TGS ENGINEERS

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STIP No. A-0009CC

Concurrence Point 4B, Hydraulic Design Review Meeting Minutes

Wednesday, June 16th, 2021, from 1:00 PM to 3:00 PM

Attendees:

USACE – Crystal Amschler
USEPA – Amanetta Somerville
USFWS – Holland Youngman
Cherokee Nation – Elizabeth Toombs
EBCI – Stephen Yerka
FHWA – Aaron Williams
FHWA – Donna Dancausse
NCDCR – Renee Gledhill-Earley
NCDCR – Lindsay Ferrante
NCDCR – Dylan Clark
NCDCR – Casey Kirby
NCDWR – Kevin Mitchell
NCDWR – Robert Patterson
NCWRC – Marla Chambers
NCDOT Division 14 – Dave McHenry
NCDOT Division 14 – Steven Buchanan
NCDOT Division 14 – Josh Deyton
NCDOT Division 14 – Garrett Higdon
AT Conservancy – Morgan Sommerville
AT Conservancy – Matt Drury
ARC – Jim Sinnette
NCDOT EPU – Mike Sanderson
NCDOT ECAP – Carla Dagnino
NCDOT EAU – David Hinnant
NCDOT TSU – Heather Hildebrandt
NCDOT TPB – Pam Cook
NCDOT EAU – Wes Cartner
TGS – Jay Twisdale
TGS – Ben Henegar
TGS – Randy Henegar
TGS – David Petty
TGS – Zachary Richards
TGS – Jimmy Terry
TGS/NCDOT – Stacy Oberhausen

Purpose: The purpose of the meeting was to review and discuss the 30% drainage plans for STIP A-0009CC. The limits of the A-0009 CC Section are NC 143 from 0.5 miles north of the Appalachian Trail to NC 28 and NC 28 from NC 143 to 0.2 miles west of SR 1235 (Gunters Gap Road) for a length of approximately 4.0 miles.

General Discussions:

- ROW acquisition for A-0009 CC is September 2021 and Let is October 2022
- The project was split into three sections for design and construction letting to allow for fair competition for Letting and for efficiency of the design and review process. It is being designed as a one continuous project to avoid losing continuity. The project will be permitted as one.
    - Section CA - US 129 from 0.2 miles south of SR 1275 (Five Point Road) to NC 143, and NC 143 from US 129 to SR 1223 (Beech Creek Road), approximately 4.0 miles.
    - Section CB – NC 143 from SR 1223 (Beech Creek Road) to 0.5 miles north of the Appalachian Trail, approximately 3.9 miles
    - Section CC – NC 143 from 0.5 miles north of the Appalachian Trail to NC 28, and NC 28 from NC 143 to 0.3 miles east of SR 1235 (Gunters Gap Road), approximately 4.0 miles
- Cherokee Nation stated that they did not received meeting materials
    - Meeting materials were sent by FHWA during the meeting
- USACE noted that USFS would not be attending this meeting since TGS answered their questions at a meeting on May 25, 2021, and through a follow-up email dated June 9, 2021

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Wednesday, June 16th, 2021, from 1:00 PM to 3:00 PM

Meeting Discussions:

PSH 35:

Stream "SBB" (C), intermittent, on -L- at Station 419+30 LT upstream

- Stream is approximately 1-2 feet wide on a 30% slope. A 24-inch CSP at 70% to a 30-inch RCP at 1% is proposed. This system flows to Cody Branch.
- This is a berm drainage outlet. Burial is not proposed due to the steep slope.
- JS on upstream side only and terminates at concrete ditch
  - NCWRC asked where the water was flowing from and if there was a stream at the outlet
    - There is a defined channel upstream that is funneling to this location
    - USACE stated the stream is reflective of the PJD
    - There are JS no waters identified downstream
  - USACE and NCDWR stated they were good with the design as proposed

Wetland "WBB", headwater forest, riparian

- Unavoidable impacts from proposed berm ditch

PSH 36:

- No jurisdictional features are proposed to be impacted
- EBCI requested an aerial image to match each plan sheet so that the team can orient themselves in the project area

PSH 37:

- No jurisdictional features are proposed to be impacted

PSH 38:

