Connecticut Department of Transportation

State Project No. 0130-0186 thru 0130-0190
Rehabilitation of Bridge Nos. 07042 through 07045; Interstate 84 over various named brooks
Replacement of Bridge No. 07051; Route 6/67 over South Branch Bullet Hill Brook
Town of Southbury

Tuesday, April 4, 2023 at 6:00 p.m.
Virtual Meeting via Zoom & YouTube Live

Minutes of Public Informational Meeting

In Attendance: There were 28 people in attendance. The meeting participants included the public and representatives of the Town of Southbury, the Connecticut Department of Transportation, and BL Companies.

Presentation: A Public Information Meeting was held for this project on April 4, 2023. This meeting was held virtually via Zoom and YouTube Live. The presentation began at 6:00 p.m.

Connecticut Department of Transportation (CTDOT) Project Engineer Susan Morneault began the presentation by announcing the project and providing the project email and webpage addresses, as well as explaining to the attendees how to participate in the question and answer (Q&A) session at the close of the formal presentation. She then introduced representatives of CTDOT and BL Companies (BLC), the Consultant Liaison Engineer, noting the project Designer as Prime AE Group.

Representatives of BLC, Stephanie Maurer and Michael Woods, and representative of CTDOT Office of Rights-of-Way, Matthew Geanacopoulos, presented the following using PowerPoint:

<u>Introduction & General Overview</u>

- Aerial map of the project locations
- Definition of common terms and procedures used in similar structure rehabilitation projects
- Overview of the existing structures, including size, type, and length of the structures, depth of fill, supporting structures, year built, and traffic load
- Identification that the purpose and need of the projects is to address the structural deterioration
- Photos of the existing structures depicting steel deterioration, section loss, voids beneath the structures, loss of backfill and shape
- Photos of the existing supporting structures depicting cracking, perched outlets, scour, undermining, and erosion.

<u>State Project No. 0130-0186 | Rehabilitation of Bridge No. 07042 carrying Interstate 84 WB over Bullet Hill Brook</u>

- Install pipe liner, install baffles, remove inlet concrete channel, repair inlet headwall/wingwall, replace outlet endwall/wingwall, and install concrete fishway
- No anticipated utility impacts, one permanent easement, current opinion of probable construction cost (OPCC) is $2,800,000 - 100% state funded
- Three anticipated Connecticut Department of Energy and Environmental Protection (CTDEEP) permits: Individual Inland Wetlands (IIW), Stormwater Discharge Permit (SDP), and Pre-Construction Notification (PCN) and one United States Army Corps of Engineers (USACE) permit: PCN

State Project No. 0130-0187 | Rehabilitation of Bridge No. 07043 carrying Interstate 84 EB over Bullet Hill Brook

- Install pipe liner, install baffles, repair inlet and outlet headwall/endwall/wingwalls, grade inlet channel embankment, and install rock weirs
- No anticipated utility impacts, one temporary construction easement, current OPCC is $2,150,000 - 90% federally funded and 10% state funded
- Anticipated permits – CTDEEP: IIW and PCN & USACE: PCN

State Project No. 0130-0188 | Rehabilitation of Bridge No. 07044 carrying Interstate 84 over Oliver Brook

- Install pipe liner, repair inlet support structure, replace outlet support with an endwall/wingwall, install trash rack at the inlet, install concrete fishway at the outlet, remove a portion of the concrete swale, reroute it and line it with riprap
- No anticipated utility impacts, two permanent easements, current OPCC is $2,950,000 - 90% federally funded and 10% state funded
- Anticipated permits – CTDEEP: IIW and PCN & USACE: PCN

State Project No. 0130-0189 | Rehabilitation of Bridge No. 07045 carrying Interstate 84 over Sams Brook

- Install pipe liner, remove concrete channel at the inlet, replace inlet and outlet supports with headwall/endwall/wingwalls, reroute bituminous swales as needed, and reinstate the channel at the outlet
- No anticipated utility or right-of-way impacts, current OPCC is $2,300,000 - 90% federally funded and 10% state funded
- Anticipated permits – CTDEEP: IIW, SDP, and PCN & USACE: PCN

State Project No. 0130-0190 | Replacement of Bridge No. 07051 carrying Route 6/67 over South Branch Bullet Hill Brook

