Project:	**C9727 - I-405, Brickyard to SR 527 Improvement Project**
Documen	**BY-CRE-01827_009727_SUB_17.02_Package 8 Final Fish Passages - Juanita Creek**
Submittal	**1/28/2025**
Due Date	**2/11/2025** **COB**
Reviewer	**Jason Pang (JP), City of Kirkland (COK), Gabe Ng (G. Ng), Chris Vondrasek (CV), Sam Michels-Boyce (SMB), Darrell Sofield (DS)**
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1	JP		Per GDM 15-4, 4 foot level benches are required in front of retaining walls. Please adjust contours at the wingwalls to provide required bench if not provided.	R	MLC	To be updated for RFC submittal.			
2	COK-KJ		Based on how the detention facility was represented in the model (by a lower peak flow value modeled under steady state for existing conditions), additional textual clarifications should be included throughout the FRA for the potential effect this has for any results comparisons upstream of the crossing. The attenuated peak flow utilized for existing conditions was based on flow released by the detention facility, so it does not accurately reflect water surface changes throughout the upstream reach.	R	YTR	To be updated for RFC submittal. The removal of detention is being modeled by increased flow so there is no actual water being added to the system and existing and proposed modeled water surface elevations upstream of the structure should not be directly compared to one another, because the proposed water surface elevations upstream of the grading limits of the project will in actualilty not increase. Chapter 2 of the contract states, "The hydrology/peak flows developed by the City of Kirkland are to be used for the Juanita Creek crossing design (Appendix H)." The Appendix H Juanita Creek Hydrology and Hydraulics Study states, "An extensive investigation into the hydrology of the Juanita Creek subbasins was conducted to ensure all stakeholders came to an agreement on the existing and projected peak flows in Juanita Creek as a result of the removal of the High Woodlands Regional Detention Facility." Table 1 of the Appendix H study provides pre- and post-contruction flows, which are used for existing and propsed hydraulic modeling.			
3	COK-KJ		The City of Kirkland (2022) reference was not produced by NHC and is not a City document either. The reference should be updated to reflect the actual author of the memo.	R	YTR	To be updated for RFC submittal. It is now our understanding that this is a WSDOT publication.			
4	COK - KJ		As part of the FRA, the template must consider and analyze compliance with Kirkland Code, including Chapter 90.70 Stream Modification of the Kirkland Zoning Code. Section 5, Decisional Criteria, of this chapter includes providing information to demonstrate no adverse impacts on drainage, stormwater detention capabilities and base flood storage volume and function, will not increase velocity upstream or downstream, will not increase sediment load upstream or downstream, and will not result in unstable geologic and soil conditions and close conditions or create an erosion hazard or contribute to scour actions. The City would anticipate this would include a downstream analysis will extend to at least the NE 141st Street culvert, survey information will be updated such that there is a reasonable channel bottom that can then be used to evaluate risk of overtopping (in the current model there is an abrupt break between survey data and LIDAR data downstream of the culvert).	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			
5	COK - KJ		Page 15 notes that there will be a 1.15 ft rise in the 1% AEP water surface elevation at Station 1+42, and shows this rise in Figure 9. In addition, larger rises than this, upward of 1.4 - 1.6 feet occur within the domain of the hydraulic model further downstream. Neither of these are currently addressed within the FRA. The FRA contradicts the information provided and states the project does not cause an average rise over 1 foot in the summary on page 17. These areas should be mentioned and addressed within the FRA.	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			
6	COK-JJG		The rise in downstream water surface elevations is likely to cause increased bank erosion and channel instability. Provide analysis of this situation - where will the eroded sediment settle, and what will be the impacts on flooding and habitat?	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			
7	COK-JJG		These sheets note that the instream pond control structure is to be abandoned/removed. Update callout to state removed, the structure should not be abandoned.	D	MLC	Based on the sequence of work and safety considerations, it is not feasible to remove this structure. It is the intention of the DB team to abandon this structure instead of remove. The design plans will be revised to include notes regarding the removal of this structure including that it will be removed 2 ft below finished grade and filled / abandoned below ground.			
8	COK - KJ		There is a private storm drainage line within COK limits on the west side of the freeway that enters from Bothell, goes through private property, and discharges near the existing culvert to be removed/abandoned downstream of the I-405 culvert crossing. Will this storm drainage line be maintained with the project and regrading in this area?	R	MLC	Yes this line is being maintained. Per drainage team, "We have performed a conveyance analysis on the existing system demonstrating that it has capacity for final condition flow rates. We are providing detention retrofit upstream of Juanita creek too, meaning that we are providing detention for impervious surfaces that exceed the areas required within the TDA." Additional questions can be relayed to drainage team (Brian Caferro, Max Magee)			
9	COK-JJG		This sheet states " abandon/remove inline detention facility" . Language on this sheet should be consistent with other sheets that state that "existing instream pond control structure to be abandoned/removed". All sheets should callout the control structure being removed.	R	MLC	Based on the sequence of work and safety considerations, it is not feasible to remove this structure. It is the intention of the DB team to abandon this structure instead of remove. The design plans will be revised to include notes regarding the removal of this structure including that it will be removed 2 ft below finished grade and filled / abandoned below ground.			
10	COK-KJ		Deformable grade control references detail 2 on sheet EFP5-16. There is no detail for deformable grade control on this page. Reference should be updated.	R	MLC	Note to be updated for RFC submittal.			
11	COK-KJ		Deformable grade control appears to referencing the wrong note (says "see note 13"). This should be updated to note 12.	R	MLC	Note to be updated for RFC submittal.			
12	COK-JJG		There still does not appear to be mention of an access road, use of the existing access road, or any other means of physically getting to the project on the upstream side of I-405.	D	MLC	Temporary access road was discussed during Task Force meeting on 3/25/25. This road will be completely within the clearing and grubbing limits for the projects and will not be reflected in the design plans, which are intended to show final site conditions. No changes to the design plans will be necessary.			
13	COK-JJG		WSDOT is not responsible for the inlet to the control structure and the 48" pipe on the upstream side of I-405. Therefore they would have no record of maintenance at this location. Kirkland has provided maintenance records for this location. - note sediment/debris and maintenance issues as contained in those documents.	R	MLC	AECOM will review and incorporate language from the maintenance records from City of Kirkland in the RFC submittal.			

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14	COK-JJG		The statement "The majority of fine sediment that does migrate from upstream will be transported as wash load and deposit near the mouth of Juanita Creek at Lake Washington" needs further investigation and explanation. The City is concerned as sediment deposition in Juanita Creek near Lake Washington (in Juanita Beach Park) is already an on-going concern. Additional sediment deposition will aggravate existing concerns with a recently-created off-channel wetland. Consider removing fine sediment within proposed flooded area to reduce delivery of this fine material to the lower reaches of Juanita Creek.	C	YTR	To be further clarified for RFC submittal. Approximately 850 cubic yards of sediment is being removed upstream of the existing structure (including approximatey 600 CY in the wetland area), since a new channel is being created and the existing channel is being graded as side channel with some step-pools, that is designed to activate above the 2-year flow. The sentence was in response to a PHD comment about mobilization of fine sediment. Fine sediment will eventually be mobilized downstream through episodic larger flows; there will likely be temporary storage along the more than 2 mile stretch of Juanita Creek between the project and Lake Washington so this is not anticipated to occur all at once A goal of the project is to restore a more natural sediment transport regime. To properly address this comment, a sediment transport model of the entire Juanita Creek may be necessary, which is out of scope for this contract.			
15	COK-JJG		The statement " As described in Section 7.2, Juanita Creek may be at risk for long-term degradation under proposed conditions..." needs further evaluation. It seems inconsistent that the project area is not likely to degrade, but the overall channel is set to degrade. And how does this interact with the deformable grade control that is shown on sheet EFP5-12?	R	CMJ	Will clarify in next submittal. This statement was stating that because the bed is deformable, degradation may occur, but our analysis in section 7..2 shows that degradation is likely minimal. We can remove the first statement to avoid confusion. We will also add how the deformable grade control will interact with any incision migrating to the project site briefly and reference Section 4.3.2.6 (deformable grade control section).			
16	COK-JJG		Note 13, which appears to be related to the deformable grade control, appears to mislabeled - looks like this should be Note 12.	R	MLC	Note to be updated for RFC submittal.			
17	COK-KJ		The City of Kirkland (2022) reference was not produced by NHC and is not a City document either. The reference should be updated to reflect the actual author of the memo.	R	YTR	To be updated for RFC submittal. It is now our understanding that this is a WSDOT publication.			
18	COK-JJG		The language "A lateral separation from the existing structure was deemed necessary in the event that the City of Kirkland could not decommission the inline detention facility during construction due to their municipal stormwater treatment commitments." needs to be removed. It is not appropriate for WSDOT to speculate as to Kirkland's stormwater treatment commitments, and WSDOT will be solely responsible for any alteration of this facility.	R	YTR	To be updated for RFC submittal. Will clarify that structure is being abandoned.			
19	COK-JJG		4.2.3.1 needs to be updated to reflect City of Kirkland maintenance records regarding the inlet to the control structure, which is also the inlet to the 48" culvert. There have been significant issues with buildup of wood and other debris, with sedimentation, and with beaver activity in and near the inlet.	R	YTR	To be updated for RFC submittal.			
20	COK-JJG		Flows downstream of I-405 will increase significantly. What is currently estimated to be the 100-year flow (41 cfs) will now become approximately the 2-year flow (40 cfs).The flood and scour impacts of this change need to be more thoroughly evaluated to prevent safety and habitat concerns.	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			
21	COK		•Despite the proposed design restoring sediment transport potential through the crossing, the system is likely supply limited based on the barriers upstream of the project site. Higher peak flows through the crossing will increase erosion of the channel bed and banks downstream, where there is already suspected channel incision occurring. Further, under proposed conditions, the stream will likely erode some of the constructed streambed sediment and transport it to downstream depositional areas, such as downstream crossings. Additional analysis should be performed for how the downstream channel will respond to the new hydraulic and sediment transport conditions from the proposed crossing, including whether sediment could aggrade at the culvert crossing NE 141st Street.	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			
22	COK-KJ		We are concerned that increased flows will impact channel and bank stability in the area immediately downstream of the new culvert. There are 51 structures within 100 feet of the stream centerline between I-405 and 111th Ave NE, primarily private residences.13 of these residences are within 50 feet of the stream centerline. Given the potential safety issue, WSDOT should conduct a geomorphic evaluation of existing conditions and the expected impacts of the project on bank stability. For example, from the 2012 geomorphic study provided by the City, 215, 216, and 214 referenced in the image below are identified as slightly unstable (215), completely unstable (216) and moderately unstable (214) (page 13 of Appendix B). 	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			

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23	COK-KJ		Throughout the document (example on page 65), while the SRH2D model does not include the existing instream pond, when referring to why there are higher velocities and shear stresses, it should note within the text that this is not only caused by existing culverts, but is also caused by the removal of the existing instream pond. This element creates a different situation than most undersized culverts and should be noted throughout the document.	R	YTR	To be updated for RFC submittal.			
24	COK-KJ		When comparing the Q100 average velocities from existing to proposed, velocities are ~3 ft/s faster in the main channel and the right bank. This will likely cause more erosion along the channel and banks downstream of the project. At station -5+00, the figure appears to show the velocity is in the 4 - 5 ft/s range, as well as WSE rise of 1 - 2 feet. With this increase and the banks of the stream so close to properties, this increase could cause significant issues for downstream property owners. How will this be addressed by the project? 	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			
25	G.Ng		Please show all other barrier/culverts. Please include all culverts in Vic. Map.	R	YTR	To be updated for RFC submittal. Additional barriers/culverts to be added to vicinity map.	OK		
26	G.Ng		Please show where the inline detention facility is on the map as it's referenced later on in this section and preceding sections without understanding where it's exactly located.	R	YTR	To be updated for RFC submittal. Detention facility to be identified on vicinity map.	OK		
27	G.Ng		Please show where the inline detention facility is on the map as it's referenced through this section and preceding sections without understanding where it's exactly located.	R	YTR	To be updated for RFC submittal. Detention facility to be identified on Figure 2-9.	OK		
28	G.Ng		proposed gradient is 3.3% and greater; this should not be called a reference reach.	R	CMJ	This will be referred to as the design reference reach per discussions with WSDOT.	OK		
29	G.Ng		Not similar. crossing is twice the gradient in reference reach.	R	CMJ	Language to be updated regarding design reference reach, project limit constraints, and slope similarities.	OK		
30	G.Ng		assume these are BF depths? Please clarify.	R	YTR	Yes, these are BF depths, clarification to be added to the RFC submittal.	OK		
31	G.Ng		this is incorrect; it is Confined.	R	YTR	To be revised for RFC submittal.	OK		
32	G.Ng		What/how was FPW determined? Please describe & document so it could be replicated if necessary.	R	YTR	To be revised for RFC submittal. Will include more description. The width of the modeled 100-year flood extents were measured for each of the bankfull width locations. A FUR was also calculated for each bankfull width location, and the average FUR was taken.	OK		
33	G.Ng		How is this slope ratio calculated? I've calculated 2.1 or 1.4 depending on how far you go upstream.	R	YTR	To be revised for RFC. Will include more description. See Figure 2-17. The natural channel gradient upstream of the grading extents is approximately 2.4%; the slope of the section of stream that includes the culvert is approximately 2.9%.	UR	pg. 42 " The new main channel upstream step-pool reach has an average slope steeper than the proposed culvert, thus meeting the WCDG 25 slope increase criteria " - This sentence is false. The upstream step pool is 4.6%; the transition between the step pools and the culvert is 3.2% and the culvert is 3.0% The step pool is 44% steeper than the transition section.	
34	G.Ng		This is great! Glad you were able to take a few grab samples and run a sieve analysis. These samples should be documented through WSDOT GHPA 2020-9-8+01 for APP ID 21036 protocol which outlines permitting steps to take stream samples below the OHWM.	R	YTR	To be updated for RFC submittal.	OK		
35	G.Ng		Please include that this restores natural stream processes.	R	YTR	To be revised for RFC submittal.	OK		
36	G.Ng		This should be able to be seen in the watershed profile.	R	YTR	To be revised for RFC submittal.	OK		
37	G.Ng		This is not a watershed profile. This is a project reach profile. While this is good to have. Please add a watershed profile.	R	YTR	To be revised for RFC submittal.	OK		
38	G.Ng		There is no slope in the profile shown below at 3% or greater; Why are we designing a stream at this steep of a slope? It doesn't match the reference reach or any other areas adjacent to the crossing.	R	YTR	As discussed with WSDOT, project constraints that limit the work area and resulting slopes within the project reach and the nature of the design reference reach will be discussed in the next phase of the FHD. Per discussions with WSDOT, no change to the proposed slope is required.	UR	Design Reference Reach is 1.9%; why are we not using a reach upstream or downstream that is closer the the proposed 3% through the crossing? What are you using from your designed reference reach that is informing the design?	
39	G.Ng		You need to explain what the FPW and/or valley width of this confined stream as that is your outer limits for Channel Migration.	R	YTR	To be revised for RFC submittal.	UR	I appreciate the expansion in this section; however it appears it doesn't provide much clarity on the limits of channel migration. You added that WSDOT compled meander beld width estimate of 30ft. Please include or reference that analysis.	
40	G.Ng		What happens once it reaches the inline detention facility? Does the migration potential increase? What's the historic path and what is the expected risk? What types of soils?	R	YTR	To be revised for RFC submittal.	OK		

