



Known for excellence.
Built on trust.



SOUTH RIVER RESILIENCE PROJECTS – PRIORITIZATION AND CONCEPTUAL DESIGN

CONWAY CENTER FLOOD MITIGATION PROJECT



PREPARED FOR:

Town of Conway
PO Box 240
32 Main Street
Conway, MA 01341

PREPARED BY:



In partnership with:



June 2024
File No. 15.0167225.00

Copyright© 2024 GZA GeoEnvironmental, Inc.



Known for excellence.
Built on trust.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION
MANAGEMENT

1350 Main Street
Suite 1400
Springfield, MA 01103
T: 413.726.2100
F: 413.732.1249
www.gza.com



Via email

June 28, 2024
File No. 15.0167225.00

Ms. Veronique Blanchard, Town Administrator
Town of Conway
PO Box 240, 32 Main Street
Conway, MA 01341

Re: Conway Center Flood Mitigation Project
South River Resilience Projects
Conway, MA

Dear Veronique,

GZA GeoEnvironmental, Inc. (GZA) is pleased to provide the attached *South River Resilience Projects – Prioritization And Conceptual Design* for the Conway Center Flood Mitigation Project. The attached Report was prepared in cooperation with Field Geology Services, Inc., and includes the conceptual designs for the replacement of the Main Street bridge over the South River and the potential flood-plain lowering along the South River upstream of the Burkeville Covered Bridge (Main Poland Road), along with associated preliminary opinions of probable project cost, a summary of anticipated permit requirements, and recommendations for next steps. The attached Report and supporting documentation are intended to serve as the deliverable for Tasks 5.1, 5.2, 5.3, and 5.4 of the Conway-GZA Contract for Professional Consulting Services in Support of the MVP Action Grant for the Conway Center Flood Mitigation Project, dated September 12, 2023. The attached Report is subject to the Limitations included in **Appendix A**.

Please do not hesitate to contact Rosalie Starvish at 860-550-2777 or Rosalie.starvish@gza.com, with any questions. We have been pleased to provide these services to date and are looking forward to advancing the project.

Very truly yours,
GZA GEOENVIRONMENTAL, INC.

Rosalie T. Starvish, P.E., CFM, CPMSM
Senior Project Manager

Nathaniel L. Russell, P.E.
Principal-in-Charge

Stephen L. Lecco, AICP, CEP, PWS
Consultant/Reviewer

Attachments: *South River Resilience Projects – Prioritization And Conceptual Design, CONWAY CENTER FLOOD MITIGATION PROJECT*



TABLE OF CONTENTS

1.0 INTRODUCTION1

2.0 IDENTIFICATION AND PRIORITIZATION OF POTENTIAL RESILIENCE PROJECTS.....2

2.1 INTRODUCTION..... 2

2.2 POTENTIAL RESILIENCE PROJECTS 3

2.2.1 Watershed Storage 3

2.2.2 Conveyance..... 3

2.2.3 Floodplain Storage and Reconnection 4

2.2.4 Floodplain Reclamation 4

2.2.5 Watershed health 5

2.3 RESILIENCE PROJECTS MODELED 5

2.4 PRIORITIZED RESILIENCE PROJECTS 6

3.0 MAIN STREET OVER SOUTH RIVER BRIDGE REPLACEMENT7

3.1 PROJECT DESCRIPTION..... 7

3.2 ENVIRONMENTAL PERMITTING DISCUSSION 7

3.2.1 LOCAL..... 7

3.2.2 STATE 8

3.2.3 FEDERAL 9

3.3 NEXT STEPS 10

3.4 PRELIMINARY OPINION OF PROBABLE PROJECT COSTS 11

4.0 FLOODPLAIN LOWERING UPSTREAM OF COVERED BRIDGE15

4.1 PROJECT DESCRIPTION..... 15

4.2 PERMITTING DISCUSSION 15

4.2.1 LOCAL..... 16

4.2.2 STATE 16

4.2.3 FEDERAL 18



TABLE OF CONTENTS

4.3	NEXT STEPS	20
4.4	PRELIMINARY OPINION OF PROBABLE PROJECT COSTS	20

TABLES

TABLE 1	CONWAY CENTER FLOOD MITIGATION PROJECTS PERMIT MATRIX
---------	---

APPENDICES

APPENDIX A	LIMITATIONS
APPENDIX B	CONCEPTUAL DESIGN – MAIN STREET OVER SOUTH RIVER BRIDGE REPLACEMENT
APPENDIX C	CONCEPTUAL DESIGN – FLOODPLAIN LOWERING UPSTREAM OF COVERED BRIDGE
APPENDIX D	SOUTH RIVER RESILIENCE PROJECTS – HYDRAULIC ANALYSIS REPORT (INCORPORATED BY REFERENCE)
APPENDIX E	CONWAY CENTER FLOOD MITIGATION PROJECT UPDATE, MAY 18, 2024



1.0 INTRODUCTION

The Town of Conway was awarded an MVP Action Grant for fiscal year (FY) 2024 from the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) for the Conway Center Flood Mitigation Project (the Project). The confluence of the South River with its tributary, Pumpkin Hollow Brook, is located within Conway Center, which experienced significant impacts from flooding during Tropical Storm Irene in 2011 and, more recently, during intense summer rains in July 2023. During these events, flood waters were observed to pass down Route 116 and Academy Hill Road. Flood waters caused severe erosion at the Main Street bridge in 2011 and endangered buildings, including the Town Hall and Field Memorial Library, along with wells, septic systems and other infrastructure in the area.

Work to improve the resiliency of the South River watershed has been ongoing since approximately 2013, including fluvial geomorphic assessments, river corridor planning, resiliency planning, and evaluation of road-stream crossings. The FY20 MVP Mohawk Trail Woodlands Partnership Regional Adaptation & Resilience Project included a task to perform hydrologic and hydraulic modeling of the South River watershed. The data from the model confirmed that Conway center is vulnerable to extreme flooding. This Project refined and expanded the hydraulic model previously developed for the South River and Pumpkin Hollow Brook in Conway center: to identify the sources of flooding; to identify potential flood mitigation projects along the South River, Pumpkin Hollow Brook, or within the upstream watershed that could reduce flooding or improve resiliency in Conway center; and to evaluate the potential benefits of such projects.

Specific details regarding the hydraulic modeling and results are presented in *South River Resilience Projects – Hydraulic Analysis Report* and included herein within **Appendix D**. This report describes the identification and prioritization of potential resilience projects for analysis and design, presents the conceptual designs for two resilience projects selected by the Town of Conway, as well as preliminary estimates of costs for implementation, a summary of anticipated permit requirements, and discussion of next steps.

The two priority projects selected for conceptual design as part of this Project include the replacement of the Main Street bridge over the South River with a widened span designed to meet the Massachusetts Stream Crossing Standards and the lowering of the floodplain along the South River located upstream of the Burkeville Covered Bridge (which carries Main Poland Road over the South River) to provide expanded flood storage. These projects are described in more detail in Sections 3 and 4 of this Report, respectively.

Activities within water resource areas are subject to a variety of reviews and permits under local, State and Federal programs. Although many of the regulatory programs appear to have overlapping jurisdictions, the intent of the programs is to help provide prudent, environmentally sensitive programming while avoiding or minimizing adverse temporary or long-term impacts.

The two priority projects identified herein represent unique project types with varying degrees of scope and effort. To prepare for the potential eventual implementation of the prioritized projects, GZA has identified the permits that will most likely be required for each project. The prioritized projects are graphically represented at a conceptual level in **Appendices B and C**. As the details of each project become better defined throughout the design process, the applicability of each permit to each project may vary. At the local level, the Conway Conservation Commission may also have variations in how



they prefer to proceed with permitting that will need to be addressed. There are currently no local Wetlands Bylaws promulgated by Conway.

GZA has identified the required wetlands- or water resource-related permitting required for each priority project, based on our understanding of the various current applicable regulations and each project’s anticipated design and construction requirements. As many permit requirements are based on the total quantities of wetland impact, permit requirements may change should any unanticipated wetland impacts be required, or if project characteristics are modified as a result of the design or permitting process. Additionally, permitting threshold values are reviewed by regulatory authorities periodically and may be subject to change. As such, permitting requirements should be reviewed as part of future design and when permitting activities are initiated. For each priority project, the potential permit requirements were reviewed against the current regulatory framework and are discussed herein.

Preliminary opinions of probable project costs are also presented herein. The preliminary opinions of cost are based on the limited data and the conditions and assumptions described in this Report. The cost estimates are not intended to be sufficiently accurate to predict the actual cost of the projects described in the Report. Further, since we have no control over when the work will take place nor the labor and material costs required to plan and execute the anticipated work, our cost opinions were developed by relying on our experience and the experience of others. Actual costs may vary over time and could be significantly more, or less, than assessed in the Report. When reviewing the opinions of cost, it must be remembered that actual costs will vary. In view of these limitations, the costs presented in the Report should be considered “order of magnitude” and used for general budgeting and comparison purposes only.

This Report is subject to the Limitations included in **Appendix A**.

2.0 IDENTIFICATION AND PRIORITIZATION OF POTENTIAL RESILIENCE PROJECTS

2.1 INTRODUCTION

The GZA-Field Team identified several potential projects that could reduce flooding or improve resiliency in Conway center. Resilience projects may include berm removal, increased watershed storage, culvert/bridge replacements, or other engineered or nature-based approaches, intended to increase storage of floodwaters or increase capacity for conveyance to reduce flood levels, velocities, and erosive energy of the river. The Team considered multiple potential projects, some drawn from prior studies of the South River, and others upon examination of data from the existing conditions hydraulic modeling. These potential projects are described below in Section 2.2, listed by categories pertaining to project type or functional benefit. Further discussion of which projects were selected for further evaluation in this project phase is included in Section 2.3.



2.2 POTENTIAL RESILIENCE PROJECTS

2.2.1 Watershed Storage

Wetlands, ponds, lakes and floodplains are natural areas within a watershed that have the potential to store floodwater and release it slowly to downstream areas after the main flood has passed. The Ashfield Lake and Conway swimming pool are two man-made waterbodies in the South River watershed that are controlled by constructed dams. The GZA-Field Team considered evaluating the potential for using these two areas as flood storage by implementing operational procedures such as lowering the water levels prior to an impending large rain event. This approach can potentially provide flood mitigation, depending on the watershed to waterbody size ratio and available storage in the waterbody. Ultimately, these potential projects weren't selected for evaluation as part of this project, due to timeline constraints, and other studies are currently underway or pending for the Ashfield Lake Dam.

2.2.2 Conveyance

Conveyance may be defined as the action or process of transporting someone or something from one place to another. In the context of flooding, conveyance is the movement of floodwater across the landscape. Under normal flow conditions in a river, conveyance is typically confined to the river channel. When flooding conditions occur, water spills over into the river's floodplain, which also provides conveyance capacity. Undersized road-stream crossings (bridges and culverts) or encroachments by development can restrict the conveyance capacity of the floodplain. The conveyance capacity of the floodplain can be restored by adequately sized road-stream crossings, removing development from the floodplain, or adding infrastructure that provides additional conveyance capacity for floodwaters. Projects that were envisioned in the South River watershed which could improve conveyance capacity are described below.

- Enlarge Main Street Bridge over South River: The existing Main Street Bridge over the South River has a span of approximately 40 feet. Historical plans suggest that a prior bridge at this location had a span of approximately 57 feet, and the span was reduced to its current width when the state highway was constructed in 1926. The estimated bankfull width of the South River is 63 feet. The Massachusetts River and Stream Crossing Standards developed by the River and Stream Continuity Partnership (2011) recommend that river and stream crossings have a span of at least 1.2 times the bankfull width of the river. Thus, based on this criteria, the Main Street bridge should have a span of at least 76 feet. The current bridge constricts the flow during high flow events, leading to increased flow velocities and associated erosion hazards.
- Culvert enlargements along Pumpkin Hollow Brook at Academy Hill Road, Maple Street, Old Cricket Hill Road: Similar to the Main Street Bridge, the road crossings over Pumpkin Hollow Brook are also undersized and do not meet the minimum span widths as recommended by the Massachusetts River and Stream Crossing Standards. The replacement of these crossings with adequately sized spans will improve conveyance and overall reduction in erosion hazards.
- Flood diversion culvert for Pumpkin Hollow Brook: Flow from Pumpkin Hollow Brook during heavy precipitation events is a significant contributor to flooding in the center of Conway. In areas where existing/historic development has already encroached on the floodplain and limits conveyance capacity, the use of engineered infrastructure may be necessary to provide additional conveyance and help to reduce flooding in developed areas, especially if it's infeasible to return the area to a natural floodplain setting. The GZA-Field Team envisioned the installation



of an underground “tunnel” (box culvert), which would begin near Pumpkin Hollow Brook and Academy Hill Road, would be constructed almost entirely within the public right of way, and would collect and convey excess (flood) flows from Pumpkin Hollow Brook to the South River downstream of Conway center, off Elm Street. This diversion would be designed to maintain normal base flows within Pumpkin Hollow Brook during non-flood conditions.

2.2.3 Floodplain Storage and Reconnection

As described above in Section 2.2.1, floodplains are natural areas within a watershed that have the potential to store floodwater and release it slowly to downstream areas after the main flood has passed. Ideally, floodplains are wide, flat and undeveloped areas, adjacent to a river, that are inundated when water rises in the main river channel and spills over during a flood. Water in the floodplain then slows and loses energy, reducing the potential for erosion. However, rivers such as the South River, which have been impacted over generations by man-made interventions, such as channel straightening and deepening, are often incised and lack connection to their floodplains. In these cases, as water rises in the channel, it does not spill over during a flood, but instead remains in the channel and maintains its erosive energy, further deepening the channel and exacerbating the lack of floodplain connection. In some cases, man-made berms along the river prevent floodwaters from accessing the river’s floodplains. The GZA-Field Team identified several locations where reconnecting the South River or Pumpkin Hollow Brook to its floodplain could be achieved by floodplain lowering, as follows:

- Pumpkin Hollow Brook at Old Cricket Hill Road (downstream of Conway swimming pool),
- Expand previous floodplain lowering project at South River Meadow,
- Upstream and downstream of Maple Street on Pumpkin Hollow Brook,
- Upstream of Main Street on South River,
- At South River/Poland Brook confluence,
- Along South River upstream of Covered Bridge, and
- Along South River in the Manwell property.

Floodplain reconnection could also potentially be achieved by removing the man-made berm along the southern bank of the South River located upstream of the Main Street bridge.

2.2.4 Floodplain Reclamation

As described in Section 2.2.2, encroachments by development can restrict the conveyance capacity of the floodplain. In some cases, man-made interventions such as straightening, deepening, berming, and channelizing of rivers, intended to confine floodwaters, results in more catastrophic impacts when the floodwaters exceed the capacity of the structures intended to confine them. Development within the floodplain can make homes and infrastructure vulnerable. In cases where flood impacts are severe, property acquisition to remove homes and infrastructure from the floodplain may be a feasible alternative. The FEMA Hazard Mitigation Assistance Program and Policy Guide lists “Property Acquisition for Open Space” as a Mitigation Project Type which consists of “a community purchasing at-risk structures from voluntary sellers and either demolishing the structures or relocating the structures to a new site outside of the hazard-prone area. The purchased property is then maintained, in perpetuity, for open-space purposes and to restore or conserve the site’s nat-



ural functions” (<https://www.fema.gov/grants/mitigation/guide/part-12/b/1>, accessed 6/20/2024). In Conway, the potential for property acquisition and the use of the new open space for flood storage and conveyance was considered, with the following project alternatives:

- Acquisition of homes along Main Street with intersection of Academy Hill Road, with potential relocation of homes and use of the space for flood storage;
- Acquisition of homes along both sides of Main Street, with potential relocation, to redirect Pumpkin Hollow Brook with a floodplain; and
- Acquisition of properties through the center of Conway for the construction of an overflow channel.

