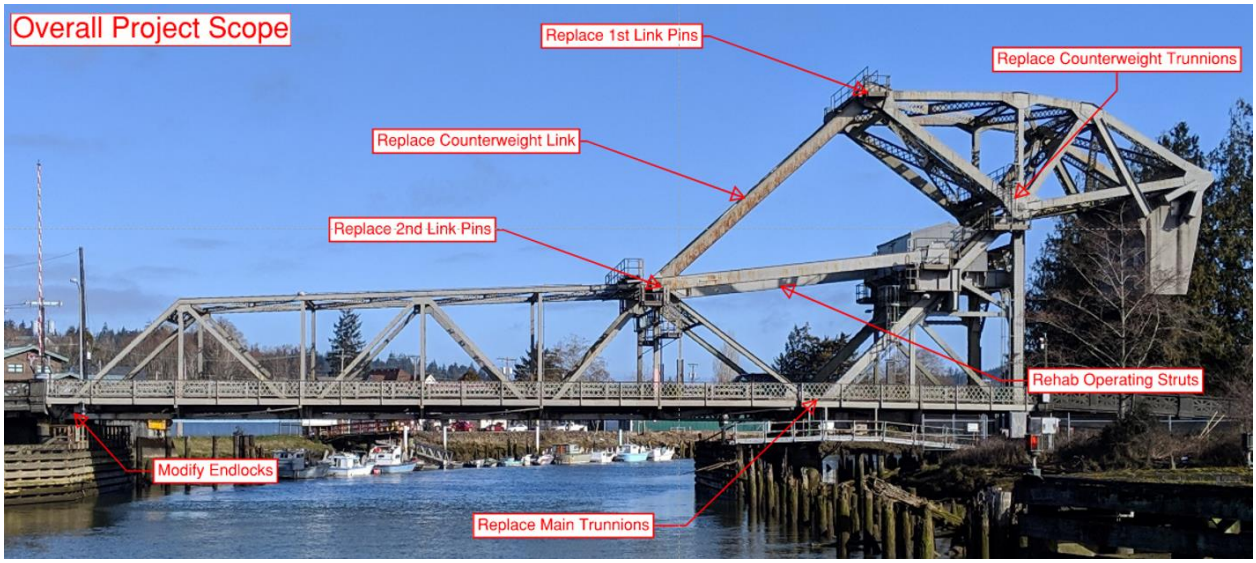
ACTION ITEM: Patrick will work with Nick to get the connection details distributed to the team by e-mail so that they can provide a better response on the timing.

7 Wishkah Mechanical Rehab – Constructability Review
Geoff Swett

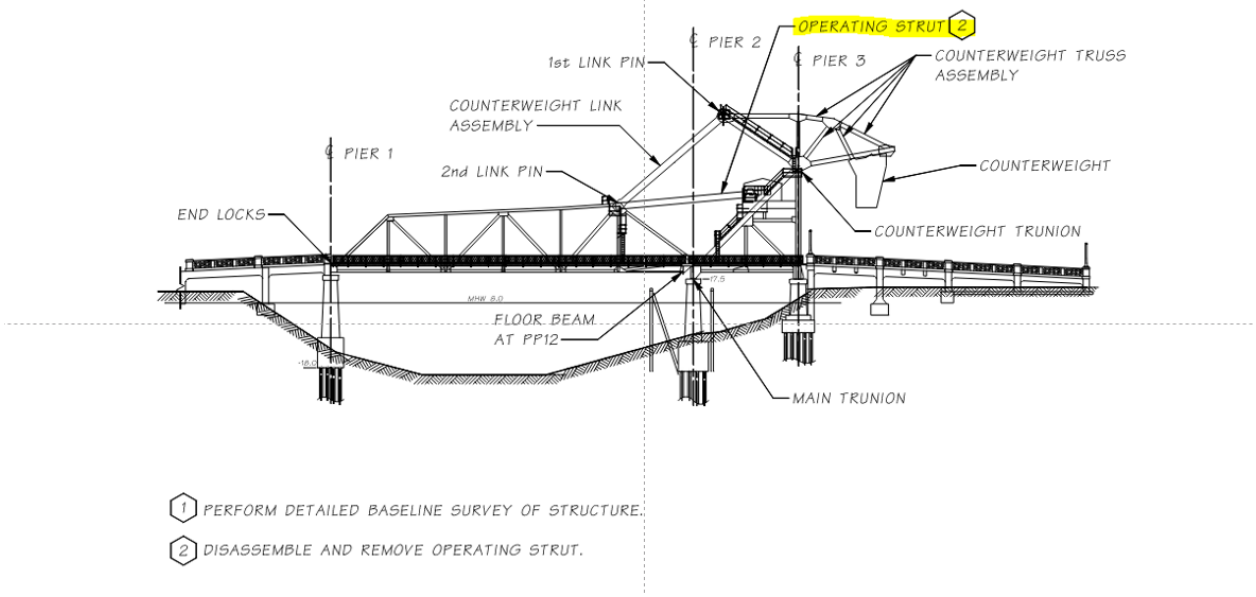
The structure is located on SR12 in Aberdeen over the Wishkah River.



The proposed scope of work is depicted on the figure below. The sequencing gets a bit complicated as the components that need to be replaced are also needed to maintain stability of the structure.

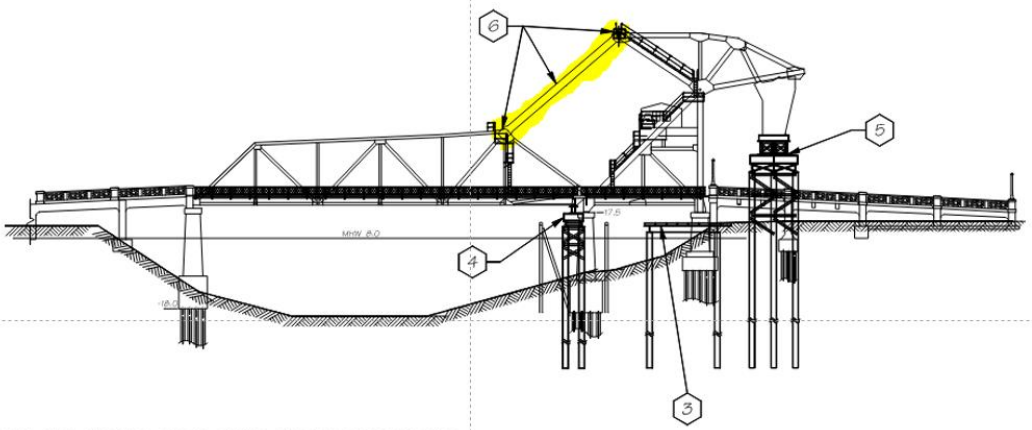


General Construction Sequence – Step 1



One of the first orders of work will be to remove the operating strut which is rack and pinion driven. To open the bridge, the operating strut is moved back and the counterweight swings down as the angle of the counterwight link changes thus lifting the span. With the bridge down, the operating strut can be removed.

General Construction Sequence – Step 2



3 DRIVE PILING AND INSTALL TEMP. WORK TRESTLE/CRANE PAD.

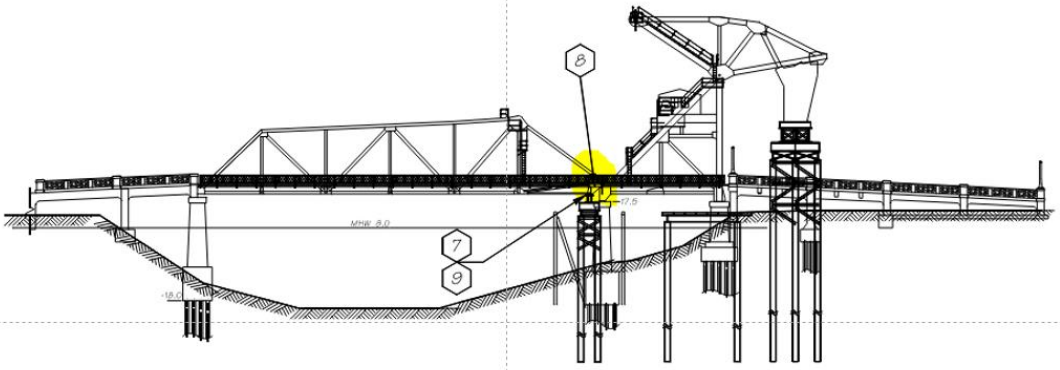
4 DRIVE PILING AND INSTALL TEMP SUPPORT SYSTEM AT FLOORBEAM PP12. DO NOT JACK LOAD AT THIS STEP.

5 DRIVE PILE AND INSTALL TEMP. SUPPORT SYSTEM AT COUNTERWEIGHT. JACK LOAD UNDER COUNTERWEIGHT TO REMOVE LOAD FROM COUNTERWEIGHT LINK ASSEMBLY.

6 REMOVE 1st LINK PIN, 2nd LINK PIN, AND COUNTERWEIGHT LINK ASSEMBLY.

After the operating strut is removed, temporary supports will be added to support the counterweight so the link mechanism can be removed. At the same time the bridge will need to be supported so the main trunnion pin can be removed and replaced. Most of the constructabilty review is focussed on the construction of the temporary supports. Discussed in more detail below.

General Construction Sequence – Step 3



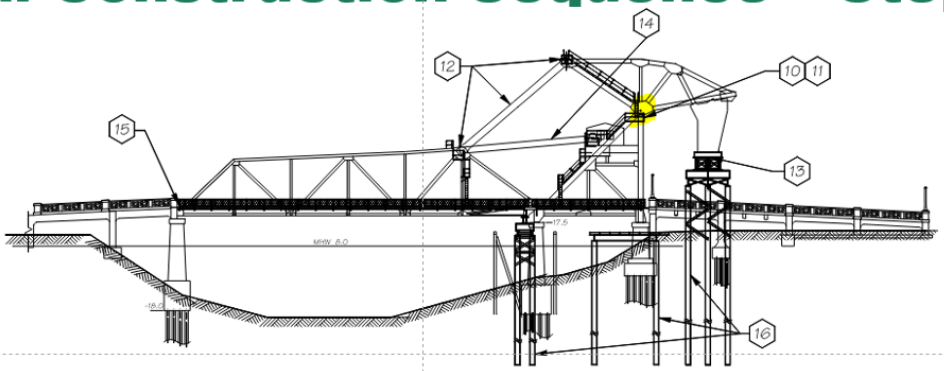
7 JACK SPAN FROM TEMP. SUPPORTS AT FLOORBEAM PP12 TO REMOVE LOAD FROM MAIN TRUNNION.

8 REMOVE AND REPLACE MAIN TRUNNION.

9 UNLOAD JACKS AT FLOORBEAM PP12 TEMP SUPPORTS AND TRANSFER LOAD BACK INTO MAIN TRUNNION.

Step three replaces the main trunnion.

General Construction Sequence – Step 4



10 INSTALL BRACKETS AND JACK COUNTERWEIGHT TRUSS ASSEMBLY TO REMOVE LOAD FROM COUNTERWEIGHT TRUNNION.

11 REMOVE AND REPLACE COUNTERWEIGHT TRUNNION. UNLOAD JACKS AND TRANSFER LOAD BACK INTO COUNTERWEIGHT TRUNNION.

12 INSTALL NEW COUNTERWEIGHT LINK ASSEMBLY, 1st LINK PIN, AND 2nd LINK PIN.

13 UNLOAD JACKS AT TEMP COUNTERWEIGHT SUPPORTS AND TRANSFER LOAD BACK INTO COUNTERWIGHT LINK ASSEMBLY.

14 REPLACE REFURBISHED OPERATING STRUT WITH NEW PINS.

15 MODIFY END LOCK RECEIVERS AND CENTERING EARS AND ALIGN SPAN TIP

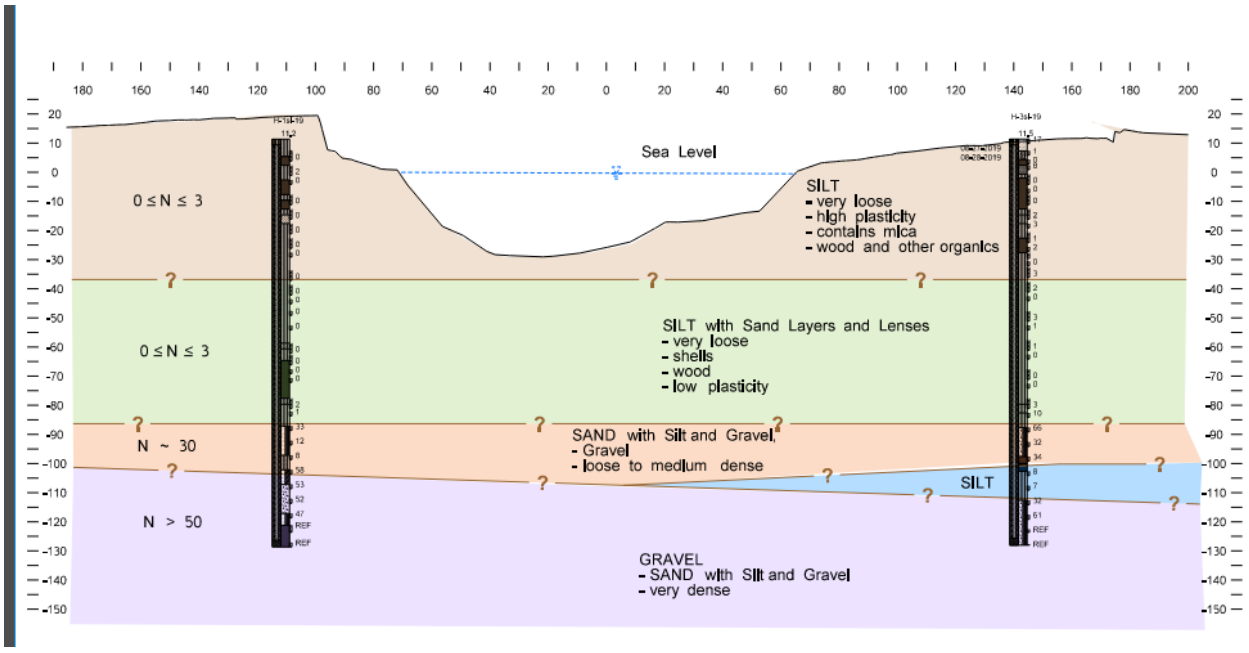
16 REMOVE ALL TEMP SUPPORTS AND TRESTLE/CRANE PADS.

STEP 4

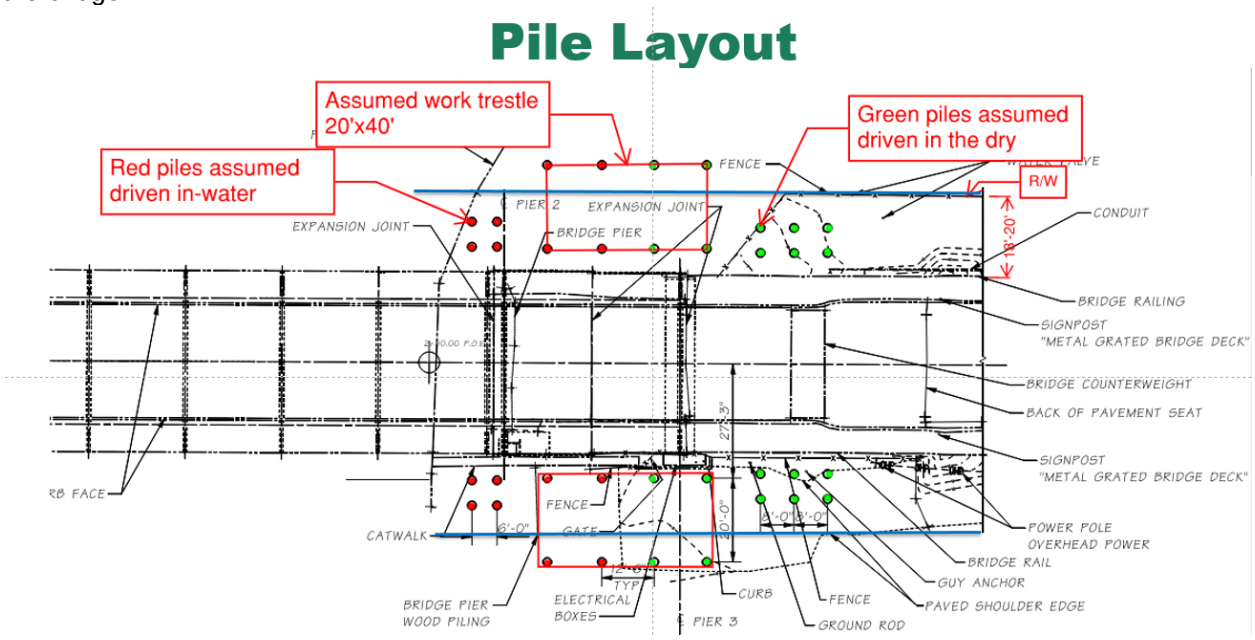
Step four essentially puts everything back together.

Temporary supports

The soils consist of essentially 100 feet of very soft silt. There is a bit of a surface crust, but that's not very thick either. Piles will be steel 2 ft diameter, open ended. We anticipate pile tip elevations to be -115 to -120 ft. The ground line elevation is approximately elevation +10 ft. Total pile lengths with stickup above ground surface are between 125' to 150'. Right now we are planning to require PDA/CAPWAP to confirm axial capacity. Because of the existing bridge, settlement and vibration monitoring will be required on the existing bridge during pile driving. Vibratory driving of piles will likley be required to minimize disturbance to the existing bridge, except the last 3'-5' will be impact driven to do CAPWAP. PDA does open the door for swinging leads to be used, as our spec book allows swinging leads with PDA monitoring. Piles will be cut off 2' below subgrade at completion of project.



For the construction of the temporary supports, it is assumed that the piles in the river would need to be driven first, and then you would work back toward the counterweight. Working the other way the piles would be in the way. At the river, there will likley need to be a bit of trestle constructed. Right now the plan is something about 20 feet in width, extending maybe 40 ft out from the bank. The picture below shows the assumed configuration on each side of the bridge. The blue lines are R/W, which is about 18 feet from the bridge.



Questions:

Access – R/W from edge of bridge is ~ 18 to 20'. Is this enough room for crane access?
No. Most cranes are 24 ft wide. Smaller crawlers could be used but you would loose the reach you need. No room for tail swing. Geoff asked if smaller cranes where used, how much reach can they achieve. Neil Hunt said it depends on the number of splices you put in the pile. The weight of the hammer and the pile together will limit the reach. It was asked if piles could be driven from a barge. John Quigg stated that he thought it may be possible. The bridges can open allowing access. They are not used very often, but there should be access from the river. Geoff will look into driving the piles from the river more ernestly. As for the counterweight piles, Geoff thought that there may be slightly more room available in the vicinty of the counterweight. The design team will look at ways to get more space for driving.

Jim Cuthbertson asked if anybody had been talking to Geotech about possibly using mudsills or spread footings on grade to support the counterweight towers instead of piles. Being short term loading, posting up and using jacks might be an option instead of driving piles. Geoff said he would talk with Geotech about that.

Kelly Griffith asked if there was a way to put some beams down and block to the existing piers to support the counterweight. Geoff didn't think the pier under the counterweight can take the load.

How close to the existing bridge can a pile be driven; how much clear distance is required?
A couple of feet clear is needed. Kelly Griffith pointed out that if the top of pile is above the bridge railing there is more room for the hammer and any lead sections above the bridge so the piles could be closer to the bridge edge.

Jacking Scheme – To take the load off the trunnions and links, Geoff thought they needed to raise the counterweight about two inches. Raising the counter weight 2 inches also causes it to rotate back about an inch. WSDOT will develop suggested details but will still require a submittal. Geoff wanted to know if the contractors had any concerns about having to prepare a jacking plan and submittal.

No concerns about having to prepare a submittal, but there were comments to make sure WSDOT provides enough room for workers and access in their concept details. There were also questions about the stability of the counterweight. Neil Hunt pointed out it looks like it was designed to be suspended. He was concerned about its stability when being supported from beneath. Geoff pointed out that the counterweight would probably need some corner/edge reinforcement to make sure there is no spalling or shearing if jacking locally.

End Meeting

Next meeting scheduled for March 5th, 2021
Notes by Cuthbertson

Meeting Minutes Addendum

After the January 22, 2021 meeting, a number of people met onsite of the Wishkah River Bridge project to review the access. The Meeting occurred on January 29, 2021. The following notes were collected and provided by Geoff Swett of the Bridge Office.

12/12N Wishkah River Bridge
Site Visit Notes
1/29/2021

Attendees:
Todd Mooney – WSDOT Geotech
Geoff Swett – WSDOT Bridge
Taj Uhde – WSDOT Bridge
Kevin Dahl – WSDOT Project Office
Scott Oliver – WSDOT Project Office
John Quigg – Quigg Brothers
Ben Jones – Quigg Brothers

The group met at the bridge site as a follow up to the AGC/WSDOT Structures Team Meeting held on 1/22/2021 to discuss crane and equipment access for driving piles to support the bridge during the mechanical rehab.