Stream "SBC" (C), perennial, on -L- at Station 458+25 LT & RT

- Stream flows to Carver Branch. Stream is approximately 3-feet wide on a 35-55% slope. The existing 36-inch CMP on 17% slope will be relined. The 36-inch CMP outlet is perched 5-feet.
- The existing CMP will be replaced with a 36-inch CSP on a 4.7% slope at downstream end. The pipe will not be buried due to steep slope. Class I Rip-Rap will be utilized for outlet channel stabilization.
  - USACE asked if the outlet will be perched
    - TGS responded no, the outlet will be at-grade
  - NCWRC inquired about the relining process and how it works
    - TGS responded that it is a sleeve, and a spray-on resin will be used to adhere the sleeve to the existing pipe. Relining will reduce the diameter of the pipe by approximately 1-inch

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Carver Branch (C), perennial, on -L- at Station 467+70 LT & RT

- Stream is approximately 6- to 8-feet wide on a 20-40% slope upstream. Stream is approximately 3-feet on a 28-35% slope downstream. The existing 36-inch CMP on 15% slope will be relined. Class II Rip-Rap will be utilized for outlet protection.

PSH 39:

Wetland "WBW", seep, non-riparian, on -L- (NC 143) at Station 473+00 on LT

- No impacts to this feature

Stream "SBG" (C), intermittent, on -L- (NC 143) Station 472+50 LT to Station 474+00 RT

- Stream is approximately 1-foot wide on a 6-14% slope. The existing system which flows to Carver Branch will be replaced with a proposed 24-inch system on a 0.5-5.1% slope.
- Minimal impacts to the left of -L- and unavoidable loss to the right of -L- due to proposed roadway improvements
- Stream goes underground at Structure 3902

Johnson Gap Branch (C), perennial, on -Y2- (NC 28) at Station 13+30

- Stream is approximately 3- to 4-feet wide on a 10% slope upstream and 6% downstream. The existing 36-inch CMP will be retained and relined with Cured in Place Pipe (CIPP) at a 1.7% slope. Class I Rip-Rap will be utilized to stabilize banks at the outlet.
    - NCWRC asked if there was any treatment for water that goes in the concrete ditches behind the retaining walls
        - TGS stated that the project was topographically constrained. It was explained that concrete ditches intercept clean water from offsite drainage which is primarily from forested areas
        - NCWRC encouraged Team to get as much treatment as possible

Stream "SET" (C), intermittent, on -Y2- (NC 28) at Station 20+00 LT

- Stream is approximately 2- to 3-feet wide on an 8% slope upstream. The existing system which flows to Johnson Gap Branch goes underground to Structure #3904 where it will discharge in a proposed 30-36-inch system on a 0.9 -7.9% slope.

PSH 40:

Wetland "WBV", non-tidal freshwater marsh, riparian, on -Y2- at Station 26+00 to Station 27+00 LT

- Unavoidable minor impacts due to roadway improvements

Carver Branch (C), perennial, on -Y2- at Station 27+70 LT & RT

- Stream is approximately 2.5- to 3.5-feet wide on a 20-30% slope upstream and 3- to 4-feet wide on a 28% slope downstream. The existing 42-inch CMP will be retained and relined on a 15% slope with the inlet changed to a 48-inch CSP on a 10% slope. The pipe will not be buried due to the steep slope. Class II Rip-Rap will be utilized for outlet protection.

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- The existing 48-inch CMP driveway pipe will be replaced with a 54-inch CMP
  - USACE inquired about the berm and toe protection to wetland
    - TGS explained the toe protection detail and the purpose to ensure that freshly compacted fill slope will not erode. It protects the toe of the proposed roadway embankment because there is a notable drainage area
  - NCWRC asked about the slope of the new 48-inch CSP. Stating that assuming that there is no fish passage due to the steep grade. Expressing that it would be great to see an area where fish passage could be restored.
    - TGS agreed that it would be good to find a place to restore fish passage, but it would not be in this area due to topography