2.2.5 Watershed health

The reforestation of open spaces by planting trees can help reduce flooding by improving the soil’s ability to absorb rainfall, providing tree canopy to intercept, store, and evaporate rainfall, and increasing evapo-transpiration in the watershed, all of which have the effect of reducing surface runoff to rivers and streams. In Conway, the concept of restoring forests in the South River watershed must be balanced with the preservation of valuable farmland. There are many open space locations within the South River watershed which may be available for reforestation. For example, a report prepared for the Mohawk Trail Woodlands Partnership by Claire Baglien, Haly Rylko, and Karen Tassinari of The Conway School, entitled “A Place for Trees, Riparian Restoration in the Deerfield River Watershed” (2022) proposed tree planting zones within the Conway Town Parcel adjacent to Pumpkin Hollow Brook. The identification of additional feasible locations would require consultation with private property owners to understand their goals for use of the open space land, including whether or not it is used for agricultural purposes.

2.3 RESILIENCE PROJECTS MODELED

GZA used the hydraulic model of the South River and Pumpkin Hollow Brook to analyze some of the potential resilience projects. The number of projects analyzed was limited per the scope, budget, and timeline of this Project. Some of the modeling effort was reserved to evaluate combinations of projects to evaluate the cumulative impacts of multiple projects within the watershed. The model was used to evaluate the benefits of each project to the center of Conway, by reviewing impacts to flooding limits, depths, and velocities at the Main Street bridge over the South River and surrounding vicinity.

The projects to be modeled were selected by considering the following criteria:

1. Feasibility to complete the project in the relatively short term (2 to 4 years). This includes consideration of time-lines for design, permitting, and construction.
2. Projects selected that are representative of the project types described above in Section 2.2. Although the projects selected did not necessarily represent all of the potential project types described, the goal was to avoid selection of projects that would only be categorized within the same project type. For example, many potential projects were identified as floodplain reconnection projects, but it was not possible to model all of the floodplain reconnection projects as part of this Project.
3. Where modeling is most useful to demonstrate the benefits and inform design. For example, the benefits of watershed reforestation are well known qualitatively, but may not be readily quantified, thus modeling such changes



in the watershed might not provide significant value. Whereas, using the model to evaluate a flood diversion culvert can provide information that will be used to determine the effectiveness and appropriate sizing of the culvert.

The projects selected for analysis in the model are as follows:

- Enlarge Main Street Bridge over South River,
- Floodplain Lowering Upstream of Covered Bridge on South River,
- Floodplain Lowering Upstream and downstream of Maple St. on Pumpkin Hollow Brook,
- Berm Removal Upstream of Main Street, and
- Pumpkin Hollow Brook Flood Diversion Culvert.

The cumulative impacts of subsets of these projects were also evaluated in the hydraulic model. The combination of the Pumpkin Hollow Brook Flood Diversion culvert with the enlarged Main Street Bridge was evaluated.

More description is provided in the *South River Resilience Projects – Hydraulic Analysis Report* included in **Appendix D**.

2.4 PRIORITIZED RESILIENCE PROJECTS

The GZA-Field Team summarized the potential resilience projects based on the results of the hydraulic modeling, in a public presentation for the Town of Conway on May 18, 2024 (see **Appendix E**). Following the presentation, Town residents were provided the opportunity to vote for their two (2) most-preferred priority projects, to advance to conceptual design. The results of the voting are summarized below, with the top two projects indicated. The conceptual designs for these two projects are presented in this report in **Appendices B** and **C** and are described in more detail in Sections 3 and 4.

Project	Number of Votes
<i>Enlarge Main Street Bridge over South River</i>	40
<i>Floodplain Lowering Upstream of Covered Bridge on the South River</i>	36
Floodplain Lowering Upstream and downstream of Maple St. on Pumpkin Hollow Brook	21
Berm Removal Upstream of Main Street <i>on the South River</i>	11
Pumpkin Hollow Brook Flood Diversion Culvert	14

Rows *italicized* were voted the top 2 priority projects to proceed to conceptual design.



3.0 MAIN STREET OVER SOUTH RIVER BRIDGE REPLACEMENT

3.1 PROJECT DESCRIPTION

The Main Street Bridge over the South River in Conway (MassDOT Bridge Identification Number 0K6) is owned by MassDOT and was built in 1925. The right upstream training wall has been reconstructed multiple times after failing in response to high flow events. The current bridge constricts the flow during high flow events, leading to increased erosion hazards. The existing bridge has a span of approximately 40 feet. The estimated bankfull width of the South River is 63 feet. The Massachusetts River and Stream Crossing Standards developed by the River and Stream Continuity Partnership (2011) recommend that river and stream crossings have a span of at least 1.2 times the bankfull width of the river. Thus, the proposed span for the Main Street bridge conceptual design is 76 feet. The proposed conceptual bridge design presented herein will be refined upon further analyses and design, including details such as scour protection stone size and thickness. The conceptual design for the proposed bridge replacement is presented in **Appendix B**.

3.2 ENVIRONMENTAL PERMITTING DISCUSSION

The replacement of the Main Street bridge with a structure designed to meet the Massachusetts Stream Crossing Standards will involve permitting at the Local, State, and Federal levels. Since the project, by design, involves temporary and potentially permanent impacts to jurisdictional wetland resource areas, and is located within mapped Massachusetts Natural Heritage Endangered Species Program (NHESP) Estimated and Priority Habitat, several environmental permits are required. The information below describes the potential triggers for the anticipated permits needed to complete the project. Some thresholds for more complex environmental permitting may be avoidable, however the permit triggers will ultimately be determined by the final project design. We note that the review of permitting requirements presented herein is limited to environmental or natural resources permitting only. Additional permitting of the replacement bridge may be required, such as by MassDOT, FHWA or other agencies having jurisdiction over the design and construction of transportation projects. However, review of such additional permitting or review requirements was beyond the scope of this Report.

3.2.1 LOCAL

The submission of a Notice of Intent (NOI) to the Town of Conway Conservation Commission and MassDEP will be required for this project. While the NOI is technically a State level permit regulated by the Wetlands Protection Act (WPA) 310 CMR 10.00, the review and issuance of the permit Order of Conditions (OOC) is administered primarily through the local Conservation Commission (Commission). Assuming that the WPA performance standards can be met at this location, a standard NOI with a streamlined MESA checklist review is anticipated. Since the project is likely to involve a combined temporary and permanent impact to greater than 50 linear feet of bank, a Wildlife Habitat Evaluation may be requested by the Conservation Commission. If MassDOT assumes control of this project, the project may be exempted from submitting a NOI to the Commission.



3.2.2 STATE

MESA

The limits of work related to the bridge's replacement would likely be located within mapped NHESP polygons indicating that Estimated Rare Wildlife or Priority Rare Species Habitat may be present. It is therefore recommended that the project Applicant submit a Species Request letter to NHESP to better inform the potentially sensitive nature of species involved and design project elements to minimize impacts. The project Applicant will also be required to submit the NOI and Project Plans to NHESP for a MESA review. This can be completed through the eDEP online NOI submission portal to streamline the process. Since the project would have a small limit of work, the MESA Checklist review fee is expected to fall within the less than 5 Acre category.

CHAPTER 91

The Commonwealth's primary tool for protection and promotion of public use of its tidelands and other waterways is Massachusetts General Law Chapter 91, the waterways licensing program. Chapter 91 regulates activities on both coastal and inland waterways, including construction, dredging and filling in tidelands, great ponds, and certain rivers and streams. Chapter 91 comprises four basic areas of geographical jurisdiction. Any activity that takes place in one of the areas, including non-tidal rivers and streams, requires Chapter 91 authorization. Specifically, Chapter 91 applies to any projects located in, on, over, or under any non-tidal, navigable river or stream on which public funds have been expended either upstream or downstream within the river basin, except for any portions not normally navigable during any season by any vessel. The MassDEP Western Regional Office (WERO) will indicate when issuing a Project File Number whether it considers South River to be a navigable stream and therefore subject to regulation under 310 CMR 9.00 Waterways Program, otherwise known as Chapter 91.

There are a number of activities subject to Chapter 91 authorization, some of which may be considered applicable as part of this project. Consultation with the regulators regarding geographical jurisdiction and the project's applicability to the activities noted below will determine whether Chapter 91 authorization is required:

- Structures - Placement or construction of any structure, regardless of size, whether permanent or seasonal. Examples of typical structures include, but are not limited to: piers, wharves, dams, seawalls, weirs, booms, breakwaters, bulkheads, ripraps, revetments, jetties, piles, lines, groins, roads, culverts, bridges, buildings, parking lots, cables, pipes, conduits, tunnels, wires, floats, etc.
- Filling - Placement of any unconsolidated materials that is confined or expected to remain in place in a waterway, except for material placed by natural processes. Such placement includes material placed for the purposes of shoreline protection, beach nourishment, or subaqueous disposal of dredged spoils.
- Dredging - Removal of materials, including but not limited to rocks, bottom sediments, debris, sand, refuse, plant or animal matter, in any excavating, cleaning, deepening, widening, or lengthening of any waters in the Commonwealth. The Department must also know the location where the removed material will be disposed.



A Chapter 91 Administrative review request or Request for Determination of Applicability may be recommended depending on the final project design and ultimate project proponent. This project may qualify as an exempt activity under 310 CMR 9.05(3)(g). Based on the size and characteristics of the brook, Chapter 91 may claim jurisdiction on the north River; however, this will need to be confirmed during the NOI permitting process.

CLEAN WATER ACT SECTION 401

MA DEP administers the Water Quality Certification regulations implementing Section 401 of the federal Clean Water Act in Massachusetts by establishing permitting requirements to ensure that dredging projects, or proposed discharges of dredged or fill material, protect the public health and the Commonwealth's water resources. A Water Quality Certification is required for all projects with greater than 100 CY of dredging impacts and/or which will result in the loss of greater than 5,000 SF cumulatively of Bordering and Isolated Vegetated Wetlands and Land Under Water regulated by the WPA. A Section 401 Water Quality Certificate for Dredging and Dredge Material Disposal will condition the handling and disposal of sediments which would be based upon laboratory testing results and possibly other testing that may be requested upon regulatory review of the permit application. As currently envisioned by the project's conceptual design, it is possible that this project may require Minor Dredge Project Certification (BRP WW 08) for dredging of more than 100 CY but less than 5,000 CY.

MASSACHUSETTS HISTORICAL COMMISSION

This project is anticipated to require one or more permits or licenses from a state agency, therefore it is possible that the Applicant may be required to file a Project Notification Form (PNF) with the Massachusetts Historical Commission (MHC). At the very least, MHC will be notified of the project as part of other permit filings.

3.2.3 FEDERAL

This bridge replacement project will require modifications to the conveyance of South River under Main Street; therefore, this project is within the jurisdiction of the U.S. Army Corps of Engineers (USACE). USACE regulates construction and other work in navigable waterways under Section 10 of the Rivers and Harbors Act of 1899 and has authority over the discharge of dredged or fill material into the "Waters of the United States" (a term which includes wetlands and all other aquatic areas) under Section 404 of the Federal Clean Water Act of 1972. The New England District of the USACE authorizes such activities in Massachusetts by use of "General Permits for Massachusetts" (GPs), effective June 2, 2023, but subject to revision, typically on an approximately 5- to 10-year cycle. Certain activities with area limits for temporary plus permanent impacts to non-tidal waters of the U.S. are eligible for "Self-Verification" (SV), in which the applicant submits a Self-Verification Notification Form (SVNF) to the USACE. The limited scope of this project may make it eligible for permitting through the SVNF process. This project may best fit under GP 23, "Linear Transportation Projects and Stream Crossings", but may also involve GP 24, "Temporary Construction, Access, and Dewatering." Designs should also comply with General Condition 20 and General Condition 31, to avoid the requirement for a "Pre-Construction Notification" (PCN). General Condition 20 and 31 are paraphrased as follows:

GC 20: Time-of-Year (TOY) Restrictions. Activities that include in-water work must comply with the TOY Restrictions below to be SV eligible, otherwise a PCN is required. PCN submittals shall contain written justification for deviation from the TOY



Restrictions. The term “in-water work” does not include conditions where the work site is “in-the-dry” (e.g., intertidal areas exposed at low tide). The term “in-the-dry” includes work contained within a cofferdam so long as the cofferdam is installed and subsequently removed outside the TOY Restriction. The TOY restrictions stated in Appendix B of the MA DMF Technical Report TR-47 can apply instead for activities in tidal waters if (1) TOYs are provided for a specific waterbody where the activity is proposed and (2) the TOYs are less restrictive than below. The activity must also not require a PCN elsewhere in this document to be SV eligible.

GC 31: 31. Stream Work and Crossings & Wetland Crossings.

a. When feasible, all temporary and permanent crossings of waterbodies and wetlands (hereinafter referred to as “crossings”) shall conform to the “Massachusetts River and Stream Crossing Standards” located at: <https://www.mass.gov/doc/massachusetts-river-and-stream-crossing-standards/download> or <https://www.nae.usace.army.mil/Missions/Regulatory/State-General-Permits/Massachusetts-General-Permit/>. Projects that do not conform to these guidelines shall be reviewed under PCN or IP procedures.

b. Crossings shall be suitably culverted, bridged, or otherwise designed to withstand and to prevent the restriction of high flows, to maintain existing low flows, maintain water quality, and not obstruct the movement of aquatic life indigenous to the waterbody beyond the duration of construction.

c. Crossings shall be installed in such a manner as to preserve hydraulic capacity and flow, sediment transport, and organism passage at its present level, between the wetlands on either side of the road. The applicant shall take necessary measures to correct any wetland damage resulting from deficiencies in hydraulic capacity, sediment transport and organism passage.

d. Stream crossings shall utilize a natural mixed grain-size streambed material composition that matches upstream and downstream substrates to create a stable streambed. Substrate should function appropriately during normal and high flows without washing out. If natural streambed material is not utilized, a PCN is required.

e. Activities involving open trench excavation in flowing waters require a PCN. Work should not occur in flowing waters (requires using management techniques such as temporary flume pipes, culverts, cofferdams, etc.). Normal flows should be maintained within the stream boundary’s confines when practicable. Projects utilizing these management techniques must meet all applicable terms and conditions of the GP, including the GCs in Section IV.

3.3 NEXT STEPS

While the data collected and evaluated as part of this project addressed the required elements to develop the conceptual design for the bridge replacement, more information and data are anticipated to be needed to advance this design beyond the conceptual level. Below is a compiled list of assessments, analysis and information needed for the next steps of this project:

- Identification of potential funding sources.
- Coordination with MassDOT will be required for work to be conducted within Main Street/MassDOT Right of Way. As this bridge is owned by MassDOT, it will be important to pursue design within MassDOT’s standard procedures. Coordination and outreach with MassDOT will be required to discuss next steps, share the Town’s analyses (hydrologic and hydraulic studies) and findings regarding proposed bridge sizing, and identify what the Town can do independently to advance the project.