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41	G.Ng		While anthropogenic features can control and limit channel migration they are not a basis for assessing low or limited migration. Heavy vegetation, like mature trees would be signs of lateral/banks stability as well as steep banks with coarser gravels/boulders if they are present. Bolstering this section will better support the retaining wall designs.	R	YTR	To be revised for RFC.	~~UR~~	Meeting on 6/13/25 discussed use of biotechnical countermeasures HEC-23 Vol. 1. The application of biotechnical (heavily planting of streambanks proposed by AECOM) does not account for other considerations outlined in HEC-23. "... vegetation alone should not be seriously considered as a countermeasure against severe bank erosion where a highway facility is at risk. At such locations, vegetation can best serve to supplement other countermeasures." "...a stable channel bed must be achieved before the banks are addressed. Scour and erosion of the bank toe produce the dominant failure modes (see HEC-20)..." While the heavy vegetation and LWM is a benefit to the stream and function; it cannot be relied upon as a stand alone countermeasure. CLOSED BY SONIA via EMAIL	
42	G.Ng		assume this is about where the inline detention facility is located; notice a sediment storage of material upstream of this 1.6%; with a prevailing gradient of 2.4% through project reach. This appears to be the natural equilibrium slope, so why are we designing something more drastic?	R	CMJ	As discussed with WSDOT, project constraints that limit the work area and resulting slopes within the project reach and the nature of the design reference reach will be discussed in the FHD. Per discussions with WSDOT, no change to the proposed slope is required.	UR	These project constraints need to be documented in FHD and designs need to show that the steps allow natural regrade over time.	
43	G.Ng		clarify what Pre & Post is in reference to. Existing and proposed? With or without regional detention?	R	YTR	To be clarified in the RFC FHD submittal.	OK		
44	G.Ng		This needs to be referenced in appendices.	R	YTR	The "Juanita Creek Hydrology and Hydraulics Study H21 Report is being referenced here. To be revised for RFC submittal.	OK		
45	G.Ng		As the EOR you should acknowledge the legitimacy of this data. It appears you're using this data without any validation or comparison to other models.	R	YTR	Validation of hydrology was performed using alternative methods and not included due to the contract requiring use of the H21 report for hydrology. Additional analyses to be added back into the FHD.	OK	Thank you! This comparison is helpful.	
46	G.Ng		This is incorrect. FUR less than 3 indicates a confined channel where a culvert is better suited.	R	YTR	Agree and to be corrected in the next FHD submittal.	OK		
47	G.Ng		This should be a design reach not a reference reach. A reference reach by definition is: A stable segment of stream with consistent slope, geometry, planform, and sediment load that represents, to the best available knowledge, the background condition of the project reach. You're designing a project reach with step pools @ 4.3% and channel crossing of 3.3%. Reference reach was 1.7%.	R	YTR	Language will be adjusted to "design reference reach" since system is highly modified, per discussions with WSDOT.	UR	If design reach designation will need to understand what elements are used to inform the design. The natural steps identified downstream of the project need to inform your step-pool design. There also appears to be reaches 2.5% & 2.7% adjacent to the project reach that seem to be better true reference reaches; why were those not utilized?	
48	G.Ng		remove references to PHD.	R	YTR	To be revised for RFC submittal.	OK		
49	G.Ng		Please provide the data, sinuosity and/or wavelength to understand what you are saying here. You can't reference the PHD.	R	YTR	To be revised for RFC submittal.	OK	Need to find appendix N	
50	G.Ng		This morphology doesn't match the reference reach or any reach in the system and is also not supported in Sec. 2.30-B Table.	R	YTR	Per discussions with WSDOT, step-pools are acceptable due to slope and project limit constraints. Discussion and photos will also be added to show the existing natural step-pools downstream of the project.	UR	Constraints will need to be clearly identified and justified as well as downstream reference reach detailed and expanded on. Your permits and your designs don't match. So your justification is not valid. Once you obtain approval from WDFW/MITF then you reference this as a basis of design. Particularly because the morphology doesn't match. Once that is agreed upon, then DBIC would need to be completed to document the contract change.	
51	G.Ng		these appear to be 20' long in the designs. At 6% these would appear to function as a cascade. What is the basis of this riffle design? Reference reach? Research paper?	R	YTR	The basis for the riffle-pool design was to achieve slightly more than 50% riffles and slightly les than 50% pools through the project reach in order to provide quality and diversity of habitat. This is a result of the meandering planform driven by the literature used to establish the meander wavelengths (USDA NRCS Part 654 Stream Restoration Design National Engineering Handbook). In addition, this includes guidance from the contract requirements about meander bar spacing being 4 times the BFW. A riffle slope of 6% means that the average pool-riffle slope is 3%, which is at the upper end of slopes for pool-riffle morpholoy, according to Montgomery and Buffington (1997).	OK		
52	G.Ng		The removal of these two crossings would be beneficial to denote in chapter 1.	R	YTR	To be revised for RFC submittal.	OK	Please include these in first paragraph of Ch. 1 - this supports WSDOT receiving credit for removing more than just one barrier with this project. Please identify WDFW ID number as well.	
53	G.Ng		Please describe how existing channel is providing high flow fish habitat?	R	YTR	To be clarifed for RFC submittal. The sentence is referring to how the portion of existing channel upstream of I-405 will be preserved and used as a side channel in the proposed condition. This side channel is designed to be activated during the 2-year flow. This side channel will be a velocity refuge for migratory fish during high flows, since velocities will be lower in the side channel than the proposed main channel.	OK		
54	G.Ng		10:1 benches are not indicative of a less than 3% gradient slope. Consider flatter floodplains for better high flow refugia and flood relief.	C	YTR	The WSDOT PHD preliminary plans included the 10:1 floodplain benches, and we intentionally kept this design for FHD because it was our understanding that these typical sections were agreed upon by comanagers, including Tribes. According to Table 5-5, the Q100 floodplain velocities (LOB and ROB) in the structure (station 5+22) are 1.67 and 1.15 fps compared to 3.14 fps in the main channel, evidence of floodplain high flow refugia. Figure 2-13 shows the range of existing conditions floodplain slopes in the design reference reach, with some slopes at 10:1 side slopes.	OK		
55	G.Ng		This information would be good to include in the Channel Migration section.	R	YTR	To be updated for RFC submittal.	UR	Thanks for adding to Chan. Migration section. It wasn't clear in previous FHD that this data was collected by WSDOT; please provide reference or data to support.	
56	G.Ng		Please provide this supporting information.	R	YTR	Will clarify/confirm for RFC submittal	OK		

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57	G.Ng		Please provide supporting documentation. The existing & proposed profile show a flatter gradient upstream of the crossing. Confirm what station or how far upstream is the tie-in location.	R	YTR	Will clarify/confirm for RFC submittal	UR	"The roadway crossing of Juanita Creek was constructed at the location of a natural grade break, where a steep confined valley begins to flatten (Figure 2-29)." - I'm struggling to see this in the figure. It shows an average consistent slope of 2.2% ~1000ft upstream and downstream. Appears to be a transport reach.	
58	G.Ng		slope ratio of proposed over proposed is not necessary.	R	CMJ	To be removed for RFC submittal.	OK		
59	G.Ng		FUR calculation needs to be shown in previous sections.	R	CMJ	To be updated for RFC submittal.	OK		
60	G.Ng		please remove reference to PHD.	R	CMJ	To be updated for RFC submittal.	OK		
61	G.Ng		I wouldn't classify it as steep at 1.6 - 2.4%. Consider updating language.	R	CMJ	To be updated for RFC submittal.	OK		
62	G.Ng		Please describe not just the storage sediment, but the upstream supply? Limited or not. How will the upper basin contribute to sediment over life of the structure?	R	YTR	To be revised for RFC submittal. As mentioned in Section 2.7.3, "Sediment supply in the system is likely limited by the upstream culvert crossings. There is some potential in the immediate valley reach for sediment recruitment, but the presence of the undersized culverts upstream limits the ability for the sediment from further upstream in the system to migrate and travel through this reach." It is difficult to know for sure, but there is some evidence that the reach upstream of the cross is sediment limited. The 119th Ave NE crossing on Juanita Creek, approximately 1,600 feet upstream of the I-405 crossing is also a complete fish barrier (https://apps.wdfw.wa.gov/fishpassagephotos/Reports/935036_Report.pdf). The outlet of the culvert is perched, there is evidence of downstream incision, and thus evidence that the reach is sediment supply limited. The Stormwater Retrofit Analysis and Recommendations for Juanita Creek Basin in the Lake Washington Watershed, Appendix B. Geomorpholgical Report (King County, 2012) (https://your.kingcounty.gov/dnrp/library/water-and-land/stormwater/juanita-retrofit/main-document.pdf) was reviewed; there is discussion of Middle Juanita Creek being armored, implying that the area is "supply-limited, but it may be more accurate to characterize it as a transport-reach where material from upstream is transported though with little deposition occurring." However, similar analysis/conclusions are not made for Upper Juanita Creek.	OK		
63	G.Ng		6% stable riffle sounds like a cascade.	R	YTR	To be clarified for RFC submittal. 6% is the max slope for a riffle. The average slope of the riffle-pool system is approximately 3% (riffles and pools each making up close to 50%), which is at the upper end of slopes for pool-riffle morpholoy, according to Montgomery and Buffington (1997).			
64	G.Ng		How is WDFW permitting these log weirs? Confirm that this would not be permitted as a fish-way. Typically log weirs would be permitted this way and would require serviceability and maintenance for the design life. If so, this would also require an easement on the property for this future maintenance.	R	YTR	To be confirmed for RFC submittal. Per discussions with WSDOT, steps have been redesigned to be deformable steps; weir base boulders have been replaced with more logs. Coordination with WDFW regarding permitting to be completed for RFC.			
65	G.Ng		remove all references to PHD. This FHD document supersedes that document and is the final basis of design endorsed and reviewed by the EOR.	R	CMJ	To be removed for RFC submittal.			
66	G.Ng		appreciate the reference to PHD and how sediment sizes has changed from that document, but it is not needed as the FHD supersedes PHD.	R	CMJ	To be removed for RFC submittal.			
67	G.Ng		This would constitute grade control and wouldn't follow stream simulation methodology.	R	CMJ	Clarification on the mobility of portions of the gradation at lower flows will be added to illustrate the deformability of the riffle streambed material. Per discussion with WSDOT, this is also not pure stream simulation per conversations with WSDOT and uses a design reference reach which will also be explained in the RFC FHD.			
68	G.Ng		This material gradation will have subsurface flow issues as the sands and gravel ratios are not high enough to fill the interstitial spaces. From experience you will need 30% streambed sediment/fines.	R	CMJ	Additional clarification will be added to the RFC FHD. The current design does not include the fines that will be washed in during construction which will prevent subsurface flow. The current design follows the 2013 WDFW WCDG which recommends 5-10% fines. A D8 will be added to the gradation to reduce the porosity of the mix and the amount of fines needing to be washed in during construction.			
69	G.Ng		Mobile woody material or LWM? Inconsistent throughout the FHD. Stable Key piece LWM will require scour countermeasures.	R	CMJ	Will clarify in the FHD, mobile wood is proposed in the structure, LWM that is stable at the 100-year and only proposed outside of the structure.			
70	G.Ng		If LWM is entirely placed above the 100yr WSE, then per F&B it can't be counted towards the targets.	D	MLC	Wood placement is intended to serve a variety of objectives including habitat cover, complexity, streambank stability, pool development, hydraulic roughness, etc. As such, we have provided a diversity in sizes, orientations, and elevations of LWM to meet these objectives per guidance in Ch 10 of the Hydraulics Manual. Per our contract, we are also directed to place Key LWM pieces as described in the PHD (developed by WSDOT). As described in the WSDOT PHD, channel spanning logs placed above the 100-year WSE will be incorporated into the design and were counted in the total number of provided key pieces of LWM required in Ch2. For these reasons, we believe these pieces should be included in the design and do count as part of the number of key pieces. The DB team also did not find the guidance that LWM placed above the 100-yr WSE cannot count toward the LWM targets for the project; however, the F&B paper is not a contractual or reference document for us to follow for this project.			
71	G.Ng		What flows is this high flow channel being engaged? Please clarify.	R	YTR	To be added for RFC submittal. The side channel is designed to be engaged during the 2-year flow.			
72	G.Ng		Be cautious that all these 46 mobile pieces of wood don't mobilize all at one event. Without reviewing each of your wood calculations it might be good to describe that better here.	R	MLC	MWM pieces are set at different elevations and vary in their layout (partially embedded, placed on top of bank, etc.) and will mobilize at different events. This will be clarified in the RFC submittal.			
73	G.Ng		Why step pools in this design? There isn't any documented in the existing system.	R	CMJ	To be clarified for RFC submittal. Step-pools are the best morphology to accommodate the steep slope in this portion of the stream created by project grading/permitting constraints and still support fish habitat and passage. There are step-pools in the existing condition downstream of I-405, photos and further description will be added to the RFC submittal.			
74	G.Ng		This FHD supersedes the PHD, there shouldn't be a reference to the PHD as a document.	R	CMJ	To be removed for RFC submittal.			
75	G.Ng		Are you confident that this less than 0.8 feet will be maintained in perpetuity?	C	CMJ	The step-pools are designed for stability at the 100-year. Per coordination with WSDOT, these will be designed to be deformable for RFC; weir base boulders have been replaced with more logs.			