- Precast concrete box culvert replacement utilizing accelerated bridge construction methods
- Relocate storm drain
- Staged construction is anticipated, two stages over two extended weekends
- Maintenance and Protection of Traffic, anticipated lane shifts and closures were reviewed
- One weekend will require a detour to enter I-84 eastbound; Passenger and Commercial vehicle detours posted
- Access roads will not be necessary for this project
- Utilities: Electric and telecommunications, aerial and underground, will be protected and supported in place, portion of the underground water main to be replaced
- No anticipated right-of-way impacts, current OPCC is $2,300,000 - 80% federally funded and 20% state funded
- Anticipated permits – CTDEEP: Inland Wetlands General Permit & USACE: self-verification permit

Proposed Construction Access Roads & Maintenance and Protection of Traffic

- Description of the proposed access for Projects 0130-0186 thru 0130-0189 which includes constructing temporary and/or permanent construction access roads, temporarily removal guiderail
- Traffic on all lanes of Interstate 84 is expected to be maintained during peak hours with potential lane shifts
- Portions of on- and off-ramps lanes will be shifted to allow for adequate buffer between work zones and the traveling public
- Construction is currently scheduled to begin in the spring of 2026 and last approximately one construction season

Rights-of-Way Process

- Letter of Intent to Acquire
- Valuation
- Offer of Just Compensation
- Negotiation
- Acquisition: Agreement, Eminent Domain, Appeal Period

Jennifer Usher (BLC) concluded the presentation and reviewed the Question-and-Answer procedures; the formal presentation lasted approximately forty-seven minutes.

Public Comments and Questions: Following the formal presentation, a live Question-and-Answer session was opened to attendees. The questions and comments below were provided via email and Zoom Live Event Chat:

Chat Question: Does the reduction in diameter of each of the metal culverts, by adding liners, limit too drastically the flow capacity of the pipes? Do you have any information concerning the maximum volume amount that these culverts have experienced over their existing lifetime?

Response: A representative of BLC responded that a hydrologic and hydraulic study was completed for each project, outlining the following steps:

- The watershed area is delineated as part of the hydrologic study, which helps identify the design storm event the structure should be able to convey.
- A hydraulic model is developed to model flow through the existing and proposed structures.
- The model is used to determine if/how the proposed structures affect the design flow and result in inundation changes.

He noted that a full analysis has been completed for each of the proposed rehabilitations to ensure that they will convey the full design flow and do not result in adverse impacts.

The representative responded that the watercourses do not have a stream gage and therefore, volume (flow) records are unavailable. He noted that the design uses a check-storm event, which is an inflated flow above the design storm to ensure that the structure will have adequate capacity.

Chat Question: Why is one of the projects 100% state funded and the others are predominantly federally funded?

Response: A representative of CTDOT responded that the Department has various sources of federal and state funding with different amounts allocated per fiscal year and that the Capital Services Unit within the Bureau of Finance and Administration allocates these funds to projects depending upon the availability of funding sources.

Chat Question: How long will these modifications last? The previous ones were 62 years. What is the projected lifetime for each of these bridges?

Response: A representative of BLC responded that CTDOT's goal is to attain a 75-year service life; further noting that a structure reline essentially results in a new structure. He also stated that some structures buried deeper may last longer due to less exposure to salts.

Chat Question: I live near the bridge that is being replaced, Bridge No. 07051, will the contractor be working at night?

Response: A representative of CTDOT responded that accelerated bridge construction is being considered and the traffic patterns for the roadway will be affected for only two weekends. She noted that it is anticipated that the contractor will need to work around the clock from Thursday night after peak hours to early Monday morning before typical commute hours.

Chat Comment: Thanks. Great job on the fish passage(s) work on each of these bridges/culverts.

Response: Thank you!

Chat Question: When is construction anticipated to Start? Will these projects be constructed at the same time? Will it impact I-84 traffic?

Response: A representative of BLC stated that these projects are anticipated to begin construction in 2026, however, they are in the preliminary phase of design and each project may have different constraints or regulations throughout design development and will progress accordingly. The representative also stated that if projects complete design concurrently they may be packaged together during construction.

The representative noted that the Department will coordinate maintenance and protection of traffic measures to minimize any impacts to mainline traffic, stating that most impacts will only affect the shoulders and ramps. Additionally, the representative stated that lane restrictions are expected to take place during off-peak hours.

Chat Question: If I heard correctly, there will be only 2 weekends that will require the detour for exit 15. Is that correct?