We first met on the south side of the bridge. It was discussed that two power poles adjacent to the roadway need to be temporarily relocated. **Action**: Kevin was going to pursue relocation with the PUD.

John Quigg confirmed that the piles to support the floor beam at panel point 12 can be driven using a derrick or crane on a barge. For driving the 6 piles to support the counterweight, John and Ben felt they would need the WSDOT R/W plus whatever access they can get from the adjacent Burger King or DNR. They suggested the crane would be parked near the bank where the paved area is wider and could then receive delivery of pile/beams etc. from trucks in the access road. The crane would then be stuck between the pile group and the river but is needed there for picking and handling the truss members, pins etc. that need to be removed and replaced. Scott mentioned that delivery of materials from a barge may be easier and safer. This would be up to the Contractor. From the discussions, it appears the access is tight, but the work is “doable;” although, it may be tedious and slow. **Action**: Kevin was going to pursue discussions with Real Estate Services, DNR and Burger King to see what access we could acquire.

Todd and I asked John and Ben if they thought cutting shoes would be needed in case we ran into logs, old temporary timber piling, etc. while driving the steel piles. We indicated we were planning on 24” x 1” wall piles and they both felt the cutting shoes weren’t needed.

We met on the North side of the bridge and discussed access. The current WSDOT R/W only provides about 17’ of room from the edge of the bridge to the R/W line/fence, and then there is a row of well-established trees in the adjacent property, which is owned by the tribe. John and Ben said they needed more room for crane access and suggested we look into easements for the adjacent property. John said he had made initial contact with the tribe and they seemed open. The tribe has tentative plans to develop the property in the future. John and Ben suggested we would need some type of work trestle for the crane adjacent to the river in WSDOT R/W and into the adjacent property so they have a decent angle to make the picks they need for the truss members being removed and replaced and the pins/bearings. The bank on the North side sloughs off to the river sooner than the South and appears less stable for equipment.

We discussed that the support piles and framework would be designed in the plans but any work trestle would be left up to the Contractor. We have a specific number of piles permitted that they could use for their trestle. They indicated the more the better. Kevin stated we were permitting 50 piles. 20 are needed for support structure and the remaining 30 could be used for the trestle. **Action**: Kevin was going to pursue with Real Estate Services access to the adjacent property and the potential removal of the trees. Scott suggested we try to lease the entire area for laydown and could then restore it to the tribe’s desire for their future development.

There are 2 water valves and a waterline near the piles needed to support the counterweight and for the temp trestle. **Action**: Kevin was going to get the waterline located so it can be avoided or relocated if necessary. The waterline crosses the river. John said Quigg Brothers worked on the water crossing back in the 70s and a trench was dredged and then filled back in with rock after the pipe was installed.

We talked about access at the counterweight trunnion. There is currently a catwalk there I need to remove to build temporary support brackets to facilitate jacking at the trunnion. The Contractor will need to build their own temp access. Access via man-lifts would not be efficient. We indicated the bridge would not need to open to marine traffic once the work started.

We discussed removal versus cutting off 2' below ground of the temp piles. John and Ben thought it was possible to remove. We may allow removal except for piles adjacent to the existing footings so we don't leave a void and loosen up the surrounding soils when the piles are removed. This could compromise the existing timber pile foundations.

There was some discussion on traffic control and length of closures. We indicated to John and Ben that traffic would be detoured during specific items of work (line boring, installing beams over the roadway, jacking, etc.), but the majority of the time traffic would be allowed on the bridge. Closures with a detour will be kept to a minimum due to back-ups at the Heron St. Bridge.

AGC/WSDOT Structures Team – Meeting Minutes
March 5, 2021

Attendees

[1] Team co-chair

Regular Attendees				
Present	**Member**	**Company**	**Phone**	**E-mail**
Y	**Ayers, Scott[1]**	Graham Const.	206-755-0239	scotta@grahamus.com
	Binnig, Bill	Kiewit IWCo.	253-255-2376	bill.binnig@kiewit.com
	Bowles, Eric	Conc. Tech.	253-383-3545	ebowles@concretetech.com
	Cucchiara, Kevin	Quigg Bros.	360-580-0015	kevinc@quiggbros.com
Y	Cuthbertson, Jim	WSDOT-Const.	360-870-1108	cuthbej@wsdot.wa.gov
	Firth, Jeff	Hamilton Const.	541-953-9755	JFirth@hamil.com
Y	Fuller, Patrick	WSDOT-AWV	206-805-2960	fullep@wsdot.wa.gov
Y	**Glassford, Patrick[1]**	WSDOT-Const.	360-705-7828	GlassfP@wsdot.wa.gov
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Y	Moore, Stuart	Atkinson	360-340-6797	stuart.moore@atkn.com
Y	Olk, John	WSDOT-Bridge	360-705-7395	olkj@wsdot.wa.gov
	Olson, Ryan	Granite Const.	206-793-8110	ryan.olson@gcinc.com
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Y	Quigg, John	Quigg Bros.	360-533-1530	johnq@quiggbros.com
	Reller, Robert	Manson Const.	206-762-0950	rreller@mansonconstruction.com
Y	Robinson, Eric	WSDOT-WSF	206-515-3897	robinse@wsdot.wa.gov
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Y	Smith, Will	WSDOT-SCR	509-577-1804	smithw@wsdot.wa.gov
Y	Swett, Geoff	WSDOT-Bridge	360-705-7157	swettg@wsdot.wa.gov
	Thody, Ryan	DBM Contractors	206-870-3525	Ryan.thody@dbmcontractors.com
	Tornberg, Ben	Manson Const.	206-496-9407	btornberg@mansonconstruction.com
	Watt, Doug	CJA	425-988-2150	dwatt@condon-johnson.com
Y	Watts, Troy	WSDOT-OR	253-255-8215	wattst@wsdot.wa.gov
	Welch, Pete	Granite Const.	425-551-3100	pete.welch@gcinc.com

Guests			
Attendee	**Company**	**Phone**	**E-mail**
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Leland, Amy	WSDOT Bridge	360-705-7394	lelanda@wsdot.wa.gov
Olson, Doug	WSDOT Bridge	360-705-7223	olsondo@wsdot.wa.gov
Petit, Piper	WSDOT NCR	509-664-0861	petitp@wsdot.wa.gov
Zeldenrust, Richard	WSDOT Bridge	360-705-7196	ZeldenR@wsdot.wa.gov

Agenda

1	**Welcome / Review of Agenda**	Patrick Glassford / Scott Ayers
2	**Approval of Previous Meeting Minutes**	Patrick Glassford / Scott Ayers / All
3	**Membership Change**	Patrick Glassford
4	**ABC and Standard Plans for Buried Structures for Fish Passage Structures**	Bijan Khaleghi / Rich Zeldenrust
5	**Constructability Review: US 101 Tumwater, Lees, & Ennis**	Piper Petit
6	**Constructability Review: US 395 NSC Spokane River Crossing**	Amy Leland
7	**AIT Composite Arch GSP**	Patrick Glassford
8	**Dextra CSL Tubes**	Jim Cuthbertson
9	**Action Items:** **a. 6-02.3(26) Cast-In-Place Prestressed Concrete Revisions** **b. 6-20 Buried Structures Revisions** **c. Geofoam Fill GSP** **d. 6-02.3(25) Prestressed Concrete Girders - Girder Erection and Stability** **e. Fish Passage Lessons Learned** **f. Fiber Reinforced Bridge Deck Study (2022 briefing at the earliest)**	 Anthony Mizumori Patrick Glassford Patrick Glassford Rick Brice / Patrick Glassford All Anthony Mizumori

Future meeting dates: April 16, 2021; May 28, 2021; September 17, 2021

1 Welcome / Review of Agenda
Patrick Glassford / Scott Ayers

Patrick welcomed everyone. He quickly mentioned that OFM had directed WSDOT to pause contract advertisements in January and then that pause was rescinded on January 28th. Patrick reminded members that at the last meeting we had a project review regarding the Montlake Bridge deck replacement. The team had requested additional information about the connections to better assess the time and effort necessary to do the work. Plan sheets showing connection details were distributed via e-mail to the team on February 10th. There have been no responses yet. Patrick nudged the team to get their comments turned in. He then went over the agenda for today's meeting. No new agenda items were suggested.

2 Approval of Previous Meeting Minutes
Patrick Glassford / Scott Ayers / All

Nobody had comments on the January meeting minutes. They will be posted to the web.

3 Membership Change
Patrick Glassford

Scott Ayers will be retiring. We have not selected a replacement co-chair yet. There are two people who have volunteered to be co-chairs, Neil Hunt and Stuart Moore. There will be more forthcoming on the heir apparent.

Scott was also recognized by WSDOT for his years of service to the Structures Team. Scott has been involved form more than twenty years with the team and has contributed significantly to the success of the partnership. He was presented with a plaque in honor of his years of service at the recent Statewide PE meeting hosted by WSDOT. Mark Gaines presented Scott with the award at that meeting, but we wanted to take a moment at the Structures team meeting to thank Scott for all that he has done and his contribution to the team and contracting community. Thank you, Scott!

4 ABC and Standard Plans for Buried Structures for Fish Passage Structures
Bijan Khaleghi / Rich Zeldenrust

Bijan presented the progress that the Bridge Office is making towards developing standard plans for fish passage structures. This is a priority for them at the moment given the magnitude of the fish passage program. It is estimated that 60% of the passages could be buried structures as opposed to 40% bridges. If standard plans can be utilized as some of the crossings, it would greatly reduce the design workload and could increase construction productivity as precasters would not have to design the structures themselves. There are a number of challenges that the Bridge office is considering in the development of standard plans: geotechnical applicability, hydraulic efficiency, precaster capability, shipping size and weight, materials, fabrication ease and cycle times for forming, joint and geometric details, and handling and erection. Right now, they have about 150 cases they are evaluating. The cases they are evaluating are as follows:

Standard Plan Buried Structures: 4-sided Box Culverts

- Span Lengths: 12' to 30' at 4' intervals
- Hydraulic Openings: 10', 15' and 20'
- Geotechnical: 2 Types Soils
- Soils Cover: 0', 2', 8', 16', 24', and 30'

Cases NOT Covered: Special Design:

- Challenging geometry: Steep profile, large skew, stage construction, etc.
- Channel migration, curvature, etc.
- Unstable and liquefiable soils

Span length	Soil Type		Soil Cover 0 to 2 ft U+Top Slab	2 to 8 ft U+Top Slab	8 to 16 ft Split U	16 to 24 ft Split U	24 to 32 ft Split U	cases
12	1	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5
	2	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5
16	1	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5
	2	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5
20	1	Height	10					5
			15					5
			20	20	20	20	20	5
	2	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5
25	1	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5
	2	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5
30	1	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5
	2	Height	10	10	10	10	10	5
			15	15	15	15	15	5
			20	20	20	20	20	5

150 Design Cases

They are thinking they will be able to cover all 150 cases with approximately 8 standard plan sheets which includes two sheets for precast wingwalls and headwalls. The table below illustrates what the bridge office is envisioning for the number of plans and includes a picture of a similar precast structure with wingwalls and head wall for discussion purposes. The picture is not a standard plan. They are not designed yet. Just illustrative of the concept.

6 Standard Plans for 4-sided Box Culverts – Covering 150 cases
2 Separate Standard Plans for Wingwall and Headwall

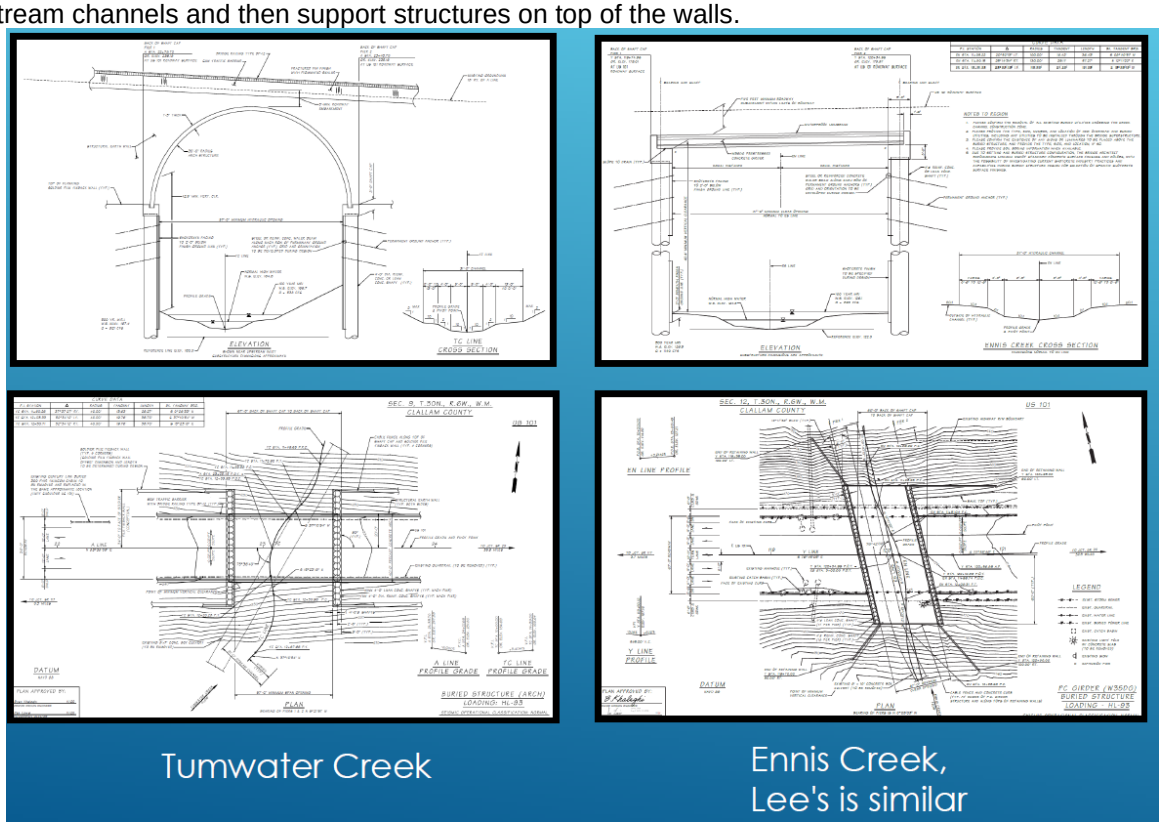
Culvert:	Cases	Plan Sheet
Soil type 1, Height=10 ft	25	1
Soil type 1, Height=15 ft	25	1
Soil type 1, Height=20 ft	25	1
Soil type 2, Height=10 ft	25	1
Soil type 2, Height=15 ft	25	1
Soil type 2, Height=20 ft	25	1
Wingwall:		
Soil type 1, Height = 10 ft	All	1
Soil type 1, Height = 20 ft	All	1
	150	8

Q: Bob Hilmes asked if structures with spans greater than 20 ft would still be inventoried.
A: Bijan – Yes structures 20 feet and greater go on the bridge inventory.
Q: Jim Cuthbertson asked if there were any concerns with production, shapes, or shipping that the team wanted to raise.
A: Stuart Moore mentioned that in the picture above the footing on the precast wall could be an issue it is too large. He suggested limiting widths to 10 feet or less for shipping. Bijan stated that the picture was just illustrative and did not represent an actual standard plan, but that they are working with industry regarding width, height, and weight of components for shipping. Jim Cuthbertson suggested that walls could be fabricated in two pieces, and a closure pour could be used to lock them together. Stuart suggested using a full height panel with reinforcing like a MSE wall as an option too. Piper Pettit mentioned that she had a project with a split box culvert that had different leg length between the top piece and the bottom piece. She

recommends keeping the legs, or height, the same for both pieces as the forms are slightly tapered to facilitate removal and they had fitment issues because the taper differences made the piece with longer legs slightly wider where the pieces were supposed to join.

5 Constructability Review: US 101 Tumwater, Lees, & Ennis
Piper Petit

The project is replacing three fish passages in Olympic Region near Port Angeles. The passages are on the fish passage injunction list. ADT on SR101 is 34,000 vehicles per day and two of the passages have no viable detours, Lee's and Ennis. All three sites have very deep fills. Ennis has about 50 feet of fill, Lees has about 45 feet, and Tumwater has 75 feet of fill. Fill slopes are all 1.5H:1V or steeper and wooded. The fills are a mix of materials: silty SAND, GRAVEL with silt, clayey SAND, SAND with silt, CLAY, and even fat CLAY. Beneath the fills, coastal SILTSTONE is present. The siltstone is variable and extremely weak to very weak with unconfined compression strength tests that range from 20 psi to 1,400 psi. Landslide scarps are present and are being buttressed by the fills, so the design team does not want to remove the fill in its entirety. The current design concept is to construct secant pile walls parallel to the stream channels and then support structures on top of the walls.

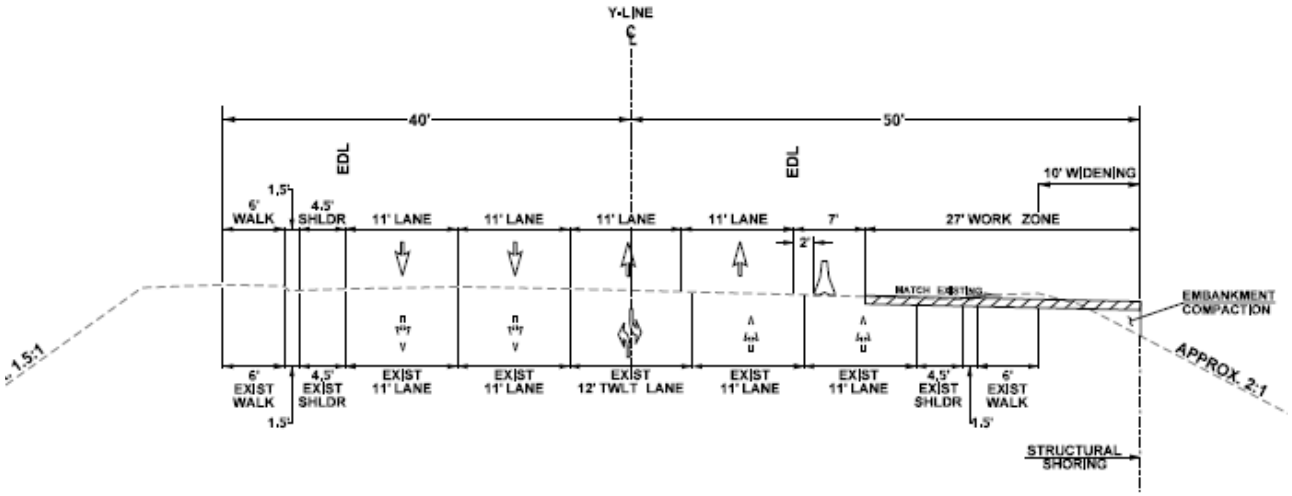


The planned construction sequence is as follows:

There is about 100 ft of roadway width to work in, but traffic must be maintained through the corridor. Tumwater has a detour available but Lees and Ennis do not and must use phased construction. Accordingly, Lees and Ennis are the focus of the constructability review. Construction at both crossings will be performed in three phases.

Phase 1 – CN Prep Work

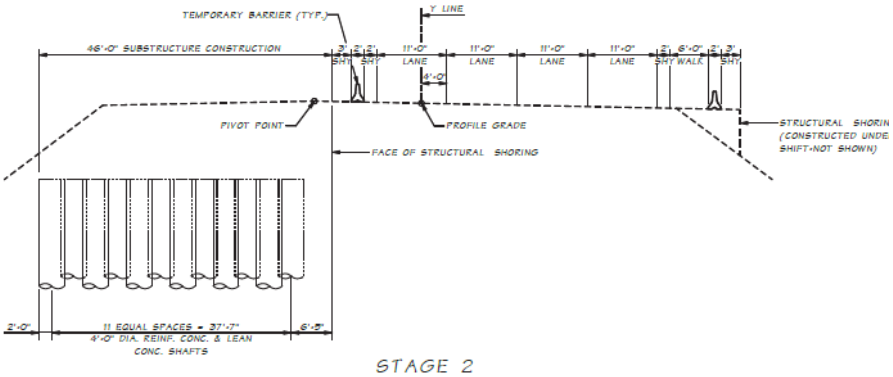
Use lane shifts & nighttime lane closures to disconnect storm system, relocate existing underground utilities, and build out 10’ temp widening to one side resulting in a work zone of about 20 feet in width.