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COMMENT (WSDOT, City, Checker)				RESPONSE TO COMMENT (Skanska, Originator of Document)			RESPONSE TO RESPONSE (WSDOT, City, Checker)		Skanska CLOSE
76	G.Ng		Section 2.30 Table states a riffle-pool morphology. These step pool designs will prohibit the channel from naturally regrading as table 2.30 also denotes.	D	CMJ	The PHD design included all riffle-pool morphology, however the upstream riffles had a slope greater than 9%; thus, per discussions with WSDOT, these upstream riffles were changed to steps. Step-pool design has been updated to remove rock and therfore will be deformable and allow natural regrade of the channel. A DBIC will be submitted to allow step-pool morphology within Juantia Creek per the contract.			
77	G.Ng		Consider current MB guidance for sizing. These should be sized up for better long-term stability.	R	CMJ	To be revised for RFC submittal.			
78	G.Ng		what's the function of these?	C	CMJ	Coir sacks filled with streambed material provide initial stability of the channel when the first floods come through but will degrade over time and allow the channel to adjust. They also will aid in preventing piping through the step and support the initial pool geometry. This description is provided on page 36 of the FHD.			
79	G.Ng		What's the low flow path?	R	CMJ	Agree, flow path to be added to step-pool detail.			
80	G.Ng		what's the design life of these? What's expectations where coir deteriorates?	C	CMJ	Coir sacks were recommended in the WSDOT PHDs for Juanita Creek and Stream 25.0L. The coir material is expected to start deteriorating after several years and the function it supports will be replaced by the establishment of streamside vegetation that will help support the bank slopes of the pool. On the upstream face of the step, coir sacks help to prevent the piping of fines. By the time the coir sacks degrade, logs/sediment will have had time to settle and experience flow-driven compaction; this will create a more impervious step structure that promotes flow going over the top of the logs.			
81	G.Ng		This discrepancy needs to be explained and justified to why it's acceptable.	R	YTR	To be revised for RFC submittal.			
82	G.Ng		how is proposed higher than existing at upstream? Is proposed flow greater than existing?	R	YTR	To be revised for RFC submittal.Chapter 2 of the contract states, "The hydrology/peak flows developed by the City of Kirkland are to be used for the Juanita Creek crossing design (Appendix H)." The Appendix H Juanita Creek Hydrology and Hydraulics Study states, "An extensive investigation into the hydrology of the Juanita Creek subbasins was conducted to ensure all stakeholders came to an agreement on the existing and projected peak flows in Juanita Creek as a result of the removal of the High Woodlands Regional Detention Facility." Table 1 of the Appendix H study provides pre- and post-contruction flows, which are used for existing and propsed hydraulic modeling.			
83	G.Ng		My understanding is the detention facility is between Station 7+00 and 10+00. How can inflow from above that be greater? also where do you get the additional flow from? I understand that it's attenuating the flows but how is it adding flow?	R	YTR	To be clarified further in FHD report. The removal of detention is being modeled by increased flow; there is no actual water being added to the system. More clarification to be added in the report that the existing and proposed modeled water surface elevations upstream of the structure should not be directly compared to one another, because the proposed water surface elevations upstream of the grading limits of the project will in actuality not increase. Chapter 2 of the contract states, "The hydrology/peak flows developed by the City of Kirkland are to be used for the Juanita Creek crossing design (Appendix H)." The Appendix H Juanita Creek Hydrology and Hydraulics Study states, "An extensive investigation into the hydrology of the Juanita Creek subbasins was conducted to ensure all stakeholders came to an agreement on the existing and projected peak flows in Juanita Creek as a result of the removal of the High Woodlands Regional Detention Facility." Table 1 of the Appendix H study provides pre- and post-contruction flows, which are used for existing and propsed hydraulic modeling.			
84	G.Ng		Who is completing these ongoing investigations?	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			
85	G.Ng		How far down does this increase in WSE continue?	D	YTR	It is our understanding that WSDOT will lead ongoing and future communication related to potential downstream flood impacts and/or improvements.			
86	G.Ng		Need to overlay GIS layer that includes known structures to understand the risk.	R	YTR	To be added for RFC submittal			
87	G.Ng		This will need to be updated with updates to any streambed material adjustments.	R	YTR	Agreed and will be added for RFC submittal.			
88	G.Ng		Based on the design of log weirs with Type 2 boulders, this is not allowed to degrade/regrade over time.	R	MLC	Boulders will be removed, replaced with only wood to allow for deformability.			
89	G.Ng		This is incorrect. Previous table shows a 1.15 foot rise at Sta. 1+42; please clarify.	R	YTR	To be revised for RFC submittal.			
90	G.Ng		what's the intention of this grading finger; would it be easier to not have this and provide floodplain and room for the channel to adjust? Otherwise, It appears to be subject to bend scour and may be more effort trying to maintain and establish it.	D	YTR	This grading finger serves several purposes: 1) to separate the proposed main channel from the existing channel that will be preserved and will provide refugia at higher flows. Modeling indicates that at a 2-year flow, this existing channel is backwatered and exhibits velocities slower than the main channel conditions (less than 0.5 ft/s). This area currently provides similar floodplain connection as further downstream but the elevation of the finger provides separation of main chnannel flow and backwater even at extreme events like the 100-year flow. 2) The adjacent property to the west of Juanita Creek at this location could be subject to bend scour and riprap had been placed on the edge of the property to adress this risk. To further protect this property, this grading figer provideds a buffer between the main channel, side channel, and the property that the stream would have to migrate through to impact this property. Additionally, (as shown on 5-12) LWM is provided on the outside of this bend to protect the finger/propery behind the finger from bend scour. The calculated bend scour for this location is low.			
91	G.Ng		See PDF for additional context.	R	YTR	Comments to be addressed for RFC submittal.			
92	CV	Section 2.4	Consider adding the Statewide Integrated Fish Distribution (SWIFD) spatial data to the reviewed and cited data sources for this section.	R	YTR	To be added for RFC submittal	A		
93	CV	Section 2.4	"The WDFW online SalmonScape application documents sockeye salmon... " Please revise for accuracy. The WDFW data does not “document” potential presence. It documents presence, where the fish have been documented, and it describes reaches where modeling shows the stream gradients will not or should not limit the fish. It does not “presume” anything as far as fish presence.	R	YTR	To be revised for RFC submittal.	A		

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94	CV	Section 2.4	"Sockeye, Chinook, and steelhead are presumed present based on a lack of gradient barrier" This “presumed present” statement isn't quite the right interpretation of the data sources. A modeled lack of gradient barriers between the reaches downstream where the species have been documented and the project crossing is true. These 3 species have been documented downstream in lower Juanita Creek (in Salmonscape and SWIFD). Please rewrite to something like: “Sockeye, Chinook, and steelhead have been documented in lower reaches downstream in Juanita Creek. Existing models find no gradient barriers in the stream profile that might limit species. However 0% passable and other partly passable fish passage barriers exist between these downstream reaches and the Culvert 998602 project crossing. These species might be potentially present in the project reach in the future if passage has been restored through all of the downstream barriers.”	R	YTR	To be revised for RFC submittal.	A		
95	CV	Section 2.4	"....potentially present in Juanita Creek based on suitable habitat" The WDFW Fish Passage map tool (or the SWIFD spatial data) show all of these species documented as present in the downstream reaches of Juanita Creek, at various distances between Lake Washington and the project crossing. These spatial data sources do not show anything “based on suitable habitat”. An accurate statement will describe where each species have been documented and the distance the documented presence ends downstream from the project crossing. If you are citing a habitat assessment that explicitly connects species to suitable habitat, please cite it.	R	YTR	To be revised for RFC submittal.	A		
96	CV	Section 2.4	"There are no available data confirming steelhead or sockeye presence in Juanita Creek, but presence is assumed based on the availability of suitable habitat" Both Salmonscape and the SWIFD spatial data show documented sockeye presence (upstream in Juanita Creek to culvert 932403) and documented winter steelhead presence (upstream to a bit further, to 108th Ave.NE). Again, there's no description of suitable habitat in these data sources. If citing habitat descriptions in one of the King County sources, please add a citation. But Salmonscape and SWIFD contradict the “no available data confirming steelhead or sockeye presence…” part of the sentence.	R	YTR	To be revised for RFC submittal.	A		
97	CV	ction 2.4, Table	Please change all references from “presumed” to “modeled”, as the “no gradient barrier” designation (in Salmonscape or in the SWIFD data) is modeled based on the stream profile gradient. Please consider adding a note under the table clarifying what we mean by 'modeled' here.	R	YTR	To be revised for RFC submittal.	A		
98	CV	ction 2.4, Table	Please change “not warranted” to “none” in this column. “Not warranted” is a description of a USFWS or NMFS agency legal decision after an official agency review of a petition to list a species under the ESA. These species (in Puget Sound) have not been reviewed this way.	R	YTR	To be revised for RFC submittal.	A		
99	CV	Section 2.6.2	Suggest moving or reiterating this description of aquatic fish habitat conditions and quality in Section 2.6.3	R	YTR	To be revised for RFC submittal.	A		
100	CV	Section 2.6.3	Here, and further down in the section, please describe the substrates with more detail (sand, silt, clay, organics, mucky and so it was hard to walk in, whatever you experienced). In the next paragraph, pool riffle habitat has been described. This stream reach might be expected to have more complexity in the substrate, even possibly areas of spawning gravel. The WDFW habitat survey describes “sand/gravel”. The hydraulic field reports mentions gravel and cobbles. Please describe these conditions and their locations, and where and why they changed. Did you encounter any large wood in the channel that helped force the pool riffle character? What did you encounter?	R	YTR	To be revised for RFC submittal.	A		
101	CV	Section 2.6.3	In Section 2.7.1, the channel description of the upstream reach includes, “The gravels found in this reach are consistent with the materials found in the adjacent stream banks and are likely representative of the sediments routinely transported by the channel.” Please add details here describing how these “consistent” gravels might relate to spawning gravels and habitat. As noted in other 2.6.3 comments, add detail on the pools and the behavior of any LWM to form them, and/or to sort the gravels in ways fish would find beneficial.	R	YTR	To be revised for RFC submittal.	A		
102	CV	Section 2.6.3	"Downstream, the creek flows through a vegetated area... " Suggested edit for clarity: Assuming this “downstream” is downstream of the Culvert 998602 crossing, it should be clearly stated. Quantifying the extent of the downstream extent you are describing will be helpful. Same with the WDFW habitat survey (in the next sentence), what distance from the crossing are we describing? Does it extend beyond the Culvert 932991 and that 0% passable barrier?	R	YTR	To be revised for RFC submittal.	A		
103	CV	Section 2.6.3	"A WDFW habitat survey detected juvenile salmonids... " This statement would seem to indicate a certain amount or quality of rearing habitat that would be worth describing. Additionally, the statement “According to residents, ….” requires a citation, either a “private conversation on “X” date and location” kind or an “in this published report” kind. Please add it here, and in the references.	R	YTR	To be revised for RFC submittal.	A		
104	CV	Section 2.6.3	"Channel complexity, floodplain connectivity, and riparian condition and function are heavily degraded due to bank armoring" Suggest providing a distance downstream that this “no habitat” and “heavily degraded” condition persist.	R	YTR	To be revised for RFC submittal.	A		
105	CV	Section 2.6.3	Last paragraph: Please add a summary statement about how this impaired water quality impacts the quality of the fish habitat. Also, please specify if this 303(d) listing applies to all of Juanita Creek, or just the upstream project reach near I-405?	R	YTR	To be revised for RFC submittal.	A		