- Coordination with private property owners as needed to secure permissions for access to complete the work. At a minimum, the Town will need to seek Right of Entry for temporary access during construction.
- Conduct geotechnical explorations and evaluations in accordance with MassDOT procedures.
- Complete topographic survey in accordance with MassDOT procedures, performed by a licensed surveyor, including confirmation of utilities locations.
- Pre-permitting coordination with relevant state and federal agencies.

As the conceptual design is further refined to advance the plans to 75% permit-level drawings and then 100% construction-level drawings, the following additional engineering and analyses should be advanced:

- Confirm/update previously performed hydrologic and hydraulic analyses based on proposed bridge geometry and in accordance with MassDOT requirements.
- Conduct scour depth analysis and scour protection design.
- Detailed proposed conditions grading and terrain modeling, earthwork calculations, cross-sections and profiles. This information will be used to develop more accurate estimates of the volumes of fill and material removed to construct the bridge. The volume of onsite material that must be disposed off-site will impact construction costs.
- Project phasing planning and associated engineering construction cost estimate updates.
- Construction details for the bridge.
- Development of restoration plans for disturbed areas and work on private property.
- Design of both short term (construction phase) and long-term erosion controls as needed.
- Design of detailed layout, profile and details for utility relocations (as needed).

3.4 PRELIMINARY OPINION OF PROBABLE PROJECT COSTS

GZA prepared a preliminary opinion of probable project cost for the bridge replacement, as presented in the table below. The preliminary opinion of probable project cost presented herein was developed based on the conceptual design and without detailed design. In preparing the cost opinion, GZA estimated approximate quantities of work and utilized a combination of sources of unit cost information which may include published RS Means Cost Data; cost data from Federal, State, or local transportation agency web sites; discussions with local experienced contractors; and GZA's experience with costs for similar projects in similar locations. Because this conceptual-level estimate was made prior to the completion of detailed design and permitting, there is a higher degree of uncertainty regarding the actual nature and scope of the work that will be performed. As such, the potential margin of error is expected to be larger than would be anticipated for cost estimates developed after detailed design and a contingency of 30% was assumed to cover the occurrence of eventual refinements to the scope of the project and to mitigate the potential for unplanned events or discoveries during construction. Costs associated with additional survey; geotechnical evaluations; civil engineering design services; permitting; designer services during construction; resident engineer services; unforeseen utility impacts or wetland mitigation require-



ments; or temporary and permanent easements are not included in the estimate of cost. Notwithstanding these limitations, the opinion of Project cost is provided to inform the Town about the potential magnitude of anticipated construction costs and to furnish information for the Town's use in evaluating the economic feasibility of proceeding with the project and the project's potential for further development. The estimate of cost may also be used to help establish a preliminary construction budget.



City/Town: Conway, MA
 Project Name: Bridge Replacement - Main Street at South River
 Project Location: Main Street (Rte 116) at South River (Sta. 2+25)
 Date: June, 2024

Bid Items No.	Bid Item Name	Unit	Unit Price	Qty	Price
101.	Clearing & Grubbing	Ac	\$ 42,500.00	0.12	\$ 5,100.00
115.1	Demolition of Bridge No. 1	LS	\$ 259,077.78	1	\$ 259,078.00
120.	Earth Excavation	CY	\$ 40.00	500	\$ 20,000.00
120.1	Unclassified Exavation	CY	\$ 50.00	304	\$ 15,200.00
121.	Class A Rock Excavation	CY	\$ 130.00	10	\$ 1,300.00
123.	Muck Excavation	CY	\$ 55.00	10	\$ 550.00
140.1	Bridge Excavation within Cofferdam	CY	\$ 62.50	500	\$ 31,250.00
146.	Drainage Structure Removed	EA	\$ 600.00	4	\$ 2,400.00
150.	Ordinary Borrow	CY	\$ 44.50	100	\$ 4,450.00
151.	Gravel Borrow	CY	\$ 53.00	135	\$ 7,155.00
151.1	Gravel Borrow for Bridge Foundation	CY	\$ 65.00	60	\$ 3,900.00
156.	Crushed Stone	TON	\$ 55.00	145	\$ 7,975.00
170.	Fine Grading & Compacting Subgrade Areas	SY	\$ 7.00	515	\$ 3,605.00
202.	Manhole	EA	\$ 5,250.00	2	\$ 10,500.00
222.3	Frame & Grate (or Cover) Municipal Standard	EA	\$ 1,200.00	4	\$ 4,800.00
241.12	12 Inch Reinforced Concrete Pipe Class III	FT	\$ 132.00	112	\$ 14,784.00
271.12	12 Inch Pipe Removed and Stacked	FT	\$ 32.50	108	\$ 3,510.00
402.	Dense Graded Crushed stone for subbase	CY	\$ 95.00	45	\$ 4,275.00
443.	Water for Roadway Dust Control	MGL	\$ 87.50	50	\$ 4,375.00
450.22	Superpave Surface Course - 9.5 (SSC-9.5)	TON	\$ 320.00	40	\$ 12,800.00
450.31	Superpave Intermediate Course - 12.5 (SIC - 12.5)	TON	\$ 320.00	60	\$ 19,200.00
450.42	Superpave Base Course - 38.5.0 (SBC - 38.5)	TON	\$ 240.00	90	\$ 21,600.00
450.60	Superpave Bridge Surace Course - 9.5 (SSC-B-9.5)	TON	\$ 317.50	25	\$ 7,938.00
450.70	Superpave Bridge Protective Course - 9.5 (SPC-B-9.5)	TON	\$ 317.50	25	\$ 7,938.00
451.	HMA for patching	TON	\$ 300.00	5	\$ 1,500.00
452.	Asphalt Emulsion for Tack Coat	GAL	\$ 11.63	150	\$ 1,745.00
453.	HMA Joint Adhesive	FT	\$ 1.75	660	\$ 1,155.00
482.3	Sawcutting Asphalt Pavement	FT	\$ 5.00	72	\$ 360.00
482.4	Sawcutting Portland Cement Concrete	FT	\$ 6.50	20	\$ 130.00
504	Granite Curb Type VA4- Straight	FT	\$ 73.50	95	\$ 6,983.00
509	Granite Transition Curb for Pedestrian Curb	FT	\$ 85.00	42	\$ 3,570.00
594.	Curb Removed and Discarded	FT	\$ 10.00	220	\$ 2,200.00
620.33	Guardrail - Curved, TL-3(Single Faced)	FT	\$ 50.00	80	\$ 4,000.00
627.1	Trailing Anchorage	EA	\$ 2,500.00	4	\$ 10,000.00
628.24	Transition to Bridge Rail	EA	\$ 6,400.00	4	\$ 25,600.00
697.1	Silt Sac	EA	\$ 222.50	6	\$ 1,335.00
697.2	Floating Silt Fence	FT	\$ 50.00	60	\$ 3,000.00
698.3	Geotextile Fabric for Separation	SY	\$ 10.00	490	\$ 4,900.00
701.	Cement Concrete Sidewalk	SY	\$ 90.00	75	\$ 6,750.00
701.1	Cement Concrete Sidewalk at Driveways	SY	\$ 101.50	34	\$ 3,451.00
701.2	Cement Concrete Pedestrian Curb Ramp	SY	\$ 126.00	22	\$ 2,772.00



Bid Items No.	Bid Item Name	Unit	Unit Price	Qty	Price
734.	Sign Removed & Reset	EA	\$ 650.00	2	\$ 1,300.00
740.	Engineers Field Office and Equipment (Type A)	LS	\$ 3,000.00	1	\$ 3,000.00
748.	Mobilization (3%)	LS	\$ 84,140.00	1	\$ 84,140.00
751.	Loam for Roadsides	CY	\$ 95.00	30	\$ 2,850.00
755.45	Wetland Restoration	SY	\$ 500.00	100	\$ 50,000.00
756.	NPDES Stormwater Pollution Prevention Plan	LS	\$ 6,000.00	1	\$ 6,000.00
765.	Seeding	SY	\$ 5.00	235	\$ 1,175.00
767.121	Sediment Control Barrier	FT	\$ 7.00	250	\$ 1,750.00
767.9	Jute Mesh	SY	\$ 8.00	235	\$ 1,880.00
769.	Pavement Milling mulch under guardrail	FT	\$ 11.00	80	\$ 880.00
833.7	Delineation for Guard Rail Termini	EA	\$ 94.00	4	\$ 376.00
850.41	Roadway Flagger	HR	\$ 72.00	80	\$ 5,760.00
851.1	Traffic Cones for Traffic Management	DAY	\$ 160.00	60	\$ 9,600.00
852.	Safety Signage for Traffic Management	SF	\$ 25.00	400	\$ 10,000.00
853.1	Portable Breakaway Barricade Type III	EA	\$ 175.00	6	\$ 1,050.00
853.21	Temporary Barrier Removed And Reset	EA	\$ 18.00	6	\$ 108.00
856.12	Portable Changeable Message Sign	DAY	\$ 28.00	60	\$ 1,680.00
859.	Relectorized Drum	DAY	\$ 0.35	60	\$ 21.00
859.1	Reflectorized Drum with Sequential Flashing Warning Lights	DAY	\$ 5.00	60	\$ 300.00
860.106	6 Inch Reflectorized White Line (Painted)	FT	\$ 2.30	350	\$ 805.00
860.112	12 Inch Reflectorized White Line (Painted)	FT	\$ 9.00	60	\$ 540.00
861.106	6 Inch Reflectorized Yellow Line (Painted)	FT	\$ 2.30	350	\$ 805.00
876.1	Electric Pole Removed and Reset	EA	\$ 10,000.00	2	\$ 20,000.00
983.12	RipRap With Gravel Packed Voids	TON	\$ 90.00	685	\$ 61,650.00
991.1	Control of Water - Structure No. 1	LS	\$ 70,000.00	1	\$ 70,000.00
995.01	Bridge Structure, Bridge No.	LS	\$ 2,000,000.00	1	\$ 2,000,000.00
Subtotal:					\$ 2,888,804.00
10% Design Engineering Contingency:					\$ 288,880.40
20% Construction Contingency:					\$ 577,760.80
2024 Dollars					\$ 3,755,445.20



4.0 FLOODPLAIN LOWERING UPSTREAM OF COVERED BRIDGE

4.1 PROJECT DESCRIPTION

The Burkville Covered Bridge spans the South River approximately 600 feet downstream of the confluence with Johnny Bean Brook. This historic bridge, built in 1869, was restored 20 years ago. Just downstream of the covered bridge the remnants of an historic mill dam are still visible; this dam provided water via an open canal to mills downstream. The South River has incised into the fine-grained sediments that accumulated behind the dam. These impoundment sediments, also known as legacy sediments, are highly erodible and are a source of fine sediment loading and water quality impacts. The riparian area is a mix of forest and residential lawns. The understory is dominated by Japanese knotweed and other invasive plant species including asiatic bittersweet which is climbing many of the trees along the river. Instream habitat is degraded and lacks complexity, but good canopy coverage and cold-water inputs from Johnny Bean Brook have the potential to provide excellent fish habitat.

This priority project involves excavation and removal of a portion of these legacy sediments for a distance of approximately 0.5 miles upstream of the covered bridge. The proposed work is located on several town-owned parcels as well as privately owned parcels. Restoration of the natural floodplain connection could be achieved by removing the sediment that accumulated in the mill pond. Lowering the floodplain reduces the 100-year flood elevation and channel velocities in the hydraulic model. This channel velocity reduction is a proxy for reduction in shear stress and erosive forces along the banks of the South River. One of the primary benefits of this project is the floodwater storage that would be created; lowering the floodplain by two feet increases floodwater storage by approximately 25.8 acre feet (41,624 cubic yards). Other benefits include a reduction in sediments sourced from the site, and increased storage of sediments (and nutrients) on the re-connected floodplain.

Invasive species mitigation and removal throughout the project area will help enhance the quality of the riparian buffer and the newly re-connected floodplain. The Town-owned portions of the proposed project area will serve as recreational assets for Conway. This site was included as a conceptual design in the 2016 *Fluvial Geomorphic Assessment and River Corridor Planning for the South River Watershed, MA*, prepared by Field Geology Services. This design can be scaled as desired by reducing or increasing the footprint of the reconnected floodplain based on landowner interest and participation as well as the availability of funding. The design seeks to provide flood storage for Conway Center while enhancing habitat, reducing erosion and sediment-loading, and providing public access to the site for use of local residents.

The conceptual design for the floodplain lowering is presented in **Appendix C**.

4.2 PERMITTING DISCUSSION

The floodplain lowering project provides an opportunity to improve the river's connection to its floodplain and increase floodwater storage capacity while decreasing floodwater impacts downstream. The information below describes the potential triggers for the anticipated permits needed to complete the project.



4.2.1 LOCAL

The submission of a NOI to the Town of Conway Conservation Commission and MassDEP will be required for this project. It is unlikely that all of the WPA performance standards can be met at this location so this would likely have to be permitted as a Limited Ecological Restoration Project. If not permitted as a Limited Ecological Restoration project, then a Wildlife Habitat Evaluation would need to be submitted with the NOI package because there would be greater than 50 linear feet of Bank disturbance.

4.2.2 STATE

MESA

The limits of work related to the floodplain lowering project are located within mapped NHESP polygons indicating that Estimated Rare Wildlife or Priority Rare Species Habitat may be present. It is therefore recommended that the project Applicant submit a Species Request letter to NHESP to better inform the potentially sensitive nature of species involved and design project elements to minimize impacts to the extent practical. The project Applicant will also be required to submit the NOI and Project Plans to NHESP for a MESA review. The project as currently envisioned would qualify within the Intermediate MESA Review Filing range. The review can be completed through the eDEP online NOI submission portal to streamline the process; however pre-project consultation is recommended. Because of the size and scope of the project and the potential conversion of wetland resource area types, it may not be possible to avoid a “Take” of rare species habitat. The determination of a “Take” will depend on the type of species present, the timing and final design of the project, and NHESP’s MESA review. Consultation with NHESP during project permitting will help to determine if a Conservation Management Plan (CMP) will be required.

MEPA

This type of project may also require a Massachusetts Environmental Policy Act (MEPA) review. If a State action is needed, such as a state permit or funding source, then MEPA review may be required depending on whether the work may exceed one or more review thresholds. As per State regulations at 301 CMR 11.03(2)(b), greater than two acres of disturbance within priority habitat is likely and if the project results in a take of state-listed endangered or threatened species or species of special concern then an Environmental Notification Form (ENF) would be required. As per State regulations at 301 CMR 11.03(3)(a and b), potentially applicable review thresholds that might require the filing of an ENF include the possible alteration of greater than 500 LF of Bank, alteration of 5,000 square feet of bordering or isolated wetlands, or alteration of greater than ½ acre of “other” wetlands (e.g., LUWW), or dredging of at least 10,000 cubic yards of material. The project as described, may exceed one or all of the thresholds mentioned above resulting in the need for an ENF and other review deemed necessary by the Secretary of Energy and Environmental Affairs. A review of the most currently available information indicates that there are no Environmental Justice communities within five miles of the proposed project site. The ENF is simultaneously sent to numerous agencies and a notification announcement is published in the Environmental Monitor, a bi-monthly publication with statewide circulation. Agencies, organizations and interested individuals are encouraged to submit comments to the MEPA unit. As currently envisioned by the project’s conceptual design, this project may result in the alteration of one or more acres of Bordering Vegetated Wetland, which would also trigger the need for a mandatory Environmental Impact Report (EIR).