STAGED CONSTRUCTION SECTION
STAGE 1

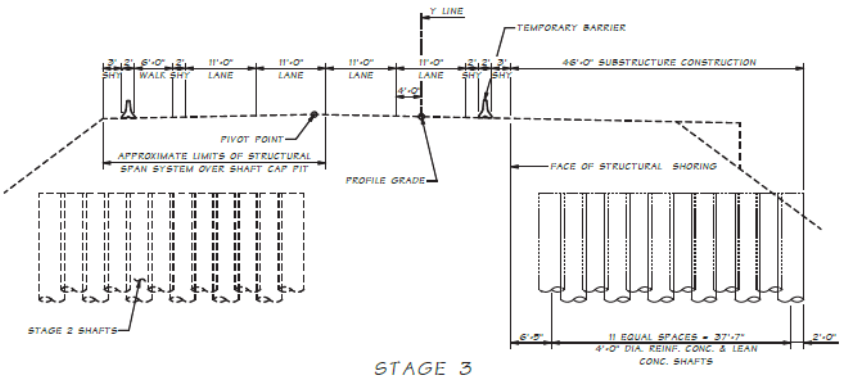
Phase 2 – Foundation Construction (3 Stages):

- Shift traffic to drill shafts from roadway surface, patched over before next stage (4 lanes of traffic open).



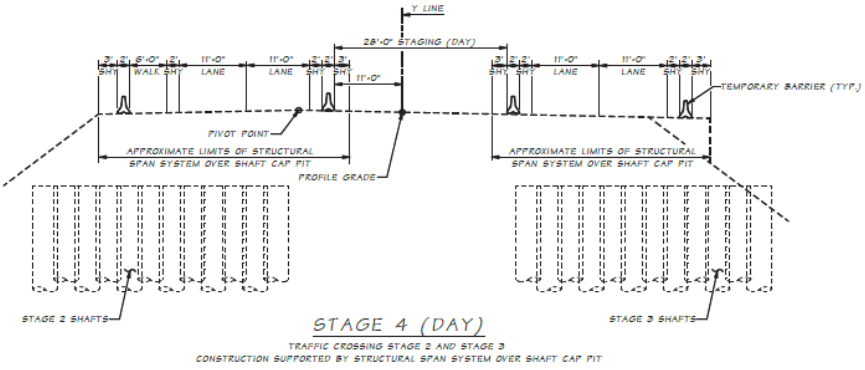
STAGE 2

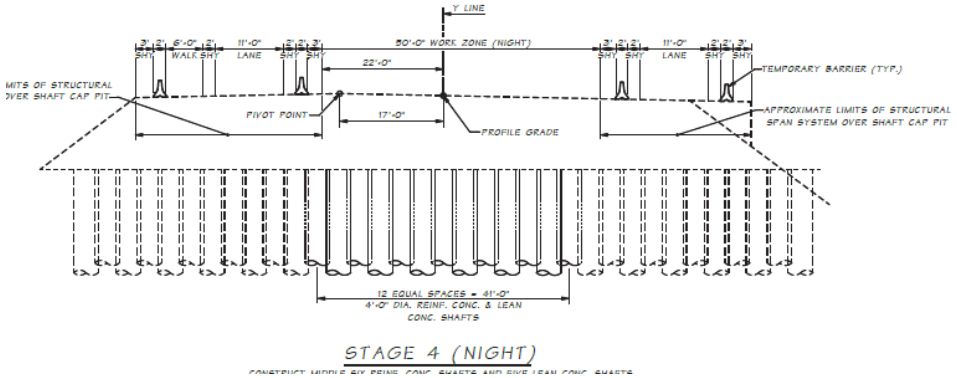
CONSTRUCT NORTHERN MOST SIX REINF. CONC. SHAFTS AND SIX LEAN CONC. SHAFTS



STAGE 3

- Shafts at center of bridge constructed during night shift single lane closures (2 lanes of traffic open) covered with steel plates for daytime traffic. Centerline shoring for Phase 3 installed this stage.

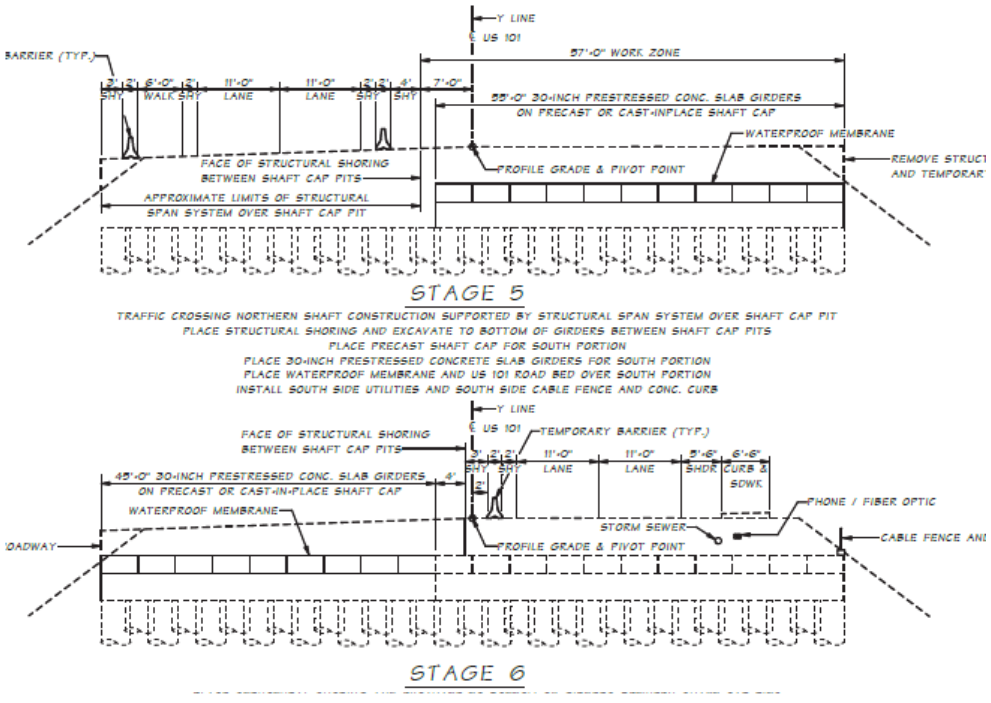




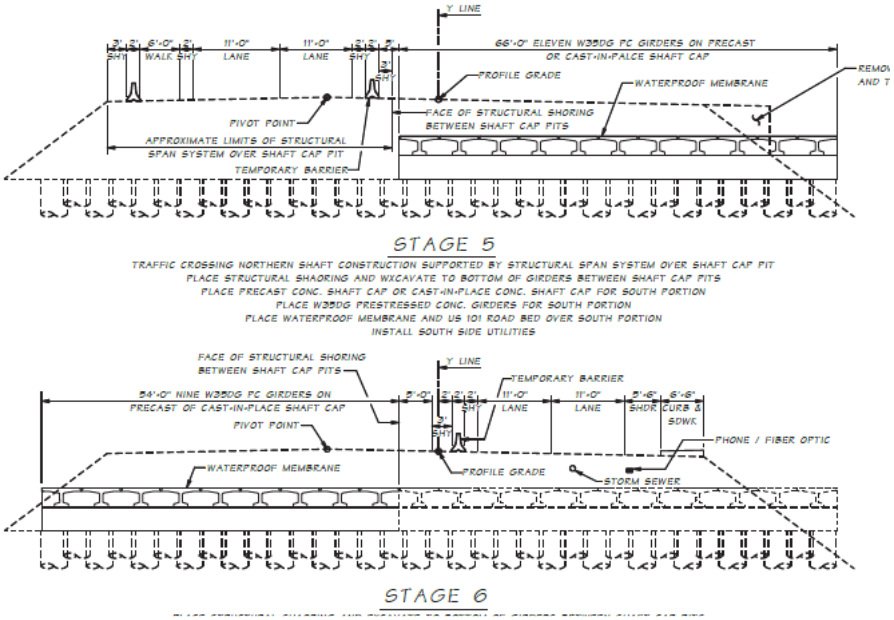
Phase 3 – Superstructure Installation and Backfill (2 Stages):

- Close 2 lanes of traffic & shift the 2 open lanes to excavate ~15’ deep, install shaft cap, girders, restore underground utilities, and backfill/repave over bridge superstructure, half at a time.

Lees Creek

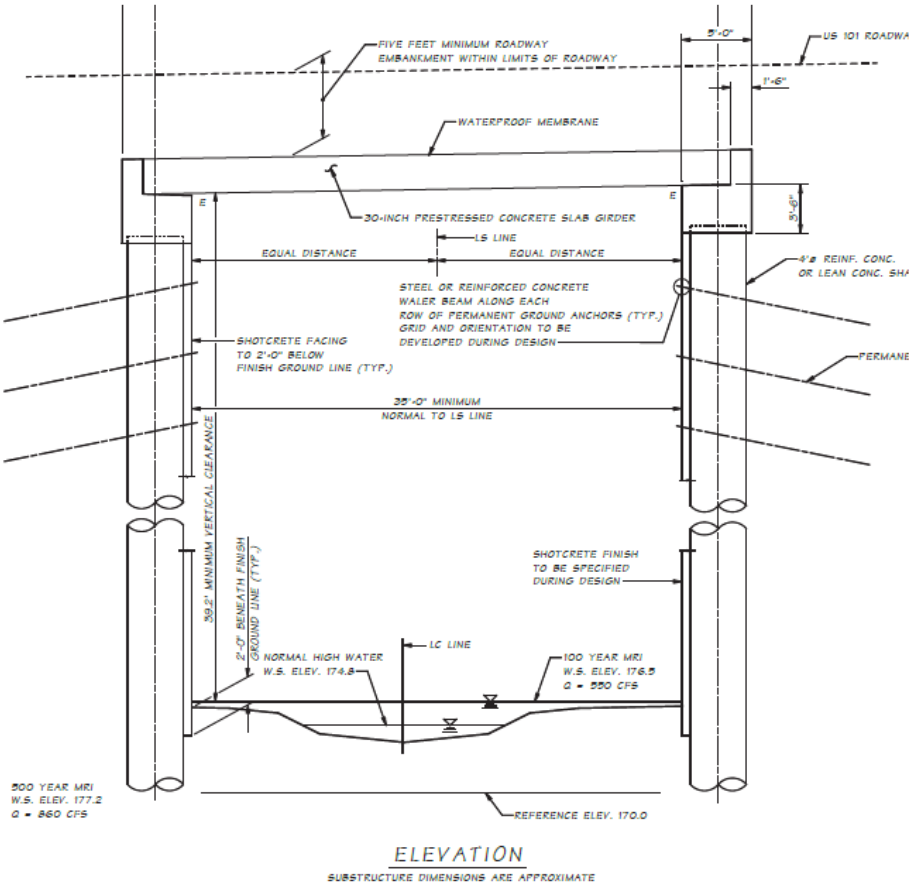


Ennis Creek



Phase 4 – Excavate and Install PGAs:

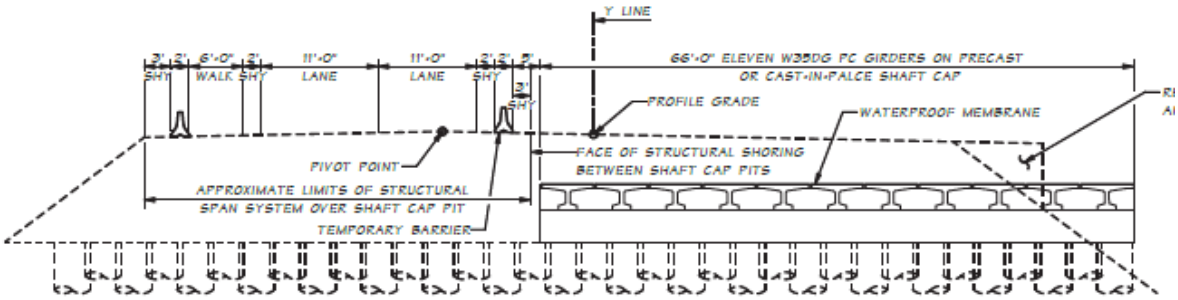
- With traffic fully restored over the new structure, access from the NE & SW side slopes to excavate beneath the finished bridge while installing PGA's, construct remainder of wing walls, remove the existing culvert, and grade new stream channel.



The Design team had some specific questions they wanted answered, but before asking those the Structures team had some questions about the staging.

Q: Kelly Griffiths - How deep (exposed height) will the shoring need to be to construct the shaft caps and superstructures?
A: Piper Pettit – it varies, Lees is shallowest because of the flat slab. It's about 12 ft. Ennis is 15 ft or so.
C: Kelly – If you get much deeper than 17 feet then you will need tiebacks and it will greatly slow down the construction.

DISCUSSION TOPIC #1 - Timeline for Superstructure Install
Does it seem feasible to install half of the superstructure and reopen the roadway to traffic in 14 days using deck bulb tee girders? How risky of a proposition is it? (i.e. Would you submit a bid? If so, would you bid in some amount of LD's to mitigate the likelihood of running over time?)



STAGE 5

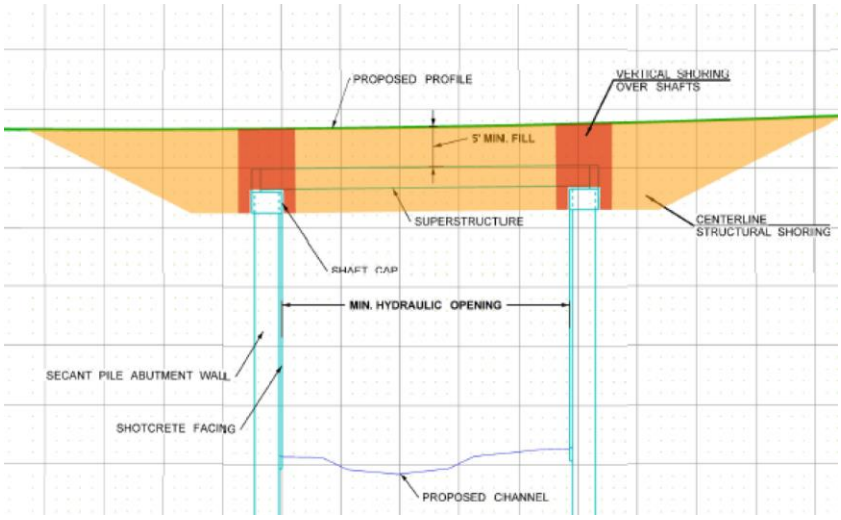
Q: Kelly Griffiths – The work includes excavating down to the top of shafts, cleaning them, form and pour the cap, get grout pads down, set the girders, weld the ties, and then backfill. Correct?
A: Piper – Yes, it also includes building some form of geosynthetic wall when backfilling so that you can do the work for the other side of the road; reversible shoring.
C: Kelly – During the day, because of the way traffic is staged you will not be able to receive materials. Could you take a lane at night?
A: Piper – Yes, you can take one of the lanes at night. Could you deliver 11 girders in one shift?
A: Kelly – No, you are more like 4 or 5 girders, but Van Dyke would need to be contacted to make sure.
Q: Stuart Moore – Could you widen more to the outside so that you can maintain two lanes of traffic on a shoefly?
A: Piper – We are constrained by geometrics but we can look into that a little more.
Q: Kelly – With the steep slopes, how are you planning to construct the widening?
A: Piper – That's why we are only widening out about 10 ft, to keep the wall height low. We are thinking sheet pile or soldier pile to keep the wall height low.
C: Jim Cuthbertson – With a 10 ft widening and a 1.5H:1V slope you are talking about a 15 ft exposed wall face. If you wanted to use a geosynthetic wall instead and you account for some embedment you are really talking about almost a 20 ft tall wall. There may not be room enough for the excavation to get the bottom reinforcing in place and still maintain traffic. If you did do a soldier pile wall, or sheet pile wall, the steep slope may not provide much passive resistance so cantilevering the wall may not work. You may need anchors or deadmen, and deadmen may conflict with the roadway depending on where they need to be placed. Kelly suggested trenching across the roadway at night to construct deadmen. Piper pointed out there are utility conflicts to deal with.
C: Geoff Swett – Circled back to the girder delivery issue. He suggested having the girders delivered over multiple nights and stored in the work zone so that they could be set in one operation. He pointed out the girders are only 54 feet long or so, and you should be able to store them onsite.
C: Scott Ayers – Stated he thought the shorter length might make it so you could haul the girders on a stretch trailer or pull trailer and get the girders to the job site easily enough. To set them all in one night you would have to set a girder every 30 minutes or so. He thought it could be done, but it is really pushing it.
Q: Stuart Moore - Asked why the office is planning to build so much bridge on stage 1. You could build less structure, just enough to get two lanes of traffic on it when it is done. It would speed up stage 1 construction and then you could have more width later.

A: Piper – We wanted to have a little extra room just in case something comes up.
C: Bijan suggested trying to stay with voided slab girders rather than deck-bulb T girders. The span lengths are within the capabilities for slab girders.
A: Piper stated she thought the issue with slab girders was the soil weight. There is 5 feet or more of soil over the slabs, and the designers are having problem getting the slab girders to work.
C: Jim Cuthbertson – Suggested using lightweight concrete instead of gravel, cellular concrete has a weight of about 30 pcf as opposed to soil at 130 pcf.
C: Neil Hunt also suggested using a lightweight glass aggregate. That material is lighter than the lightweight concrete and it has no setup time like the concrete. He also suggested not backfilling during the temporary configuration. He suggested ramping down and letting traffic run directly on the girders, temporarily. That would be a way to speed up the construction and maybe complete the construction in the 14 day window that is desired.
Q: Stuart Moore – Asked why they were not doing that permanently. Why backfill at all?
A: Piper – We need the fill for the underground utilities.

DISCUSSION TOPIC #2 - Alternative Span Types
Given this 14 day time constraint, would a precast or plate arch be a preferable superstructure type to decrease number of CIP elements and lessen schedule risks?

A: Kelly Griffiths – Setting arch shapes would probably be slower and the shaft caps would be more detailed to form which would also be slower. All that you are really deleting is some of the earthwork, and that was probably the fastest earthwork.
A: Neil Hunt – Stated that these shapes may be harder to get, and Kelly pointed out that you may not be able to ship as many pieces at once or stockpile them as easily in the work zone either. Neil also pointed out that the change in shape would likely drive the shaft caps deeper which will complicate the shoring issues and increase the costs associated with shoring, excavation, and backfilling.

DISCUSSION TOPIC #3 - Centerline Shoring Challenges
What methods might be used to shore above and directly beside finished shafts (shown in red below) prior to beginning superstructure stages?



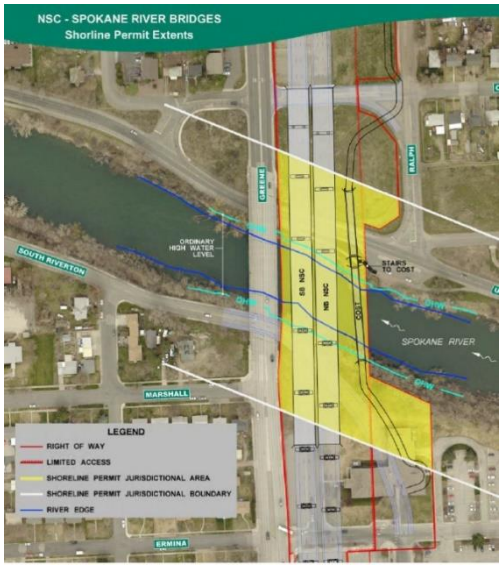
A: The issue is that the shafts are secant and run perpendicular to the centerline of the road and the necessary shoring. Some of the ideas offered up to solve the conflict included using sheet piles for much of the shoring wall, but where the sheets need to cross the secant shafts that can't work as the sheets can't penetrate into the shafts. You could install Soldier Piles on either side of where the shaft cap will be located and use a street plate between them to retain the soil. The plate would just penetrate to the top of shaft. Alternately, Neil Hunt suggested using a temporary shoring system that would be bolted/anchored to the top

of shaft. Kelly suggested casting a shaft high to act as shoring, but mentioned you have a girder conflict with that.

Q: How would structural shoring methods be modified at Lees Creek, where 1 ft of concrete pavement from original US 101 roadbed is located 7.5'- 8' below existing grade along centerline?
A: Kelly Griffiths suggested predrilling or excavating down and breaking up the concrete prior to shoring.
A: Jim Cuthbertson concurred with Kelly, He said if he was a contractor he would drag a trench box along, excavate and break the slab up, and backfill as you go, then you can build the shoring after its all backfilled.