Stream "SBC" (C), perennial, on -Y2- at Station 36+00 LT & RT

- Stream which flows to Carver Branch is approximately 4-feet wide on a 20-30% slope upstream and 2.5- to 6-feet wide on an 8% slope downstream. The existing 42-inch CMP on a 15% slope with an outlet perched 7.5-feet will be replaced a proposed 48-inch system on a 1-45% slope.
- The proposed system removes the 7.5-foot perched outlet. The outlets will be on a 1% grade to minimize outlet velocity. Class I Rip-Rap will be utilized for outlet protection.
  - NCWRC asked if we were assuming there would never be fish passage, so the velocity is being reduced for erosion purposes
    - TGS confirmed and stated that fish passage is not feasible in this location

PSH 41:

Stream "SBD" (C), intermittent, on -Y2- at Station 44+50 LT

- Stream flows to Carver Branch
- Impacts are associated with bank stabilization. Class I Rip-Rap will be utilized stabilize bank and for erosion control at outlet to Structure # 4106.

Stream "SFP" (C), perennial, on -Y2- at Station 47+00 to Station 49+50 RT

- Stream which flows to Carver Branch is approximately 5-feet wide on an 9-18% slope. The proposed channel realignment will be on an 11-19% slope. The new channel will be lined with Class II Rip-Rap for stability

Stream "SFH" (C), perennial, on -Y2- at Station 49+00 to Station 53+00 LT

- Stream is approximately 4- to 6-feet wide on a 16-22% slope upstream and 5-feet wide on a 12-16% slope downstream. The existing 42-inch CSP will be retained and relined with CIPP on a 14% slope and extended with a 48-inch CSP on a 10% slope upstream and a 42-inch CSP on a 18% slope downstream. Downstream, the proposed channel change will be on a 6-15% slope and lined with Class II Rip-Rap for stability.
  - NCDWR asked if consideration was given to build retaining walls in this area
    - TGS confirmed this curve is at the minimum radius to satisfy design speed and is set to save several homes and removal of an access road at Station 39+00 LT which serves numerous properties. A retaining wall option was evaluated; but much of the stream would still be impacted plus a channel change was still required which made the retaining wall option not feasible due to impacts.

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- NCDWR stated that they understood the justification for not placing a wall upstream but there is more room downstream, so asked why not build a wall downstream. Stated could present findings at CP 4C if the Team need time to evaluate.
    - USACE concurred
- USACE reminded the Team that to lower the mitigation rate you must follow the stream relocation guidance. Mitigation is going to depend on how this stream looks compared to the current stream. Anything that the Team can to do to improve the stream or bring it back to where it is now or better will help with mitigation
- NCDOT asked will the larger Class II Rip-Rap bury the stream flow in the channel change.
    - TGS stated that it is proposed to be lined due to the steepness and that any proposed Rip-Rap would be keyed in

PSH 42:

Stream "SFM" (C), intermittent, on -L- at Station 57+00 RT to Station 60+20 LT

- Stream which flows to Carver Branch is approximately 1- to 2-feet wide on an 10-30% slope upstream. Downstream, the stream is approximately 2- to 3-feet wide on a 19% slope.
- There is unavoidable parallel stream loss due to proposed roadway improvements. The stream will be lined with Class I Rip-Rap at Station 59+00.
- The existing 24-inch CMP will be relined to a 25% slope and extended downstream with a 24-inch CMP at an 18% slope. Class II Rip-Rap will be utilized for outlet protection.
    - USACE asked if the 24-inch pipe flows into Structure 4208 at 90° angle
        - TGS responded that what is shown is how the stream is flowing today

Stream "SFN" (C), intermittent, on -L- at Station 59+00 to Station 60+00 LT

- Stream flows to Carver Branch. Possible impacts due to fill

Carver Branch (C), perennial, on -Y- at Station 66+70 – Major Hydraulic Crossing #21

- Stream is approximately 6-feet wide on a 4-8% slope upstream and 5-13% slope downstream.
- The existing 6-feet by 6-feet RCBC on a 6.4% slope will be extended downstream with a 6-feet by 6-feet RCBC on a 7.4% slope.
- The existing 2-foot perch downstream will be removed with the proposed extension. Class II Rip-Rap will be utilized for bank stabilization for the outlet at Structure 4222.
    - NCDOT asked what storm event is 6x6 RCBC designed for
        - TGS answered that it does achieve a 50-year design