CHAPTER 91

As was discussed above, Massachusetts General Law Chapter 91 is the waterways licensing program charged with the protection and promotion of public use of public tidelands and other waterways. Chapter 91 regulates activities on inland waterways, including construction, dredging and filling in certain rivers and streams. Chapter 91 applies to any projects located in, on, over, or under any non-tidal, navigable river or stream on which public funds have been expended either upstream or downstream within the river basin, except for any portions not normally navigable during any season by any vessel. The requirement for a Chapter 91 Waterways License from MassDEP would be verified during MEPA review process for this project.

There are a number of activities subject to Chapter 91 authorization, some of which may be considered applicable as part of this project. Consultation with the regulators regarding geographical jurisdiction and the project's applicability to the activities noted below will determine whether Chapter 91 authorization is required:

- Filling - Placement of any unconsolidated materials that is confined or expected to remain in place in a waterway, except for material placed by natural processes. Such placement includes material placed for the purposes of shoreline protection, beach nourishment, or subaqueous disposal of dredged spoils.
- Dredging - Removal of materials, including but not limited to rocks, bottom sediments, debris, sand, refuse, plant or animal matter, in any excavating, cleaning, deepening, widening, or lengthening of any waters in the Commonwealth. The Department must also know the location where the removed material will be disposed.

CLEAN WATER ACT SECTION 401

MA DEP administers the Water Quality Certification regulations implementing Section 401 of the federal Clean Water Act in Massachusetts, by establishing permitting requirements to ensure that dredging projects, or proposed discharges of dredged or fill material, protect the public health and the Commonwealth's water resources. A Water Quality Certification is required for all projects with greater than 100 CY of dredging impacts and/or which will result in the loss of greater than 5,000 SF cumulatively of Bordering and Isolated Vegetated Wetlands and Land Under Water regulated by the WPA. A Section 401 Water Quality Certificate for Dredging and Dredge Material Disposal will condition the handling and disposal of sediments which would be based upon laboratory testing results and possibly other testing that may be requested upon regulatory review of the permit application. As currently envisioned by the project's conceptual design, it is possible that this project would require a Major Fill/Excavation Project Certification (BRP WW 10) for a cumulative loss of more than 5,000 square feet of Bordering Vegetated Wetland and Land Under Water. The project may also require Minor Dredge Project Certification (BRP WW 08) for dredging of more than 100 CY but less than 5,000 CY. As the project design is advanced, the identification of and avoidance of impacts to wetlands might eliminate the need for Section 401 permitting.

MASSACHUSETTS HISTORICAL COMMISSION

This project is anticipated to require one or more permits or licenses from a state agency, therefore it is possible that the Applicant may be required to file a Project Notification Form (PNF) with the Massachusetts Historical Commission (MHC). At a minimum, MHC will be notified of the project as part of other permit filings.



4.2.3 FEDERAL

USACE

The USACE regulates construction and other work in navigable waterways under Section 10 of the Rivers and Harbors Act of 1899 and has authority over the discharge of dredged or fill material into the "Waters of the United States" (a term which includes wetlands and all other aquatic areas) under Section 404 of the Federal Clean Water Act of 1972. The New England District (NED) of the USACE issues General Permits (GPs) for activities subject to USACE jurisdiction in waters of the U.S., including navigable waters, within the boundaries of, and off the coast of, the Commonwealth of Massachusetts. Based upon the current scope of the Project, we anticipate that the work may qualify for GP10, "Aquatic Habitat Restoration, Enhancement, and Establishment Activities", which authorizes activities associated with the restoration, enhancement, and establishment of non-tidal wetlands and riparian areas, streams, and open waters, including "the relocation of non-tidal waters, including non-tidal streams and associated wetlands for reestablishment of a natural stream morphology and reconnection of the floodplain". To be authorized by this GP, the project must be planned, designed, and implemented so that it results in net increases in aquatic resource functions and services. Under GP10, permanent or temporary impacts in non-tidal waters of the U.S. that are greater than 5,000 square feet require Pre-Construction Notification (PCN).

CONSTRUCTION GENERAL PERMIT

It is likely that the Project construction will disturb more than one acre of land, and as such, will be subject to coverage under the United States (U.S.) Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) stormwater permitting program. Specifically, the work will need to obtain coverage under the EPA's Construction General Permit (CGP), which requires the Owner and the Contractor to file a Notice of Intent (NOI) with the EPA and the preparation of a Stormwater Pollution Prevention Plan (SWPPP). No land disturbance can take place until the SWPPP is prepared and at least 14 days have passed since the NOI(s) has/have been filed with EPA and EPA has acknowledged permit coverage online and via email.

PERMITTING SUMMARY

Table 1 below provides a matrix of the priority projects and a summary of the potential permits needed for each.



Table 1: Conway Center Flood Mitigation Projects Permit Matrix

Project Area	Local			State								Federal				
	RDA (WPA)	NOI (WPA)	Habitat Eval.	NHESP			MEPA		Ch. 91	401 WQC	PNF	IPAQ	USACE GP		USACE IP	CGP (SWPPP)
				Species Request	MESA < 5 Ac	CMP	ENF	EIR					SVNF	PCN		
Main Street/ South River Bridge Replacement	No	Yes	Yes	Yes	Yes <5 Ac	Not Anticipated	No	No	Possible	Yes	Yes	Yes	Yes	No	No	No
Floodplain Lowering Upstream of Covered Bridge	No	Yes	Possible	Yes	Yes >5 Ac	Possible	Possible	Possible	Possible	Yes	Yes	Yes	No	Yes	No	Yes

Key: RDA – Request for Determination of Applicability; NOI – Notice of Intent; **Habitat Eval.** – Wildlife Habitat Evaluation; **NHESP** – Natural Heritage Endangered Species Program; **MESA** – Massachusetts Endangered Species Act; **CMP** – Conservation Management Plan; **MEPA** – Massachusetts Environmental Policy Act; **ENF** – Environmental Notification Form; **EIR** – Environmental Impact Report; **Ch 91** – Mass General Law Chapter 91; **401 WQC** – Section 401 Water Quality Certificate; **PNF** – Project Notification Form; **USACE GP** – U.S. Army Corps of Engineers General Permit; **SVNF** – Self-Verification Notification Form; **PCN** – Pre-Construction Notification Form; **USACE IP** – U.S. Army Corps of Engineers Individual Permit; **CGP SWPPP** – Construction General Permit Stormwater Pollution Prevention Plan



4.3 NEXT STEPS

While the data collected and evaluated as part of this project addressed the required elements to develop the conceptual design for the floodplain lowering project, more information and data are anticipated to be needed to advance this design beyond the conceptual level. The design may be relatively straightforward from a technical perspective; however, coordination with property owners and regulatory agencies will be a critical aspect of advancing this project. Below is a compiled list of assessments, analysis and information that is anticipated to be needed for the next steps of this project:

- Coordination with private property owners to secure permissions for access to complete the work.
- Conduct formal wetland delineation and habitat surveys.
- Confirm extent of impoundment (legacy) sediment behind the former dam, as compared to native soils.
- Prepare topographic survey, performed by a licensed surveyor, including confirmation of potential utilities locations.
- Pre-permitting coordination with relevant state and federal agencies.
- Identification of potential funding sources.

As the conceptual design is further refined to advance the plans to 75% permit-level drawings and then 100% construction-level drawings, the following additional engineering and analyses should also be advanced:

- Detailed proposed conditions grading and terrain modeling, earthwork calculations, cross-sections and profiles. This information will be used to develop more accurate estimates of the volumes of fill and material removed with the floodplain lowering. The volume of onsite material that must be disposed off-site will impact construction costs.
- Development of restoration plans for disturbed areas and work on private property.
- Design of both short term (construction phase) and long-term erosion controls as needed.
- Project phasing planning and associated engineering construction cost estimate updates.

4.4 PRELIMINARY OPINION OF PROBABLE PROJECT COSTS

GZA prepared a preliminary opinion of probable project cost for the floodplain lowering project, as presented in the table below. The preliminary opinion of probable project cost presented herein was developed based on the conceptual design and without detailed design. In preparing the cost opinion, GZA estimated approximate quantities of work and utilized a combination of sources of unit cost information which may include published RS Means Cost Data; cost data from federal, state, or local transportation agency web sites; discussions with local experienced contractors; and GZA's experience with costs for similar projects in similar locations. Because this conceptual-level estimate was made prior to the completion of detailed design and permitting, there is a higher degree of uncertainty regarding the actual nature and scope of the work that will be performed. As such, the potential margin of error is expected to be larger than would be anticipated for cost estimates developed after detailed design and a contingency of 30% was assumed to cover the occurrence of eventual



refinements to the scope of the project and to mitigate the potential for unplanned events or discoveries during construction. Costs associated with additional survey; geotechnical evaluations; civil engineering design services; permitting; designer services during construction; resident engineer services; unforeseen utility impacts or wetland mitigation requirements; or temporary and permanent easements are not included in the estimate of cost. Notwithstanding these limitations, the opinion of Project cost is provided to inform the Town about the potential magnitude of anticipated construction costs and to furnish information for the Town’s use in evaluating the economic feasibility of proceeding with the project and the project’s potential for further development. The estimate of cost may also be used to help establish a preliminary construction budget.

City/Town: Conway, MA
 Project Name: Floodplain Lowering Upstream of Burkville Covered Bridge
 Project Location: South River by 269 Ashfield Road (Rte 116), Conway
 Date: June, 2024

TOTAL LOWERING OPINION OF COST

Bid Items No.	Bid Item Name	Unit	Unit Price	Qty	Price
101.	Clearing & Grubbing	Ac	\$ 42,500.00	9.20	\$ 391,000.00
120.	Earth Excavation	CY	\$ 40.00	52,300	\$ 2,092,000.00
121.	Class A Rock Excavation	CY	\$ 130.00	1,100	\$ 143,000.00
123.	Muck Excavation	CY	\$ 55.00	2,700	\$ 148,500.00
697.2	Floating Silt Fence	FT	\$ 50.00	240	\$ 12,000.00
740.	Engineers Field Office and Equipment (Type A)	Mo	\$ 3,000.00	6	\$ 18,000.00
748.	Mobilization (3%)	LS	\$ 119,730.00	1	\$ 119,730.00
755.45	Wetland Restoration	SY	\$ 20.00	44,500	\$ 890,000.00
756.	NPDES Stormwater Pollution Prevention Plan	LS	\$ 6,000.00	1	\$ 6,000.00
765.	Seeding	SY	\$ 5.00	44,500	\$ 222,500.00
767.121	Sediment Control Barrier	FT	\$ 7.00	4,000	\$ 28,000.00
991.1	Control of Water	LS	\$ 40,000.00	1	\$ 40,000.00
Subtotal					\$ 4,110,730.00
10% Engineering Contingency (to nearest dollar)					\$ 411,073.00
20% Construction Contingency (to nearest dollar)					\$ 822,146.00
2024 Total					\$ 5,343,949.00



Appendix A – Limitations



USE OF REPORT

1. GeoEnvironmental, Inc. (GZA) prepared this Report on behalf of, and for the exclusive use of our Client at the stated time for the stated purpose(s) and location(s) identified in the Report. Use of this Report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

STANDARD OF CARE

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in the Report and/or proposal, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work.
3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services at the same time, under similar conditions, and at the same or a similar property. No warranty, expressed or implied, is made.
4. Basis of Opinion of Cost Unless otherwise stated, our opinions of cost are only for comparative and general planning purposes. These opinions are based on the limited data and the conditions and assumptions described in the Report. The cost estimates may involve approximate quantity evaluations and are not intended to be sufficiently accurate to develop construction bids, or to predict the actual cost of work addressed in the Report. Further, since we have no control over when the work will take place nor the labor and material costs required to plan and execute the anticipated work, our cost opinions were made by relying on our experience, the experience of others, and other sources of readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.
5. Cost opinions presented in the Report are based on a combination of sources and may include published RS Means Cost Data; past bid documents; cost data from federal, state or local transportation agency web sites; discussions with local experienced contractors; and GZA's experience with costs for similar projects at similar locations. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation. Actual costs will likely vary depending on the quality of materials and installation; manufacturer of the materials or equipment; field conditions; geographic location; access restrictions; phasing of the work; subcontractors mark-ups; quality of the contractor(s); project management exercised; and the availability of time to thoroughly solicit competitive pricing. In view of these limitations, the costs presented in the Report should be considered "order of magnitude" and used for budgeting and comparison purposes only. Detailed quantity and cost estimating should be performed by experienced professional cost estimators to evaluate actual costs. The opinions of cost in the Report should not be interpreted as a bid or offer to perform the work. Unless stated otherwise, all costs are based on present value.
6. The opinion of costs are based only on the quantity and/or cost items identified in the Report, and should not be assumed to include other costs such as legal, administrative, permitting or others. The estimate also does not include any costs with respect to third-party claims, fines, penalties, or other charges which may be assessed against any responsible party because of either the existence of present conditions or the future existence or discovery of any such conditions.



ADDITIONAL SERVICES

7. It is recommended that GZA be retained to provide engineering services during any final design, construction and/or implementation of any measures recommended in this Report. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; and iii) provide modifications to our design.