Response: A representative of BLC responded that project 0130-0190 is expected to require two weekend closures to accommodate the accelerated bridge construction activities. Additionally, the representative stated that it is anticipated that all turning movements will be maintained during the first stage and the detour for the exit 15 I-84 eastbound on-ramp would only be necessary for the second stage, which would likely be one extended weekend closure.

Chat Question: Will each project be completed in 2026?

Response: A representative of BLC indicated that this question had been answered previously.

Chat Question: Has this team presenting tonight met with Town Representatives to discuss the project?

Response: A representative of BLC reported that the projects have been presented to the Town and that they were provided with the information presented tonight. Additionally, the representative stated that coordination with the Town will continue as design progresses.

Email Comment: Outstanding job presenting what is a complex project to area residents.

Response: Thank you, the team strives to provide an accessible presentation to bring our projects to the public, your feedback is appreciated.

Adjournment: The email address, telephone number, and project webpage address were provided for additional questions or comments regarding the project following the meeting. Attendees were reminded that additional questions or comments will be received until April 18, 2023. A request to fill out the optional survey was reiterated.

The meeting adjourned at approximately 7:15 p.m.

Subsequent to the meeting and prior to the end of the two-week comment period (April 18, 2023), additional questions and comments were submitted via email from the Pomperaug River Watershed Coalition (attached); responses to the questions posed in their letter are included below.

Question: Will these bridges be able to convey the 100 year storm event? Specifically, do the hydrology and hydraulic calculations show that each proposed bridge rehabilitation will result in a structure that is able to convey the 100 year design storm following NOAA Atlas 14 precipitation frequency estimates for Northeast United States (released September 2015)? If not, what design storm will they convey? Have further provisions for climate change been included in the hydrology calculations? Also, will these structures adequately convey the sediment and/or woody debris that rivers typically convey during larger storm events?

Response: *The proposed structure rehabilitations and replacement have been designed in accordance with the CTDOT Drainage Manual, which provides guidelines regarding design discharge and prescribes structures conveying waterways for drainage areas less than 1 square mile be designed to pass a 50-year frequency design storm event. The five subject structures convey waterways that have watershed areas less than one square mile (between approximately 0.2 and 0.7 square miles) and have been designed to accommodate a 50-year design storm event. The NOAA Atlas 14 rainfall frequency estimates were used to develop the flow for each structure and the 50-year design storm is conveyed through each one.*

The CTDOT completed a Climate Change and Extreme Weather Vulnerability Pilot Project in 2014. This study determined that the procedures used in both hydrologic and hydraulic design have a level of conservativeness built in. This conservativeness was found to allow for potential future variations in precipitation and discharge estimates. There is also no clear indication that existing structures, previously designed using older data and methods, are now significantly undersized as the CTDOT's structures have been subjected to increased rainfall over the last few decades.

During the hydraulic study of each project, a structure's performance is analyzed using the design storm as well as check storm. Projects with a 50-year design storm have a 100-year check storm. Specific to the Southbury culvert rehabilitation projects, the 100-year storm is between 15.5% and 17.9% higher than the 50-year design storms. The check storm models show the culverts remain hydraulically adequate for the higher flows.

The rehabilitated structures are expected to convey the waterway and typical debris; according to recent inspections of the existing structures there are no signs of blockages due to debris. Please note that the sediment found in Bridge No. 07045 is not a result of the hydraulic opening size, but rather attributable to the lack of slope of the channel downstream of the outlet as it becomes a diffuse wetland channel throughout the area; and per coordination with CTDEEP, CTDOT is proposing to remove the sediment that is within the area downstream of the outlet to facilitate flow.

Question: Do the structures in each of the bridge projects comply with the Army Corps of Engineers (ACOE) stream crossing standards for bankfull width, openness ratio and Aquatic Organism Passage (AOP) as described in the "Stream Crossing Best Management Practices" bulletin from the ACOE New England District dated January 2015?

a. What is the bankfull width for each stream in comparison to the existing structure width and the proposed structure width?

b. What is the openness ratio for each existing structure and for each proposed structure?

c. Will the culvert gradient (slope) match the stream channel profile?

d. How do water depths and velocities through the bridges compare to natural stream channel depths and velocities during median flow conditions?