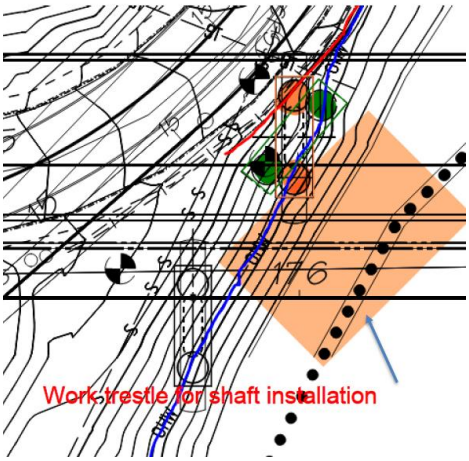
6 Constructability Review: US 395 NSC Spokane River Crossing
Amy Leland

US 395 runs North-South through Spokane WA. The new highway will be a divided highway crossing over the Spokane River just east of the Greene St. Bridge. The bridges will be eight spans. There is also a pedestrian bridge that will be included in the contract. The separation between the NB and SB structures is 7'3" which matches the other structures on the corridor. The 395 structures will be higher in elevation than the Greene St. structure. Along the south bank of the river there is a metal bin wall that supports South Riverton Rd. Pier 5 of the SB new bridge will be located between the wall and the river in the clump of trees that are shown in the photo below.

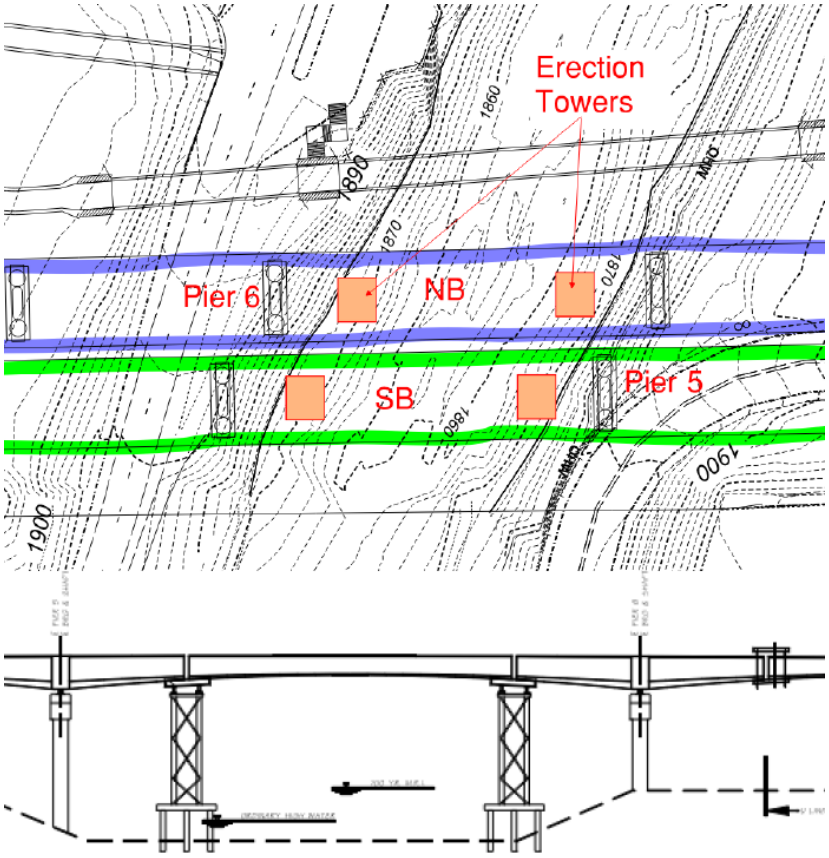


Pier 5 location of SB bridge

The bridge is in design now and the design team is evaluating options for the construction of pier 5. The ideal alignment of the shafts relative to the bridge is perpendicular to bridge as represented by the orange shafts in the figure, but the shafts could be constructed skewed to the bridge missing the wall, as shown in the green shafts.

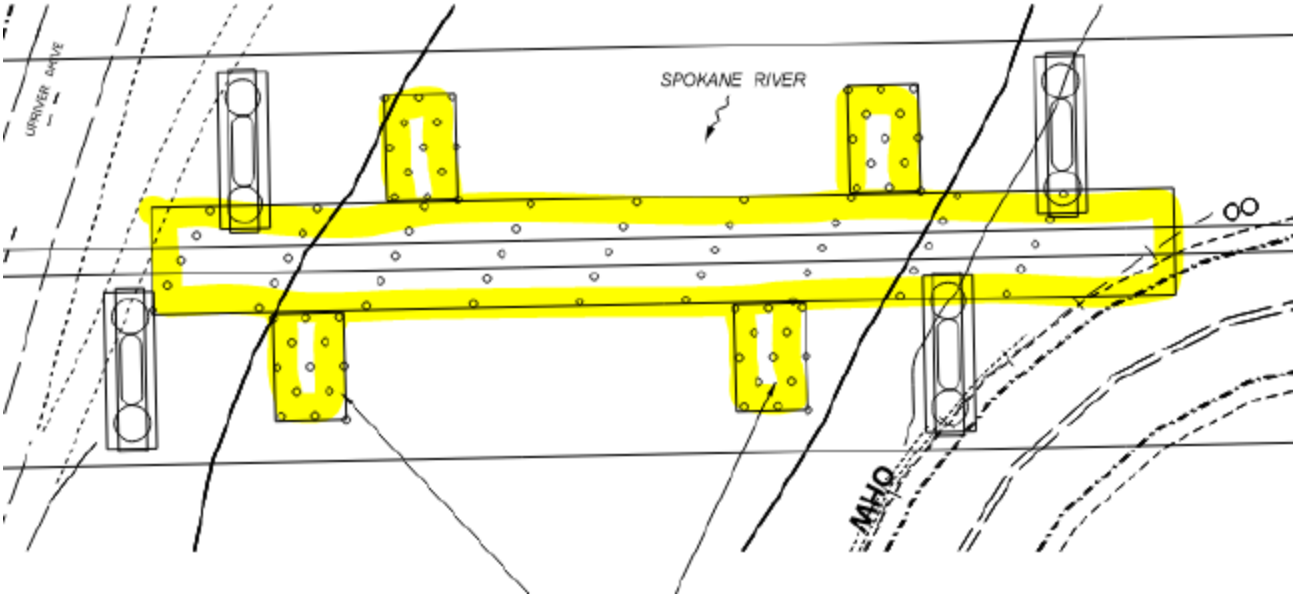


In addition, the structure type necessitates the use of erection towers in the river. To construct the erection towers, work trestles will be needed. There are in water work windows June 16th to August 31st, but extensions have been obtained on other projects when requested. So, there may be the ability to modify them. Bridge need to do more analysis to see if trestles can remain in place during high water season. The erection tower locations are shown below.

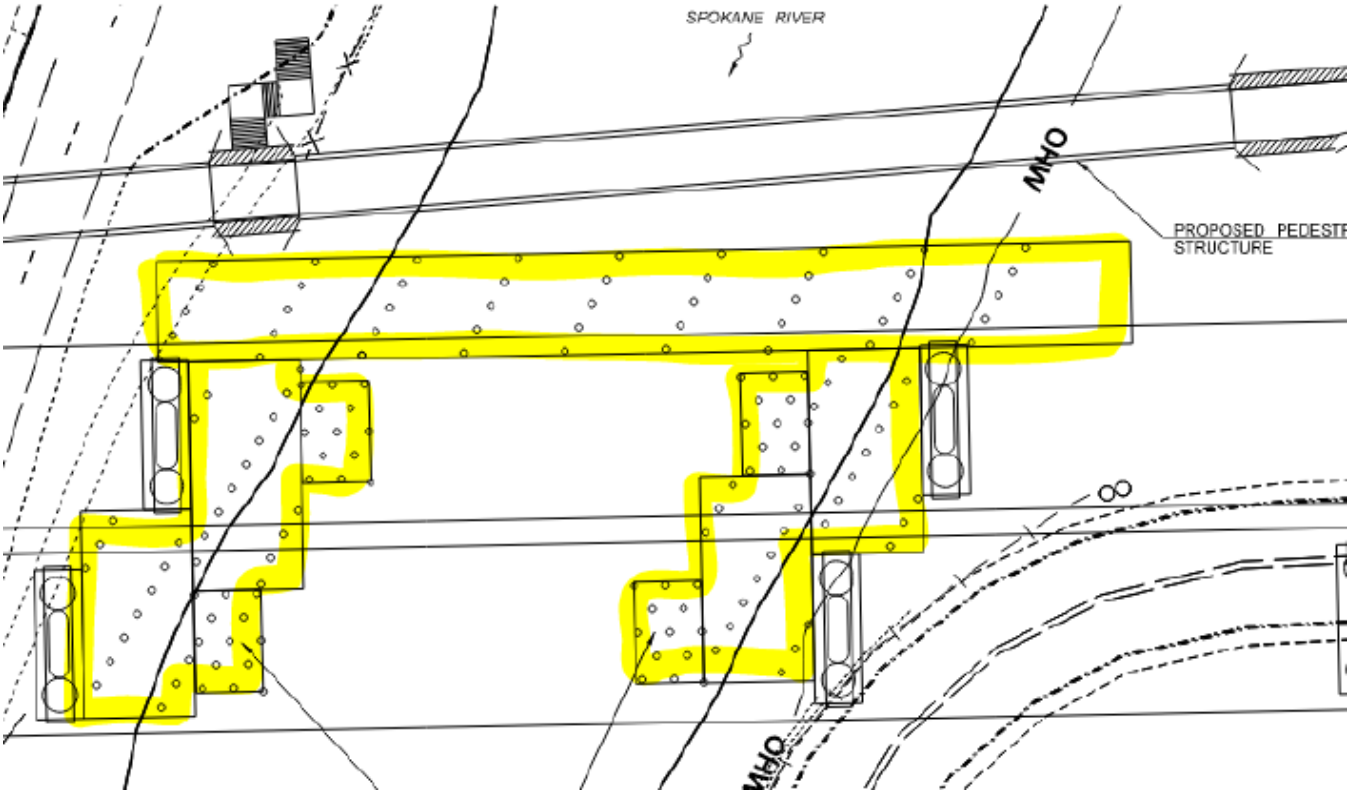


For the work trestle, Bridge needs to have a conceptual plan to discuss with the resource agencies. They are considering two options. One would have the trestle roughly centered between the new NB and SB structures. The other option would build the trestle to the east on the 395 bridges, closer to the pedestrian path bridge, and then finger piers would be used to access the erection towers and in-water piers of 395.

Option 1



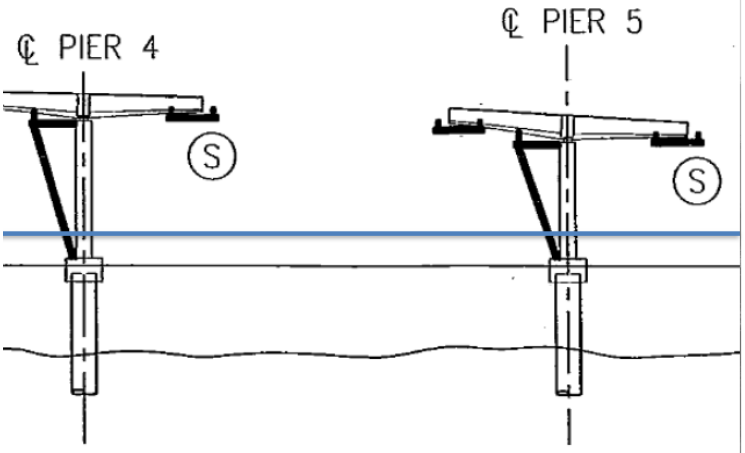
Option 2



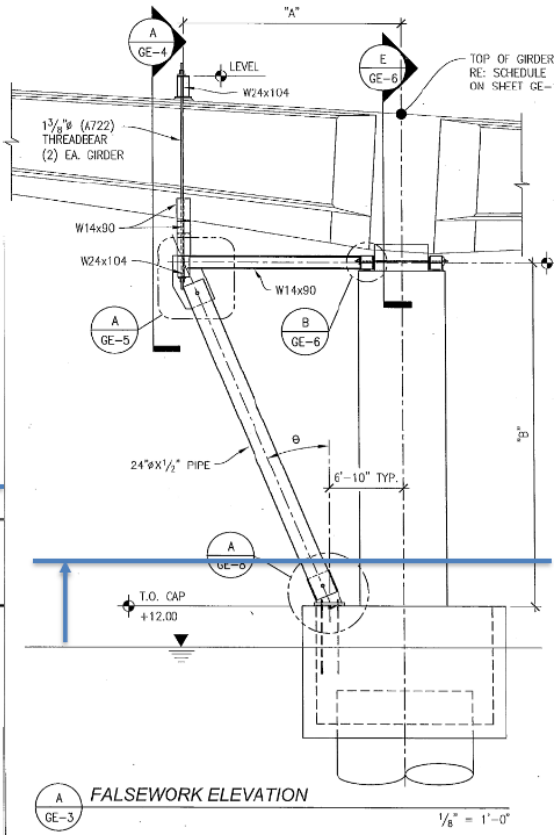
Bridge is also considering an alternative to the trestles. When the Manette Bridge was constructed temporary bracing from the shaft caps was used to support the girders and carry the loads in the structure. The Bridge office is considering a similar concept for this bridge. Examples from the Mannette Bridge are shown below:

Alternative to Work Trestle

- Bracing Similar to Manette construction



For our project, the top of shaft caps near the river will be below finished grade. Most likely a cofferdam and seal will be required.



There are known work trestle construction constraints on the project which, in part, are contributing to the evaluation of alternate support methods. The constraints include:

- In water work window between June 16th and August 31st.
- Trestle or just trestle piles may remain in place outside in water work window
  - Depending on water level, trestle deck may have to be temporarily removed
  - An analysis will determine if the total number of trestle piles may remain
- Piles must be removed upon completion –they cannot be cut at mud line
  - Potential exception for reaction piles around shafts if required

The design team had specific questions for the AGC Structures team. Those were:

Would a separate Pier 5 shaft trestle be used, or should it be incorporated into the erection tower trestle?

- **The elevation of the erection tower trestle may have elevation requirements (higher than required for shaft construction)**

Q: Why not construct the pier 5 shafts from the roadway?
A: Amy Leland - This project was reviewed by the ADSC drilled shaft group. They indicated that the wall likely could not withstand the equipment loading without some form of load platform being constructed to shield the wall. If you were going to do that, it might be best just to construct a work trestle on the river side of the pier and construct the shafts from there rather than from above the wall. That is the current plan.
Q: Scott Ayers – For the trestle between the bridges, what is the separation distance between the cross beams? We had a project where there was not enough to get a crane boom between the bridges.
A: Amy – The shaft caps are about 30 feet apart, but the edge to edge distance between the bridge decks is slightly greater than 7 feet. Once girders are set, the width between the two bridges would be closer to 10 feet from girder edge to girder edge.
Q: Scott – What is the distance from the river to the bottom of girders?

A: Amy – About 70 ft.
Q: Scott – How deep is the water?
A: Amy – It varies with season, 1880 is the ordinary water elevation. Jim Cuthbertson pointed out the ground contours are around 1860 feet, so 20 ft of water.
C: Scott – Scott was exploring the use of flexi-floats to pull piles for the trestle removal. Kelly Griffiths pointed out that if they needed to use flexi-floats just for that it would not be very efficient. Stuart Moore thought that the option 2 trestle would be the better option, but everyone agreed that pulling the trestle piles from under the bridges would be an issue because of headroom constraints. Stuart suggested, possibly demo-ing the trestle as you set girders. Set a girder pull some trestle. Set another girder pull more trestle. That way you never block yourself in headroom wise. There is still the issue of pulling the piles for the erection towers as those can't come out until after the superstructure is in place, and if you have demoed the work trestle as you go, you just complicated their removal.

Amy wanted to explore the bracing option in more detail. The bracing is there to prevent uneven loading in the hammer head pier. The hammer heads are about 100 feet from joint to joint, placing the joints about 50 feet out from the centerline of the pier. The piers will have pier walls rather than columns so it may be possible to brace off of the wall rather than the shaft cap. At Manette, the shaft caps were above the water elevation, but at this bridge the caps will be below water if cofferdams are not used. Posting up from the shaft cap may be more difficult if there is no cofferdam in place. The shaft caps will be buried two feet below the mudline at the river bottom.

Q: Stuart Moore – Can you move the towers out of the river?
A: Doug Olson – We could do that but the towers end up conflicting with the roads along the river and one of those roads we must keep open. Maybe one tower could be moved out of the river, Pier 5 NB.

Amy recapped the discussion to this point as: There seems to be more preference for the bracing option rather than the tower option. If that is the case then the pier 5 shaft construction trestle would be its own independent trestle and not connected to any other work trestles. That would minimize the issues with the in water work windows. It is possible that a work trestle for the bridge construction may still be necessary just for general access and constructability.

Scott Ayers pointed out that the work window looks to be 10 weeks or so. There seems to be a lot of work to complete in that window for these piers. Work trestles, falsework towers, cofferdams, and eight shafts. Amy confirmed that the job is a multi-season job so the likely sequence would be to construct both bridge's substructure one season and super structures the subsequent season.

Bob Hilmes wanted the team to address the number of piles for work trestle because they needed a quantity for the permit applications. Amy stated she was assuming 100 piles. Scott stated that seemed low to him. Just for the shafts you need four reaction piles per shaft for the oscillator. That's 32 piles just for those. Amy stated she was not including those piles in her count, so the number is probably greater than the 100 she was assuming for work trestle and towers. The consensus was you needed about 140 piles just to be sure.

7 AIT Composite Arch GSP
Patrick Glassford

Ran out of time - Topic was deferred

8 Dextra CSL Tubes
Jim Cuthbertson

Ran out of time – A summary of the product was distributed via e-mail March 8th after the meeting. A copy of the information is attached to the end of the notes. We did receive two responses indicating that contractors would be interested in the product and thought that having this product available for use could be a benefit.

9 Action Items:

Ran out of time - Topic was deferred

a. **6-02.3(26) Cast-In-Place Prestressed Concrete Revisions**
   Anthony Mizumori
b. **6-20 Buried Structures Revisions**
   Patrick Glassford
c. **Geofoam Fill GSP**
   Patrick Glassford
d. **6-02.3(25) Prestressed Concrete Girders - Girder Erection and Stability**
   Rick Brice/Patrick Glassford
e. **Fish Passage Lessons Learned**
   All
f. **Fiber Reinforced Bridge Deck Study (2022 briefing at the earliest)**
   Anthony Mizumori

Next Meeting April 16th
Notes by Jim Cuthbertson
Special thanks to Scott for his service!

1. Dextra's Sonitec® CSL Tube

WEBSITE:
https://www.dextragroup.com/activities/technical-solutions-for-construction/solutions/32-ground-anchoring/piling/88-sonitec-csl-foundations

Kris Krabill, Dextra's US Sales Manager and Tim Knaus, Foundation Technologies, presented their CSL tube product Sonitec® at the ADSC meeting in February. Dextra and Foundation Technologies have teamed to bring this technology to the US.

Tubes are manufactured in Ontario, California and meet Buy America requirements. Distribution occurs out of CA or Georgia. Sonitec® CSL tubes have been successfully used internationally for over 20 years on some of the largest projects in the world. Since introduction, over 50,000,000 LF have been used in deep foundation applications. Sonitec® is the only CSL tube specifically designed for this application and has a unique "Push-fit" design. A representation of the tube is shown below.

The tube weighs about one pound per lineal foot as opposed to schedule 40 pipe at about 3 pounds per lineal foot. The tube is 1/3 of the weight and pushes together. The tube is two inch OD with 1.9 inch nominal ID. Wall thickness is 0.049 inches and tubes come in 20 foot lengths standard. The tie lugs are welded to the tube and can carry 100 pounds at each lug. The outer pressure capacity is 725 psi or 580 feet of depth when filled with water. The tube can be tied to the cage using the tabs and 16 gauge tie-wire. The joints are frictional, and it is recommended that tie-wire be used to tie the tubes together for added security. A rubber seal cap with a metal insert is used on the bottom. If necessary, the tube at the top of the shaft can be cut to length. Burs need to be removed to prevent damage to the seal when pressed together. Tubes are tied loosely to the cage to minimize bending when the cage is hoisted vertically; the tubes weight and gravity pulls the tube down a few inches and the tube swings up tight against the inside of the cage. Here is a photo of the tubes installed loosely. There is about 4-inches of space or about a fist's width.

Pricing - As it relates to typical schedule 40, depending on project location, prices vary from a bit below to a bit above, but in general it is competitive, according to Dextra. The cost savings for these tubes is reported to

not be in the materials but in the labor to install them. A typical tube weighs 20 pounds compared to 70 pounds for pipe. This means you only need one person to handle and tie tubes instead of two. You can reportedly cut your labor man hours in half.