Stream "SBJ" (C), perennial, on -Y2- at Station 67+70 – Major Hydraulic Crossing #22

- Stream which flows to Carver Branch is approximately 4-feet wide on an 8-10% slope upstream and is approximately 4- to 6-feet wide on an 8-25% slope downstream.
- The existing 42-inch CSP is on an approximate 10% slope and the 48-inch CSP that is on an 8% slope will be replaced with a proposed 66-inch WSP at a 13.5% slope and a 66-inch CAAP on a 10% slope.

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- The proposed pipes will not be buried due to the steep slopes. The existing 2-foot perch downstream will be removed with the proposed extension. The outlet channel will be lined with Class II Rip-Rap for outlet stabilization.

PSH 43:

Stream "SBN" (C), perennial, on -Y2- at Station 76+00

- Stream which flows to Carver Branch is 2- to 4-feet wide on a 3% slope upstream.
- The existing 24-inch CMP is on a 2-6% slope and perched approximately 2-feet above water surface with a 6-foot diameter scour hole at the outlet.
- The proposed 42-inch RCP/WSP Trenchless will be buried 0.7-feet at the inlet and outlet on a 1% slope. Class I Rip-Rap will be utilized for outlet protection.
    - NCDWR stated that it appears flow is being potentially rerouted to this portion of the stream and wanted to know if the channel could handle the added flow
        - TGS confirmed flow is being rerouted from Structure 4311 to the existing 24-inch outlet. TGS responded that from a constructability juncture, this appears to be the most practical location to align outlet Structure 4311 (due to drive and wall constraints at Station 77+50 LT as well as proximity of stream to roadway embankment).
        - TGS confirmed a smaller amount (@ 3 acres) is being rerouted from Structure 4305 due to poor existing drainage conditions on private property, particularly in the vicinity of two home (Station 70+00 RT and Station 74+00 far RT). A large wide grass line ditch was designed to slow the flow as much as possible
    - USACE stated that it might be best to create a better angle from Structure 4311 so stream outlets better downstream
        - TGS confirmed they would consider but if Structure 4311 were shifted further southeast, the outlet would be much closer to the JS because of streambank topography (leaving less room to dissipate discharge before entering JS, etc.).
        - Agreed likely fine as is
    - TGS will confirm the capacity to make sure that this stream can adequately carry the extra flow. TGS will be prepared to discuss at the next meeting. TGS inquired if there would be any opposition to a floodplain bench above the normal water surface if extra conveyance capacity is needed (to minimize permanent impacts to this existing channel).
        - USACE responded that they were not opposed to a floodplain bench

Stream "SBO" (C), intermittent, on -Y2- at Station 76+80 RT

- Stream which flows to Carver Branch is 2- to 4-feet wide on a 3% slope.
- Stream will be restored from Station 78+00 to Station 78+50 RT due to proposed removal of the existing 18-inch CMP.
- Proposed reestablished stream section to be lined with Class II Rip-Rap for stability due to slope

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PSH 44:

Carver Branch (C), perennial

- Minimal erosion control and bank stabilization impacts anticipated

Archaeological Area identified by Stream "SA" on -Y- at Station 93+00 to Station 96+00 LT

- Minimal to no impacts are anticipated

PSH 45:

Stream "SBV" (C), perennial, on -Y3- at Station 13+30

- The existing stream which flows to Edwards Branch is 2- to 3-feet wide on a 1.5-2% slope.
- The existing system will be replaced with a 30-inch RCP on a 0.5% slope buried 0.5-feet.
- The stream channel will be realigned downstream on -Y2- from Station 99+00 to Station 99+75 LT on a 0.5% slope.
- Bill Crisp Road (-Y3-) will be realigned to the west to improve its intersection alignment with Stecoah Road and to avoid parallel impacts to Edwards Branch.