Response: *The practices referenced above are the United States Army Corps of Engineers (USACE) guidelines for new or replacement structures. Of the five projects, only Project 0130-0190 includes a structure replacement (Projects 0130-0186 thru 0130-0189 consist of structure rehabilitations).*

The following references Project 0130-0190, replacement of Bridge No. 07051:

a. The bankfull width of the waterway is approximately 8 feet. The existing structure is 9 feet 4 inches wide, and the proposed structure is 10 feet wide, meeting the USACE recommended guidelines of maintaining an opening equal to or above 1.2 times the bankfull width.

b. The existing openness ratio is 0.26 feet and the proposed openness ratio is 0.28 feet.

c. The existing streambed approaching Bridge No. 07051 has a profile slope of about 4.4%. The existing pipe has a 2.1% slope. The proposed slope of the new box culvert is 1.7%. The streambed downstream has a profile slope of 2.4%.

d. Velocities and depths through the proposed structure are effectively unchanged from the natural condition for typical daily flows.

CTDOT coordinates bridge rehabilitation and replacement projects closely with CTDEEP and USACE; Projects 0130-0186 thru 0130-0190 were presented to both agencies and received preliminary concurrence, along with confirmation of permit requirements.

Question: Who will be responsible for the maintenance of the concrete fishways, rock weirs, and baffles? How will the fishways address the existing separation between the culvert invert and the stream channel? Have natural fish passable stream channels been considered? Does CT DOT plan to have CT DEEP Fisheries review the detailed projects plans when they are available?

Response: *Responsibility for the maintenance of the proposed fish enhancements is under review. The CTDOT will continue to coordinate with CTDEEP through the design process to determine future maintenance responsibilities.*

Fishways (sometimes referred to as fish ladders) are used to provide for upstream fish passage under perched outlet conditions. The proposed fishways consist of lines of concrete baffles or rock weirs that create pools of water (steps) separated by short falls that allow fish to travel upstream. Due to site conditions, the two concrete fishways (at the outlets of Bridge Nos. 07042 and 07044) and a rock weir fishway (Bridge No. 07043) are included in the subject projects to address the current perched outlet issue and provide fish passage.

The proposed rehabilitations for Bridge Nos. 07042, 07043, 07044, and 07045 do not permit a natural channel to be created, this would require full structure replacements. Additionally, these bridges are located beneath 8'-30' of soil over the pipe that the supports I-84 and full replacement of these structures would have substantial environmental and cost impacts, as well as potential impacts to rights-of-way and the traveling public. The purpose and need of Projects 0130-0186 thru 0130-0189 are to address the structural deficiencies of these bridges, which is achieved by the proposed rehabilitations.

As noted in the presentation review above, the proposed replacement of Bridge No. 07051 consists of replacing the existing structure with a precast concrete box. The current design proposes the placement of 1-foot of natural stream bottom material along the bottom.

These projects, along with their proposed scopes of work have been reviewed by CTDEEP Fisheries; CTDOT will continue to coordinate with CTDEEP as designs progress. Additionally, as part of the CTDEEP environmental permit process, CTDEEP Fisheries Division is required to review and provide concurrence of the proposed design.

Question: What control measures will be taken to ensure that these grout compounds do not leak into the stream? What other control measures will be used to limit environmental impacts that may be associated with slip-lining methods?

Response: *The contractor is responsible for the means and methods of construction and is required to submit a temporary water handling plan detailing the specific control measures proposed prior to the start of work activities. This plan will indicate how the contractor will convey flow and will identify the means of protecting the watercourse during construction. The grout will be contained at the ends of the pipe by building a bulkhead or other means of containment which will provide a barrier to the stream. Containment within the pipe may be achieved through several methods and is typically done by installing a temporary pipe within the existing structure to convey flow while the liner to be constructed, preventing construction debris from entering the watercourse. Additionally, the contractor will be required to employ the Best Management Practices for Water Pollution Control as specified in the Environmental Compliance section of CTDOT Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction. Once the grout and controlled low strength material have been installed there will be a curing period similar to concrete and the substance will harden, at which point the material will not leak into the stream.*

Question: Do the natural soil and stream conditions for each of the bridge crossing sites where aluminum pipe is proposed meet the ideal conditions described by Wisconsin DOT? Has the design team considered the impacts of deicing chemicals that may reduce the lifespan of the rehabilitated culverts where aluminum is used as the insert?