Use by WSDOT – Right now these tubes do not meet WSDOT specifications because we have specifications written around schedule 40 pipe. The materials for the CSL tubes are contained in Division 9; specifically section 9-36.4. That section states:

> *9-36.4 Access Tubes and Caps*
> *Access tubes for CSL or TIP testing shall be steel pipe of 0.145 inches minimum wall thickness and at least 1½ inch inside diameter.*
> *The access tubes shall have a round, regular inside diameter free of defects and obstructions, including all pipe joints, in order to permit the free, unobstructed passage of 1.3-inch maximum diameter source and receiver probes used for the crosshole sonic log tests. The access tubes shall be watertight and free from corrosion, with clean internal and external faces to ensure a good bond between the concrete and the access tubes.*
> *The access tubes shall be fitted with watertight threaded PVC caps on the bottom, and shall be fitted with watertight PVC caps, secured in position by means as approved by the Engineer, on the top.*

*Remember Dextra Wall thickness is 0.049 inches

WSDOT is evaluating revising its specs to allow more options for CSL tubes. Your opinion would be appreciated.

AGC/WSDOT Structures Team – Meeting Minutes
May 28, 2021

Attendees

[1] Team co-chair

Regular Attendees				
Present	**Member**	**Company**	**Phone**	**E-mail**
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Y	Cucchiara, Kevin	Quigg Bros.	360-580-0015	kevinc@quiggbros.com
	Cuthbertson, Jim	WSDOT-Const.	360-870-1108	cuthbej@wsdot.wa.gov
Y	Firth, Jeff	Hamilton Const.	541-953-9755	JFirth@hamil.com
Y	Fuller, Patrick	WSDOT-AWV	206-805-2960	fullep@wsdot.wa.gov
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Y	**Moore, Stuart**[1]	Atkinson	360-340-6797	stuart.moore@atkn.com
Y	Olson, Ryan	Granite Const.	206-793-8110	ryan.olson@gcinc.com
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Y	Quigg, John	Quigg Bros.	360-533-1530	johnq@quiggbros.com
	Reller, Robert	Manson Const.	206-762-0950	rreller@mansonconstruction.com
Y	Robinson, Eric	WSDOT-WSF	206-515-3897	robinse@wsdot.wa.gov
	Schettler, Jim	Jacobs	425-239-7542	jim.schettler@jacobs.com
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Y	Thody, Ryan	DBM Contractors	206-870-3525	Ryan.thody@dbmcontractors.com
	Tornberg, Ben	Manson Const.	206-496-9407	btornberg@mansonconstruction.com
	Watt, Doug	CJA	425-988-2150	dwatt@condon-johnson.com
Y	Watts, Troy	WSDOT-OR	253-255-8215	wattst@wsdot.wa.gov
	Welch, Pete	Granite Const.	425-551-3100	pete.welch@gcinc.com

Guests			
Attendee	**Company**	**Phone**	**E-mail**
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Mizumori, Anthony	WSDOT Bridge	360-705-7228	mizumoa@wsdot.wa.gov
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Proszek, Alexandra	WSDOT	509-324-6005	proszam@wsdot.wa.gov
Sarieddine, Hisham	Shannon&Wilson		HJS@shanwil.com

Agenda

1	**Welcome / Review of Agenda**	Patrick Glassford / Stuart Moore
2	**Approval of Previous Meeting Minutes**	Patrick Glassford / Stuart Moore / All
3	**Membership Changes**	Patrick Glassford / Stuart Moore
4	**Spokane River Bridge Constructability Review**	Amy Leland
5	**6-02.3(25) Prestressed Concrete Girders Spec Revisions**	Anthony Mizumori
6	**6-02.3(26) Cast-In-Place Prestressed Concrete Spec Revisions**	Anthony Mizumori
7	**Action Items:** **a. 6-20 Buried Structures Revisions** **b. Geofoam Fill GSP** **c. Fish Passage Lessons Learned** **d. Fiber Reinforced Bridge Deck Study (2022 briefing at the earliest)**	 Patrick Glassford Patrick Glassford All Anthony Mizumori

Future meeting dates: September 17, 2021; October 29, 2021; December 10, 2021

1 Welcome / Review of Agenda
Patrick Glassford / Stuart Moore

Patrick welcomed everyone and thanked them for attending. He then went over the agenda for today's meeting.

2 Approval of Previous Meeting Minutes
Patrick Glassford / Stuart Moore / All

Nobody had comments on the March meeting minutes. They will be posted to the web.

3 Membership Change
Patrick Glassford

Scott Ayers has retired. Stuart Moore has taken this position for one year, then Neil Hunt will take over.

John Olk has retired. Patrick Glassford's rotation in the State Construction Office ends in 2 months, so he will not be returning.

4 Spokane River Bridge Constructability Review
Amy Leland

Amy shared her PowerPoint presentation distributed earlier by Jim Cuthbertson. Amy reviewed the bridge layout for the new bridge.

Amy's questions for the team members:

- Is the installation of a cofferdam feasible?

No members voiced a concern over feasibility. Ryan felt it is constructible, but reaction piles will not fit inside the cofferdam as shown. Stuart felt reaction piles could be removed prior to installing sheets. Hisham indicated piles would need to remain as removal would impact shaft capacity. Jeff Firth said the contract needs to be clear if it is required for reaction piles to remain. Ryan and Stuart indicated that reaction piles are laid on a 15' square. Leaving piles in increases contract cost. Stuart asked if Riverton would be open to traffic. Alexandra indicated it would be closed. Stuart said it may be cheaper to just replace the wall.

- How much clearance from the adjacent Riverton Wall is needed to install the sheet piles?

Ryan Olson indicated walers would be required because the material isn't very dense. One row at the top of the cofferdam and one just above shaft cap. The layout is extremely tight. Ryan assumed a waler depth of 2'. Ryan indicated sheet piles could be set hard against the shaft cap, but more lateral room is desirable (2' clear). Stuart and Kevin agreed. Kevin said sheets near the wall would need to extend 3'-6' above the wall to allow clearance for the vibratory hammer.

- Can the sheet piles be installed through potential rip rap that covers a portion of the slope?

The group discussed temporarily removing riprap for driving, then replacing it after driving. Ryan felt that the wall would settle due to driving.

- The underlying soils consist of well graded gravel and sand, silty gravel, and silty sand with cobbles and boulders. Can the sheet piles be installed through these soils? (See Borings H-1-19 & H-2p-19)

Hisham discussed the potential to encounter cobbles and boulders. Ryan felt driving would be very difficult. John Quigg agreed. Ryan said the borings at the piers show easy driving, but the soil profiles don't. Stuart suggested cobbles and boulders would be a problem for driving. Hisham confirmed their presence by pointing out that in areas, the borings had to core through cobbles.

- Would the sheet pile installation cause vibrations that could impact the existing wall and adjacent utilities?

Stuart asked who owns the risk for protecting the existing wall. Stuart indicated sheets would only extend 10'-20' below the seal elevation.

- What is the most probable depth of Z section used for the cofferdam?

Amy indicated 18" section is anticipated. Stuart indicated the section was reasonable.

- What would be the preferred option to install the sheets piles, from the work trestle in the river or from the S. Riverton Ave?

Kevin indicated either option is viable. Kelly asked if the wall could support the crane. Hisham indicated that he did not know. Amy asked if more info about the wall is needed for the contractor to evaluate and bid. Kelly indicated that maximum loading would be required and that he would assume that WSDOT had evaluated the effects of vibration on the wall and adjacent utilities. Kelly indicated that he would view any impacts to the wall as a WSDOT problem.

- How long would it take to install the cofferdam at Pier 5?

Alex indicated sheet installation/removal must occur during the in-water work window, but they may remain in place between in water work windows. Generally, no commitment on durations was provided other than it could take the entire in-water work window if problems are encountered.

- At Pier 6, can the sheet pile be installed at the edge of the shaft cap or is there a minimum clearance that will need to be maintained to construct the shaft cap?

Amy indicated that Upriver Drive must remain open during construction and asked how close traffic could be to construction. Stuart indicated traffic must be 20' away during sheet installation (nighttime closures are allowed). Alternating one-way traffic with temp signals is an option. Kelly suggested that there should be 2' from back of barrier to the sheets. Ryan indicated that barrier could be hard against the sheets. Neil inquired about the possibility of shifting Upriver Drive to the north by temporary widening. Neil suggested providing enough work area to leave cranes in place during cofferdam installation.

Amy summarized that she is hearing that there are risks or concerns all over the place and while it may be doable, perhaps a different option should be considered. Ryan concurred. Kelly suggested it would be best to remove and replace the wall. The design team will re-evaluate.

5 6-02.3(25) Precast Concrete Girder spec Revisions

Anthony Mizumori

Anthony drafted spec revisions based on addressing sweep issues in longer spans. First change – ensure plumbness of each girder prior to proceeding to the next girder. Stuart explained issues at the 70th project. Girders were braced off while still supported by cranes, but the adjacent girder was sagging due to self-weight. They needed adjustable bracing to replumb girders when they were no longer supported by cranes. Anthony indicated wider top flanges may be allowed to enable pick points closer to the end of the girder to mitigate this issue. In general, the team is opposed to the proposed plumbness language. WSDOT to consider requiring a correction plan rather than current revision language.

Working drawing requirement for installing brackets prior to erection to address eccentric loading – Stuart indicated providing this analysis could be problematic for smaller companies. The team discussed the possibility of providing loads to use with the PG Stable program for analysis. We discussed limiting the requirement based on span to depth ratio. Anthony asked if the team is willing to suggest a typical overhang bracket weight for WSDOT to analyze. Neil suggested Contractors provide the weights in the submittal and WSDOT perform analysis during review. BSO is concerned about risk to WSDOT with this proposal. Patrick suggested the team provide some weights for further analysis prior to proceeding with this spec revision.

Lifting loops – Bryant suggested deleting "all girders shall be picked as shown in the plans" – this statement is too general. Anthony will consider this deletion.

Handling analysis – Contractors were generally opposed to providing analysis; although, they indicated they have the ability to do so, particularly on DB projects. The Bridge Office is primarily concerned about conditions such as one girder end on the truck while the other is crane supported. Stuart suggested clarifying and/or limiting conditions where an analysis must be provided.

6 6-02.3(26) Cast-in-Place Prestressed Concrete Spec Revisions

Anthony Mizumori

Anthony provided an overview of changes (primarily adopting current PTI specifications). No significant concerns were voiced by the group. Consider getting some input from PT suppliers.

7 Action Items:

a. 6-20 Buried Structure Revisions - Glassford
b. Geofoam Fill GSP - Glassford
c. Fish Passage Lessons Learned - All
d. Fiber Reinforced Bridge Deck Study (2022 briefing at earliest) - Mizumori
e. Provide overhang bracket loading – Bryant Helvey volunteered to provide these.

Next meeting: September 17th.
Notes by Troy Watts.

AGC/WSDOT Structures Team – Meeting Minutes
September 17, 2021

Attendees

[1] Team co-chair

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Y	Thody, Ryan	DBM Contractors	206-870-3525	Ryan.thody@dbmcontractors.com
	Tornberg, Ben	Manson Const.	206-496-9407	btornberg@mansonconstruction.com
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Mizumori, Anthony	WSDOT-Bridge	360-705-7228	MizumoA@wsdot.wa.gov

Agenda

1	**Welcome / Review of Agenda**	Cuthbertson/Stuart Moore
2	**Approval of Previous Meeting Minutes**	Cuthbertson/Stuart Moore/All
3	**Membership Changes – Team, WSDOT Construction Office, WSDOT Bridge**	Cuthbertson / Stuart Moore
4	**Constructability Reviews** **a) SR-9 Snohomish River Bridge**	WSDOT PEO
5	**Last meeting's Action Items review and reporting** **a. Geofoam Fill GSP** **b. Fish Passage Lessons Learned** **c. Fiber Reinforced Bridge Deck Study (2022 briefing at earliest)** **d. Provide overhang bracket loading**	 Scott Sargent All Anthony Mizumori Bryant Helvey
6	**New Action Items:** **a. Abutment design for scour – fish passage** **b. Dextra CSL tube spec revisions** **c. Standardizing Geotech Memo** **d. 6-02.3(25) and (26) Const. Manual Updates**	 Stuart Moore Scott Sargent Stuart Moore Scott Sargent

Future meeting dates: October 29, 2021; December 10, 2021

1 Welcome / Review of Agenda

Jim and Stuart started the meeting. This is the first meeting since May and we had a light agenda planned. We did a quick safety minute. Then moved to the next item.

Approval of Previous Meeting Minutes
Patrick Glassford distributed the May meeting minutes by e-mail for comments earlier this summer. No edits were proposed or suggested then or at this meeting. The May minutes will be finalized and posted to the webpage where the team meeting notes are posted. Thanks to Troy Watts for taking notes in May.
https://partners.wsdot-sites.com/agc/

2 Membership Changes

This team's leadership has changed since May. Scott Ayers the former AGC co-chair has retired and Patrick Glassford the co-chair for WSDOT changed positions in the agency. The new leadership is as follows:

Scott Ayers, Graham → Stuart Moore, Atkinson

Patrick Glassford, WSDOT → Jim Cuthbertson, WSDOT ASCE

Stuart Moore will be the AGC co-chair through this year and then Neil Hunt will take over and be co-chair next year.

Kelli Rider of Manson Construction is a new permanent member of the team. She is replacing Rob Reller of Manson who retired. WSDOT has seen a number of staffing changes due to retirements and also people changing positions. Some of the key changes are as follows:

Bridge Const

John Olk	⇨	Patrick Glassford
Mark Szewick	⇨	Vacant
Chris Feely	⇨	Chris Feely

Bridge Specs

Mike Bauer	⇨	Michael Bressan
Scott Sargent	⇨	Vacant

Construction Office

Denys Tak	⇨	Vacant
Marco Foster	⇨	Vacant
Chris Gross	⇨	Vacant
Greg Moorehouse	⇨	Michele Britton
Jenna Fettig	⇨	Jenna Ball
Patrick Glassford	⇨	Scott Sargent
		Chris Tams
		John Romero

John Olk and Mark Szewick of the Bridge Office Construction Support unit both retired. They were the chief reviewers of Working Drawings and structure related submittals. Patrick Glassford has changed positions and will now be in the Bridge Office along with Chris Feely performing those working drawing and submittal reviews. Mike Bauer has retired from the Specifications Unit at the Bridge Office. He has been replaced by Michael Bressan, and Scott Sargent of that same unit will move to the State Construction Office as part of our rotational Assistant State Construction Engineer program which Patrick Glassford formerly held. Scott will start mid-November in that new role as an ASCE. Other changes in the State Construction Office include, Denys Tak leaving State service. He is now with FHWA Western Federal Lands division in Vancouver. Marco Foster retired and is likely elk hunting at the moment. Chris Gross who maintains all of design build templates promoted out of the office and will be replaced in the near future. Greg Morehouse who maintained the Standard Specifications book and all the GSPs for the State retired and has been replaced by Michele Britton. Jenna Fettig in our Contract Ad and Award Office is now Jenna Ball. Same great service with a new name. There are also two new ASCEs added into the Office, Chris Tams and John Romero.

3 Constructability Review - SR-9 Snohomish River Bridge

This project has been reviewed by the team before, but the project office had additional questions that arose when they tried to incorporate some of the team's previous project review comments. Massoud Kayanda Assistant Project Engineer presented the project and led the discussion.

The project team is still planning to build a parallel alignment west of the existing highway. There will be a new bridge constructed over the Snohomish River, likely steel plate girders, and a second new bridge south of the river for an overflow channel. The focus was on the main bridge over the river. The two main span piers at the river will likely be founded on drilled shafts, two per pier, probably 10 feet in diameter, and upwards of 150 ft in length. To construct the shafts at each bank of the river, they are planning for a work trestle to be constructed. The picture below shows the general concept with a mock-up of the trestles and shafts.

The south pier adjacent to Lowell Rd. was the focus of the discussion. Because of requirements to pass floating river debris under the work trestle in high flow events, the team believes the trestle working surface will be about four feet higher than the current elevation of Lowell Rd. The plan is to have a pile supported trestle with up to 50 piles, likely 24-inch diameter piles. Piles will be installed and removed during in water work windows only, but the trestle can remain in place for up to two years provided it can pass debris. The proximity of the trestle edge to the fog line of Lowell Rd. along with the elevation difference has raised concerns about keeping the road open, operational, and safe while the trestle is in place. It also raises questions about the contractor being able to easily and efficiently move equipment onto and off of the trestle when it is being used for bridge construction. Lastly, the construction and demo of the trestle itself will likely require a closure of Lowell Rd, albeit for a short duration, assuming the work occurs from land rather than from a barge.

Massoud was asked if it is possible to place fill and temporary pavement on Lowell road to raise the grade so that the trestle deck elevation and the roadway elevation could be the same. Massoud thought it might be possible, but was concerned with clearance under the existing bridge which has about 22 ft of clearance.

Massoud mentioned one of their other concepts was to construct a one or two lane shoofly to the south of Lowell Rd, but that geometry has issues because of the existing bridge's pier and the private property structures that can be seen in the above, right photo.

Geoff Swett asked if one lane of Lowell Rd could be closed and then the remaining lane signalized for one-lane alternating traffic. It would eliminate the shoofly. Massoud will look into that.

Stuart Moore suggested closing Lowell Rd during shaft construction. If the road could be closed for a month or so, the contractor would have much better access during shaft construction. Once shaft construction was completed, the work area demands become much less as you wouldn't need access for a large drill rig,

support crane, and concrete pump truck all at the same time like you do during shaft construction. Stuart also thought that if you could utilize the road then the work trestle could probably be made smaller than what is currently proposed; 25 ft wide by 100 ft long.

Bryant Helvey wanted more clarification as to why the trestle had to be higher than Lowell Rd. He suggested constructing the trestle at the existing Lowell Rd elevation. Using the trestle during months when peak flows are unlikely to occur, and then removing the deck during winter to prevent the deck obstructing peak flows and snagging debris. The piles would remain in place though. With this concept, the trestle deck is only in place when the trestle is in use, and not in place through the high-flow portions of the year. He did not know if such a concept would be allowed by the current permits.

After the meeting, Massoud provided the following summary of what was discussed.

Raise Lowell Road
- Build up Lowell Rd to allow walking equipment across from the laydown yard
- Need to check the minimum 16 ft clearance will be maintained

Provide single lane closure
- Close one lane close to the river
- Provide single lane traffic control (signalized)
- Check traffic volume/ potential detours

Install removable wood deck
- Install piles with removable wood deck and keep during drilling operations
- Remove the deck after the drilling is complete
- Keep piles until fish window is open to remove

Some assumptions for construction and work durations:
- 1-week to install trestle
- 1.5-weeks drill/shaft (3-weeks/pier)
- 24-hours/weld to join structural casings (~20-30ft/stick)
- Due to lack of room, preference is to build cranes and walk to the trestle
- Contractor might prefer to come in, drill the shaft and out instead of building the proposed 25ft x100ft trestle

4 Last meeting's Action Items review and reporting

a) Geofoam Fill GSP
Beginning after the first of the year, Scott Sargent plans to begin work on taking a number of project specific special provisions and converting them into a Standard Specification with supporting GSPs. Developing standard and consistent language will benefit both the contractors who perform the work and WSDOT.

b) Fish Passage Lessons Learned
This is really more of a solicitation for feedback from the contractors at this point. WSDOT is interested in hearing about improvements that can be made to our contract's plans and specifications based on lessons learned. The structures team is encouraged to think about issues, problems, and even the odd praise for doing something right. Jot those ideas down and let's discuss them at the next meeting.

c) Fiber Reinforced Bridge Deck Study (2022 briefing at earliest)
Anthony Mizumori stated that the Bridge office has two pilot projects identified. Each project has a pair of bridges. The plan is to use fiber reinforced concrete on one and regular class 4000 concrete for bridge decks on the other. The two projects are: Purdy Creek which should be on advertisement November 22, 2021 and I-90 Cabin Ck I/C to west Easton which will be on advertisement January 18, 2022.

d) Provide overhang bracket loading
Bryant Helvey will gather-up more info on this with the hopes of being able to present some information at the next meeting.