Edwards Branch (C), perennial, on -Y2- at Station 99+80 – Major Hydraulic Crossing #24

- Stream is 3- to 4- feet wide at a 1.5-2% slope.
- The existing 66-inch CMP is proposed to be replaced with a 12-foot by 5-foot RCBC with sills and baffles on a 4.3% slope (The CP 4B plans sent out on June 1, 2021, showed a 10-foot by 6-foot RCBC but after coordination with our Structures Section, it was changed to a 12-foot by 5-foot RCBC to provide adequate cover).
- The proposed sill detail will remain unchanged with a 3-foot wide (low flow width) channel meandering through the culvert to match the existing stream width. Class I Rip-Rap will be utilized for bank stabilization at the inlet and outlet.
- Historic Property Boundary right of -L- at Station 105+00 is outside of the proposed construction impact area
    - USACE mentioned concerns regarding outletting at a sharp angle to Carver Branch and requested that Team create as natural a flow as possible where these streams come together
        - TGS noted the constrained area and agreed to evaluate and respond at the next meeting
    - EBCI stated that they do not believe the [archaeological] sites have been fully investigated and are still waiting on more reports which could potentially change the designs when assessments have completed
        - TGS responded that the Team is fully aware of the sensitive sites along the project and designed to avoid and/or minimize impacts. Team is aware that investigations are ongoing and that results may require design changes

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- EBCI stated that they prefer to receive the draft archaeological report via email or a link instead of a CD in the mail. Would prefer to receive GIS but any design file would work
- CN stated that they would like a hard copy and the shape files, but their email system does not accept files over 10MB
- NCDCR stated that they would like to receive a copy of the draft archaeological report
- EBCI stated that they prefer to obtain an encrypted link and can receive emails up to 100MB
    - TGS responded that they will make sure that interested Team members obtains a copy of the draft archaeological report

Archaeological area on -Y2- at Station 102+80 to Station 104+50 RT

- TGS will strive to minimize and hopefully avoid archaeological impacts

Wetland "WBR", headwater, riparian, on -Y2- at Station 106+60 LT to Station 111+40 LT

- Unavoidable minor impacts due to proposed roadway improvements

Stream "SCB" (C, Tr), perennial, on -Y2- at Station 109+70 to Station 111+90 LT

- The stream which flows to Stecoah Creek is 1- to 3-feet wide on a 3-10% slope.
- A channel change is proposed at Station 109+80 LT for a 15% slope and lined with Class II Rip-Rap.
- Impacts are unavoidable due to proposed roadway improvements
    - NCWRC questioned the reason behind changing the existing grade from 3-10% to 15% with the channel change. Asking why this stream needs to be steepened
        - TGS stated that they are proposing short earthen berm since a flatter channel change would impact more wetlands and streams
    - USACE stated that it is in a low area and requested that we discuss where it goes because it looks like the storm flow is being diverted
        - TGS responded that the design avoids septic drain fields
    - USACE asked why stream was not routed across the road instead of remaining in the system for so long. USACE asked why not try to daylight since the stream will be impacted regardless
        - TGS stated that they could investigate going across the road and would likely plan to do so
    - NCWRC asked if there was a natural channel change that occurs before the stream goes into the pipes
        - TGS responded that it is hard to determine. The area is very steep with a relatively steep drop at this section.
    - NCWRC questioned if the area was too steep for fish passage and if the short rocky slopes of the stream before it goes into the pipe could be made passable by fish by utilizing a natural channel design or if the rest of the system in the area would preclude fish passage any way

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- USACE asked if fish were present, what kind, and what fish would be there naturally. USACE further stated they are OK with extending the impacts if needed to make channel change slope flatter to enhance fish passage if fish are currently present
    - TGS responded that they will take a closer look at this crossing and report back to the Team
- NCWRC emphasized that the main concern is fish passage if fish are in the stream. If fish are not present, NCWRC withdraws all comments

PSH 46:

Pond "PH" on -Y2- at Station 118+50 to Station 122+50 LT

- Impacts due shifting alignment to avoid Stecoah Creek
- Rock fill in Pond with natural Rip-Rap will be required