Response: *The CTDOT has not studied the comparative environmental conditions in Wisconsin, or the compounds used on their roadways, as such Wisconsin DOT standards have not been adopted by CTDOT. However, as stated in the presentation, the proposed liner material is subject to change. The final material will be selected using new guidance being developed by CTDOT which recommends liner materials based upon abrasion levels, corrosion rate, environmental testing, material wear rates and availability, constructability, and life cycle cost analysis, as well as structural and hydraulic capacity.*

April 18, 2023

Alvaro Garcia Jr., P.E.
Transportation Supervising Engineer
CT Department of Transportation
2800 Berlin Turnpike
Newington, CT 06111

RE: CT DOT Project Nos. 0130-0186 thru 0130-0190 in Southbury, CT

Dear Mr. Garcia,

As the Executive Director of the Pomperaug River Watershed Coalition, a Woodbury-based environmental non-profit organization whose mission is to ensure plentiful, high quality water in the Pomperaug River Watershed communities through the use of science and education, I was very interested to learn about the bridge rehabilitation projects planned along the I-84 corridor in Southbury as well on Route 6/67 near the 1-84 Exit 15 east bound on/off ramps. Each of the bridge crossings associated with CT DOT Project Numbers 0130-0186 thru 0130-0190 are located along high quality tributaries that eventually flow into the Pomperaug River. The Bullet Hill Brook watershed, in particular, is documented by CT DEEP as cold water habitat that supports a wild brook trout population.[1] Where this brook flows into the Pomperaug River, stocked trout will congregate on a hot summer day to find refuge from the much warmer main river. Restoring and enhancing migration opportunities for trout to access more of their spawning grounds through this watershed system are critically important to their continued survival.

Having reviewed the conceptual plans and listening to the recording of the virtual Public Information Session held on April 4, 2023, PRWC heard / learned the following:

A. These bridges were installed in 1961 (more than 60 years old) and the proposed rehabilitation of the structures is expected to add 75 more years to their lifespan.
B. The condition of these bridges range 3 to 5 (serious to fair) on a ranking scale of 9 (brand new) to 0 (bridge has failed) and the condition ranking is based on bi-annual inspection of all the bridge components by CT DOT.
C. All of the these bridges are asphalt coated corrugated metal pipes ("culverts") larger than 6 feet in diameter (some round, some arch shaped) where there are issues of invert deterioration; voids beneath the structures; cracking and separation through the head-, end-, and wing-walls; perched outlets; scour and undermining; loss of backfill and loss of shape.
D. These projects are in the preliminary phases of design.
E. Each individual project is subject to full hydrologic model study being completed to demonstrate conveyance of a set "design flow" through existing structure as well as the proposed structure.

[1] Connecticut Department of Energy & Environmental Protection. (May 2022) "Cold Water Stream Habitat Map" https://portal.ct.gov/DEEP/Water/Inland-Water-Monitoring/Cold-Water-Stream-Habitat-Map

F. The conceptual plans show several technical fish passage designs (i.e. concrete fishways). The project team (CT DOT / BL Companies) indicated that they worked closely with CT Department of Energy and Environmental Protection (CT DEEP) on the design of the fish passage structures to re-establish fish passage through these bridges.
G. Four of the five bridges (Bridge Nos. 07042, 07043, 07044, and 07045) will be rehabilitated using a slip-lining method that involves a process to clean the existing pipe and to fill voids around the existing pipe with "pressure grout"; then, an aluminum pipe is inserted and the void between the new pipe and existing pipe is filled with "controlled low strength material." Using this method, the internal diameter (or height and width) of the structure is reduced. Bridge No. 07042 and Bridge No. 07045 are round culverts that will be narrowed by 18 inches in diameter; Bridge No. 07044 is a round culvert that will be narrowed by 12 inches in diameter; Bridge No. 07043 is an arch pile that will become 33 inches narrower in width and 7 inches shorter in height.
H. For Bridge No. 07051, CT DOT plans to do a full replacement of the bridge. The existing pipe arch culvert will be replaced with a precast concrete box culvert. The box culvert will be 8 inches wider than the existing pipe and just 3 inches shorter, clearly comparable in size. The box culvert invert will be buried beneath one foot beneath of natural stream bed material to provide continuous fish passage. This bridge rates as in fair condition, the best condition of the five bridges detailed in the project bundle.

In regards to the conceptual plans and additional details described in the public information session, PRWC is submitting the following comments and questions related to these projects:

Main Comment: <u>PRWC is very concerned about the sizing of the existing structures and the proposal to further reduce their size in relation to conveyance of storm volume, aquatic organism passage, risk of environmental impacts associated with slip-lining practices, and longevity of the proposed pipe materials</u>.