5 New Action Items:

a) Abutment design for scour – fish passage
Stuart Moore suggested that the structures team look at the design and construction issues that are being created by designing for scour at abutments. Amy Leland at the Bridge Office said that she is currently working with the Bridge Office and Hydraulics Office to clarify WSDOT's design policy for scour. She stated that she would be willing to provide an update of her efforts to this team at our October meeting. She is penciled in for an update.

b) Dextra CSL tube spec revisions
WSDOT with input from the ADSC task force plans to revise the material requirements for CSL testing tubes. This group will be kept apprised of those changes, if any. This is on Jim Cuthbertson's to-do list since he is involved with that team.

c) Standardizing Geotech Memo
This is primarily a design build issue. Atkinson has been experiencing difficulty with getting concurrence on the Material Properties for Geotechnical Design memo that is required as part of the chapter 2.6 requirements of the Request for Proposal. Stuart would like to see a template developed or some examples that can be followed as to what constitutes a good memo so that teams can reduce the back and forth that happens with the approvals of these. Jim Cuthbertson suggested inviting Andrew Fiske the new State Geotechnical Engineer to the meeting to discuss the issue and hear suggestions from the team.

d) 6-02.3(25) and (26) Const. Manual Updates
This is delayed until Scott Sargent assumes his ASCE role. Patrick Glassford has done some work on these sections already and will share those with Scott.

e) Sheet Pile Abutments
This item was not on the agenda and is a proposed item by Geoff Swett. Nucor and Skyline Steel have been working on sheet pile structural abutments. Geoff will research this a bit more and may make contact to get Nucor or Skyline to make a presentation on this at the next meeting. More to come…

Meeting Concluded
Next Meeting October 29, 2021
Notes by Jim Cuthbertson

AGC/WSDOT Structures Team – Meeting Minutes
October 29, 2021

Attendees

[1] Team co-chair

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	Cuthbertson, Jim[1]	WSDOT-Const.	360-870-1108	CUTHBEJ@WSDOT.WA.GOV
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Agenda

1	**Welcome / Review of Agenda**	Cuthbertson/Moore
2	**Approval of Previous Meeting Minutes**	Cuthbertson/Moore/All
3	**Abutment design for scour – fish passage** *Amy Leland at the Bridge Office will discuss the BSO's design policy for scour.*	Leland/All
4	**DB – Geotechnical Design Properties Approval** *General discussion about the approval of properties for design and the issues with obtaining approval.*	Moore/Fiske/All
5	**6-20 Precast Structure Procurement** *WSDOT is looking for ways to spread out the casting of structures into other times of the year instead of April-June.*	Cuthbertson/All
6	**Materials Escalation and Supply Challenges** *A general discussion on current material supply and cost issues, what the group's thoughts are for near term, and what happens if the Infrastructure Package passes.*	Cuthbertson/All
7	**Last meeting's Action Items review and reporting** **a) Fish Passage Lessons Learned - All** This is really more of a solicitation for feedback from the contractors at this point. WSDOT is interested in hearing about improvements that can be made to our contract's plans and specifications based on lessons learned. The structures team is encouraged to think about issues, problems, and even the odd praise for doing something right. Jot those ideas down and let's discuss them at the next meeting. **DEFERRED ITEMS** **b) Geofoam Fill GSP – Scott Sargent** Beginning after the first of the year, Scott Sargent plans to begin work on taking a number of project specific special provisions and converting them into a Standard Specification with supporting GSPs. **c) Fiber Reinforced Bridge Deck Study (2022 briefing at earliest) – Anthony Mizumori** Anthony Mizumori stated that the Bridge office has two pilot projects identified. Each project has a pair of bridges. The plan is to use fiber reinforced concrete on one and regular class 4000 concrete for bridge decks on the other. The two projects are: Purdy Creek which should be on advertisement November 22, 2021 and I-90 Cabin Ck I/C to west Easton which will be on advertisement January 18, 2022.	

d) Provide overhang bracket loading – Bryant Helvey

Bryant Helvey will gather-up more info on this with the hopes of being able to present some information at the December meeting.

e) Dextra CSL tube spec revisions – Jim Cuthbertson

WSDOT with input from the ADSC task force plans to revise the material requirements for CSL testing tubes. This group will be kept apprised of those changes, if any. This is on Jim Cuthbertson's to-do list since he is involved with that team.

f) 6-02.3(25) and (26) Const. Manual Updates – Scott Sargent

This is delayed until Scott Sargent assumes his ASCE role. Patrick Glassford has done some work on these sections already and will share those with Scott.

g) Sheet Pile Abutments – Geoff Swett

Nucor and Skyline Steel have been working on sheet pile structural abutments. Geoff will research this a bit more and may make contact to get Nucor or Skyline to make a presentation on this at the December meeting. More to come…

Future meeting dates:

December 10, 2021; January 21, 2022; March 4, 2022; April 15, 2022

1 Welcome / Review of Agenda

Jim and Stuart started the meeting. We reviewed the agenda. Then moved to the next item.

2 Approval of Previous Meeting Minutes

Jim Cuthbertson distributed the September meeting minutes by e-mail for comments after the September 17th meeting. No edits were proposed or suggested then or at this meeting. The September minutes will be finalized and posted to the webpage where the team meeting notes are posted. https://partners.wsdot-sites.com/agc/

3 Abutment design for scour – fish passage

Amy Leland of the Bridge and Structures Office gave a presentation about their recently posted Design Memorandum which outlines the Bridge Office's and Hydraulics Office's policy regarding designing structures for scour. https://wsdot.wa.gov/sites/default/files/2021-11/08-2021-BDM-Memo-Scour-design-policy-revised_2.pdf

The Bridge Design Manual has had a section devoted to scour for many years, and the new memorandum augments section 7.1.7 in the manual. The contents of the memorandum will ultimately be incorporated into the next version of the Bridge Design Manual and the memo will be archived. https://wsdot.wa.gov/engineering-standards/all-manuals-and-standards/manuals/bridge-design-manual-lrfd

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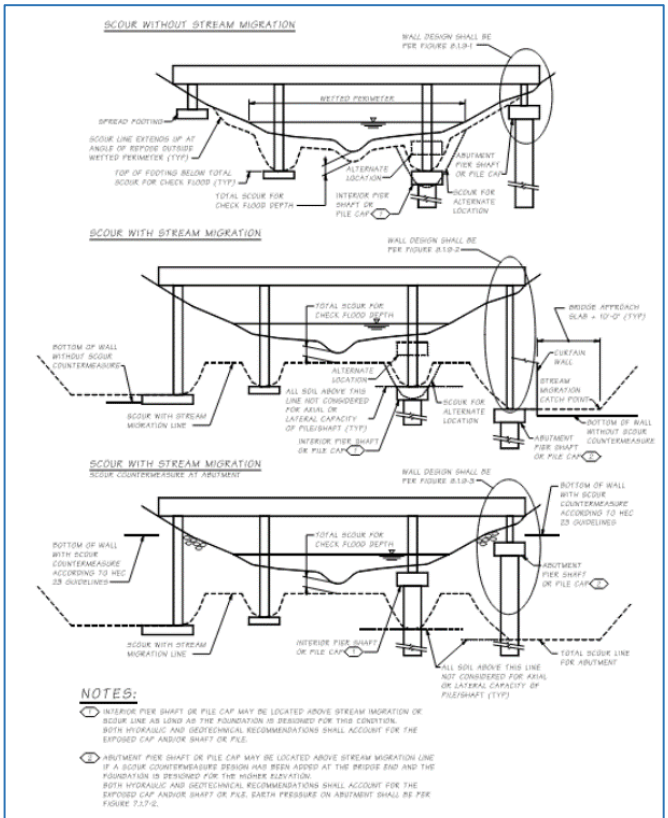

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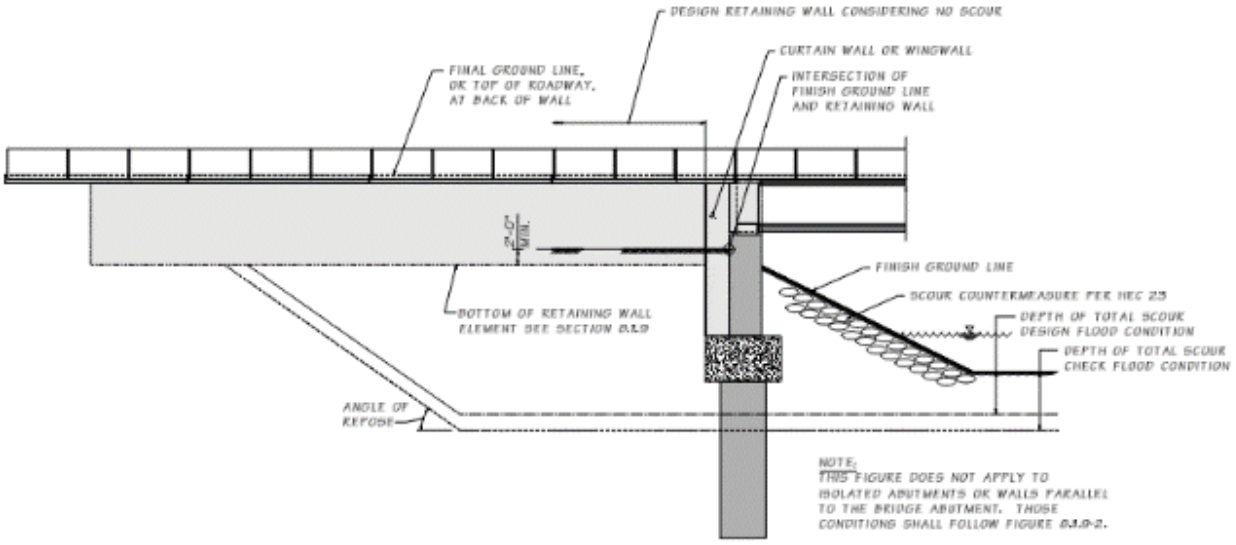

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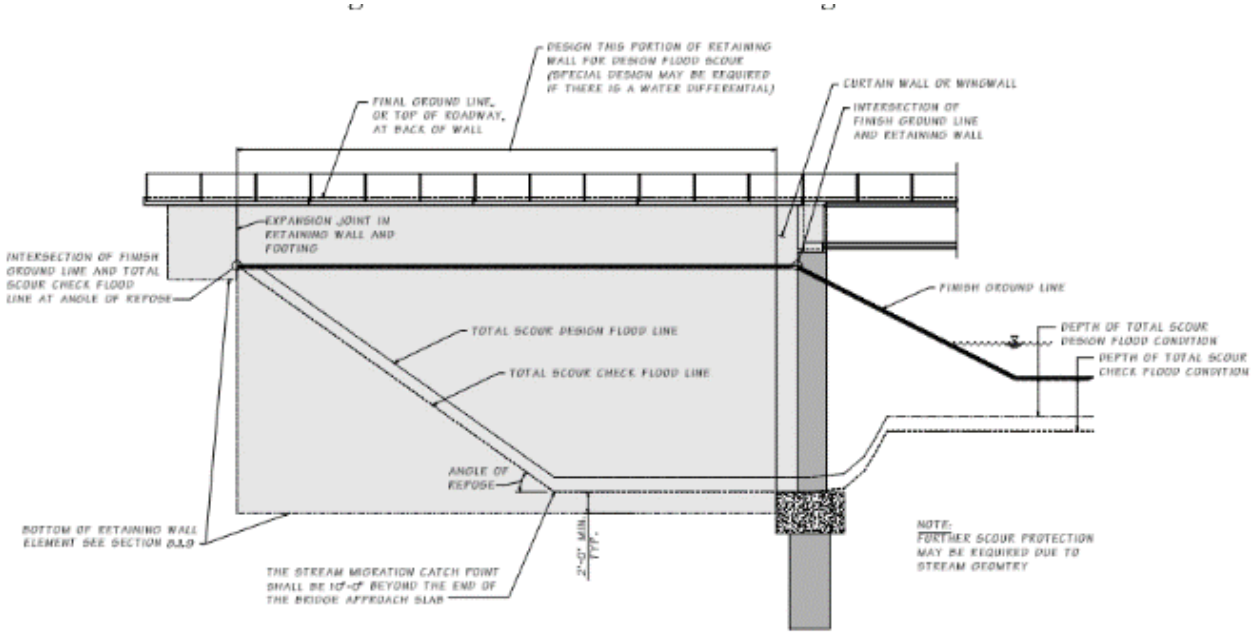

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Neil Hunt asked if WSDOT would consider allowing the contractors to precast the culvert pieces themselves. Geoff Swett explained that we already allowed that in the current 6-20 standard specification. It was pointed out by the Contractors that the Std. Spec only allows that if you are casting on the project site. WSDOT should consider allowing the contractors to self-cast at locations that are not "the project" site. Geoff said he would review the language in the Standard Spec and suggested that we discuss it at the next meeting. ACTION ITEM – Review 6-20 Contractor Casting at the next meeting. Kevin Cucchiara pointed out that the pay scale is different for a precaster who is supplying a product than it is for a prime contractor who is self-casting and paying prevailing wage. Often times the cost difference makes a contractor who wants to self-cast less competitive in a low bid world. However, they often have greater control over production schedules and have less risk to account for too.

6 **Materials Escalation and Supply Challenges**

WSDOT currently uses or has available the ability to use price adjustment factors for certain materials, Steel, Fuel, and Asphalt. With the current market's volatility in material prices, it was asked of the team if WSDOT would benefit from expanding this practice to other materials that are currently experiencing significant price changes or products that have availability issues.
Neil Hunt stated that currently electrical components are very difficult to find, especially lamps.
Joanna Lowrey mentioned that her office is having an especially hard time with flashing beacons.

Kelli Rider and Kelly Griffith pointed out issues with the current WSDOT steel price adjustment factor. Kelli R. pointed out the way WSDOT writes these clauses makes it difficult for a contractor to manage risk. Specifically, because we expect a credit if the price goes down. That practice makes it difficult. So, if we wrote them differently, we may have more people opt into using them. Use would be directly proportional to how they are written. Kelly G. pointed out that we require contractors to opt in within 10 days after award. He felt that a lot of the time there is just so much going on within that window, that contractors just fail to get around to opting in. They have other things they are working on that are simply more critical to the project and their delivery.

Kelly Griffith also pointed out that WSDOT tends to tie the price to some kind of index rather than actual hard numbers. He felt that if WSDOT were to work from the actual quote documents it would make it easier and more attractive for a contractor to use adjustment factors. It was suggested that we pass this to the Admin Team to consider other means of payment. ACTION ITEM – Talk to Admin Team about how adjustment factors are calculated and how they could be calculated.

The primes pointed out that right now many of their minor suppliers and smaller subs who are also responsible for providing materials are not honoring the price quotes they made at the time of bid because material prices have increased so much since then that they can't take the hit. They would rather default than provide the materials for their quoted price. Jim Cuthbertson asked how do we fix that? Neil and Kelly felt that if they could come to DOT and discuss a means to pay for the increased material costs that would certainly help smaller companies especially those that are DBE.

Jeff Firth suggested that WSDOT consider creating some kind of a force account escalation item that was set aside much like we do for shaft obstructions. Jim Cuthbertson suggested that perhaps we could create something like that, and we could even make it material non-specific. Contractors could tap it when needed by showing actual invoicing, but once exhausted the fund is depleted and can't be replenished. Any remaining funds would be retained by WSDOT. This would potentially lower bid contingencies for some items, and the Agency would only pay when escalation actually occurs, saving money in the long run.

7 Action Items:

Fish passage lessons learned (Item A)– Nobody had any lessons to share. This item will be closed.

For Next meeting

ACTION ITEM from topic 5 – Review 6-20 Contractor Casting at the next meeting

ACTION ITEM from topic 6 – Talk to Admin Team about how adjustment factors are calculated and how they could be calculated.

Nucor Steel presentation on sheet pile Abutments (Item g)

Bracket Loading (Item d) - Bryant Helvey

Meeting Concluded
Notes by Jim Cuthbertson

Upcoming Meetings: December 10, 2021; January 21, 2022; March 4, 2022; April 15, 2022

AGC/WSDOT Structures Team – Meeting Minutes
October 29, 2021

Attendees

[1] Team co-chair

Regular Attendees				
Attended	**Member**	**Company**	**Phone**	**E-mail**
	Allen, Buck	Hamilton Const.	360-742-3326	BALLEN@HAMIL.COM
Y	Binnig, Bill	Kiewit IWCo.	253-255-2376	BILL.BINNIG@KIEWIT.COM
Y	Bowles, Eric	Conc. Tech.	253-383-3545	EBOWLES@CONCRETETECH.COM
	Christopher, Chris	WSDOT-Const.	360-705-7821	CHRISTC@WSDOT.WA.GOV
Y	Cucchiara, Kevin	Quigg Bros.	360-580-0015	KEVINC@QUIGGBROS.COM
	Cuthbertson, Jim[1]	WSDOT-Const.	360-870-1108	CUTHBEJ@WSDOT.WA.GOV
Y	Firth, Jeff	Hamilton Const.	541-953-9755	JFIRTH@HAMIL.COM
	Gaines, Mark	WSDOT-Bridge	360-705-7207	GAINESM@WSDOT.WA.GOV
Y	Glassford, Patrick	WSDOT-Bridge	360-705-7828	GLASSFP@WSDOT.WA.GOV
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	Helvey, Bryant	Graham	206-718-7266	BRYANT.HELEVY@GRAHAMUS.COM
Y	Hilmes, Bob	WSDOT-ER	509-324-6089	HILMESB@WSDOT.WA.GOV
Y	Hunt, Neil	The Walsh Group	206-348-1726	NWHUNT@WALSHGROUP.COM
Y	Kane, Ed	WSDOT-NWR	425-225-8743	KANEED@WSDOT.WA.GOV
	Khaleghi, Bijan	WSDOT-Bridge	360-705-7181	KHALEGB@WSDOT.WA.GOV
	Lehmann, Debbie	FHWA	360-753-9482	DEBBIE.LEHMANN@DOT.GOV
Y	Lowrey, Joanna	WSDOT-SWR	360-442-1346	LOWREYJ@WSDOT.WA.GOV
Y	Moore, Stuart[1]	Atkinson	360-340-6797	STUART.MOORE@ATKN.COM
Y	Olson, Ryan	Granite Const.	206-793-8110	RYAN.OLSON@GCINC.COM
	Owen, Geoff	Kiewit IWCo.	360-609-6548	GEOFF.OWEN@KIEWIT.COM
	Quigg, John	Quigg Bros.	360-533-1530	JOHNQ@QUIGGBROS.COM
Y	Rider, Kelli	Manson Const.	206-516-9576	KRIDER@MANSONCONSTRUCTION.COM
	Robinson, Eric	WSDOT-WSF	206-515-3897	ROBINSE@WSDOT.WA.GOV
	Sargent, Scott	WSDOT-Const.	360-705-7753	SARGENW@WSDOT.WA.GOV
	Schettler, Jim	Jacobs	425-239-7542	JIM.SCHETTLER@JACOBS.COM
	Smith, Will	WSDOT-SCR	509-577-1804	SMITHW@WSDOT.WA.GOV
Y	Swett, Geoff	WSDOT-Bridge	360-705-7157	SWETTG@WSDOT.WA.GOV
Y	Thody, Ryan	DBM Contractors	206-870-3525	RYAN.THODY@DBMCONTRACTORS.COM
	Tornberg, Ben	Manson Const.	206-496-9407	BTORNBERG@MANSONCONSTRUCTION.COM
	Watt, Doug	CJA	425-988-2150	DWATT@CONDON-JOHNSON.COM
Y	Watts, Troy	WSDOT-OR	253-255-8215	WATTST@WSDOT.WA.GOV
	Welch, Pete	Granite Const.	425-551-3100	PETE.WELCH@GCINC.COM

Guests			
Name	**Company**	**Phone**	**E-mail**
Fiske, Andrew	WSDOT Geotech	360-709-5456	FISKEA@WSDOT.WA.GOV
Leland, Amy	WSDOT Bridge	360-705-7394	LELANDA@WSDOT.WA.GOV

Agenda

1	**Welcome / Review of Agenda**	Cuthbertson/Moore
2	**Approval of Previous Meeting Minutes**	Cuthbertson/Moore/All
3	**Abutment design for scour – fish passage** *Amy Leland at the Bridge Office will discuss the BSO's design policy for scour.*	Leland/All
4	**DB – Geotechnical Design Properties Approval** *General discussion about the approval of properties for design and the issues with obtaining approval.*	Moore/Fiske/All
5	**6-20 Precast Structure Procurement** *WSDOT is looking for ways to spread out the casting of structures into other times of the year instead of April-June.*	Cuthbertson/All
6	**Materials Escalation and Supply Challenges** *A general discussion on current material supply and cost issues, what the group's thoughts are for near term, and what happens if the Infrastructure Package passes.*	Cuthbertson/All
7	**Last meeting's Action Items review and reporting** **a) Fish Passage Lessons Learned - All** This is really more of a solicitation for feedback from the contractors at this point. WSDOT is interested in hearing about improvements that can be made to our contract's plans and specifications based on lessons learned. The structures team is encouraged to think about issues, problems, and even the odd praise for doing something right. Jot those ideas down and let's discuss them at the next meeting. **DEFERRED ITEMS** **b) Geofoam Fill GSP – Scott Sargent** Beginning after the first of the year, Scott Sargent plans to begin work on taking a number of project specific special provisions and converting them into a Standard Specification with supporting GSPs. **c) Fiber Reinforced Bridge Deck Study (2022 briefing at earliest) – Anthony Mizumori** Anthony Mizumori stated that the Bridge office has two pilot projects identified. Each project has a pair of bridges. The plan is to use fiber reinforced concrete on one and regular class 4000 concrete for bridge decks on the other. The two projects are: Purdy Creek which should be on advertisement November 22, 2021 and I-90 Cabin Ck I/C to west Easton which will be on advertisement January 18, 2022.	

d) Provide overhang bracket loading – Bryant Helvey

Bryant Helvey will gather-up more info on this with the hopes of being able to present some information at the December meeting.

e) Dextra CSL tube spec revisions – Jim Cuthbertson

WSDOT with input from the ADSC task force plans to revise the material requirements for CSL testing tubes. This group will be kept apprised of those changes, if any. This is on Jim Cuthbertson's to-do list since he is involved with that team.

f) 6-02.3(25) and (26) Const. Manual Updates – Scott Sargent

This is delayed until Scott Sargent assumes his ASCE role. Patrick Glassford has done some work on these sections already and will share those with Scott.

g) Sheet Pile Abutments – Geoff Swett

Nucor and Skyline Steel have been working on sheet pile structural abutments. Geoff will research this a bit more and may make contact to get Nucor or Skyline to make a presentation on this at the December meeting. More to come…

Future meeting dates:

December 10, 2021; January 21, 2022; March 4, 2022; April 15, 2022

1 Welcome / Review of Agenda

Jim and Stuart started the meeting. We reviewed the agenda. Then moved to the next item.