Appendix B – Conceptual Design – Main Street over South River Bridge Replacement

© 2024 - GZA GeoEnvironmental, Inc. GZA-0-167200 - 0 167299 \150167225.00 CONWAY CENTER FLOOD MITIGATION\15.0167225.00 CAD\DWG\167225.00-CONCEPTUAL DESIGN.DWG DEMO-SED-EROS-WATER CONTROL June 27, 2024 MARK STADNICKI

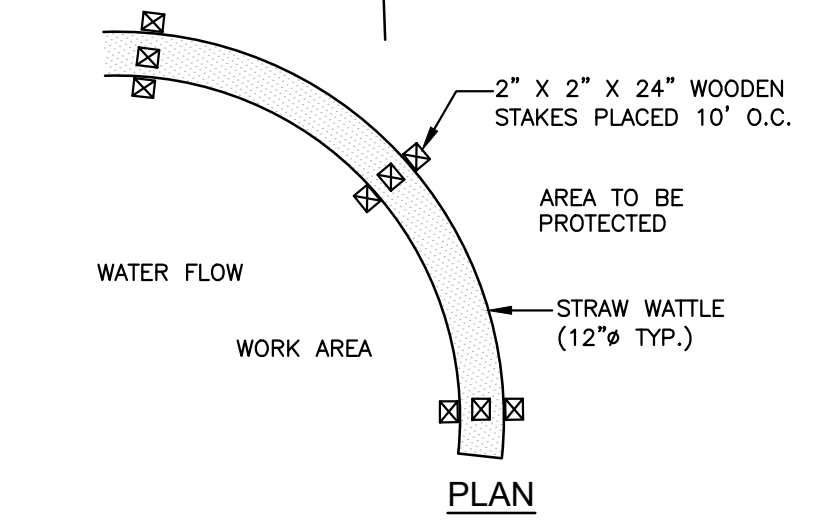
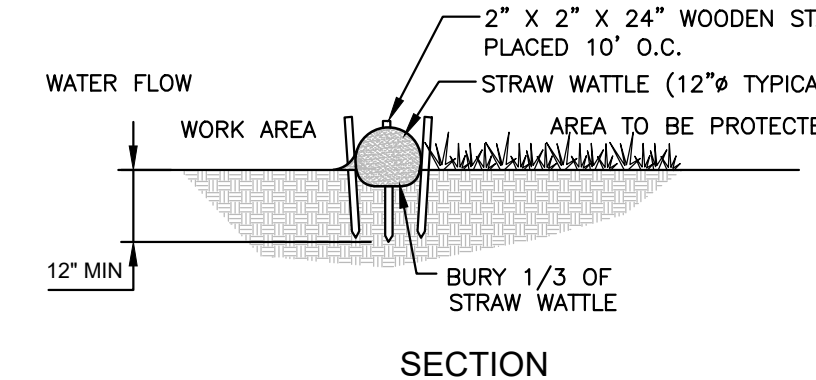
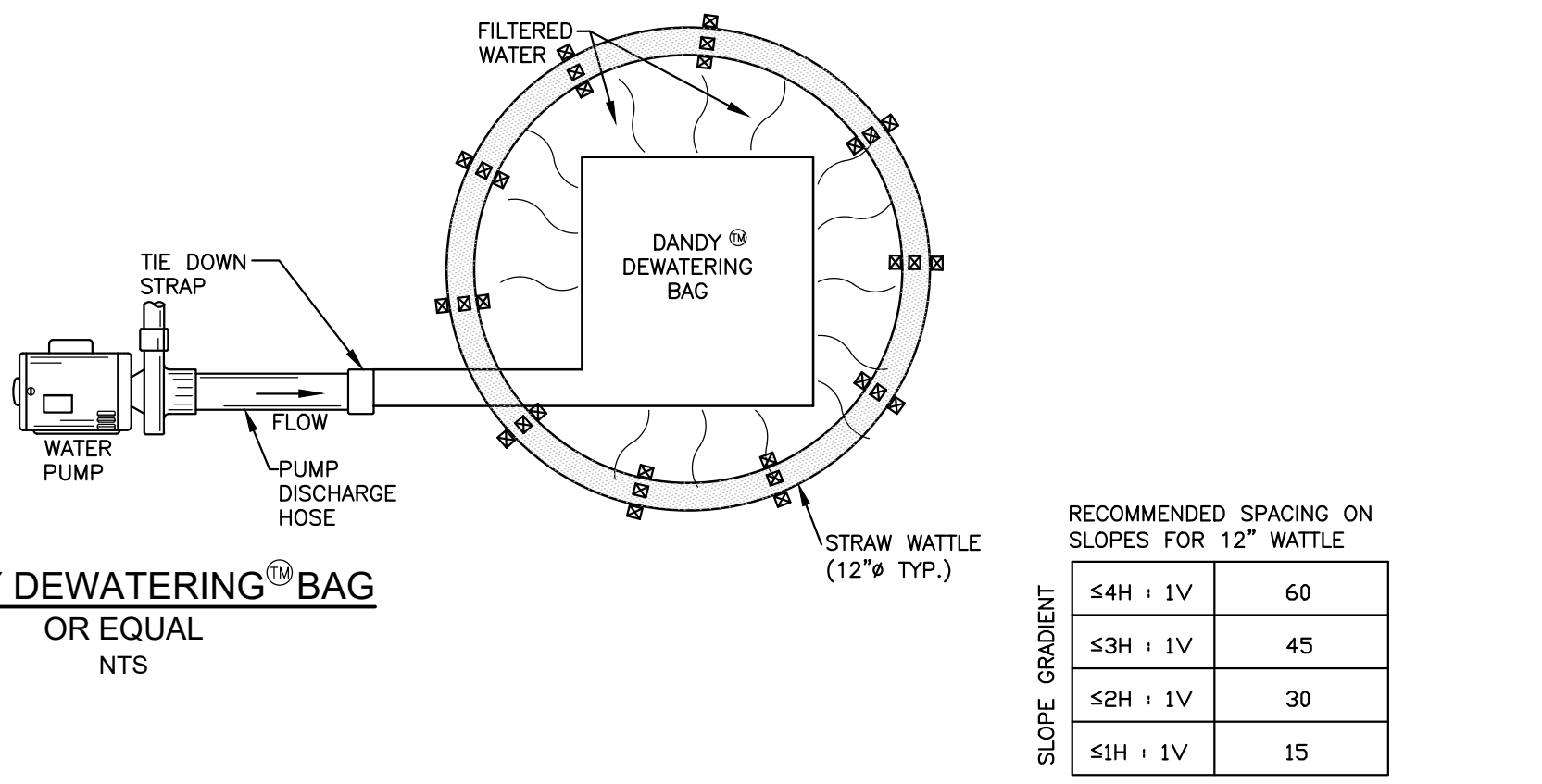
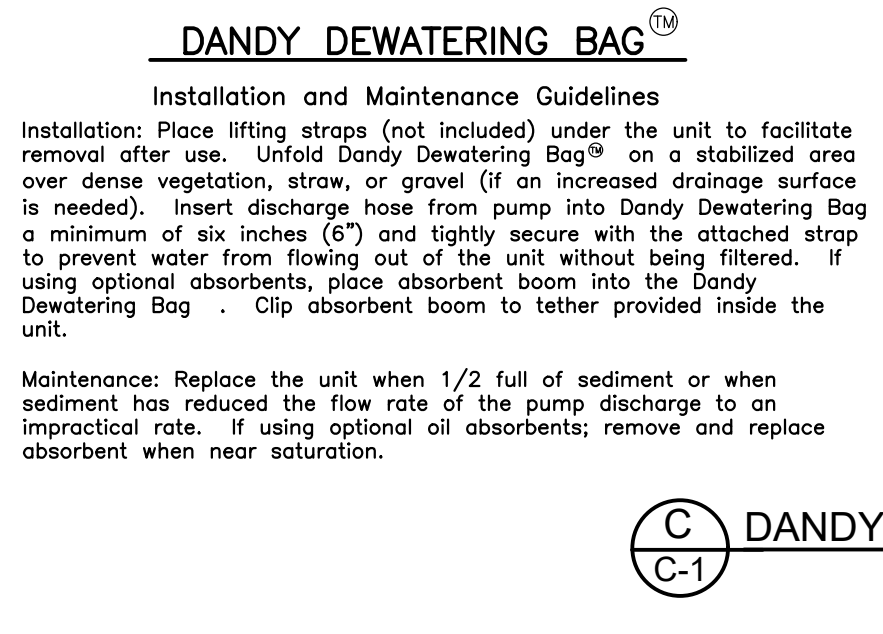
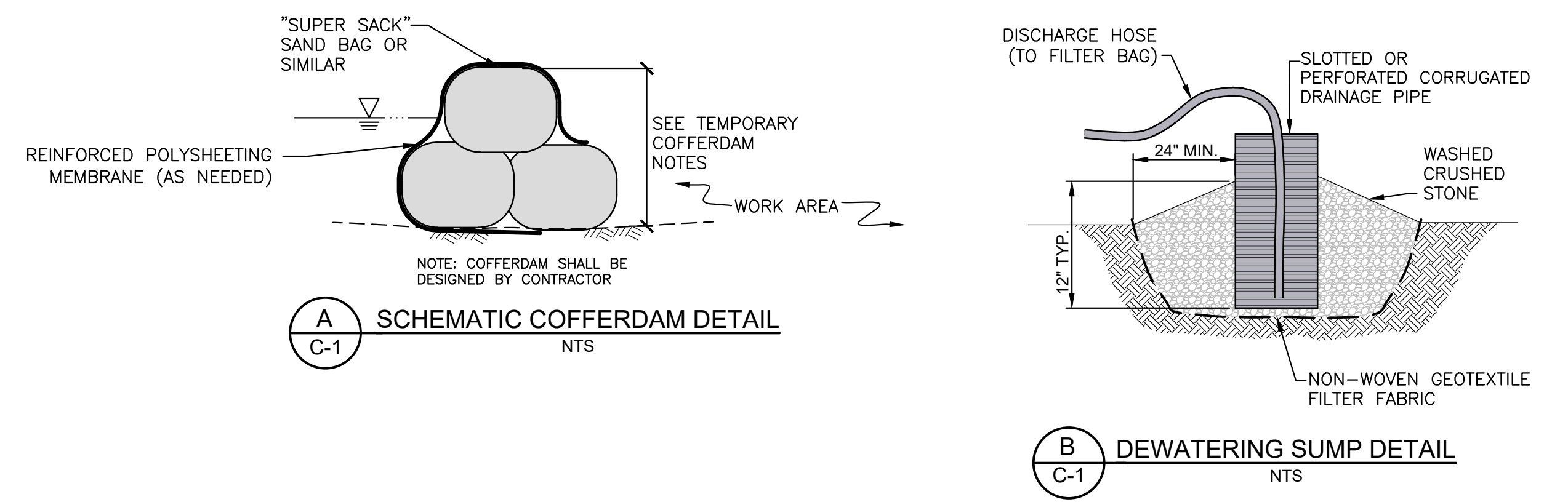


TEMPORARY WATER CONTROL, DEMOLITION AND SEDIMENT & EROSION CONTROL PLAN

LEGEND	
	RIGHT-OF-WAY (GIS)
	PROPERTY LINE (GIS)
	EXISTING DRAINAGE SEWER
	LIDAR TOPO CONTOUR (5')
	LIDAR TOPO CONTOUR (1')
	LIMIT OF WORK
	TEMPORARY EROSION CONTROL BARRIER
	TEMPORARY FLOATING SILT FENCE
	TEMPORARY COFFER DAM
	PROPOSED SAW CUT
	EXISTING OVERHEAD WIRES
	EXISTING FENCE
	EXISTING FENCE TO BE DEMOLISHED
	CONCRETE TO BE DEMOLISHED
	PAVEMENT TO BE DEMOLISHED
	T.B.R.
	TO BE REMOVED



- NOTES:**
- EXISTING CONDITIONS**
- TOPOGRAPHIC INFORMATION DEPICTED IS BASED ON LIDAR DATA OBTAINED FROM THE NOAA DATA ACCESS VIEWER (<https://coast.noaa.gov/data/viewer/#/lidar/search/>)
 - BOUNDARY INFORMATION DEPICTED IS APPROXIMATE AND BASED ON THE COMPILED DATA OBTAINED FROM PROPERTY BOUNDARY INFORMATION FROM MassGIS (<https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html>) AND THE 1926 STATE HIGHWAY LAYOUT OF ROUTE 116 (LAYOUT NO. 2370).
 - HIGHWAY LAYOUT STATIONING IS APPROXIMATE AND BASED ON THE 1926 STATE HIGHWAY LAYOUT OF ROUTE 116 (LAYOUT NO. 2370).
 - IMAGERY INFORMATION DEPICTED IS 2023 ORTHO PHOTOGRAPHY OBTAINED FROM MassGIS MassMapper (<https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html>)



PRELIMINARY PLANS
NOT FOR CONSTRUCTION

APPROVED:

NO.	ISSUE/DESCRIPTION	BY	DATE

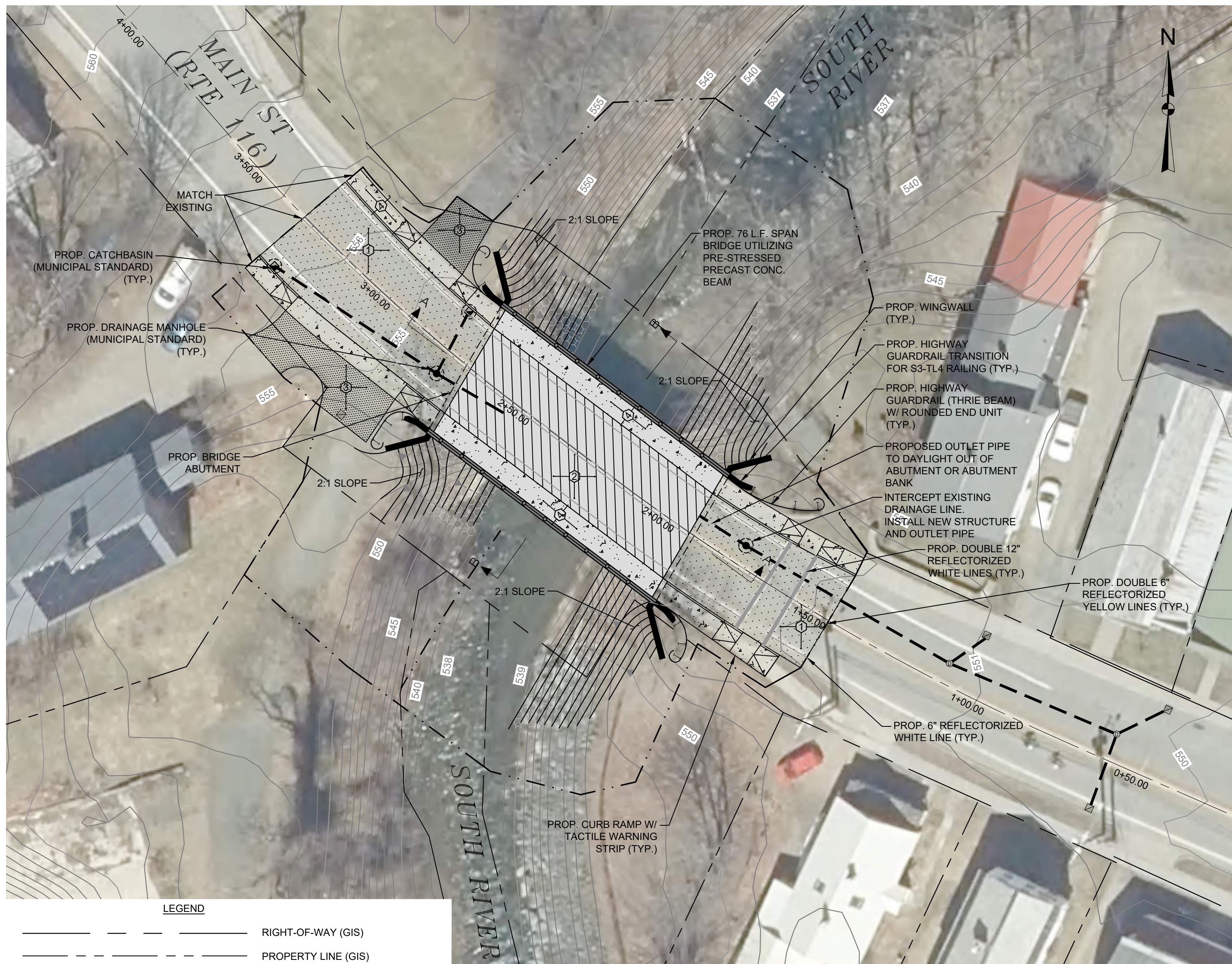
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

MAIN STREET SOUTH RIVER BRIDGE REPLACEMENT CONCEPTUAL DESIGN

TEMPORARY WATER CONTROL, DEMOLITION AND SEDIMENT & EROSION CONTROL

PREPARED BY: GZA GeoEnvironmental, Inc. www.gza.com	PREPARED FOR: TOWN OF CONWAY 32 MAIN STREET, P.O. BOX 240 CONWAY, MA 01341
PROJ MGR: RFS DESIGNED BY: MJS DATE: JUNE, 2024	REVIEWED BY: RFS DRAWN BY: MJS PROJECT NO.: 15.0167225.00
CHECKED BY: NLR SCALE: AS SHOWN REVISION NO.: -	DRAWING C-1 SHEET NO. 1 OF 2