Issue 1: Detailed project descriptions and images included in the slides presented during the public information session show that several of the existing structures have characteristics like perched outlets, large scour pools, and undermined outlet structures. This evidence suggests that some of these particular existing bridges are already undersized in comparison to the stream channel and 100 year storm volume. For example, Bridge No. 07042 has an outlet that is perched 50 inches above stream grade and a scour hole has formed which has undermined the cutoff wall and footing and entire length of the support structure by 1 inch up to 3 feet. It was also noted that this structure is not aligned with the natural flow of the stream channel. Similarly, Bridge No. 07043 has a perched outlet condition 18 inches above stream grade and is not flow aligned. Bridge No. 07044 also has a perched outlet, is not flow aligned, and has a 12-foot diameter scour hole that undermines the outlet cradle up to 8 feet wide and 27 inches deep. These characteristics suggest that the stream channels are constricted as they flow through these bridges which increase the stream's velocity, thus eroding sediment at the outlet of each structure. Recognizing that there are already a large scour holes below Bridge Nos. 07042 and 07044 and their outlet structures (end-walls, wing-walls, cradles, related footing) are being undermined, it seems highly likely that water flowing through a more constricted pipe will have even more erosive power that could continue to result in the undermining of rehabilitated, or replaced, and new outlet structures including the concrete fishways and rock weirs. Undersized bridges and culverts can also cause problems upstream of the inlet. If high water flows cannot pass freely through the bridge or culvert, water pools upstream of the inlet, turning like a

whirlpool in a draining bathtub. The whirlpool action can scour out the streambed and streambanks as well as the roadway upstream of the inlet. In addition, sediment and debris being carried by the water settles out and creates piles upstream of the culvert inlet. This can further block the bridge or culvert and lead to more flooding and erosion upstream of the inlet and increases the risk for failure.

> **Related Questions: Will these bridges be able to covey the 100 year storm event?** Specifically, do the hydrology and hydraulic calculations show that each proposed bridge rehabilitation will result in a structure that is able to convey the 100 year design storm following NOAA Atlas 14 precipitation frequency estimates for Northeast United States (released September 2015)? If not, what design storm will they convey? Have further provisions for climate change been included in the hydrology calculations? Also, will these structures adequately convey the sediment and/or woody debris that rivers typically convey during larger storm events?

Issue 3: Bridge No. 07045 is reported to have 2 to 4 feet of sand and gravel accumulated in the base of the culvert. This suggests the existing structure may not have been installed with an adequate slope to accommodate sediment transport and/or that the water velocity through the culvert is slower than in the stream channel causing sediment to be deposited inside the pipe.

Issue 4: Assuming that the existing structure for Bridge No. 07051 is adequately sized for the 100-year design storm volume and that it will span full stream channel width, it appears that the proposed replacement is an improvement in the crossing in relation to pass of aquatic life. In general, the practice of embedding the flow-aligned culvert below stream grade and matching the substrate to the natural stream channel better supports fish passage. PRWC is pleased to see this practice included in the conceptual designs; however it is not evident that the bridge is sized to convey the 100-year design storm or to comply with Army Corps of Engineers (ACOE) stream crossing standards for bankfull width, openness ratio and Aquatic Organism Passage (AOP).

> **Related Questions:** Do the structures in each of the bridge projects comply with the Army Corps of Engineers (ACOE) stream crossing standards for bankfull width, openness ratio and Aquatic Organism Passage (AOP) passage as described in the attached "Stream Crossing Best Management Practices" bulletin from ACOE New England District dated January 2015[2]?
>
> a. What is the bankfull width for each stream in comparison to the existing structure width and proposed structure width?
> b. What is the openness ratio for each existing structure and for each proposed structure?
> c. Will the culvert gradient (slope) match the stream channel profile?
> d. How do water depths and velocities through the bridges compare to natural stream channel depths and velocities during median flow conditions?

[2] US Army Corps of Engineers – New England District. (January 2015) "Stream Crossing Best Management Practices" https://www.nae.usace.army.mil/Portals/74/docs/regulatory/StateGeneralPermits/NEGP/BMPStreamCrossings21Jan2015.pdf

Issue 5: The installation of concrete fishways and rock weirs at the outlet of Bridge Nos. 07042-07044 along with the installation of angled corner baffles has been proposed to aid fish passage. These structures are prone to clogging with debris and will likely require regular clearing to enable fish migration.