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106	CV	Section 2.6.4	Section 2.6.4 is light on detail. Please describe the vegetation in more detail, such as conifer or deciduous, species, maturity or seral stage of the trees? Native shrubs or mostly Himalayan blackberry. Reed canary grass or other wetland or groundcover species. Other channel forming features described? Potential for beaver activity? Both photo figures illustrate a more complex riparian corridor than the text hints at. With a narrow corridor downstream, what's the canopy cover and stream shade? Is it better upstream?	R	MLC	Section 2.6.4 to be revised per comment. To include the following information: Juanita Creek, both upstream and downstream of the I-405 crossing, flows through a mixed canopy dominated by mature Pseudotsuga meziesii, Acer macrophyllum, Thuja plicata and Tsuga heterophylla, generally located upland of the stream. Shade and canopy cover is denser upstream where there's an existing wetland. The riparian area, across the entire stream, is dominated by weeds including Himalayan blackberry, reed canary grass, scotch broom, purple loosestrife, Hedge Bindweed, giant hogweed, Canadian thistle, butterfly bush, common reed, Japanese knotweed, and yellow flag iris. Beaver activity will be added to this section.	A		
107	CV	Section 2.6.4	Section 2.6.3 describes the 303(d) listing. Does the riparian condition contribute to or help ameliorate these problems?	R	YTR	To be revised for RFC submittal.	A		
108	SMB		4th paragraph references Appendix J, but that appendix is blank. Include Level A assessment, or just reference WDFW report	R	YTR	To be revised for RFC submittal.	A		
109	SMB		Suggest deleting rows with 0% basin coverage	R	YTR	To be revised for RFC submittal.	A		
110	SMB		Last line of 2.7.2.1 erroneously says a FUR of 2.11 is "unconfined." Please change to "confined"	R	YTR	To be revised for RFC submittal.	A		
111	SMB		Typo in first paragraph. Change "exiting" to "existing" in 3rd line	R	YTR	To be revised for RFC submittal.	A		
112	SMB		Please include more discussion explaining the difference between Pre and Post scenarios hydrology scenarios. Is this pre- and post- human development? Pre- and post- project conditions?	R	YTR	To be revised for RFC submittal.	A		
113	SMB		It's unclear exactly what the existing detention facility is and how it functions. Is it realistic that it will continuously detain flows in the 100yr + scenario, never letting more than 41cfs reach the I-405 culvert?	R	YTR	To be revised for RFC submittal. Chapter 2 of the contract states, "The hydrology/peak flows developed by the City of Kirkland are to be used for the Juanita Creek crossing design (Appendix H)." The Appendix H Juanita Creek Hydrology and Hydraulics Study states, "An extensive investigation into the hydrology of the Juanita Creek subbasins was conducted to ensure all stakeholders came to an agreement on the existing and projected peak flows in Juanita Creek as a result of the removal of the High Woodlands Regional Detention Facility." Table 1 of the Appendix H study provides pre- and post-contruction flows, which are used for existing and propsed hydraulic modeling.	A		
114	SMB		There is an unlabeled, horizontal line just above the top of the right bank that partially spans the channel. What is this line? 2-yr flow?	R	YTR	To be revised/removed for RFC submittal.	A		
115	SMB		Is it accurate to state that both the proposed structure grade and the proposed upstream gradient are the same (3%)? Based on the profile in App D, the upstream reach looks much steeper	R	CMJ	To be revised for RFC submittal.	A		
116	SMB		4th bullet - For consistency, the Section 4.2.4 says the length is 253 feet. Please resolve	R	YTR	To be revised for RFC submittal.	A		
117	SMB		Please clarify what the first sentence after Table 4-4 means.	R	YTR	To be revised for RFC submittal. Typically, WSDOT recommends proposed sediment gradation to not be more than 20% larger than existing conditions. However, for	A		
118	SMB		We should have better justification for why a stable bed is necessary. What is the sediment supply from upstream, and why can't we assume mobilized sediment will be replenished? If this proposed streambed mixture has not been reviewed/approved by the comanagers, I'm concerned the comanagers will push back on this design claiming an overly coarse, roughened channel.	R	CMJ	More information on the sediment supply will be added to the RFC report and additional explanation how large portions of the riffle streambed sediment is expected to be mobile at lower flows to try and adress concerns of a rigid/stable bed. MIT comments have been received and comment responses have been provided. See comment MIT comment #209 response for details. These will be added to the RFC report.	A		
119	SMB		Text states that "the upper one foot of bankfull channel will consist of WSDOT streambed sediment." I don't see that detail on any of the sections in App D	R	MLC	This statement will be removed in the RFC submittal, and was part of the draft FHD design.	A		
120	SMB		It's not clear to me from the calcs or the narrative what portions of the proposed sediment gradation are stable at the 100yr design flows.	R	YTR	To be revised for RFC submittal.	A		
121	SMB		Figure caption says "conceptual." At FHD, this shouldn't be a conceptual layout	R	YTR	To be revised for RFC submittal.	A		
122	SMB		Typical WSDOT modeling approach is to only include "rigid" features into the mesh surface, and to simplify deformable features into a typical cross-section/gradient. Including the steps is appropriate, but including riffle features implies they are rigid. Additionally, sizing that material based on the localized steep run slope of the riffle almost ensures they will be immobile.	D	CMJ	To be clarified for RFC submittal. The riffle pool morphology is designed to persist over time and not develop a plane bed condition. This is accomplished by designing the largest 16% of material to be stable at the 100-year flow and thus providing sufficient large material to support the development of riffles. This does not mean that they are rigid and non deformable as 64% of the riffle mix will be mobile at the 2-year flow. Further, the riffle gradation is designed based on the riffle sections in the hydraulic model through regions of the stream where LWM does not heavily influence hydraulics. Due to this, the D84 is designed to be stable for the condition without LWM and in reality, the increased turbulence, vortices, and shear stresses around the logs will result in the material to be more mobile than illustrated with the D84 being stable at the 100-year. In pools where wood is placed, the streambed is expected to respond beyond the pre-formed condition and is not expected to be rigid. See comment response to #118. Modeling the non-rigid features like riffles and pools provides more detailed hydraulic results that can be useful when evaluating fish passage velocities, depths and how the overall design is functioning. Modeling these does not necessarily imply they are rigid; this is intended to model more accurately the the preformed as-built conditions and the conditions that may develop over time when riffles and pools form, whether they exist in the same locations with the same geometry (which is not necissarily expected) or not. Either way, the more detailed results are useful to inform design deicsions and how the crossing will function.	A		
123	SMB		Consider following current WSDOT guidance for meander bar "teardrop" shape and sizing of head/tail material to help ensure more successful performance	R	YTR	To be revised for RFC submittal.	A		
124	SMB		Typo 3rd line of Section 4.3.2.5. "Junita"	R	YTR	To be revised for RFC submittal.	A		
125	SMB		Text states that pool sediment is mobile at the 100-yr flow. How does pool sediment perform at lower flows? 2yr?	R	YTR	Discussing to be added for the RFC submittal.	A		

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126	SMB		5th line is missing a close parenthesis	R	YTR	To be revised for RFC submittal.	A		
127	SMB		Sediment given in mm. Suggest giving these dimensions in inches as well for consistency of units throughout report	R	YTR	To be revised for RFC submittal.	A		
128	SMB		Why is Manning's roughness of the side channel steps (0.29) so much higher than steps in main channel?	R	CMJ	To be clarified for RFC submittal. See FHD Appendix E. The following explanation will be added in the RFC FHD: Step-pools in the main channel are modeled within the surface so roughness is partially represented via changes in the mesh elevations. Side-channel step-pools are not in the surface so their full roughness must be accounted for with an increased mannings N. Yochum et al 2014 was used to establich this mannings N for the side channel step-pools.	A		
129	SMB		Last paragraph states that we have insufficient geotech data. We should have final geotech data before this report is finalized. Is there more data to be collected?	R	YTR	To be revised for RFC submittal.Geotechnical data will be referenced.	A		
130	SMB		The first paragraph states that the proposed riffle material will stop headcut migration, but earlier in the report (4.3.2.4) state the riffles are meant to be deformable. These seem to be contradictory design goals	R	YTR	To be clarified in the RFC submittal. A DGC will be added at the downstream tie in that consists of logs and some coarse material. It's purpose is to slow the process of a headcut migrating upstream. The riffles are expected to be both deformable and respond over time but provide enough large material to not allow excessive degradation of the channel	A		
131	SMB		2nd to last paragraph says that a project benefit is restoring natural sediment transport. However, by armoring the bed, we're not restoring natural sediment transport to occur.	R	CMJ	Additional explanation will be provided that illustrates how mobile the bed actually is. Approximatley 64% of the riffle bed material is mobile at the 2-year. In addition, this does not take into account potential sediment load coming from upstream. A project benefit it that it will restore more nautral sediment transport. It is anticipated that both deposition and transport of material from upstream sediment inputs will occur in the project reach and transport of the design material will occur (as illustrated via 64% of the riffle material being transportable at the 2-year and pool sediment mobile at smaller events), therefore the bed within the project will participate in sediment transport but generally provide enough coarse material to resist rapid incision and flushing of sediment out of the project reach. The stream bed is designed to maintain pool-riffle morphology and avoid the creation of a plain bed morphology. Because the sytem is highly disturbed, with the presence of the detention facility, for the RFC, what was the reference reach will now be classified as a "design reference reach" and direct application of the stream simulation and comparison of existing to proposed bed material sizes is not as informative. There are two potential drawbacks to having coarser material in the proposed design: 1) Loss of surface flow that could create a barrier to fish due to inadequate depths and 2) the reduction in deformability of the channel bed and sediment transport. We believe our design adresses both of these concerns because 1) The design gradation that is presented in Table 4-4 does not include the additonal fines that will be washed in between each lift and the final placed streambed will be finer than the design gradation. The means of construction here will facilitate the adequate incorporation of fines whose sole purpose is to prevent flow from going subsurface. 2) The introduction of more fines during construction will allow the bed to be even more mobile than the design gradation has been demonstrated to be. This design gradation will be largely mobile even at lower flows and only the D84 is designed to be stable up to the 100-year flows. Note that 64% of the mix will be mobile at the 2-year and 73% of the mix will be mobile at the 10-year and the proposed gradation is well graded. Coarser material can provide additional benefits similar to LWM, including more hydraulic/habitat complexity, increased roughness, and multiple flow paths. Coarse material within the structure may mitigate for the lack of LWM within the structure and may provide some of the benefits that wood provides outside of the structure. A recent flume study and publication by the University of Idaho, highlights the biological benefits to coarser sediment for samonid egg survival: "The artificial egg pocket causes convergence of the downwelling flows as well as increased dispersion of the flow within the egg pocket. These characteristics may be beneficial for embryos survival because (1) the increased downwelling flows can provide more DO, and (2) the increased dispersion around the larger grains and within the larger pore spaces will provide better distribution of DO to all eggs. (https://www.sciencedirect.com/science/article/abs/pii/S0309170825000612)." The pressure variance induced by large wood increases hyporheic exchange and dissolved oxygen and	A		
132	SMB		"Thus, the less conservative Julien 2002 equation will also be evaluated" is repeated twice in the 1st paragraph. Delete one.	R	YTR	To be revised for RFC submittal.	A		
133	SMB		3rd paragraph, last sentence says "projected 500 100-year flow". Which is it? Please fix	R	YTR	To be revised for RFC submittal.	A		
134	SMB		Please expand the justification for assuming the channel bends won't migrate to the walls, thereby including bend scour in the total scour computation. You could lean on the meander bars helping to hold channel alignment. Or, bend scour COULD be included in total scour depth, even though it ultimately it won't increase the minimum 3ft requirement.	R	YTR	To be revised for RFC submittal.For RFC, bend scour is being included as part total scour. The depth of the preformed pools are accounting for a portion of the calculated bend scour.	A		
135	SMB		Please identify the project location on these FEMA maps	R	YTR	To be revised for RFC submittal.	C	App A not included in resubmittal	
136	SMB		The report mentions at least 1 other site visit. Are there other field reports to include?	R	YTR	To be revised for RFC submittal.	C	App B not included in resubmittal	
137	SMB		What is the purpose of including these 2 existing cross section details? Needed for construction?	R	MLC	Sheet was added to address a COK comment, however, it has now been resolved on another sheet and this sheet will be removed.	A		