2024 - GZA GeoEnvironmental, Inc. GZA-20-167200 - 0 167225.00 CONWAY CENTER FLOOD MITIGATION\15.0167225.00 CAD\DWG\167225.00-CONCEPTUAL DESIGN.DWG PROP. BRIDGE June 27, 2024 MARK STADNICKI

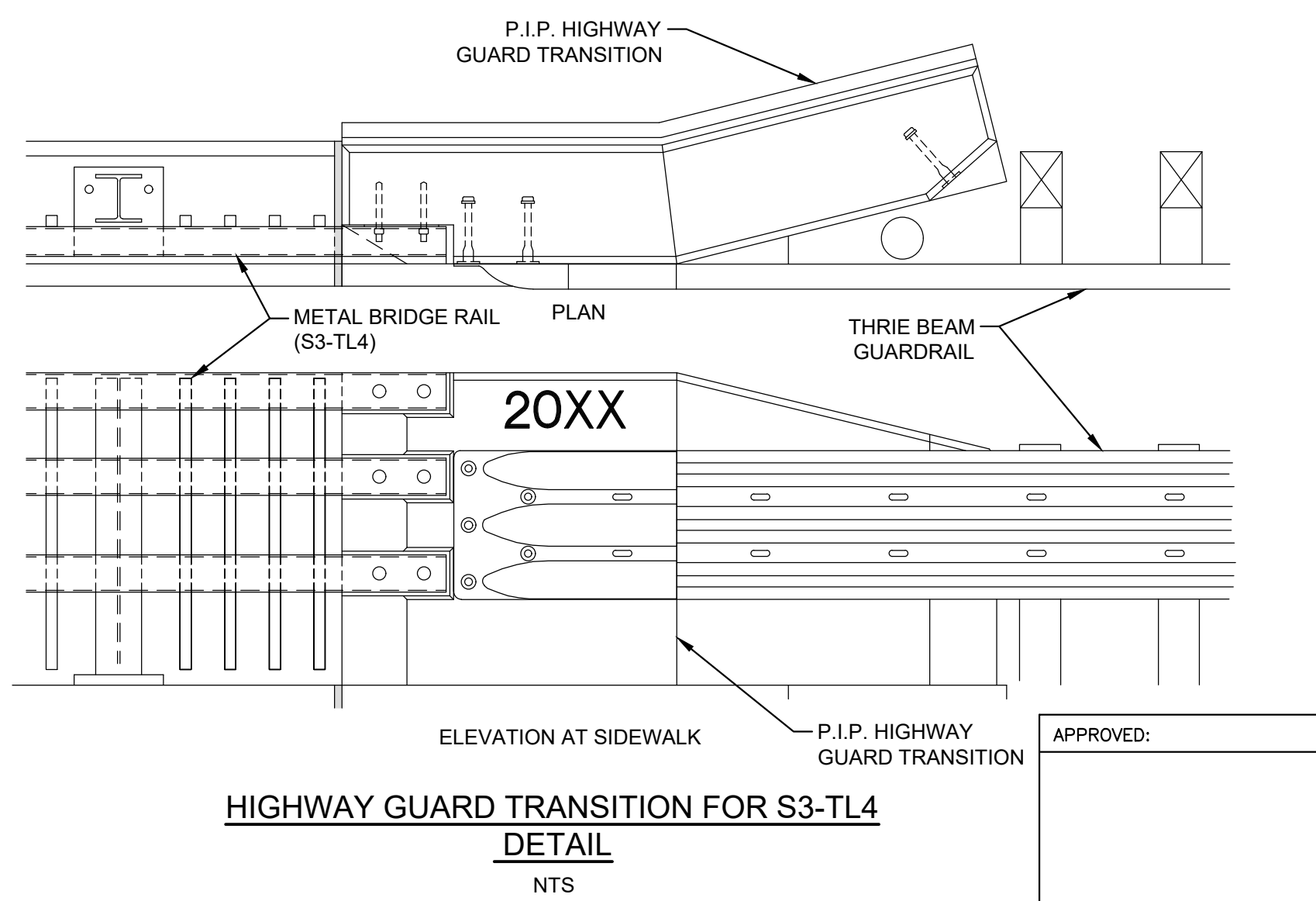
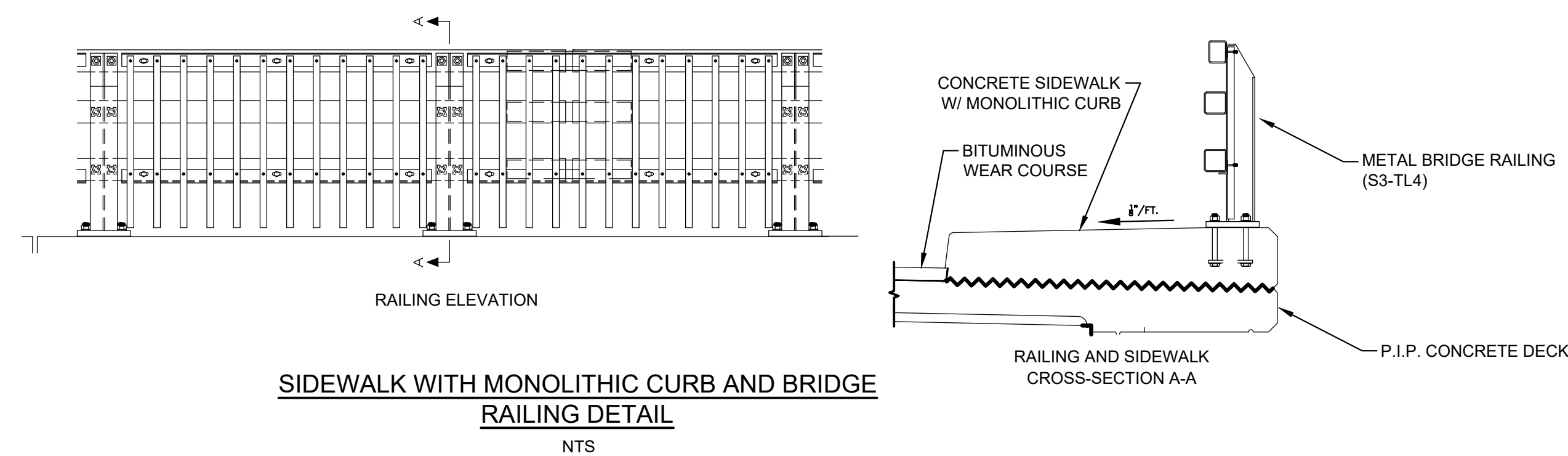
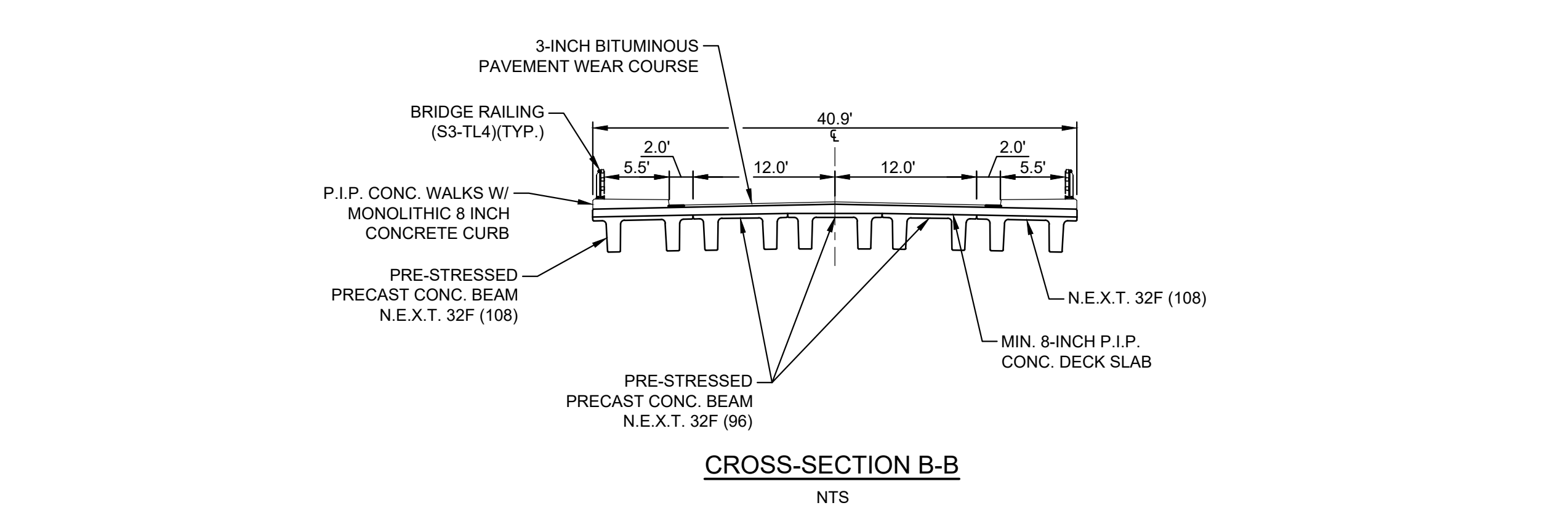
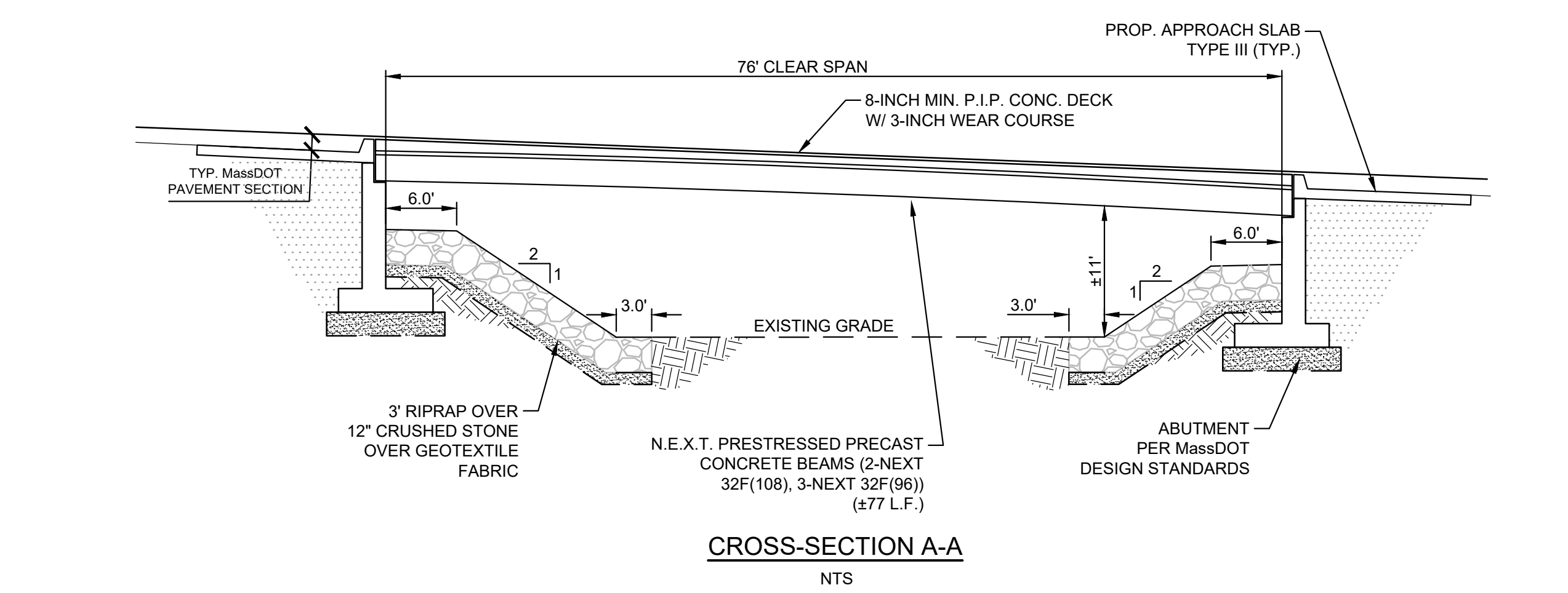


LEGEND	
	RIGHT-OF-WAY (GIS)
	PROPERTY LINE (GIS)
	LIDAR CONTOUR (5')
	LIDAR CONTOUR (1')
	EXISTING DRAINAGE SEWER
	PROPOSED DRAINAGE SEWER
	PROPOSED CONTOUR LINE
	PROPOSED GUARDRAIL
	PROPOSED METAL RAILING
	PROPOSED RIPRAP
	PROPOSED BITUMINOUS WEAR COURSE (3" BITUMINOUS PAVEMENT)
	PROPOSED BITUMINOUS PAVEMENT (1 1/2" SUPERPAVE SURFACE COURSE OVER 2 1/2" SUPERPAVE INTERMEDIATE COURSE OVER 3" SUPERPAVE BASE COURSE OVER 12" DENSE GRADED CRUSHED STONE SUBBASE)
	PROPOSED CONCRETE PAVEMENT (4" CONCRETE OVER 8" DENSE GRADED CRUSHED STONE SUBBASE)
	PROPOSED BITUMINOUS DRIVEWAY REPAIR (2" BITUMINOUS PAVEMENT OVER 8" DENSE GRADE CRUSHED STONE SUBBASE)
	POURED IN PLACE
	TYPICAL



- NOTES:**
- EXISTING CONDITIONS**
- TOPOGRAPHIC INFORMATION DEPICTED IS BASED ON LIDAR DATA OBTAINED FROM THE NOAA DATA ACCESS VIEWER (HTTPS://COAST.NOAA.GOV/DATAVIEWER#/LIDAR/SEARCH)
 - BOUNDARY INFORMATION DEPICTED IS APPROXIMATE AND BASED ON THE COMPILED DATA OBTAINED FROM PROPERTY BOUNDARY INFORMATION FROM MassGIS (HTTPS://MAPS.MASSGIS.DIGITAL.MASS.GOV/MassMapper/MassMapper.html) AND THE 1926 STATE HIGHWAY LAYOUT OF ROUTE 116 (LAYOUT NO. 2370).
 - HIGHWAY LAYOUT STATIONING IS APPROXIMATE AND BASED ON THE 1926 STATE HIGHWAY LAYOUT OF ROUTE 116 (LAYOUT NO. 2370).
 - IMAGERY INFORMATION DEPICTED IS 2023 ORTHO PHOTOGRAPHY OBTAINED FROM MassGIS MassMapper (HTTPS://MAPS.MASSGIS.DIGITAL.MASS.GOV/MassMapper/MassMapper.html)
- PROPOSED CONDITIONS**
- PROPOSED CONDITIONS SHOWN ON THE PLAN ARE CONCEPTUAL AND FOR GENERAL INFORMATION TO ACCOMPANY GRANT APPLICATION.
 - CONCEPTUAL BRIDGE DESIGN IS BASED OFF MassDOT LF RD BRIDGE MANUAL - 2013 EDITION STANDARD BRIDGE DETAILS.