> **Related Questions:** Who will be responsible for the maintenance of the concrete fishways, rock weirs, and baffles? How will the fishways address the existing separation between the culvert invert and the stream channel? Have natural fish passable stream channels been considered? Does CT DOT plan to have CT DEEP Fisheries review the detailed project plans when they are available?

Issue 6: The detailed designed plans and conceptual drawings indicate aluminum culverts will be inserted through the existing structures on Bridge Nos. 07042-07045 and that "pressure grout" will be used to fill voids where there has been section loss within the culverts and where the stream channel bed has eroded below the invert while "controlled low strength material" will be installed around top and remainder of the new culvert to secure it inside the original structure.

> **Related Questions:** What control measures will be taken to ensure that these grout compounds do not leak into the stream? What other control measures will be used to limit environmental impacts that may be associated with slip-lining methods?

Issue 7: The projected lifespan of the rehabilitated structures is noted to be 75 years based on designs where aluminum pipe is used. According to a 2019 study by Wisconsin Department of Transportation[3], this is the upper lifespan limit for an aluminum culvert under ideal conditions. It was noted that the lifespan can be severely reduced and the material can fail prematurely under non-ideal conditions use of chloride-based deicing salts on highways and abrasion from sediment transport through the structure. Specifically, the study found that "Based on natural environmental conditions in Wisconsin, aluminum culverts should provide 50 to 75 yrs or more of service life if installed in sites that meet generally accepted abrasion, pH, and resistivity limits (where soil and water pH ranges from 4.5 to 9, resistivity is greater than 500 Ω-cm, and abrasion classification is Abrasion Level 1 to 3). .... the infiltration of chloride-based deicing chemicals though soil fill and contact with aluminum leads to pitting corrosion that may lead to premature culvert failure. Best practices to prevent this mechanism include installing an impermeable isolation membrane within the backfill, testing and limiting the chloride content of the embedment backfill, and using free-draining backfill below the membrane and as embedment around the buried structure."

> **Related Questions:** Do the natural soil and stream conditions for each of the bridge crossing site where aluminum pipe is proposed meet the ideal conditions described by Wisconsin DOT? Has the design team considered the impacts of deciding chemicals that may reduce the lifespan of the rehabilitated culverts where aluminum is used as the insert?

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[3] Beaver, Jesse L. & Bass, Brent J. (May 2019) "Performance and Policy Related to Aluminum Culverts in Wisconsin." https://wisconsindot.gov/documents2/research/0092-17-05-final-report.pdf

Summary Comments: While PRWC appreciates CT DOT's effort to rehabilitate these bridges in an economically prudent manner and with little disruption to traffic flow, PRWC urges the department to:

1. Confirm that the rehabilitation will adequately convey the 100-year storm event using NOAA Atlas 14 precipitation frequency estimates for the northeast;
2. Comply with the ACOE Stream Crossing Best Management Practices for bankfull width, openness ration, and aquatic organism passage;
3. Reconsider natural fish passage stream channels in consultation with CT DEEP Fisheries and ACOE;
4. Develop and strictly adhere to a maintenance plan for concrete fishways should they be installed;
5. Preventatively and proactively address potential environmental impacts of compounds associated with slip-lining methods for culvert rehabilitation; and
6. Consider environmental factors that could lessen the projected life-span of aluminum pipes and whether alternate pipe materials are better suited should slip-lining methods be used.

Thank you for considering our comments and questions as you move from the conceptual design phase to more detailed engineering. We look forward to reviewing the plans as they develop.

Sincerely,

Carol A Haskins

Carol Haskins
Executive Director
Pomperaug River Watershed Coalition

CC: Jeffery Manville, First Selectman Town of Southbury
Blake Landon, Director of Public Works, Town of Southbury
Aaron Budris, Senior Environmental Planner, Naugatuck Valley Council of Governments
Peter Aarested, Division Director, CT DEEP Fisheries Division

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Members of the public can submit comments and questions during the two-week public comment period following the meeting. Please direct comments and questions by April 18, 2023 to:

- email: DOTProject130-186thru190@ct.gov
- (860) 594-2020
- Alvaro Garcia Jr., P.E. Transportation Supervising Engineer, at (860) 594-3353 or Alvaro.Garcia@ct.gov