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Due Date	**2/11/2025** **COB**
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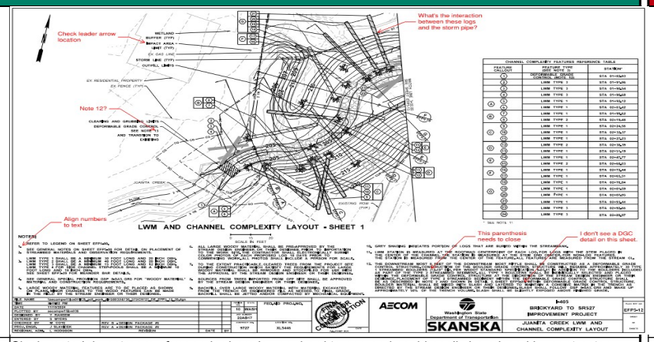
138	SMB			R	MLC	To be resolved in RFC phase.	A		
139	SMB		Slash material upstream of meander bars is very hard to see and could easily be missed by contractor	R	MLC	To be resolved in RFC phase.	A		
140	SMB		Typ: Lots of existing linework overlapping proposed crossing and grading, which makes sheet very busy. WSDOT typically does not include existing features within proposed streamwork	C	MLC	Existing topography will be turned off within proposed stream grading; however, there is important linework (e.g. underground utilities) that the contractor should be cognizant of for construction and will be left on.	A		
141	SMB		Type 2 & 3 boulders are called out on the side channel steps for ballast, but they are shown below the logs. Will step logs be attached to boulders, or how does that interaction work?	R	MLC	Boulders will be set on top of wood pieces used in the side channel steps. We will clarify this interaction for the RFC plans through notes and an additional detail.	A		
142	SMB		General comment about LWM details - I'm concerned that the comanagers will push back on the layout of LWM. Most pieces of wood are perched will above the thalweg and won't interact with typical "average" flow events	D	MLC	Wood placement is intended to serve a variety of objectives including habitat cover, complexity, streambank stability, pool development, hydraulic roughness, etc. As such, we have provided a diversity in sizes, orientations, and elevations of LWM to meet these objectives per guidance in Ch 10 of the Hydraulics Manual. Additionally, per WSDOT Fish Passage Training (Module 16) recommendations, WSDOT recommends deviating from prior guidance that all LWM pieces be set at the bottom of the channel and/or that the rootwad end be placed in the center of the streambed.	A		
143	SMB		Suggest showing the storm line on the left detail in relation to the horizontal wood members	R	MLC	To be resolved in RFC phase.	A		
144	SMB		The WSEs shown on the Mobile Wood Detail differ a lot from those shown on EFP5-08, where the 10-yr hits the structure wall at the same location as the streambed. Can we resolve for consistency?	R	MLC	To be resolved in RFC phase.	A		
145	SMB		Log-to-Log Fastener Detail: It's not clear in the plans what log structures this connection applies to	R	MLC	Not used, to be removed for RFC phase submittal.	A		
146	SMB		LWM Step-Pool Control Table - multiple typos "SECURLY"	R	MLC	To be resolved in RFC phase.	A		
147	SMB		Note 6 states that there are different sediment gradations for the head and tail of the bars, but the plans/details don't indicate where these different mixes go within each bar	R	MLC	To be resolved in RFC phase.	A		
148	SMB		Meander Bar plan detail - It could cause confusion that the flow direction on the detail (left to right) is opposite of the overall plan sheet (EFP5-13/14; right to left), which might lead the contractor to put slash on wrong side of bars	R	MLC	Agree, RFC plans will adjust plan and section views of the meander bar detail to match flow direction of the creek on the plan view sheets.	A		
149	DS		No geotechnical borings or geotechnical memo was consulted, nor was the DNR Geo Portal (https://geologyportal.dnr.wa.gov/) referenced, which would have helped review historical subsurface geotechnical reports. As such, it appears (but it is hard to determine for sure) that channel regrading will get into the underlying soils described as glaciolacustrine clay (Hon West, 1990)	R	CMJ	More information from these sources will be added in the RFC submittal	A		
150	DS		The Proposed channel has a 1:10 slope landward of the top bank, where the slope in the reference reach was considerably less. The result is that the proposed channel is more confined (the FUR is lower) than the reference reach.	C	`	The WSDOT PHD preliminary plans included the 10:1 floodplain benches, and we intentionally kept this design for the FHD because it was our understanding that these typical sections were agreed upon by comanagers, including Tribes. The proposed flood prone width - width of the 100-year inundation extents - is approximately the width of the tunnel which is 37.8 feet. So technically, the proposed channel is likely less confined (the FUR is higher) than existing conditions. Per discussion with WSDOT, because the sytem is highly disturned, for the RFC, what was the reference reach will now be classified as a "design reference reach."	A		

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151	DS		There is no discussion /investigation of the existing detention facility, High Woodland Regional Detention Pond. Presumably, there is documentation on its construction, if sediment transport is affected, and an intended function that could be used to describe better the channel changes that occurred before and after its construction.	C	YTR	More clarification to be added to RFC Submittal. We've reviewed available information on the detention faciltiy. Hydraulic modeling was conducted to determine flood reduction potential of the project, however, there does not seem to have been extensive investigation into the changes in sediment transport capacity or pre- and post-construction channel behavior. According to the King County Surface Water Management Division SEPA Environmental Checklist for Juanita Creek Regional Flow Control Facilities (November 1990), which is included as part of the High Woodlands Regional Detention Pond (Project 047007) Operation and Maintenance Manual (December 1994), "The High Woodlands flow control structure lies within the I-405 right-of-way at the Juanita Creek crossing of I-405... The empondment area extends upstream (northeasterly) from there about 1000 feet...The goals of the Juanita Creek Regional Flow Control Project are to: reduce flooding along Juanita Creek downstream of Interstate 405; reduce erosion and sedimentation through the project area and in the downstream reaches of Juanita Creek; and to rehabilitate the stream channel through Windsor Vista and enhance the wildlife habitat in this reach of the stream. These goals will be achieved by: providing detention of stormwater in a regional detention pond at High Woodlands; constructing bank stabilization measures to solve localized bank failure problems; installing instream structures for energy dissipation and increased habitat in Windsor Vista; and by control of pedestrian access and revegetation. Investigations were performed in the initial stages of this project to determine: the stability of the channel through Windsor Vista; the fisheries resource throughout the study area; and existing recreational patterns. This information was used to determine types of flow control improvements likely to provide the most benefit to the Windsor Vista channel. These investigations indicated that the control of runoff from high-frequency storm events is critical if the channel through Windsor Vista is to be stabilized and the fisheries habitat enhanced. Modeling was conducted of the detention facility at High Woodlands, upstream of Windsor Vista, to evaluate the relationships of ponding depth to peak flow reduction for a wide range of storm events. A number of alternatives to provide flood control were evaluated, including both site alternatives and design alternatives. The alternative selected for implementation provides the best balance of both low-frequency storm peak flow reduction for flood control and high-frequency storm peak flow reduction for erosion and sedimentation control....High Woodlands Detention Facility: A regional detention facility will be constructed in the High Woodlands ravine. The natural ravine is approximately 8 acres in surface area and has a potential storage volume of up to 30 acre-feet if flooded to a depth of 10 feet above the existing pipe invert. Improvements include: a 20-foot high concrete catch basin control structure connected to the existing 48-inch corrugated metal pipe (CMP) culvert under the I-405 roadway embankment; a weir wall inside the control structure with multiple adjustable orifices; overflow capacity provided by the top of the catch basin through a conical-shaped debris cage; and 18 feet of fill around the control structure with a 48-inch inlet pipe leading from the stream into the control structure through this new fill.... A maintenance access road will be constructed to the top of the control structure from the former Department of Transportation gravel pit road to the south of the detention site. Areas disturbed by construction will be restored by hydroseeding and planting new riparian	A		
152	DS		Section 4.3.2 shows conceptual level plans, and no structure types (which differs from Appendix D)	R	YTR	To be revised for RFC submittal. Title for Figure 4-5 to remove the word conceptual and confirm it matches plans.	A		
153	DS		I am not familiar with the alternative methods they used for LTD but it appears to use coarse sediment in the roughened riffles to amour the channel. I am concerned that the most downstream proposed riffle will become a barrier.	R	CMJ	To be clarified for RFC submittal. See comment response #131. The proposed riffle material is expected to provide enough larger material to slow down any rapid incision as indicated by the armoring analysis but will still be deformable. Per discussion with WSDOT, a deformable grade control with logs and woody material of varying size/slash will be added at the downstream tie in and is designed to prevent the development of a fish passage barrier. This explanation will be added in the RFC FHD. The armoring approach (and equilibrium slope approach) for estimating long-term degradation were presented to WSDOT HQ on July 2, 2024, and we recieved approval via email on July 3, 2024 that they were acceptable.	A		
154	Gabe		Please see additional comments in Excel Spreadsheet: ScourReviewChecklist_JuanitaCr_Kjensen	R	MLC	Comments are responded to in additional Excel spreadsheet.			
155	Gave		Please see additional comments in Excel Spreadsheets: SRH-2D-Model-Audit-Checklist_WSDOT_Juanita_Creek_MP_21.94	R	MLC	Comments are responded to in in additional Excel spreadsheet.			
156	SMB		Please see additional comments in Excel Spreadsheets: JuanitaCrk_FHD_SRH2DModelReview_2D_ModelQC	R	MLC	Comments are responded to in additional Excel spreadsheet.		Noted, see comment close-out comments in model review spreadsheet	

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157	ATS		The average slope of the crossing should be used to size bed material. Using an oversteepened riffle slope has substantially oversized the proposed bed material.	D	YTR	Our modeling approach has been discussed with WSDOT. We are designing preformed pools. We are modeling the condition immediately after construction is complete. We want to confirm the stability/mobilty of our riffles. By using a detailed surface for modeling we learning more about the hydraulics of the system, improving our design. Because the sytem is highly disturbed, for the RFC, what was the reference reach will now be classified as a "design reference reach" and direct application of the stream simulation and comparison of existing to proposed bed material sizes is not as informative or useful compared to when a pure reference reach is used. There are two potential drawbacks to having coarser material in the proposed design: 1) Loss of surface flow that could create a barrier to fish due to inadequate depths and 2) the reduction in deformability of the channel bed and sediment transport. We believe our design adresses both of these concerns because 1) The design gradation that is presented in Table 4-4 does not include the additonal fines that will be washed in between each lift and the final placed streambed will be finer than the design gradation. The means of construction here will facilitate the adequate incorporation of fines whose sole purpose is to prevent flow from going subsurface. 2) The introduction of more fines during construction will allow the bed to be even more mobile than the design gradation has been demonstrated to be. This design gradation will be largely mobile even at lower flows and only the D84 is designed to be stable up to the 100-year flows. Note that 64% of the mix will be mobile at the 2-year and 73% of the mix will be mobile at the 10-year and the proposed gradation is well graded. Coarser material can provide additional benefits similar to LWM, including more hydraulic/habitat complexity, increased roughness, multiple flow paths, and cover that are particularly beneficial to juveniles. Coarse material within the structure may mitigate for the lack of LWM within the structure and may provide some of the benefits that wood provides outside of the structure. A recent flume study and publication by the University of Idaho, highlights the biological benefits to coarser sediment for samonid egg survival: "The artificial egg pocket causes convergence of the downwelling flows as well as increased dispersion of the flow within the egg pocket. These characteristics may be beneficial for embryos survival because (1) the increased downwelling flows can provide more DO, and (2) the increased dispersion around the larger grains and within the larger pore spaces will provide better distribution of DO to all eggs. (https://www.sciencedirect.com/science/article/abs/pii/S0309170825000612)." The pressure variance induced by large wood increases hyporheic exchange and dissolved oxygen and nutrient exchange between the surface and subsurface. The literatiure above indicates that coarser sediment can provide similar benefits as large wood. Because bed material generally covers a larger area of the stream than wood does, the benefits that some coarser material provides can have a significant impact on the mentioned processes, especially in areas lacking of LWM like within the crossing.	A	Using oversteepend riffles for sizing is still not suggested	
158	ATS		Initial pebble counts were taken above the influence of the detention facility. The statement regarding backwatering influencing the sediment size does not hold for the pebble count locations. This substantial oversizing of material does not allow for natural stream processes to occur through the crossing.	R	YTR	We believe it is difficult to know for sure that all pebble counts were taken outside of the influence of the detention facilty. The most downstream was only taken a couple hundred feet upstream of the crossing. If there was no detention facility and the stream was free flowing, it seems possible that the sediment gradation in the reference reach would be larger due to higher velocity. According to the King County Surface Water Management Division SEPA Environmental Checklist for Juanita Creek Regional Flow Control Facilities (November 1990), which is included as part of the High Woodlands Regional Detention Pond (Project 047007) Operation and Maintenance Manual (December 1994), "The High Woodlands flow control structure lies within the I-405 right-of-way at the Juanita Creek crossing of I-405... The empondment area extends upstream (northeasterly) from there about 1000 feet." While the detention facility may not actually have influence so far upstream, there seems to be uncertainty as to the area of influence. However, we will remove reference to this backwatering. Also, we do not believe the material is oversized. See #157.	A		
159	ATS		Meander bars having the same sediment gradation as the riffles does not seem to meet the intention of the meander bar. The meander bar is meant to be a larger gradation to maintain the sinuosity within the channel. If the main channel and meander bar sediment are the same, it does not provide any diversity of sediment to maintain the meander within the channel.	C	YTR	Will clarify in text and Table 4-4. The meander bar tails will have the same gradation as the riffles. However, the meander bar head will be more coarse, based on WSDOT design manual.	A		
160	ATS		In preventing LTD, this does not allow for natural stream function through the crossing as required by the terms of the injunction.	C	CMJ	See comment response #131. The proposed riffle material is expected to provide enough larger material to slow down any rapid incision as indicated by the armoring analysis but will still be deformable.	A	As with previous comments, overcoarsening bed does not allow for natural regrade of this system.	
161	ATS		This sediment grade mix appears to invite subsurface flow.	C	CMJ	Additional clarification will be added to the RFC FHD. The current design does not include the fines that will be washed in during construction which will prevent subsurface flow. The means of construction here will facilitate the adequate incorporation of fines whose sole purpose is to prevent flow from going subsurface. The current design follows the 2013 WDFW WCDG which recommends 5-10% fines. A D8 will be added to the gradation to reduce the porosity of the mix and the amount of fines needing to be washed in during construction.	A		
162	ATS		The PHD attached to the RFP documents had the steepest proposed slope at 5.9%, not sure where the steeper slopes come from.	C	YTR	To be clarified for RFC submittal. The average channel slope is an average through flat pools and steep riffles. The design has pools taking up approximately 50% of the stream and riffles take up the other 50%. The resulting riffles will be approximately twice as steep as the average channel slope. Riffle-pool spacing is established through the methods described in comment #31. As shown in the PHD plans, the steepest riffle was 9.81%, which is the reason we switched to pool-riffles for FHD for the two most upstream riffles, as discussed with WSDOT.	A	Preformed pools are still not suggested	
163	ATS		These step pools as designed do not allow for natural stream function.	R	CMJ	Per discussions with WSDOT, the step-pool design has been updated to remove boulder and include more logs and will be deformable.	C	From our last discussions, I thought the step pools in the main channel were being removed	