- PAVEMENT NOTES:**
- FULL DEPTH HMA CONSTRUCTION**
- SURFACE COURSE: 1.5" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER 2" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5) OVER
- BASE: 4" SUPERPAVE BASE COURSE - 38.5 (SBC-37.5) OVER
- SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER 8" GRAVEL BORROW TYPE B
- CEMENT CONCRETE SIDEWALKS**
- SURFACE COURSE: 4" CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610) OVER
- SUBBASE: 8" GRAVEL BORROW TYPE B
- CEMENT CONCRETE SIDEWALKS AT DRIVEWAYS**
- SURFACE COURSE: 6" CEMENT CONCRETE (AIR ENTRAINED 4000 PSI, 3/4", 610) OVER
- SUBBASE: 8" GRAVEL BORROW TYPE B
- HMA DRIVEWAYS**
- SURFACE COURSE: 1.5" HOT MIX ASPHALT SURFACE COURSE - 9.5 (SSC-9.5) OVER 2.5" HOT MIX ASPHALT SURFACE COURSE - 12.5 (SSC-12.5) OVER
- SUBBASE: 8" GRAVEL BORROW TYPE B
- BRIDGE PAVEMENT**
- SURFACE COURSE: 1.5" SUPERPAVE BRIDGE SURFACE COURSE - 9.5 (SSC-B-9.5) OVER
- PROTECTIVE COURSE: 1.5" SUPERPAVE BRIDGE PROTECTIVE COURSE - 9.5 (SPC-B-9.5)



PRELIMINARY PLANS

NOT FOR CONSTRUCTION

NO.	ISSUE/DESCRIPTION	BY	DATE

MAIN STREET SOUTH RIVER BRIDGE REPLACEMENT CONCEPTUAL DESIGN

BRIDGE REPLACEMENT SITE PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. www.gza.com	PREPARED FOR: TOWN OF CONWAY 32 MAIN STREET, P.O. BOX 240 CONWAY, MA 01341
PROJ MGR: RFS DESIGNED BY: MJS DATE: JUNE, 2024	REVIEWED BY: RFS DRAWN BY: MJS PROJECT NO. 15.0167225.00
CHECKED BY: NLR SCALE: AS SHOWN REVISION NO. -	DRAWING C-2 SHEET NO. 2 OF 2



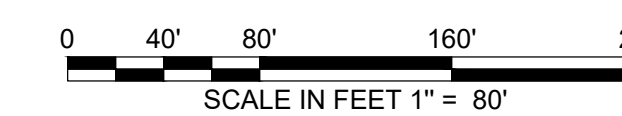
Appendix C – Conceptual Design – Floodplain Lowering Upstream of Covered Bridge



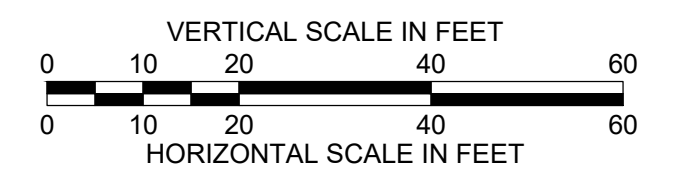
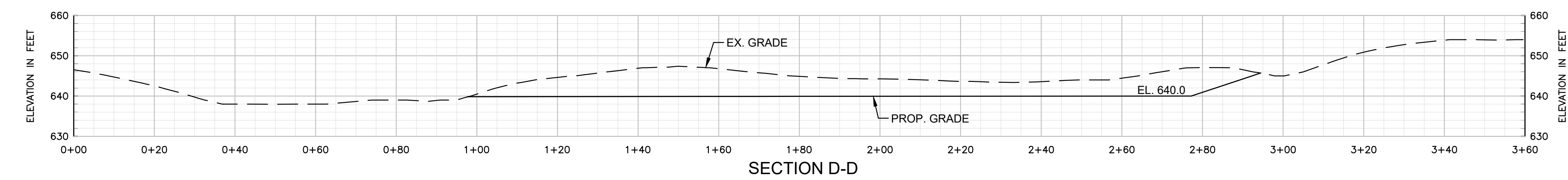
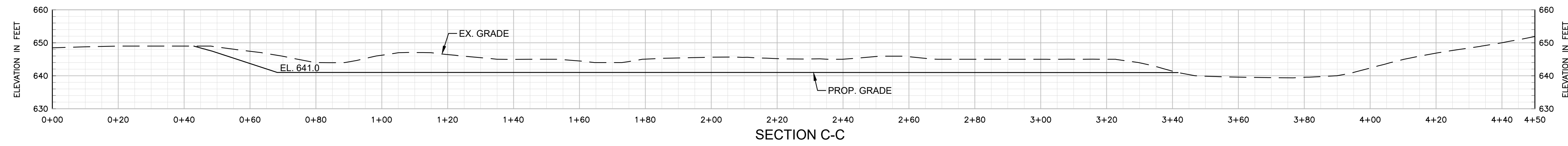
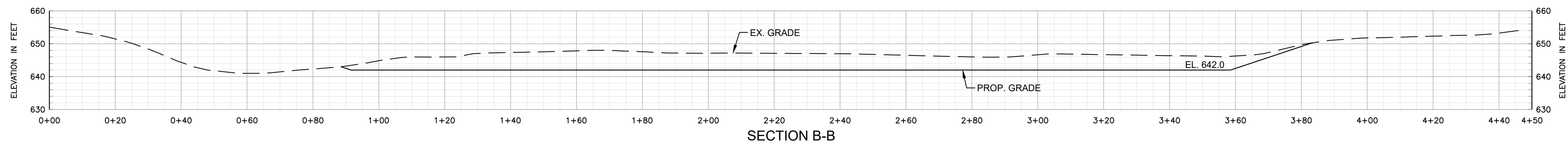
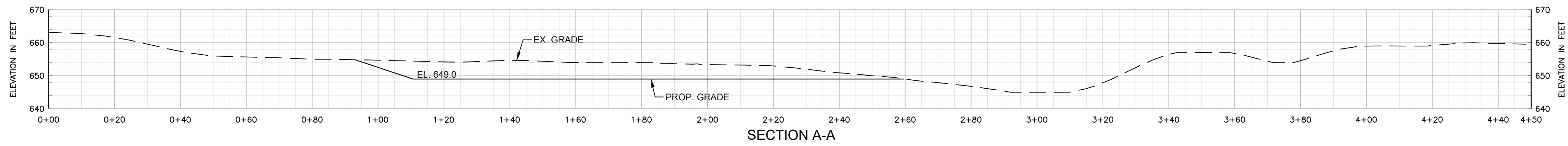
LEGEND

↑ A ——— A ↑ CROSS SECTION LOCATION

NOTE:
AERIAL IMAGERY OBTAINED FROM MassGIS-MassMapper ORTHO IMAGERY 2023.



NO.	ISSUE/DESCRIPTION	BY	DATE
<small>UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOTECHNICAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.</small>			
FLOODPLAIN LOWERING UPSTREAM OF BURKVILLE COVERED BRIDGE CONWAY, MA			
CONCEPTUAL DESIGN			
<small>PREPARED BY:</small> GZA GeoEnvironmental, Inc. <small>www.gza.com</small>		<small>PREPARED FOR:</small> TOWN OF CONWAY 32 MAIN STREET, P.O. BOX 240 CONWAY, MA 01341	
<small>PROJ MGR:</small> RTS <small>DESIGNED BY:</small> RTS <small>DATE:</small> JUNE, 2024	<small>REVIEWED BY:</small> NLR <small>DRAWN BY:</small> EDM <small>PROJECT NO.:</small> 15.0167225.00	<small>CHECKED BY:</small> SSL <small>SCALE:</small> 1"=80' <small>REVISION NO.:</small> -	FIGURE 1



NO.	ISSUE/DESCRIPTION	BY	DATE
<small>UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOTECHNICAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.</small>			
FLOODPLAIN LOWERING UPSTREAM OF BURKVILLE COVERED BRIDGE CONWAY, MA			
CONCEPTUAL DESIGN CROSS - SECTIONS			
<small>PREPARED BY:</small> GZA GeoEnvironmental, Inc. <small>www.gza.com</small>		<small>PREPARED FOR:</small> TOWN OF CONWAY 32 MAIN STREET, P.O. BOX 240 CONWAY, MA 01341	
<small>PROJ MGR:</small> RTS <small>DESIGNED BY:</small> RTS <small>DATE:</small> JUNE, 2024	<small>REVIEWED BY:</small> NLR <small>DRAWN BY:</small> EDM <small>PROJECT NO.:</small> 15.0167225.00	<small>CHECKED BY:</small> SSL <small>SCALE:</small> AS NOTED <small>REVISION NO.:</small> -	FIGURE 2



Appendix D – South River Resilience Projects - Hydraulic Analysis Report
(Incorporated by Reference)



Appendix E – Conway Center Flood Mitigation Project Update, May 18, 2024

Conway Center Flood Mitigation Project Update

Rosalie Starvish, GZA
Nicolas Miller, Field Geology Services
May 18, 2024



ResilientMass



Franklin Regional
Council of Governments



Field Geology Services
Hydro Geomorphology

1

Agenda

- Hydrologic and Hydraulic Modeling Overview
- Existing Conditions Results
- Flood Resilience Projects
 - Overview
 - Modeling Results
 - Prioritization
- Next Steps
- Questions and Discussion
- Provide Your Input



2

Hydrologic and Hydraulic Modeling Overview

- Objectives
 - Model the South River and Pumpkin Hollow Brook
 - Focus on Conway Center
 - Flood impacts
 - Flood mitigation strategies
- Methods
 - Surveyed data collection
 - Hydrology (Flows)
 - Hydraulics (Depth and Velocity)

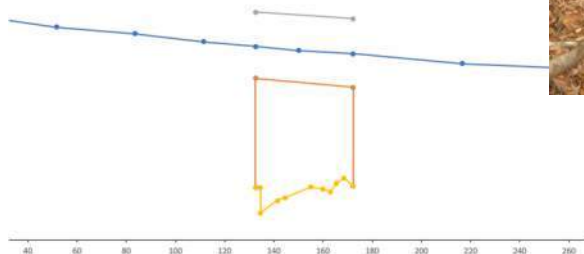


3

Hydrologic and Hydraulic Modeling Overview

- Surveyed Data Collection
 - Elevations
 - Bridge and culvert crossing dimensions

Survey transect – Main St bridge



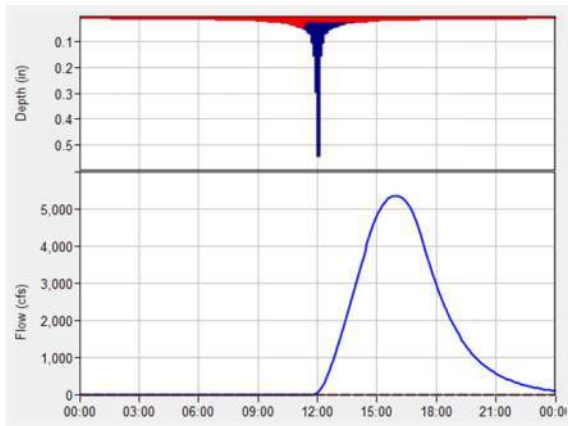
Map of survey points



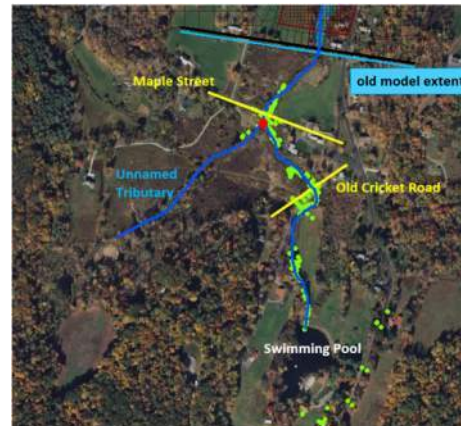
4

Hydrologic and Hydraulic Modeling Overview

The **Hydrologic Model** component takes precipitation and outputs streamflow. Parameters are based on observed storms and knowledge of the watershed.



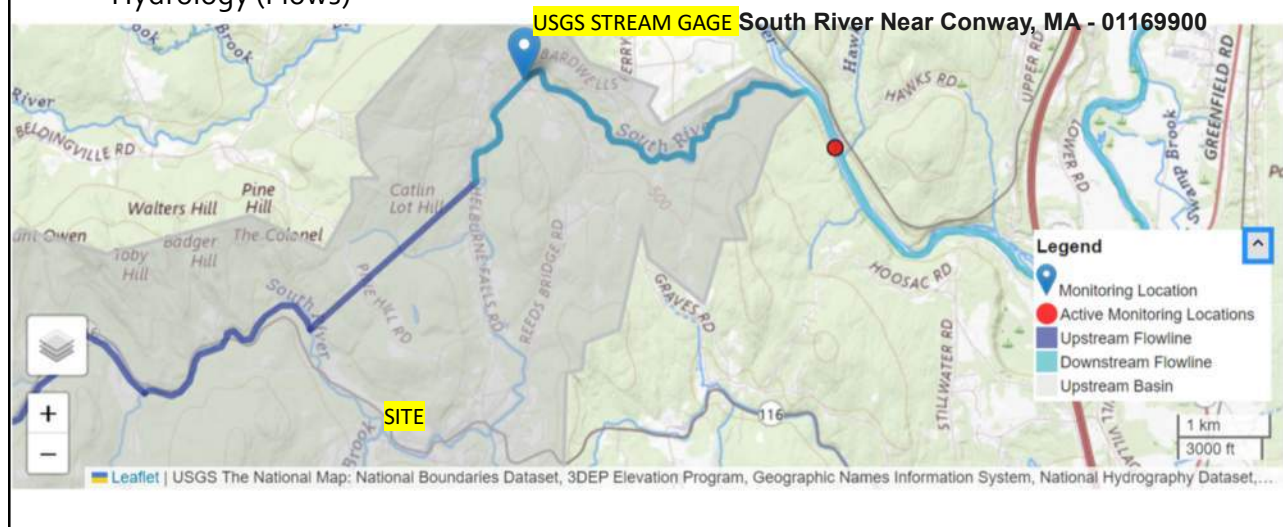
The **Hydraulic Model** combines streamflow with known and surveyed geometry to output depth and velocity of flow.