2 Approval of Previous Meeting Minutes

Jim Cuthbertson distributed the September meeting minutes by e-mail for comments after the September 17th meeting. No edits were proposed or suggested then or at this meeting. The September minutes will be finalized and posted to the webpage where the team meeting notes are posted. https://partners.wsdot-sites.com/agc/

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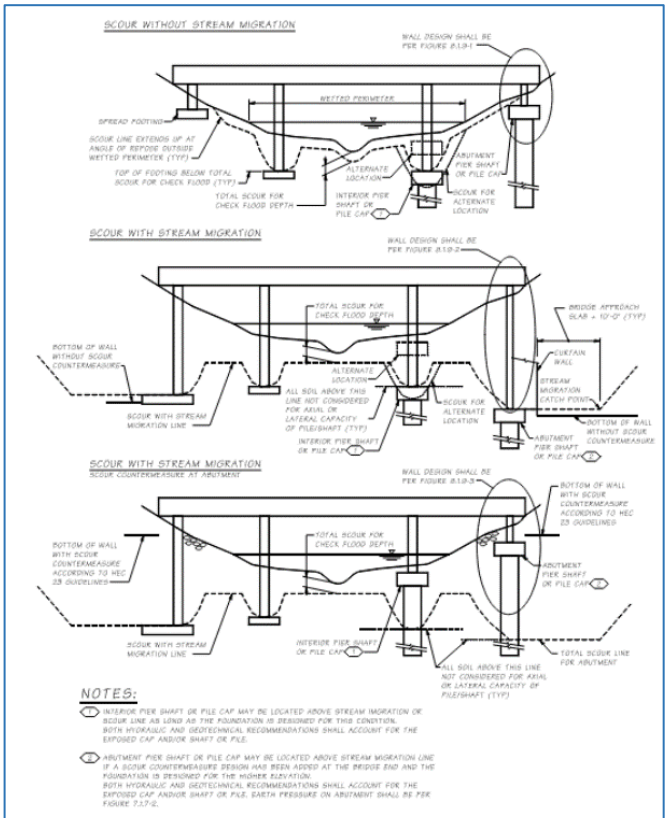

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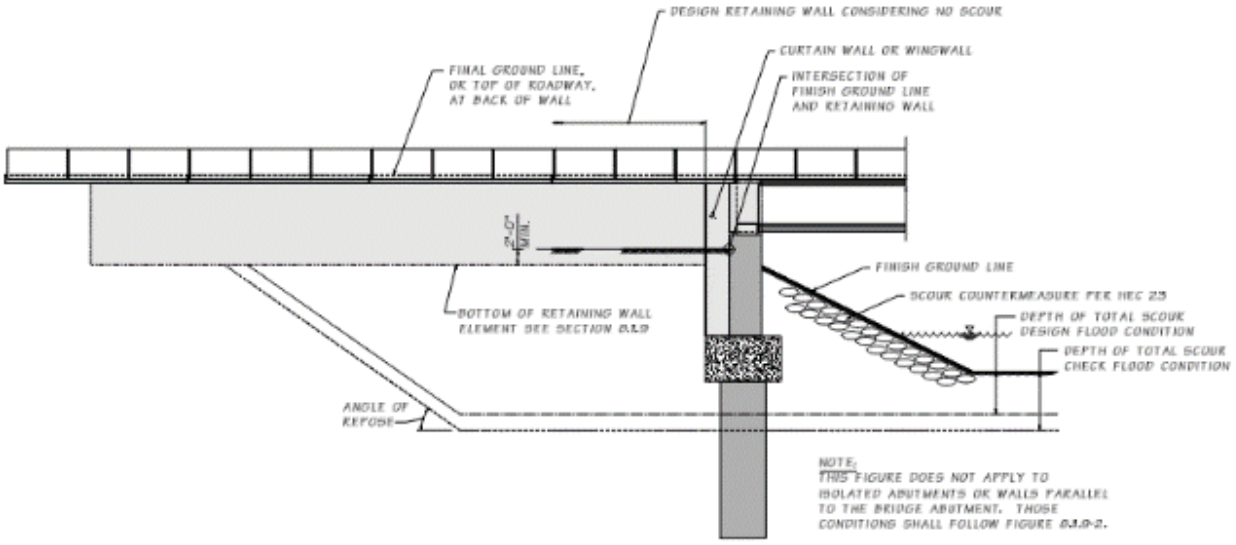

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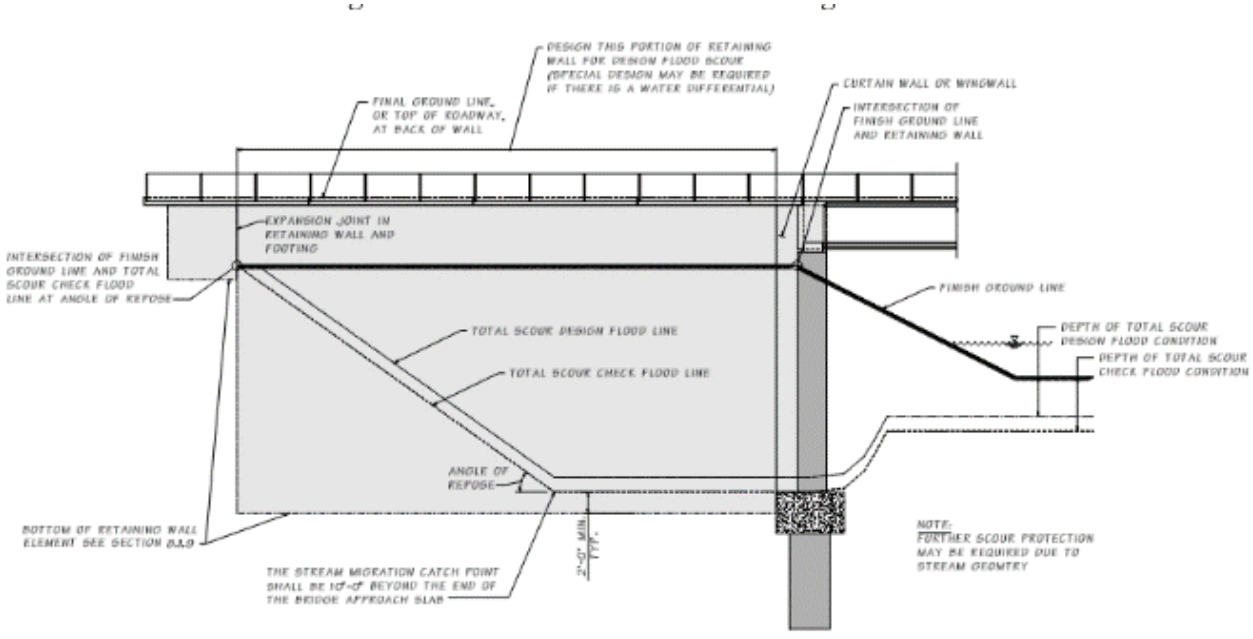

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Neil Hunt pointed out that one of the best things the Agency could do is to utilize structures that are large enough so that they can be mostly constructed outside of the normal high-water mark enabling year-round construction. Then during the fish window there would only be the old structure's removal and stream restoration work to perform. It was also suggested that WSDOT needs to take stock of the potential structure types and get that information to industry so that they can plan as early as possible for the number of structures thought to be precast shapes, girder type structures, voided slab structures, and even steel or arch type structures. If industry could plan that would help them.

Geoff Swett mentioned that Bridge is working on Standard Plans for some of the "box" type structures and is also allowing more steel plate type structures. Kevin Cucchiara of Quigg Brothers explained that they had a project with WSDOT where they went through a VECP process. He stated that the process seemed to be more cumbersome than what they had anticipated, and he thought that having a standard plan design available to them would have certainly streamlined and accelerated the review process.

Neil Hunt asked if WSDOT would consider allowing the contractors to precast the culvert pieces themselves. Geoff Swett explained that we already allowed that in the current 6-20 standard specification. It was pointed out by the Contractors that the Std. Spec only allows that if you are casting on the project site. WSDOT should consider allowing the contractors to self-cast at locations that are not "the project" site. Geoff said he would review the language in the Standard Spec and suggested that we discuss it at the next meeting. ACTION ITEM – Review 6-20 Contractor Casting at the next meeting. Kevin Cucchiara pointed out that the pay scale is different for a precaster who is supplying a product than it is for a prime contractor who is self-casting and paying prevailing wage. Often times the cost difference makes a contractor who wants to self-cast less competitive in a low bid world. However, they often have greater control over production schedules and have less risk to account for too.

6 **Materials Escalation and Supply Challenges**

WSDOT currently uses or has available the ability to use price adjustment factors for certain materials, Steel, Fuel, and Asphalt. With the current market's volatility in material prices, it was asked of the team if WSDOT would benefit from expanding this practice to other materials that are currently experiencing significant price changes or products that have availability issues.
Neil Hunt stated that currently electrical components are very difficult to find, especially lamps.
Joanna Lowrey mentioned that her office is having an especially hard time with flashing beacons.

Kelli Rider and Kelly Griffith pointed out issues with the current WSDOT steel price adjustment factor. Kelli R. pointed out the way WSDOT writes these clauses makes it difficult for a contractor to manage risk. Specifically, because we expect a credit if the price goes down. That practice makes it difficult. So, if we wrote them differently, we may have more people opt into using them. Use would be directly proportional to how they are written. Kelly G. pointed out that we require contractors to opt in within 10 days after award. He felt that a lot of the time there is just so much going on within that window, that contractors just fail to get around to opting in. They have other things they are working on that are simply more critical to the project and their delivery.

Kelly Griffith also pointed out that WSDOT tends to tie the price to some kind of index rather than actual hard numbers. He felt that if WSDOT were to work from the actual quote documents it would make it easier and more attractive for a contractor to use adjustment factors. It was suggested that we pass this to the Admin Team to consider other means of payment. ACTION ITEM – Talk to Admin Team about how adjustment factors are calculated and how they could be calculated.

The primes pointed out that right now many of their minor suppliers and smaller subs who are also responsible for providing materials are not honoring the price quotes they made at the time of bid because material prices have increased so much since then that they can't take the hit. They would rather default than provide the materials for their quoted price. Jim Cuthbertson asked how do we fix that? Neil and Kelly felt that if they could come to DOT and discuss a means to pay for the increased material costs that would certainly help smaller companies especially those that are DBE.

Jeff Firth suggested that WSDOT consider creating some kind of a force account escalation item that was set aside much like we do for shaft obstructions. Jim Cuthbertson suggested that perhaps we could create something like that, and we could even make it material non-specific. Contractors could tap it when needed by showing actual invoicing, but once exhausted the fund is depleted and can't be replenished. Any remaining funds would be retained by WSDOT. This would potentially lower bid contingencies for some items, and the Agency would only pay when escalation actually occurs, saving money in the long run.

7 Action Items:

Fish passage lessons learned (Item A)– Nobody had any lessons to share. This item will be closed.

For Next meeting

ACTION ITEM from topic 5 – Review 6-20 Contractor Casting at the next meeting

ACTION ITEM from topic 6 – Talk to Admin Team about how adjustment factors are calculated and how they could be calculated.

Nucor Steel presentation on sheet pile Abutments (Item g)

Bracket Loading (Item d) - Bryant Helvey

Meeting Concluded
Notes by Jim Cuthbertson

Upcoming Meetings: December 10, 2021; January 21, 2022; March 4, 2022; April 15, 2022

AGC/WSDOT Structures Team – Meeting Minutes
December 10, 2021

Attendees

[1] Team co-chair

Regular Attendees				
Attended	**Member**	**Company**	**Phone**	**E-mail**
	Allen, Buck	Hamilton Const.	360-742-3326	BALLEN@HAMIL.COM
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Y	Cucchiara, Kevin	Quigg Bros.	360-580-0015	KEVINC@QUIGGBROS.COM
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	Gaines, Mark	WSDOT-Bridge	360-705-7207	GAINESM@WSDOT.WA.GOV
Y	Glassford, Patrick	WSDOT-Bridge	360-705-7828	GLASSFP@WSDOT.WA.GOV
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Y	Moore, Stuart[1]	Atkinson	360-340-6797	STUART.MOORE@ATKN.COM
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	Tornberg, Ben	Manson Const.	206-496-9407	BTORNBERG@MANSONCONSTRUCTION.COM
	Watt, Doug	CJA	425-988-2150	DWATT@CONDON-JOHNSON.COM
Y	Watts, Troy	WSDOT-OR	253-255-8215	WATTST@WSDOT.WA.GOV
	Welch, Pete	Granite Const.	425-551-3100	PETE.WELCH@GCINC.COM

Guests			
Name	**Company**	**Phone**	**E-mail**
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Mooney, Todd	WSDOT Geotech	360-709-5463	MOONEYT@WSDOT.WA.GOV

Agenda

1	**Welcome / Review of Agenda**	Cuthbertson/Moore
2	**Approval of Previous Meeting Minutes**	Cuthbertson/Moore/All
3	**Sheet Pile Abutments** Maria Idrovo from Nucor Skyline steel will give us a presentation on their sheet pile abutment system. https://www.nucorskyline.com/globalnav/applications/bridge-abutments	Idrovo/All
4	**Bracket Loading on WF Girder Webs** Bryant Helvey has gathered up some information regarding applied loads. WSDOT is considering revisions to Div. 6 language concerning the loads that can be applied because of not plumb webs.	Helvey/All
5	**Vacant**	
6	**Vacant**	
7	**Last meeting's Action Items review and reporting** DEFERRED ITEMS **a) Geofoam Fill GSP – Scott Sargent** Beginning after the first of the year, Scott Sargent plans to begin work on taking a number of project specific special provisions and converting them into a Standard Specification with supporting GSPs. **b) Fiber Reinforced Bridge Deck Study (2022 briefing at earliest) – Anthony Mizumori** Anthony Mizumori stated that the Bridge office has two pilot projects identified. Each project has a pair of bridges. The plan is to use fiber reinforced concrete on one and regular class 4000 concrete for bridge decks on the other. The two projects are: Purdy Creek which should be on advertisement November 22, 2021 and I-90 Cabin Ck I/C to west Easton which will be on advertisement January 18, 2022. **c) Dextra CSL tube spec revisions – Jim Cuthbertson** WSDOT with input from the ADSC task force plans to revise the material requirements for CSL testing tubes. This group will be kept apprised of those changes, if any. This is on Jim Cuthbertson's to-do list since he is involved with that team. **d) 6-02.3(25) and (26) Const. Manual Updates – Scott Sargent** This is delayed until Scott Sargent assumes his ASCE role. Patrick Glassford has done some work on these sections already and will share those with Scott.	

1 Welcome / Review of Agenda

Jim and Stuart started the meeting. We reviewed the agenda introduced our guests and then moved to the next item.

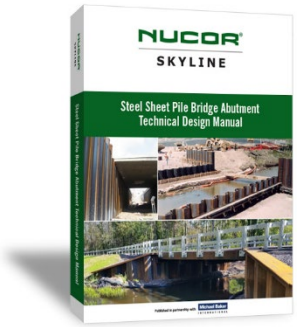
2 Approval of Previous Meeting Minutes

Jim Cuthbertson distributed the October meeting minutes by e-mail for comments after the October 29th meeting. No edits were proposed or suggested then or at this meeting. The October minutes will be finalized and posted to the webpage where the team meeting notes are posted. https://partners.wsdot-sites.com/agc/

3 Sheet Pile Abutments

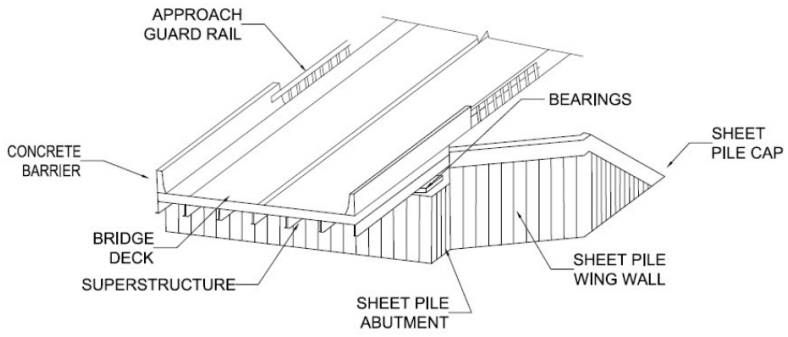
Geoff Swett of the Bridge Office invited Maria Idrovo of Nucor Skyline Steel to talk about sheet pile abutments. Nucor has been working for several years to expand the use of sheet pile abutments in the US. They have been used with great success in Europe for many years and would be ideal for fish passage projects where we have both short spans and scour concerns. Nucor has a three hour webinar on the topic which can be watched. It can be accessed from their web site.

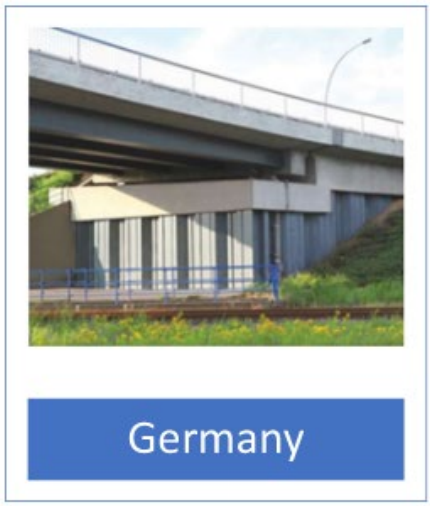
https://www.nucorskyline.com/globalnav/applications/bridge-abutments

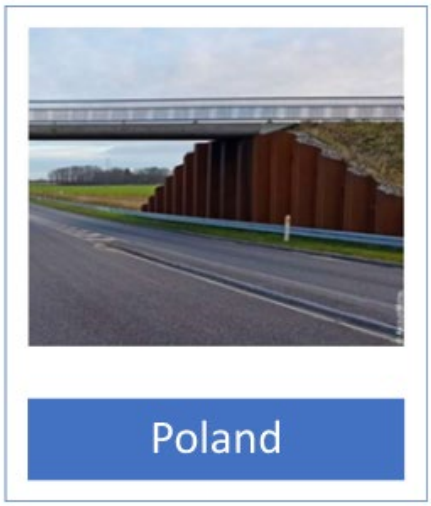


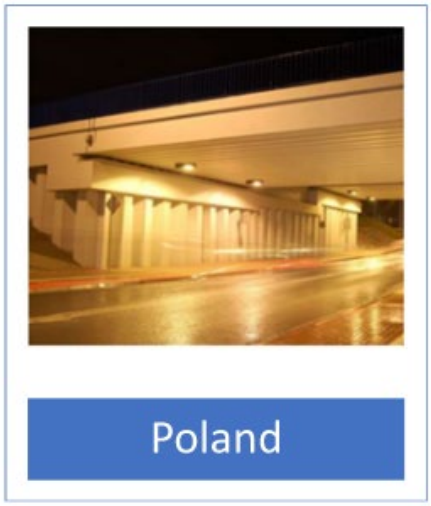
Nucor has recently published a technical design manual for abutments. It too is free and can be ordered in a paper version from their web site. Some of the advantages of the system are that the sheets can be used for temporary soil support and for permanent structure support in one step. It may eliminate the need for temporary shoring. The sheets themselves can be used for structure axial support immediately after being driven, which also eliminates curing time that is often required for other foundation options. The sheets can be coated and painted to improve aesthetics. There are options that will enable the use of concrete facing too, and Calgary zoo utilized a rubble fill retained by wire within the sheet pile bays for a rugged rock look; see the image to the right.

Sheet pile abutments have been used in the US since the 1960s so they are not “new”. However, AASHTO does not address them very well. Much of the design guidance contained in the Nucor design manual is based on Euro code, but AASHTO is referenced where possible. Currently, Alaska and New York state are the largest users of these types of structures and approximately 150 of them have been constructed. Nucor does have the ability to perform the necessary structural design for the system, or they can support others who are doing the design. Below are some examples of the system.