Stream "SCD" (C, Tr), perennial, on -Y2- at Station 123+50 LT

- The stream which flows to Stecoah Creek is 1- to 3-feet wide on a 3-6% slope.
- A channel realignment is proposed from -Y2- from Station 123+50 to Station 125+20. The realigned channel will be lined with Class I Rip-Rap for stabilization.
    - USACE stated that they appreciate the efforts to stay off Stecoah Creek. The current design is a more preferrable outcome. USACE noted that stream relocation guidance applies as far as creating the design and establishing mitigation

Stecoah Creek (C, Tr), perennial

- May have minimal erosion and bank stabilization impacts

PSH 47:

Stecoah Creek (C, Tr), perennial, on -Y2- at Station 129+00 – Major Hydraulic Crossing #25

- Creek is 15- to 20-feet wide on a 2-3% slope upstream and 15- to 21-feet wide on a 2-7% slope downstream
- The existing 3 barrel 10-foot by 9-foot RCBC on a 1% slope will be retained and extended on the downstream side at a 4% slope to match the existing stream grade. The existing RCBC is perched approximately 2-feet at the outlet
- Class II Rip-Rap will be utilized for bank stabilization at the outlet. Minimal erosion and bank stabilization impacts may be required
- A single line of boulders will be utilized to maintain low flow in the two eastern most barrels
    - NCWRC expressed concern with using multiple barrels for the base stream flow asking if it could be reduced to one barrel. They asked if the stream widths upstream and downstream were evaluated.
        - TGS responded that the stream ranges from 15- to 21-feet and each barrel is 10-feet in width

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- NCWRC stated that we all know that it is an inappropriate design to split the base flow. NCWRC asked if there was history of needing to clean out debris and how often
  - TGS stated that there was no known history of debris accumulating or issues regarding historic flooding due to debris. Culvert is currently functioning well with no issues noted during site visit and in photographs (other than the perch which TGS is proposing to remove at the outlet)
- NCWRC stated that it was very concerning but feels the best thing would be to replace the entire crossing with something more appropriate, but if records indicate no issues or problems and the Team is confident with the design then NCWRC will not push the issue. However, NCWRC wanted it noted that this is a bad design and believes that the best thing is to fix the issue
  - TGS noted concerns
- FHWA asked what the issues with debris are
  - NCWRC explained that fish passage is a concern and issues with water building up behind the debris that could destabilize the culvert/system and cause erosion. Stating that comments are based on FHWA guidance on the subject

PSH 48:

Stream "SDT" (C, Tr), perennial, on -Y2- at Station 141+30

- Stream which flows to Stecoah Creek is 3- to 7-feet wide on a 5-9% slope upstream and 5- to 9-feet wide on a 2-5% slope downstream
- The existing 60-inch CMP on a 6% slope is perched approximately 1-foot at the outlet will be replaced with a proposed 60-inch CAAP/WSP on a 6.1% slope. The pipes will not be buried due to the steep slope.
- Class I Rip-Rap will be utilized for outlet protection
  - USACE stated that this is not an ideal stream design because it is angled, long and not straight. USACE requested a more direct crossing for fish passage and asked about stream quality concerning the farmland pasture downstream. Requested Team look at a more direct passage to get the stream across to promote stream passage.
    - TGS stated would investigate stream quality and design taking USACE comments into consideration particularly if this is a higher quality stream

PSH 49:

No jurisdictional features to be impacted

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PSH 50:
No jurisdictional features to be impacted

Closing Comments:

- TGS reminded Team that all three sections of A-0009C are on very aggressive schedules and requested any input on the designs be submitted quickly to keep the project on its current schedule.
- TGS stated that meeting minutes will be submitted to attendees by June 30, 2021
- NCWRC stated that that they want the best fish passage and stormwater treatment possible
- NCDWR stated that Station 76+00 and the retaining wall are their main concerns
- EBCI reminded the Team that archaeological investigations are incomplete

Action Items:

- **PSH 41:** "SFH" investigate retaining wall downstream to avoid impacts to stream
- **PSH 42:** "SFM" investigate stream sharp angle and proposed erosion control risk
- **PSH 43:** "SBN" check channel dimensions and evaluate if channel can handle anticipated flow
- **PSH 45:** "SCB" investigate realigning to facilitate fish passage and if fish are present
- **PSH 48:** "SDT" investigate a more direct pipe placement to enhance fish passage if they are present in stream