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164	ATS		This is over engineered for this system. These should be steps that are allowed to deform over time, allowing for natural stream function to occur	R	CMJ	Per discussions with WSDOT, the step-pool design has been updated to remove boulder and include more logs and will be deformable.	C	From our last discussions, I thought the step pools in the main channel were being removed	
165	ATS		I don't understand the reason for the points along the profile being numbered (01-74). These are not explained on this sheet.	R	MLC	Elevations will be added corresponding to these points on the profiles for RFC submittal.	A		
166	ATS		Table 2 - this sediment gradation is too large. Refer to previous comments in the FHD. This sediment will not encourage natural stream function through the crossing, as required by the terms of the injunction.	D	YTR	**See comment responses for #157 (and #122, 131, 213). We do not believe the sediment gradation is too large. This has been discussed with WSDOT.**	C	Although discussions have occurred, I still believe that this over coarsended bed material does not allow for natural regrade of the system, as required by the Injunction.	
167	ATS		What is the reason for including these sections as a part of this plan set	R	MLC	To be removed, comment from City on PHD phase will be addressed on the profile sheet.	A		
168	ATS		This plan view is very busy, really hard to read.	R	MLC	Agree, will adjust for RFC submittal.	A		
169	ATS		General comment about LWM layout - rootwads need to be more engaged in the low flow channel.	D	MLC	Wood placement is intended to serve a variety of objectives including habitat cover, complexity, streambank stability, pool development, hydraulic roughness, etc. As such, we have provided a diversity in sizes, orientations, and elevations of LWM to meet these objectives per guidance in Ch 10 of the Hydraulics Manual. Additionally, per WSDOT Fish Passage Training (Module 16) recommendations, WSDOT recommends deviating from prior guidance that all LWM pieces be set at the bottom of the channel and/or that the rootwad end be placed in the center of the streambed.	A/C	Still looks as though the rootwads are still not engaged enough in the stream	
170	ATS		Note 12 - This does not read like a deformable grade control. This sounds like a series of boulders that could likely become a barrier to fish passage… Plus, there is no detail showing this 'deformable grade control'. The intention of this grade control is to deform over time to allow natural stream functions to occur. This, as designed, appears to not allow natural stream function to occur.	R	MLC	Deformable grade control detail to be added for RFC submittal. Boulders will be removed and replaced with wood.	A		
171	ATS		The step pool designed are over engineered, and a drastic change to what was shown in the preliminary plans. These steps look as though they would be considered a fishway by WDFW, thus not meeting the terms of the injunction.	R	CMJ	Per discussions with WSDOT, the step-pool design has been updated to remove boulders and include more logs and will be deformable.	C	From our last discussions, I thought the step pools in the main channel were being removed	
172	ATS		Structure A - rootwads are not engaged in the low flow channel, thus not creating any instream diversity.	D	MLC	Wood placement is intended to serve a variety of objectives including habitat cover, complexity, streambank stability, pool development, hydraulic roughness, etc. As such, we have provided a diversity in sizes, orientations, and elevations of LWM to meet these objectives per guidance in Ch 10 of the Hydraulics Manual. Additionally, per WSDOT Fish Passage Training (Module 16) recommendations, WSDOT recommends deviating from prior guidance that all LWM pieces be set at the bottom of the channel and/or that the rootwad end be placed in the center of the streambed.	A		
173	ATS		Structure B - rootwads are not engaged in the low flow channel, thus not creating any instream diversity.	D	MLC	Wood placement is intended to serve a variety of objectives including habitat cover, complexity, streambank stability, pool development, hydraulic roughness, etc. As such, we have provided a diversity in sizes, orientations, and elevations of LWM to meet these objectives per guidance in Ch 10 of the Hydraulics Manual. Additionally, per WSDOT Fish Passage Training (Module 16) recommendations, WSDOT recommends deviating from prior guidance that all LWM pieces be set at the bottom of the channel and/or that the rootwad end be placed in the center of the streambed.	A		
174	ATS		Structure D - rootwads are not engaged in the low flow channel, thus not creating any instream diversity.	D	MLC	Wood placement is intended to serve a variety of objectives including habitat cover, complexity, streambank stability, pool development, hydraulic roughness, etc. As such, we have provided a diversity in sizes, orientations, and elevations of LWM to meet these objectives per guidance in Ch 10 of the Hydraulics Manual. Additionally, per WSDOT Fish Passage Training (Module 16) recommendations, WSDOT recommends deviating from prior guidance that all LWM pieces be set at the bottom of the channel and/or that the rootwad end be placed in the center of the streambed.	A		
175	ATS		Structure E - rootwads are not engaged in the low flow channel, thus not creating any instream diversity.	D	MLC	Wood placement is intended to serve a variety of objectives including habitat cover, complexity, streambank stability, pool development, hydraulic roughness, etc. As such, we have provided a diversity in sizes, orientations, and elevations of LWM to meet these objectives per guidance in Ch 10 of the Hydraulics Manual. Additionally, per WSDOT Fish Passage Training (Module 16) recommendations, WSDOT recommends deviating from prior guidance that all LWM pieces be set at the bottom of the channel and/or that the rootwad end be placed in the center of the streambed.	A		
176	ATS		This step pool design is over engineered, and will not provide natural stream function in this system. Deformable steps will provide the stream to function naturally over time, which is required per the terms of the injunction. Additionally, this is a substantial change from what was shown in the preliminary plans, and requires more discussion as to how we have gotten to this overly engineered design. Steps designed and constructed in this manner have, historically, become passage barriers, thus negating the ability for the stream to function naturally.	R	CMJ	Per discussions with WSDOT, the step-pool design has been updated to remove boulder and include more logs and will be deformable.	C	From our last discussions, I thought the step pools in the main channel were being removed	
177	ATS		No deformable grade control detail is provided. As noted on previous sheets, the description of this deformable grade control does not meet the intention of how a deformable grade control should perform, which should deform over time, and allow the stream to function naturally over time.	R	MLC	Deformable grade control detail to be added for RFC submittal. Boulders will be removed and replaced with wood.	A		
178	DJS		This is the only mention of the beaver dam in section 2. It is visible in Historical LiDAR and there is evidence of older dams that may have influenced sediment transport or sediment size downstream which is helpful to understand in sections 2.7 and 7.2. A) Please elaborated. B) was it present in Dec 2023, if not what changed?	R	YTR	To be revised for RFC submittal. The active beaver dam approximately 400 feet downstream of I-405 was present during the December 2023 site visit. Additional information will be added to Section 4 regarding City of Kirkland maintenance records showing debris and beaver dam issues. Also note that the December 2019 Hydraulic Field Report, included in Appendix B, states, "There was only one location upstream of the crossing that contained a Fox and Bolton-defined key piece of LWM. It was located in a temporary natural barrier. It was not evident if the temporary barrier was beaver-influenced, or natural recruitment. This was located in the upper quarter of the reference reach."	A		

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179	DJS		"Beaver Dam Removal. This seems out of place, recommend moving to section 4?	R	YTR	To be revised for RFC submittal.	A		
180	DJS		There is no discussion /investigation of the existing detention facility, High Woodland Regional Detention Pond. Presumably, there is documentation on its construction, if sediment transport is affected, and an intended function that could be used to describe better the channel changes that occurred before and after its construction which should be discussed in section 2.7	R	YTR	See comment response #151	A		
181			The text based summarized landcover doesn't equal the values in table 2-1. Did you update table after revising the watershed? Please revise	R	YTR	To be revised for RFC submittal.	A		
182	DJS		the final FHD needs to have results from a GeoTechnical report incorporated into the analysis and results. In this draft NO geotechnical borings or geotechnical memo were consulted , nor was the DNR Geo Portal (https://geologyportal.dnr.wa.gov/) referenced, which would have helped review historical subsurface geotechnical reports. As such, it appears (but it is hard to determine for sure) that channel regrading will get into the underlying soils described as glaciolacustrine clay (Hon West, 1990). hopefully, the Geotechnical report will clear this up.	R	YTR	To be revised for RFC submittal. Geotechnical information will be discussed.	A		
183	DJS		FYI: WSDOT recommends you use Site Visits #, to include each time a survey or field crew collects data (see training). WSDOT requires field hydraulics memos for site visits pictures and observations in those can/should be referenced in the FHD. The Dec 3, 2023 field visit, please include the field memo. It is unclear if the site conditions changed between 2019 and 2023, and how, please add this to section 2.6 and 2.7 if relevant.	R	YTR	Field memo, in WSDOT format, will be included with the RFC submittal.	A		
184	DJS		Nice this figure has existing stationing. Could you refer to these stations throughout section 2 please?	R	YTR	To be revised for RFC submittal.	A		
185	DJS		What was surveyed and when is not clear, please revise.	R	YTR	To be revised for RFC submittal.	A		
186	DJS		The description of the channel conditions (channel width, sediments, banks, gradient, etc.) downstream is missing; it is not present in section 2.7.2. Without observations of the downstream conditions, we can not check your conclusions about design tie-ins, channel armoring, and long-term degradation. Please add.	R	YTR	To be revised for RFC submittal. There is discussion and a photo of downstream conditions in Section 2.7.3, along a gradients shown in Figure 2-16. But will elaborate.	A		
187	DJS		A) What were they used for? B) Where is the lab analysis? C) Given you report, the eroded bank sediments are finer than the sediment size distribution upstream (includes no gravel) does this suggests you may have a different geomorphic reach downstream?. D) Please comment on why there are no sediment observations downstream.	R	YTR	These banks samples were not used for design. Lab analysis reports were included as an appendix for the PHD, but were removed for FHD. Will include for RFC submittal. Additional field work to be conducted to better quantify streambed sediment size downstream of the crossing.	A		
188	DJS		text indicates lidar and survey is showing an elevation from lake Washington. That is not shown in the figure. Please clarify and call out parks and confluences, and culverts mentioned in later text. The profile in section 7.2 shows gradient breaks and decrease in gradient downstream. Please discuss how these may impact channel migration (or channel stability) Please reconcile the difference in reported gradient in section 2.7.4 and 7.2	R	YTR	To be revised for RFC submittal. Will reference or include a figure similar to Figure 7-1. Figure 2-16 shows gradients near the crossing ranging between 1.6% to 2.9%; these are the same slope ranges mentioned in Sectoin 7.2, page 76. The relevance of the question regarding the impact of channel migration miles downstream of the I-405 crossing is unclear. But to answer the question, typically lower gradients have lower stream power, with reduced sediment transport capacity, which can lead to sediment deposition, meandering stream patterns, and increased lateral migration. As the stream loses energy, it tends to erode laterally rather than vertically, undermining banks, leading to channel instability. Lower gradient streams are more likely to overflow their banks, especially during high flow events; this interaction with the floodplain can lead to avulsions, which are are important factors in channel migration. In lower gradients, the accumulation of sediment can increase the streambed elevation, also increasing the potential for avulsion.	A		
189	DJS		Note you mention a transition zone in section 2.7.4, page 21. I agree, have you considered thinking about these 3 geomorphic reaches based on topography and surface geology I would recommend placing them as such in figure 2-16 1) the downstream reach station -450 to 270. 2) Flow and sediment transport impacted = 270 to 800, and 3) what you have as your reference reach = station 800 to 1900.	R	YTR	Will consider revising for RFC submittal.	A		
190	DJS		Can you explain what is happening at station 300 ? If you obtain the gradient of the reaches described above. The gradients downstream are different then above. please consider.	R	YTR	To be revised for RFC submittal. There is a property access culvert at station 300.	A		
191	DJS		Section 7.1 suggests anthropogenic changes; reading this section, those changes are unclear. In this section, 1) there is no discussion of historical analysis and what you found. 2) there is nothing mentioned of observations upstream. Can you rule out that the channel was rerouted or modified for development and would make existing channels more prone to channel instability? Please review historical topo maps and aerial photos (see section 7.1 for sources) and elaborate.	R	YTR	To be revised for RFC submittal. Additional discussion of lateral migration to be included in RFC submittal, including discussion of geotechnical information. Note Section 7.1 states, "Historical aerial imagery available through the King County GIS Spatial Data Warehouse and Google Earth Pro was reviewed for potential evidence of bend meander or channel widening. The available imagery dates from 1990 to the present. The resolution of available imagery is not refined enough to document small to moderate changes in the Juanita Creek channel and does not show any significant realignment of the channel."	A		
192	DJS		Section 4.3.2 shows conceptual level plans, and no structure types (which differs from Appendix D.)	R	YTR	To be revised for RFC submittal. Title for Figure 4-5 to remove the word conceptual and confirm it matches plans.	A		
193	DJS		a) Without a geotechnical report you should NOT consider this section to be Final. b) FYI, Completed in 2/2024, WSDOT implemented a revision of the Scour Section of the FHD template and created a set of training videos. These revisions do make it more clear what WSDOT expects to see in the FHDs. I encourage you to use the figure templates and methods.	R	YTR	To be revised for RFC submittal. Scour analysis will include evaluation of geotechnical information. We are using the contract version of the FHD template that we are required to follow. The WSDOT H&H Training webpage still only provides the 10/2/2022 version of the FHD template: https://wsdot.wa.gov/engineering-standards/project-management-training/training/hydraulics-hydrology-training.	A		
194	DJS		You are missing available historic mapping and aerial photos. See USGS historical topos and King County GIS. Note: In King County in 2022, put all their historical photos online. this includes georeferenced aerial photos from the 1930. Please interpret these channel changes/ponds in the reference reach and downstream (consider putting this info in section 2)	R	YTR	To be revised for RFC submittal. Will review all historical imagery.	A		