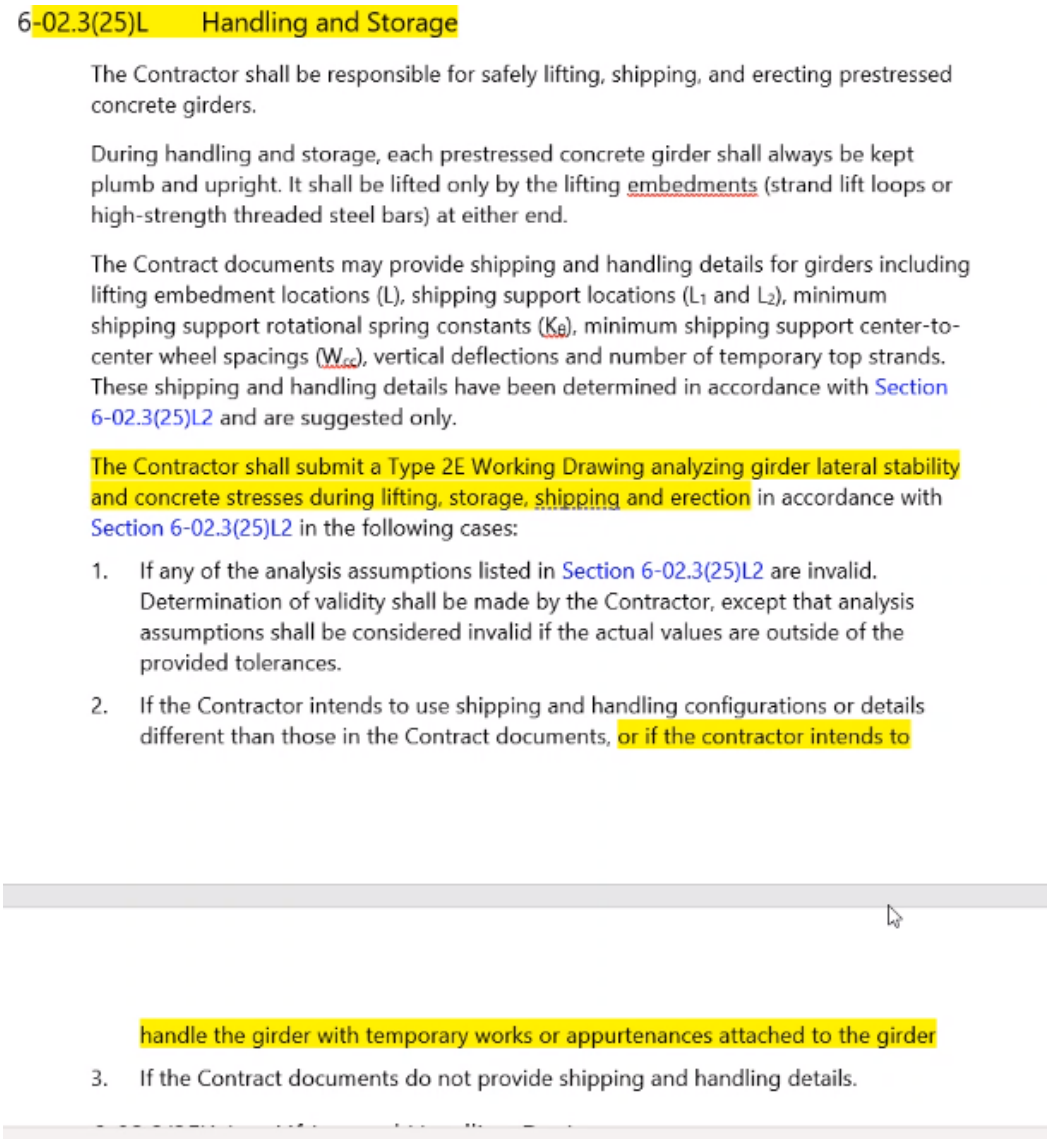




After Maria's presentation, the team members raised a couple of issues that they may have when using this system. One of the issues is the relatively deep scour that is often predicted particularly when stream migration is an issue. It would not be uncommon for scour depths to be deep enough that sheet piles can not be used as cantilever elements. Some form of tiebacks or bracing may be needed to resist the lateral earth pressures. Associated with scour, abrasion damage to coatings or coating damage during installation could lead to corrosion concerns for the designs. The bridge office was very interested in how the manual deals with corrosion and if different corrosion rates could be applied to the "flood" side of the sheets verses the retained soil side. Seismic design was also a concern. Extreme limit state design controls many of WA structures. Since Alaska has been using sheet pile abutments, it was asked what they are doing for their seismic design. Maria indicated that she would take these issues back to her design team so that they can be addressed.

4 Bracket Loading on WF Girder Webs

About six months ago this issue was brought up to the Structures Team. Bryant Helvey gathered up some data on the topic and wrote a summary of his findings. His writeup is attached at the end of the notes. WSDOT was planning to make some revisions to Section 6-02.3(25)L Handling and Storage. This came about because of an issue where girder webs were not plumb after being set. There were changes made to the specifications after this issue was raised. The current specifications state:



6-02.3(25)L Handling and Storage

The Contractor shall be responsible for safely lifting, shipping, and erecting prestressed concrete girders.

During handling and storage, each prestressed concrete girder shall always be kept plumb and upright. It shall be lifted only by the lifting embedments (strand lift loops or high-strength threaded steel bars) at either end.

The Contract documents may provide shipping and handling details for girders including lifting embedment locations (L), shipping support locations (L_1 and L_2), minimum shipping support rotational spring constants (K_θ), minimum shipping support center-to-center wheel spacings (W_{cc}), vertical deflections and number of temporary top strands. These shipping and handling details have been determined in accordance with Section 6-02.3(25)L2 and are suggested only.

The Contractor shall submit a Type 2E Working Drawing analyzing girder lateral stability and concrete stresses during lifting, storage, shipping and erection in accordance with Section 6-02.3(25)L2 in the following cases:

1. If any of the analysis assumptions listed in Section 6-02.3(25)L2 are invalid. Determination of validity shall be made by the Contractor, except that analysis assumptions shall be considered invalid if the actual values are outside of the provided tolerances.
2. If the Contractor intends to use shipping and handling configurations or details different than those in the Contract documents, or if the contractor intends to handle the girder with temporary works or appurtenances attached to the girder
3. If the Contract documents do not provide shipping and handling details.

Bryant found four examples which use the 8K-80" brackets and one that used the 8K-18" bracket. The 18-inch bracket is not used that commonly, most contractors use the 80-inch or 60-inch versions of the brackets. What he found was that most contractors are using fairly similar bracket spacings and thus fairly similar bracket loads. Although, loading does vary a bit based on the overhang dimension. Lumber dimensions are what generally controls the spacing of brackets. For just the brackets, plan on having a one hundred pound point load every four feet of girder length. It is less common for contractors to install the entire decking system prior to picking the girders. The consensus was that for a 100 ft girder having 20 brackets at 100 lbs, adds only about 2,000 lbs to the girder. The girder self-weight is so overwhelming compared to the weight of the brackets that picking plumbness is not really affected, the center of gravity is shifted by fractions of an inch, and the risk of tipping over the girders from the brackets themselves once set on the bearings is really low. WSDOT did revise the 2022 specification to require a Type 2E Working Drawing if the brackets are attached. WSDOT will see what we get for submittals and may revisit this issue in a future meeting or future specification revisions.

5 **VACANT**
6 **VACANT**

7 Last meeting's Action Items Review and Reporting

No additional updates other than those discussed in the agenda are needed at this time.

Future meeting dates:
January 21, 2022
March 4, 2022
April 15, 2022

Meeting Adjourned.
Notes by Cuthbertson

AGC/WSDOT Structures Team
Study on Overhang Bracket Loads on Concrete WF Girders
10/29/2021

Purpose:

-After a project experienced some girder webs that were not plumb after being set, WSDOT is examining potential Division 6 language which would require Contractors to analyze the affects of placing overhang brackets on girders.

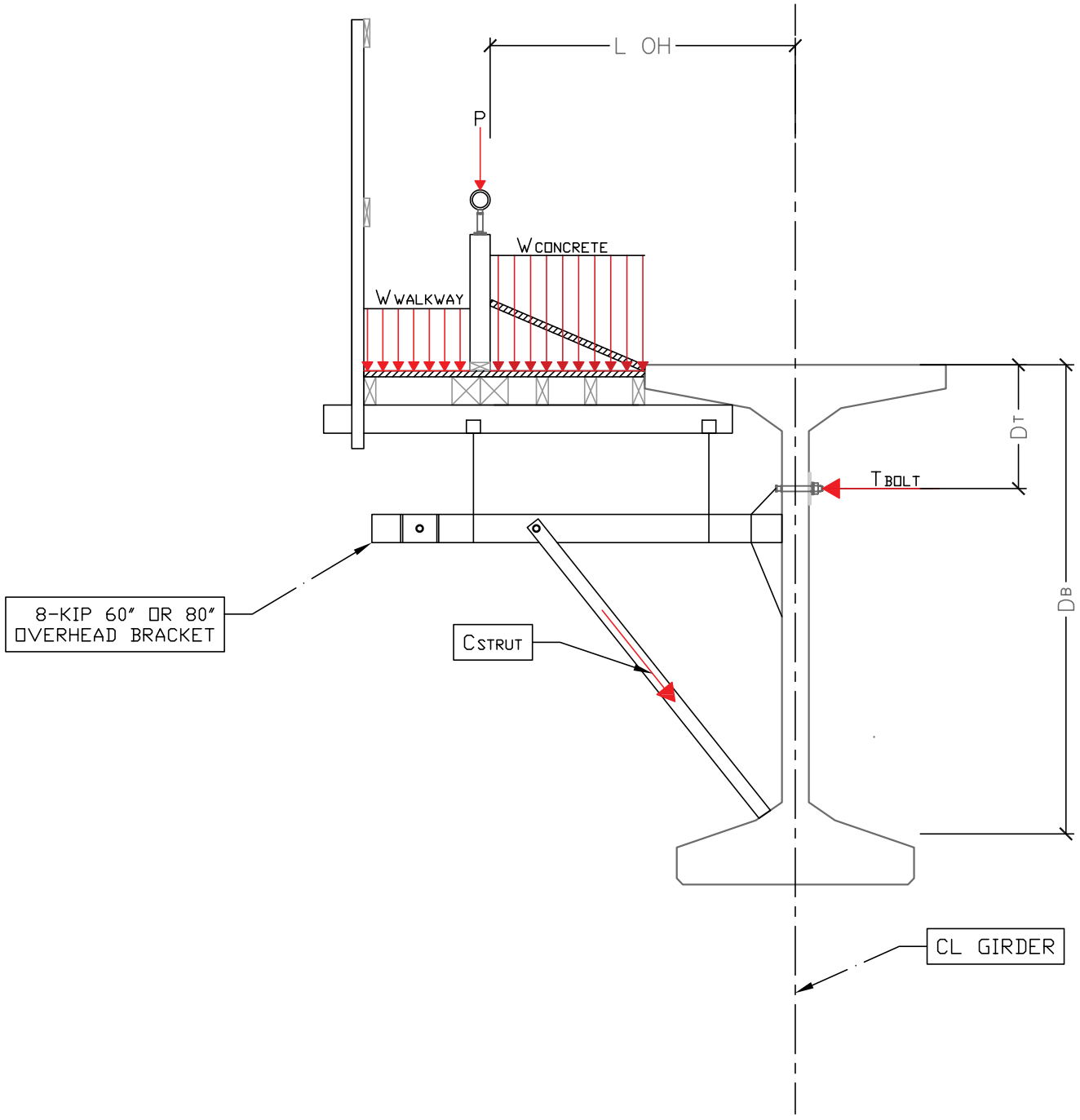
-Before implementation, WSDOT agreed to look at some "typical" bracket loads.

Bridge Structure	Girder Shape	OH Bracket Type	Overhang Length (ft)	OH Bracket Spacing (ft)	Forces/Locations Exerted Into Girder Web			
					T-Bolt (k)	Dt (ft)	C-Strut (k)	Db (ft)
Puyallup River SB	WF100G	8k-80"	6.75	4.0	5.1	1.33	7.8	7.42
Puyallup River SB	WF74G	8k-80"	4.88	4.0	5.2	1.33	3.7	5.25
L Street	WF74G	8k-80"	3.54	4.0	3.1	1.33	4.4	5.25
520 WABS	WF74G	8k-80"	4.67	5.0	5.8	1.50	9.1	5.25
518 Off-ramp	WF50G	8k-18"	5.23	4.0	18.0	1.00	18.0*	2.38

See attached graphic demonstrating locations of dimensions and forces.

Legend of Abbreviations:

T-Bolt	Tension in bolt attaching overhang bracket to web, which is exerting a force in the web outward (toward overhang)
Dt	Distance T-Bolt occurs from top of flange.
C-Strut	Compression in angled strut, which is exerting a force in the web inward (away from overhang)
Db	Distance C-Strut occurs from top of flange (generally at top of bottom flange)
	* Some WF girder shapes are too short to accommodate the "strut" type of OH bracket and thus a full-steel bracket must be used; in this case, "C-Strut" is actually a horizontal compression force that is parallel to "T-Bolt"


L OH
P
W CONCRETE
W WALKWAY
DT
TBOLT
DB
8-KIP 60" OR 80"
OVERHEAD BRACKET
CSTRUT
CL GIRDER

AGC / WSDOT STRUCTURES

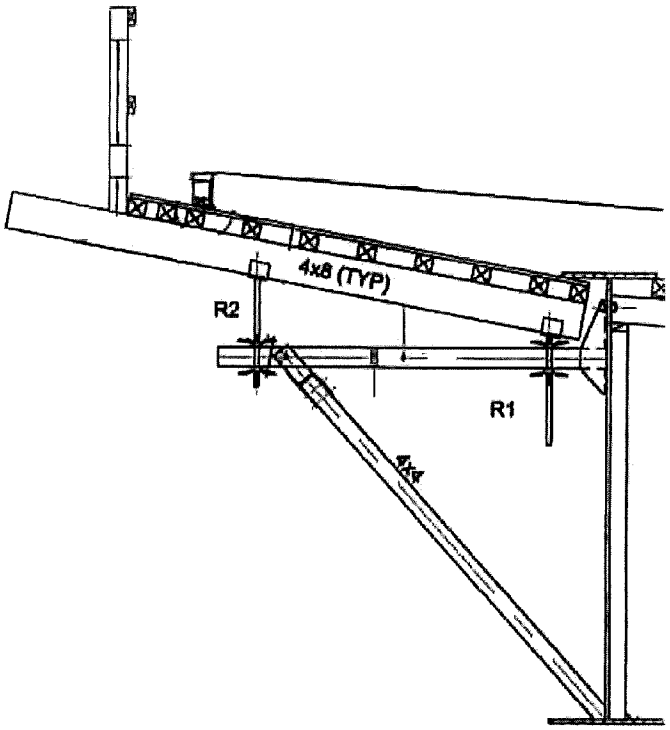
C/E 8KIP BRIDGE OVERHANG BRACKET

ADJUSTABLE BRACKETS FOR STEEL & CONCRETE GIRDER BRIDGES -- CAPACITY OF 8,000 LBS. S.W.L

This is our new bracket with high capacity.
Designed to work with deep steel and concrete girder bridges.

An economical answer to wide overhangs, deep steel & concrete girders

TWO SIZES – STANDARD 80" AND THE 60" MODELS



Safe working load of 8,000 pounds per bracket. Factor of Safety is 2.5 to 1

Brackets bolt easily and quickly to girders. A single 7/8" bolt is located near the top flange.

No hanger required

Screwjacks adjust for slopes and super elevations for easy form release

Bracket works equally well on precast concrete girders by simply removing the saddle jacks and 4" x 4" attachment, turning bracket over, and reassembling.

Finish elevations can be adjusted quickly and accurately – NO WEDGES

Varying lengths of diagonal 4" x 4" (#2) lumber adjust brackets to fit girders up to 100" deep

Wide overhangs accommodated

Model 60" - weighs 84 pounds
Model 80" - weighs 95 pounds

Weight bears on the bottom flange of the girders

60" Model

* First screw jack is 12" from girder web (36" between jacks)
* Diagonal brace bolt is 42" from girder web.
* Screw jacks are 1" coil with two wing nuts

80" Model

* First screw jack is 12" from girder web
* Second jack is either 42" or 60" from first jack
* Diagonal brace bolt is 42" or 66" from girder web

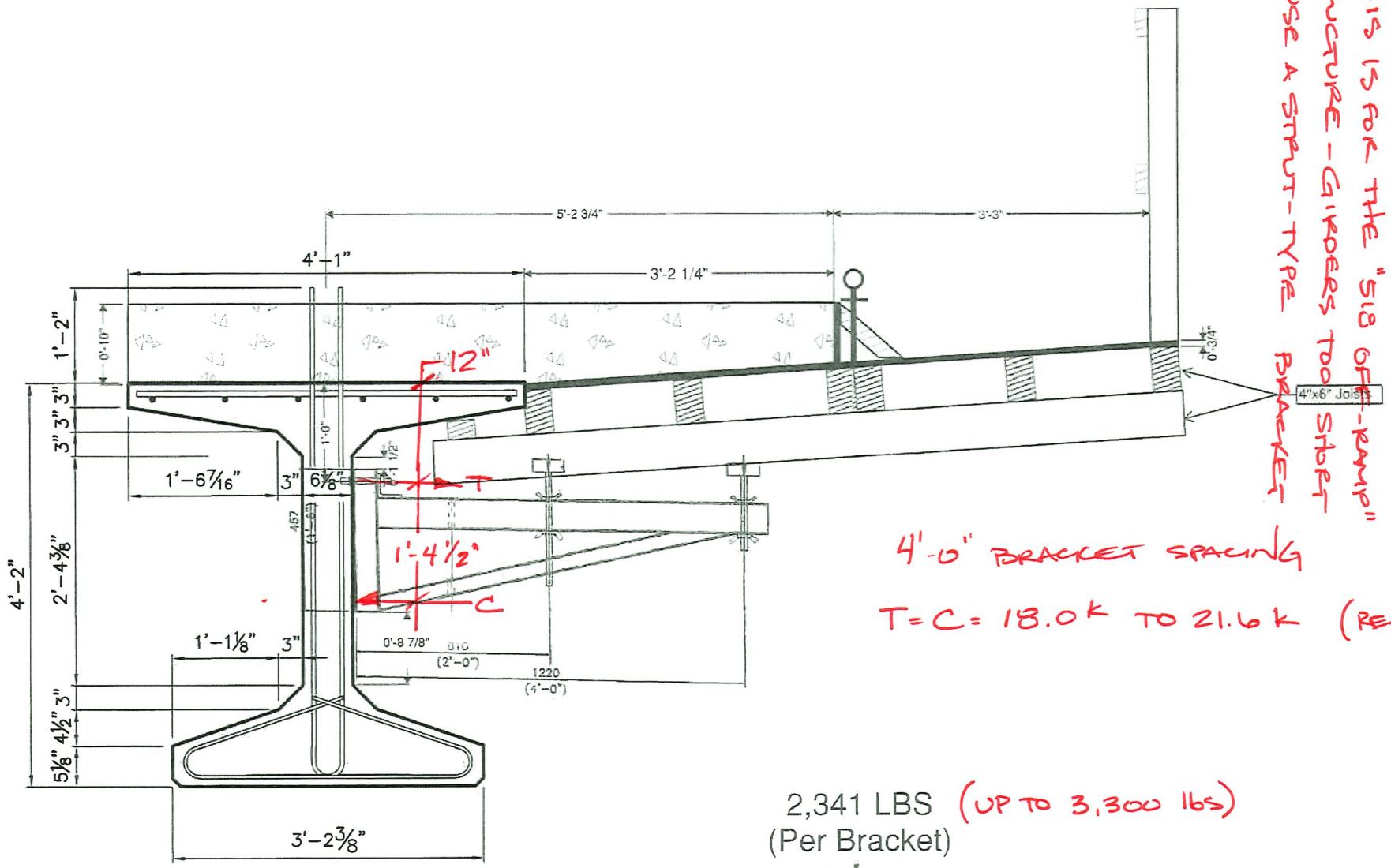
CONSTRUCTION ENTERPRISES INC.
www.constructionenterprisesinc.com

TEL 415.383.4514
FAX 415.383.9227
Constent7@comcast.net

AGC/WSDOT STRUCTURES

NOTE

- THIS IS FOR THE "518 OFF-RAMP" STRUCTURE - GIRDERS TOO SHORT TO USE A STRUT-TYPE BRACKET



4'-0" BRACKET SPACING

T = C = 18.0 k TO 21.6 k (REQ'S 1" BOLT)

2,341 LBS (UP TO 3,300 lbs)
(Per Bracket)

177 lb/ft

Bracket Loading:
(per LF deck)

60 lb/ft - STD WALKWAY LOAD

L. Young, Graham, 8-Dec-2017

Appendix 1