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195	DJS		From what I understand, HEC-20 Rapid assessment is not meant to be used in this manner. Unless you cite some peer-reviewed study that shows that Fractional scoring and comparing vertical /lateral ratings has value, please don't use these conclusions.	C	YTR	Additional discussion of lateral migration to be included in RFC submittal, including discussion of geotechnical information and acknowledgement of the limitations of the rapid assessment. Note that even though the rapid assessment indicates a score of good stream stability, lateral migration was in fact assumed for scour analysis.	A		
196	DJS		a) Could you make your conclusion clear and complete based on the info you have, 2) Pleased the term "NOT low" is used. Based on what I read, it seems like this should be your summary. "Based on the available geologic and geomorphic understanding described in section 2, the risk of lateral migration is NOT low. The existing sediments/soils in the bed and banks are considered erodible. Beavers/beavers dams are present in the watershed. It is possible that the channel could shift or change. We were not able to determine the amount the channel has changed historically." if this is not correct, please revise	R	CMJ	To be revised for RFC submittal.	A		
197	DJS		WSDOT suggests you use A) HEC-18 equations 6-16 and 6-18 and B) that you show your math so it can be checked. Pemberton and Lara are outdated. Please revise.	D	YTR	We assume you mean HEC-20 eq. 6-16 (equation 6-18 is one we are already using for MPM equillibrium slope). HEC-20 eq. 6-16 cites: USBR, 1984, "Computing Degradation and Local Scour," Technical Guideline for Bureau of Reclamation (E.L. Pemberton and J.M. Lara)." USBR 1984 is the Pemberton and Lara publication, in other words, HEC-20 cites Pemberton and Lara. The armoring layer approach (and equilibrium slope approach) for estimating long-term degradation were presented to WSDOT HQ on July 2, 2024, and AECOM recieved approval via email on July 3, 2024 that the approach was acceptable.	A		
198	DJS		Regarding sediment size in equilibrium slope equation: A key variable to the equilibrium slope and armoring equations (both methods) is an accurate sediment gradation of the underlying bed sediments. In section 2 you don't have any observations of the bed sediment or underlying soils (they are likely different) downstream of the crossing and you should not assume the sediments will be the same in the reach (upstream) where the pebble counts are located. Please conduct field work to take samples and revise.	R	YTR	To be revised for RFC submittal. Additional field work to be conducted to better quantify streambed sediment size downstream of the crossing. Note that results of armoring layer approach - not the equilibrium slope approach - are being used to estimate LTD.	A		
199	DJS		Regarding sediment size in the armoring equation: A key variable to the equilibrium slope and armoring equations (both methods) is an accurate sediment gradation of the bed where you expect it to armor. In section 2 you don't have any observations of the bed sediment or underlying soils (they are likely different) downstream of the crossing and you should not assume the sediments will be the same in the reach (upstream) where the pebble counts are located. Please conduct fieldwork to take samples and revise.	R	YTR	To be revised for RFC submittal. Additional field work to be conducted to better quantify streambed sediment size downstream of the crossing.	A		
200	DJS		Regarding 1.47 feet scour depth. We suspect you should revise your methods to HEC-18 and evaluate bed /soil sediment downstream (likely finer); the potential channel incision would be greater than 3 ft, which could unravel the proposed riffle. Please consider a different design.	R	YTR	To be revised for RFC submittal. Additional field work to be conducted to better quantify streambed sediment size downstream of the crossing.	A		
201	DJS		"we would respond by creating a ramp" and a deformable grade control would be installed downstream end of the proposed treatment" these are contradictory and unclear if these are in your design or something else.	R	CMJ	The report reads "…riffle material would respond by creating a ramp…" A detail and clarification on the design of the deformable grade control to be added for RFC submittal. Design has been discussed with WSDOT and includes wood, not boulders.	A		
202	DJS		Your approach doesn't follow HEC-18, and it needs to follow the WSDOT manual, not only the HEC manuals.	D	YTR	The WSDOT Hydraulics Manaul cites HEC-18 and HEC-20. HEC-20 cites: USBR, 1984, "Computing Degradation and Local Scour," Technical Guideline for Bureau of Reclamation (E.L. Pemberton and J.M. Lara)." USBR 1984 is the Pemberton and Lara publication, in other words, HEC-20 cites Pemberton and Lara, which provides the methods we are following. The armoring layer approach (and equilibrium slope approach) for estimating long-term degradation were presented to WSDOT HQ on July 2, 2024, and AECOM recieved approval via email on July 3, 2024 that the approach was acceptable.	A		
203	MIT		"Juanita Creek does not meet all the criteria for the bridge design method, so the stream simulation methodology is the optimal choice." We are unaware of which criteria drives this decision, so please specify. It should also be noted that due to the long crossing (>10x BFW), at least an additional 30% should be added to the width, supporting criteria for a bridge crossing.	D	CMJ	Based on the WDFW 2013 WCDG, a floodplain utilization ratio (FUR) less than 3 indicates a confined channel where a culvert is better suited and a FUR greater than 3 is an unconfined channel better suited for a bridge crossing. Since the FUR is less than 3, culvert design using stream simulation is approproate. As described in section 4.2.2 of the FHD report, 2013 WCDG Equation 3.2 was used to establish a width of 17 feet and then 30% additional width was applied because the proposed structure is considered a long crossing. This resulted in a width of 23 feet. Furthermore, additional width was provided per agreement between MITFD, WDFW, and WSDOT and the final minimum hydraulic width was established as 30 feet. Because the proposed structure is a tunnel arch structure, even more width is provided outside of the minimum hydraulic width.			
204	MIT		BFW concurrence. Generally, MITFD and other resource stakeholders are participants in the BFW determination. It is not clear why a concurrence site visit to measure and agree upon BFW was not conducted here.	D	YTR	It is our understanding that MITFD was involved with the concurrence site visit. As stated in the WSDOT PHD (2022), "On December 3, 2019, WSDOT, WDFW, and MITFD performed the site assessment at Juanita Creek to determine and concur on field-measured bankfull width, discuss possible alternatives for the proposed crossing, and observe existing site conditions."			

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205	MIT		Sediment Characterization - While Wolman pebble counts serve a valuable purpose, particularly for comparing stream reaches, they have limitations in accurately quantifying fine sediment distributions. These limitations stem from the methodology used to collect samples, which can underrepresent finer sediment fractions. To achieve a more precise characterization of particle size distributions—especially for assessing streambed composition—we recommend conducting sieve screening analysis. This method provides a more accurate assessment of fine sediment content, improving the reliability of sediment characterization for stream evaluations.	D	YTR	Since Juanita Creek has a regional detention facility, existing conditions sediment size upstream of the crossing is particularly fine, due to lowered velocities. The removal of this facility will increase downstream flows. As discussed with WSDOT, since this reach has been highly modifed, the facilty is being removed, and hydraulics will be changing significantly, the reference reach will now be considered a "design reference reach", defined as "A reach of stream, preferably within the same watershed, that is relatively stable." Thus, we do not feel as though additional characterization of upstream sediment would add much value to streambed design, since it is proposed conditions modeling that is used to size streambed material.			
206	MIT		Figure 4-1 Design riffle cross-section. Based on the cross-section shown in Figure 4-1, our calculations indicate that water velocities at bankfull flow (approximately the 2-year flood event) will be too high for salmon to migrate upstream. Given the side slope dimensions and channel width, we estimate a bankfull cross-sectional flow area of 6.5 square feet. Using a channel slope of 2.9% (Figure 2-16) and the post-construction 2-year flow of 40 cfs (Table 3-1), we calculate a water velocity exceeding 6 ft/s (Manning's equation). This velocity surpasses the threshold for both adult and juvenile salmon passage. As a result, it is unlikely that the proposed channel planform will meet the passage criteria established under the Injunction. We recommend that the channel in these locations is increased in cross-sectional area, roughened with wood, in order to slow water velocities.	D	YTR	We are unclear what specific calculations were performed to reach this conclusion but the use of the continuity equation for calculating velocities ignores aspects which are accounted for using the SRH-2D modeling software (e.g., horizontal velcotiy distribution, interaction with adjacent cells, viscocity, turbulence). We believe that using the 2-year flow as the fish passsage flow is too conservative. We calculated fish passage flows based on the guidance outlined in the WDFW's 2013 WCDG and NOAA Fisheries West Coast Region Anadromous Salmon Design Manual. The preferred method for calculating fish passage flows is determined from mean daily streamflow gage data records. This method was investigated but was found to not be applicable due to the lack of stream gage data for the project site. The nearby gage records at King County gage 27L and King County gage 27J are too short in duration to be used in calculating the fish passage design flows. The gage records at King County gage 27a and the USGS gage 12120500 are located significantly further downstream of the project site, with a much larger contributing drainage area. These stream gages are also not appropriate for determining fish passage flows. Without applicable gage data, a regression analysis was used to calculate the fish passage design flow per the WDFW's Level B Hydraulic Analysis Spreadsheet. Due to the uncertainty inherent in the regression analysis, the calculated fish passage flow plus one standard of error was used for a fish passage design flow; we estimated fish passage design flow to be 5.8 cfs. Additional consideration was taken from the NOAA Fisheries Guidelines for Salmonid Stream Crossings in WA, OR and ID which states that 50% of the 2-year flood flow (20 cfs) can be used when stream gage data is not available. The 5.8 cfs and 20 cfs flow rates were modeled to confirm the design meets velocity criteria for fish passage (see modeled screen shots to the right). We also beleve the 2 ft/sec velocity criteria is too conservative. Table 6-1 of the WDFW 2013 WCDG recommends a maximum velocity of 2 ft/sec for culverts >200 ft long - however that is assuming plain bed morphology throughout the lengthof the culvert. Our design includes riffles and pools spaces less than 100 ft apart, thus, accourd to Tble 6-1, the maximum velocity for fish passage flows is 4 ft/sec. As shown in screenshot, the cross sectional average velocity of the steepest riffles for 5.8 cfs and 20 cfs model runs were 1.8 ft/sec and 2.8 ft/sec. Velocities at the margins of the flow that are more commonly used by salmonids are less than 2 ft per second throughout the project (and at both fish passage flows) and therefore meet the stream simulation criteria for velocity.			
207	MIT		Figure 4-2 Design left and right pool cross-sections.Based on the cross-section shown in Figure 4-2, our calculations also indicate that water velocities at bankfull flow (approximately the 2-year flood event) are too high for salmon to migrate upstream. Given the side slope dimensions and channel width, we estimate a bankfull cross-sectional flow area of 11.36 square feet. Using a channel slope of 2.2% (Figure 2-16) and the post-construction 2-year flow of 40 cfs (Table 3-1), we calculate a water velocity exceeding 3.5 ft/s (Manning's equation). This velocity surpasses the threshold for juvenile salmon passage. As a result, it is unlikely that the proposed channel planform will meet the passage criteria established under the Injunction. We recommend that the channel in these locations is increased in cross-sectional area, roughened with wood, in order to slow water velocities.	D	YTR	See response #206			
208	MIT		Figure 4-4 MHO Cross-section through crossing. Based on the cross-section shown in Figure 4-4, our calculations indicate that water velocities at bankfull flow (approximately the 2-year flood event) will be too high for salmon to migrate upstream. Given the side slope dimensions and channel width, we estimate a bankfull cross-sectional flow area of 6.5 square feet. Using a channel slope of 3% (Table 4-1) and the post-construction 2-year flow of 40 cfs (Table 3-1), we calculate a water velocity exceeding 6 ft/s (Manning's equation). This velocity surpasses the threshold for both adult and juvenile salmon passage. As a result, it is unlikely that the proposed channel planform will meet the passage criteria established under the Injunction. We recommend that the channel in these locations is increased in cross-sectional area, roughened with wood, in order to slow water velocities.	D	YTR	See response #206			

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209	MIT		Table 4-4 Proposed streambed material - In general, we do not support the use of coarse rock as a solution for improving fish passage. Coarse rock can disrupt flow dynamics, particularly at low flows, by sieving water and creating barriers to fish movement. This condition often is the result when high flows move material and deform features such as meander bars. While we have reluctantly agreed to the use of larger materials for constructing meander bars to help maintain channel structure at the stream crossing, we do not support its use for bed stabilization in other stream reaches, such as riffle sections. As shown in Table 4-4, the proposed material mix for the riffle reaches is significantly larger than the existing stream sediment. This substantial size discrepancy increases the risk of creating unfavorable conditions for fish passage and may necessitate future repairs if passage impediments develop. Table 4-5 provides a distribution of the proposed streambed sediment based on sieve screening of quarry materials. However, there is no direct comparison to existing stream conditions, as sediment characterization was conducted using Wolman pebble counts. As previously noted, this method does not accurately represent the finer sediment fraction due to its inherent limitations. We recommend conducting a sieve analysis of the existing substrate and comparing it to the proposed material gradation to ensure compatibility with natural stream conditions. To promote sustainable stream function and improve fish passage, we recommend incorporating natural features, such as large wood, which salmon have adapted to over time, for bed stabilization and meander bar formation. We support, acknowledge, and appreciate the use of wood proposed (section 4.3.2.1), which aligns with this recommendation. See below comment for further detail.	D	CMJ	Project permitting constraints have resulted in a steeper crossing than the immediate upstream reach where the pebble count was conducted. This pebble count was within the influence of the detension facility that has created a highly modified stream. In the proposed condition, the detention facility is being removed and the hydrology and hydraulics will be changing significantly. Therefore, the reference reach is a "design reference reach" and direct application of the stream simulation and comparison of existing to proposed bed material sizes is not as informative or useful compared to when a pure reference reach is used. See #206 There are two potential drawbacks to having coarser material in the proposed design: 1) Loss of surface flow that could create a barrier to fish due to inadequate depths and 2) the reduction in deformability of the channel bed and sediment transport. We believe our design adresses both of these concerns because 1) The design gradation that is presented in Table 4-4 does not include the additonal fines that will be washed in between each lift and the final placed streambed will be finer than the design gradation. The means of construction here will facilitate the adequate incorporation of fines whose sole purpose is to prevent flow from going subsurface. 2) The introduction of more fines during construction will allow the bed to be even more mobile than the design gradation has been demonstrated to be. This design gradation will be largely mobile even at lower flows and only the D84 is designed to be stable up to the 100-year flows. Note that 64% of the mix will be mobile at the 2-year and 73% of the mix will be mobile at the 10-year and the proposed gradation is well graded. Coarser material can provide additional benefits similar to LWM, including more hydraulic/habitat complexity, increased roughness, multiple flow paths, and cover that are particularly beneficial to juveniles. Coarse material within the structure may mitigate for the lack of LWM within the structure (WSDOT requirement) and may provide some of the benefits that wood provides outside of the structure. A recent flume study and publication by the University of Idaho, highlights the biological benefits to coarser sediment for samonid egg survival: "The artificial egg pocket causes convergence of the downwelling flows as well as increased dispersion of the flow within the egg pocket. These characteristics may be beneficial for embryos survival because (1) the increased downwelling flows can provide more DO, and (2) the increased dispersion around the larger grains and within the larger pore spaces will provide better distribution of DO to all eggs. (https://www.sciencedirect.com/science/article/abs/pii/S0309170825000612)." The pressure variance induced by large wood increases hyporheic exchange and dissolved oxygen and nutrient exchange between the surface and subsurface. The literatiure above indicates that coarser sediment can provide similar benefits as large wood. Because bed material generally covers a larger area of the stream than wood does, the benefits that some coarser material provides can have a significant impact on the mentioned processes, especially in areas lacking of LWM like within the crossing.			
210	MIT		Figure 4-5. Conceptual layout of habitat complexity - We support the incorporation of wood into the meander bar design to enhance habitat complexity and improve fish passage function. However, to ensure these benefits are sustained over the long term, we recommend that the wood within the crossing be designed to remain stable rather than mobile. Our observations indicate that mobile wood is often displaced from its intended location, reducing its effectiveness and potentially allowing the streambed to evolve into an undesirable plane-bed condition. To mitigate this, wood placement should include key pieces for anchoring. If this is not feasible within the crossing, an alternative stabilization method, such as boulder collars, can be used. Boulder collars provide stability while allowing for natural bed adjustments as the channel responds to the wood, maintaining both dynamic habitat conditions and key features that promote fish passage.	D	CMJ	It is current WSDOT guidance that LWM and stable key pieces should not be placed within the crossing. There is much uncertainty to installing large wood within water crossings and the WCDG, pg. 35 and 36, advises against it. Meander bars with slash and mobile wood are provided within the crossing to provide similar functions as LWM.			
211	MIT		Step-pool design - We support the creation of step-pools throughout the design reach to enhance fish passage conditions. To maintain continuity, this approach should be extended through the crossing to ensure consistent hydraulic and habitat functions. Rather than using coir sacks filled with rock, we recommend incorporating more natural and sustainable materials, such as wood. Coir fabric is prone to degradation over time, leading to the dispersal of contained gravels downstream. While some spawning gravel augmentation can be beneficial, this method does not provide long-term stability for maintaining the step-pool system. In contrast, wood—particularly when submerged in the wetted channel environment—can persist for decades, often outlasting the life span of the crossing structure. Each pool should include a gravel tail-out that transitions into a riffle, ensuring a natural progression for fish passage. The current design, which combines coir sacks with an outlet spilling onto large rock below the logs, does not align well with the typical features fish use for upstream migration. To facilitate effective passage, pools should maintain spill-over scour, creating adequate depth for fish to generate momentum as they navigate each step. Additionally, to meet WDFW fish passage criteria (WDFW 2019), the vertical drop at each step should not exceed approximately 8 inches. By utilizing natural materials such as wood, the step-pool system can be maintained more effectively, ensuring long-term habitat function and reliable fish passage.	D	CMJ	The wood in the step-pools are designed to be stable at the 100-year flow and have LWM and per WSDOT guidance are not placed in the crossing. Coir sacks are provided to establish the final as built pool shape and will provide initial stability of the pool when the first high flow events come until planting at the top of the pool is established and the root structures help support the side slopes of the pool as the coir material degrades. Similarly coir sacks will hold streambed material and will help prevent piping of the material through the step and loss of flow over the logs. Adequate submerged wood is present in the design and will provide the longer term sustainability of the step-pool system. The current step-pool design has drop heights of 0.7 ft which is less than the 0.8 ft drop maximum as defined by WFDW 2013 WCDG. This results in steps that are close together in order to make up vertical distance at the upper end of the project while providing habitat. Large rock has been removed from the design to better provide deformability and additonal wood has been added to replace the rock. The updated FHD will include documentation and photos of log steps found in Juantia Creek.			

Project:	**C9727 - I-405, Brickyard to SR 527 Improvement Project**
Documen	**BY-CRE-01827_009727_SUB_17.02_Package 8 Final Fish Passages - Juanita Creek**
Submittal	**1/28/2025**
Due Date	**2/11/2025** **COB**
Reviewer	**Jason Pang (JP), City of Kirkland (COK), Gabe Ng (G. Ng), Chris Vondrasek (CV), Sam Michels-Boyce (SMB), Darrell Sofield (DS)**
Documen	

Formal Design Review
Form RCSR (Review Comment Summary and Resolution)

CODES
A = Accept Comment - Correct, Add to, or Clarify document
D = Dismiss Comment - no change needed on document
C = Clarify / Discuss and resolve before next design phase
R = Resolve comment in the next submittal phase
T = Transfer to a different submittal

COMMENT (WSDOT, City, Checker)				RESPONSE TO COMMENT (Skanska, Originator of Document)			RESPONSE TO RESPONSE (WSDOT, City, Checker)		Skanska CLOSE
212	MIT		Deformable Grade Control - Deformable Grade Control (DGC) has been shown to enhance substrate cohesion, helping to maintain channel shape. However, because the wood component in DGC primarily consists of small slash, the habitat benefits it provides are generally less favorable than those offered by larger woody material (LWM). One advantage of DGC is its potential to allow for smaller substrate sizes while still stabilizing the streambed. However, in this case, no reduction in sediment size appears to be achieved, as the proposed gradations remain overly coarse. To optimize both habitat function and bed stability, we recommend evaluating the feasibility of incorporating LWM and refining the sediment gradation to better align with natural stream conditions.	R	MLC	Deformable grade control detail to be added for RFC submittal. Boulders will be removed and replaced with wood and slash.			
213	MIT		"The Type I pool sediment is expected to be mobile at the 100-year design discharge. The Type II riffle and bank sediment and meander bar material has D84 size designed to be stable at the 100-year design discharge." - If sediment is too stable, it loses the ability to form scour pools and respond dynamically to wood placement within the channel. When material is resistant to mobility, it also resists deformation, making it unlikely to create the plunge pools and other key features that facilitate fish movement upstream. To enhance fish passage and habitat complexity, sediment gradation should allow for sufficient mobility to promote natural scour and pool formation while relying on the natural particle gradation and wood to maintain channel shape and structure.	D	CMJ	Modified critical shear stress evaluation of the proposed gradation results in 64% of the mix being mobile at the 2-year and 73% mobile at the 10-year flow events and illustrates the deformability of the streambed. LWM that is designed to be stable at the 100-year flow is placed in the pre-formed pools that will have residual pool depths after construction that will provide slower velocity areas for migrating fish. These pre-formed pools are also expected to respond to LWM by allowing some additional scour to their as-built condition as demonstrated by large portions of the Type II material being mobile at lower flows. Increased turbulence, vortices, and shear stresses around logs will also result in the Type II material potentially being more mobile in these local areas than what is illustrated by the D84 being stable up to the 100-year flow, since the streambed gradation is designed based on typical riffle sections of the stream that do not include significant wood influence. In summary, the sizing of streambed material did not take into account additional forces created by LWM and therefore the bed is expected to adjust and respond to LWM within the channel and in pools.			
214	MIT		"Stability can be achieved by self-ballasting, ballasting by other logs, and partially burying LWM, and no anchors are required." - We commend the effort to achieve natural stability without relying on mechanical anchoring systems, as this approach better supports habitat function. However, if the target stability is designed for approximately the 10-year flow event, the longevity of the wood may be insufficient to sustain long-term ecological benefits. To ensure continued function, we recommend evaluating wood stability commensurate with high flows and duration over time, and adding sufficient stabilization as needed to provide the necessary functions over the long-term.	D	CMJ	To clarify, only mobile woody material is designed to be stable up until the 10-year flow. All of the LWM is designed to be stable at the 100-year flow and therefore is expected to sustain long-term ecological benefits. This stability at the 100-year flow is achieved without mechanical anchoring.			
215	MIT		The riparian planting plan appears to incorporate significant rigor; however, the specific species to be planted and the long-term objectives for establishing a diverse, native riparian community remain unclear. A successful plan should prioritize species that contribute to long-term succession, providing essential functions such as shade, nutrient input, and functional wood recruitment into the channel. We recommend avoiding the use of small, fast-growing species such as willow, as they can inhibit the establishment of conifers and other large-diameter trees critical for long-term habitat stability. Additionally, the extensive root systems of willows can armor banks, potentially confining the channel and disconnecting it from its floodplain. To minimize unintended impacts, soil stabilization measures such as fabric and engineered materials should be placed outside the 100-year flood elevation or in areas where they will not be subject to undercutting and erosion into the channel.	R	KJ	We believe that our current planting plan is compliant with these recommendations. As mentioned in the FHD, the plant species that constitute the proposed planting grow naturally both at the project site and in its immediate vicinity. Also, we do not recommend removing all soil stabilization measures from within the 100-year flood extents. All erosion control fabric is fully biodegradable and is only intended to be present long enough for vegetation establishment and root development. Erosion control is necessary within the 100-year flood extents in case Juanita Creek experiences large flows early after project completion. Here are our proposed revisions to the planting plan: - Salix spp (willow) removed from some of the plant mixes and replaced with Rubus spectabilis (salmonberry). - For further species diversity adjacent to the stream, Cornus sericea and Carex obnupta added to Mix D Stream Bank mix.			