5

Hydrologic and Hydraulic Modeling Overview

- Hydrology (Flows)



6

Hydrologic and Hydraulic Modeling Overview

- Hydrology (Flows)

Annual Recurrence Interval	Annual Exceedance Probability	In any 1 year period	In any 30 year period
2-year	50%	1 chance in 2	99.9999999%
50-year	2%	1 chance in 50	45%
100-year	1%	1 chance in 100	26%
500-year	0.2%	1 chance in 500	6%

7

Hydrologic and Hydraulic Modeling Overview

- Hydrology (Flows)

Irene (9,300 cfs at USGS gage)

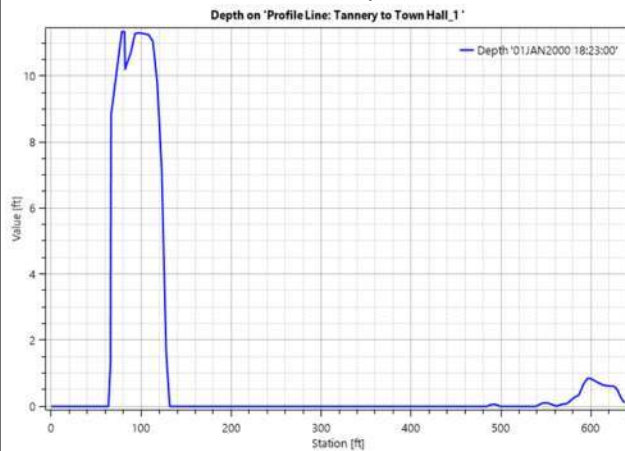
Watershed	Drainage Area	Peak Flow (cfs)						
		1 Year	2 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Main Street at South River	21.0	665	1,762	4,811	6,600	7,668	8,912	12,222
Pumpkin Hollow Brook	1.6	52	137	373	503	594	691	947
Johnny Bean Brook	1.1	34	90	247	345	394	458	628
South River	18.3	579	1,535	4,191	5,752	6,680	7,763	10,647

8

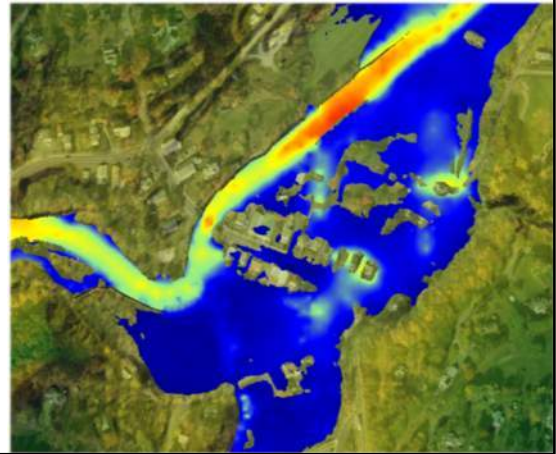
Hydrologic and Hydraulic Modeling Overview

- Hydraulics (Depth and Velocity)

Modeled depth



Modeled velocity



9

Existing Conditions Results

Extent of Flooding



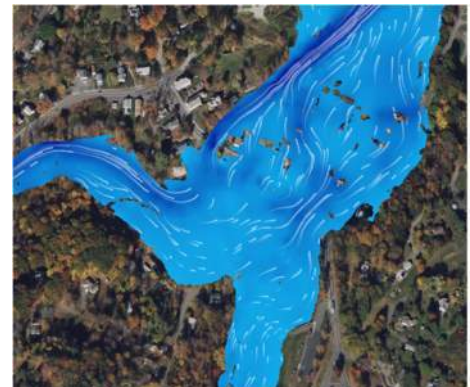
2 Year

7' 4"



10 Year

13' 3"



100 Year

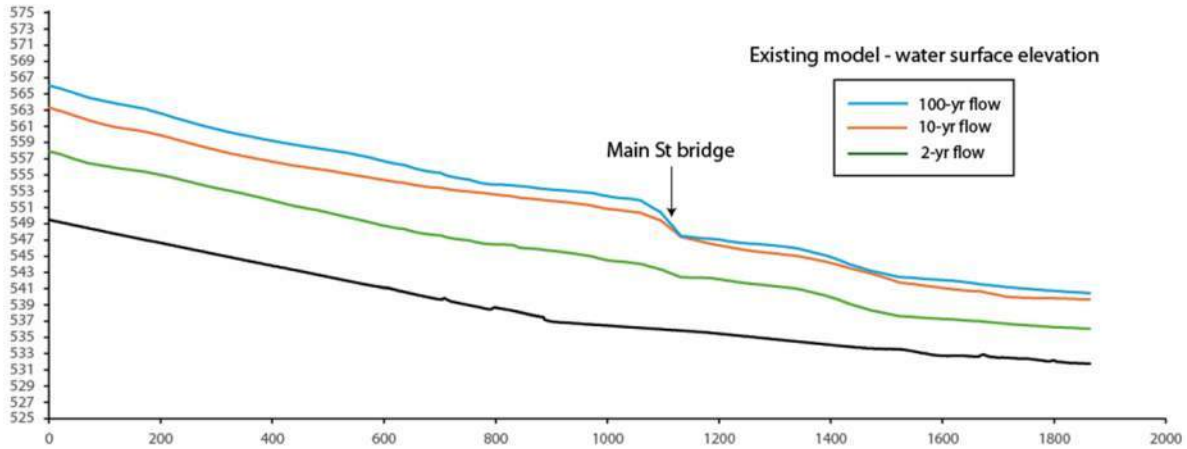
14' 4"

Depth of flow through Main Street Bridge

10

Existing Conditions Results

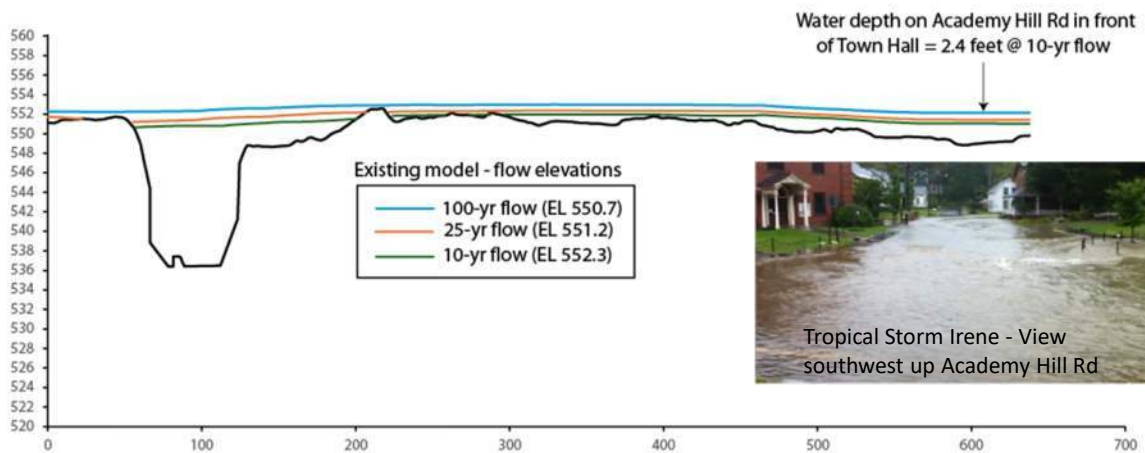
Modeled water surface elevations – through Main St bridge



11

Existing Conditions Results

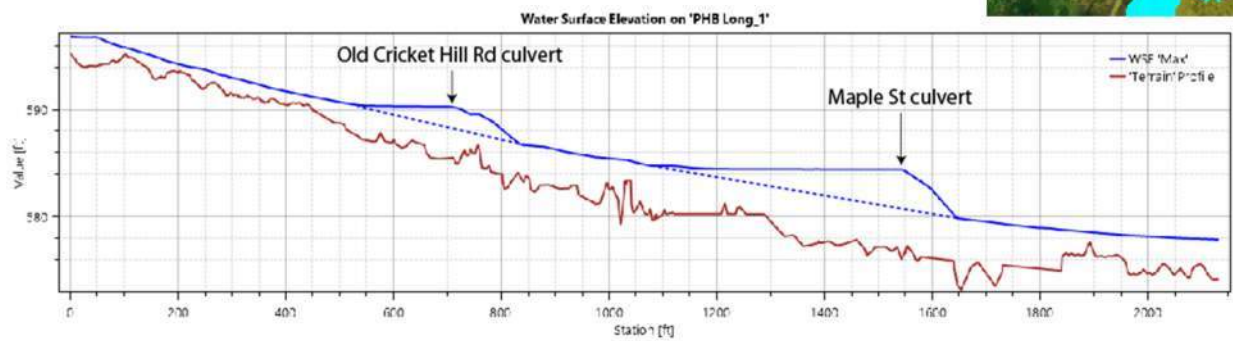
Modeled depth upstream of Main St bridge



12

Existing Conditions Results

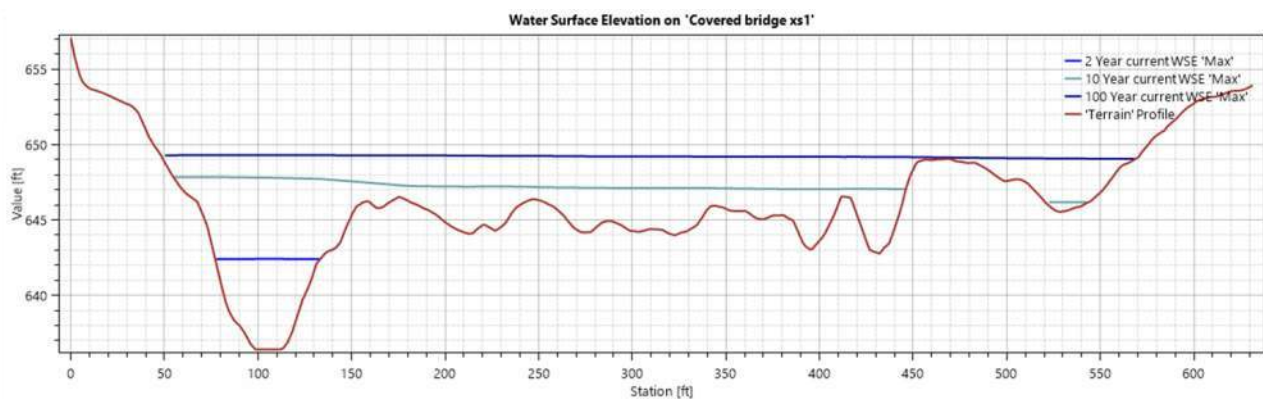
Undersized culverts on Pumpkin Hollow Brook



13

Existing Conditions Results

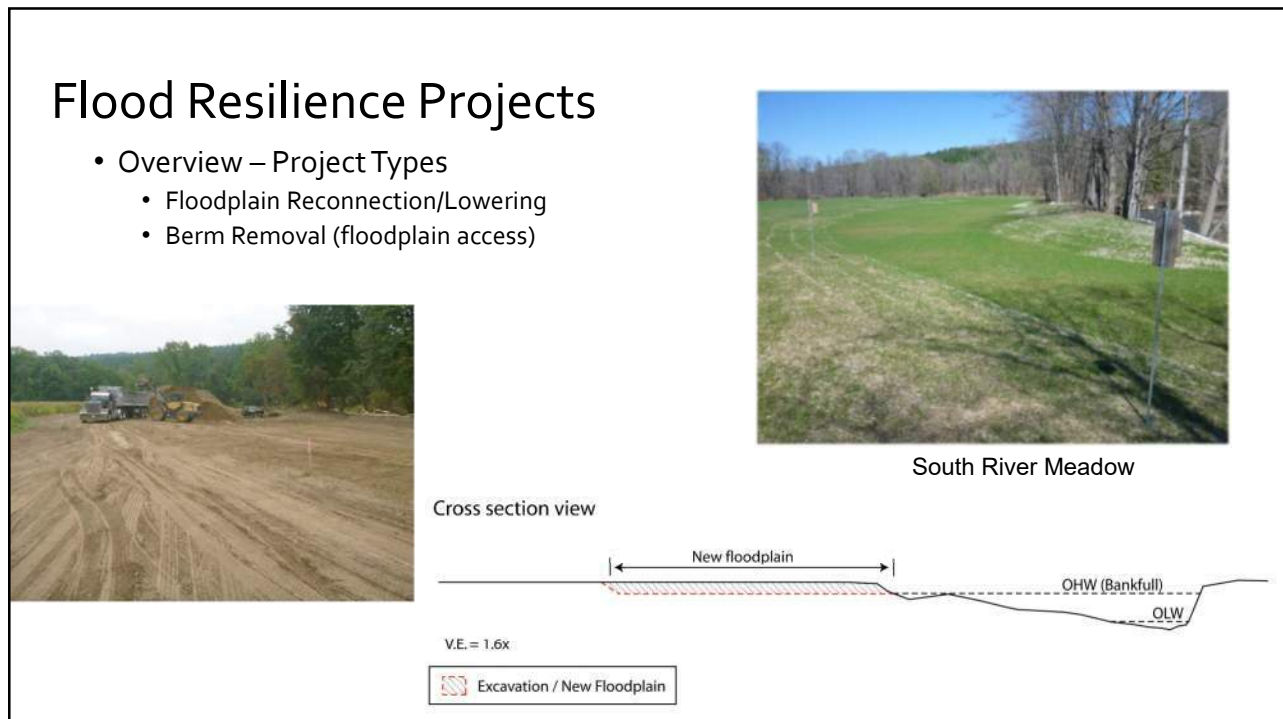
Modeled depth upstream of the Covered bridge



14



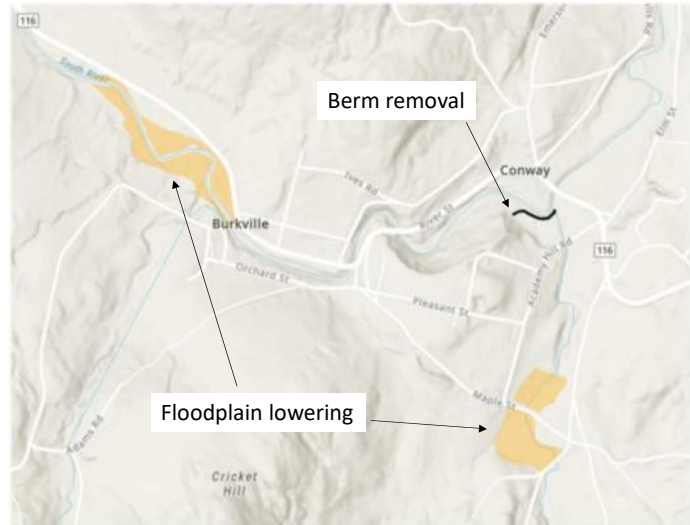
15



16

Flood Resilience Projects

- Overview – Project Types
 - Floodplain Reconnection/Lowering
 - Berm Removal (floodplain access)



17

Flood Resilience Projects

- Floodplain Lowering



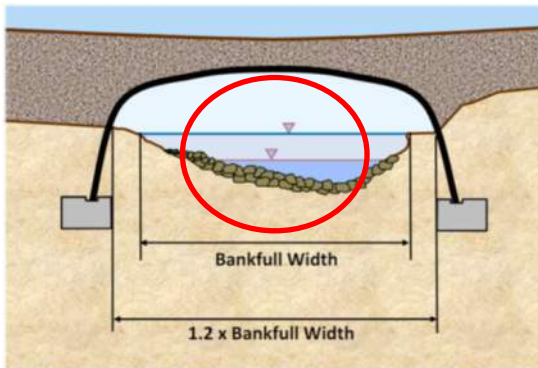
Legacy sediments upstream
of covered bridge



18

Flood Resilience Projects

- Overview – Project Types
 - Bridge/Culvert Capacity (Upsizing)



Source: MassDOT Stream Crossing Handbook

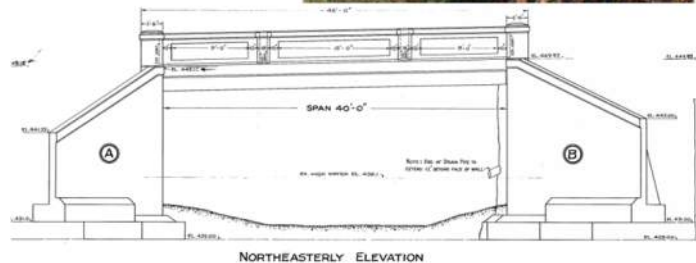
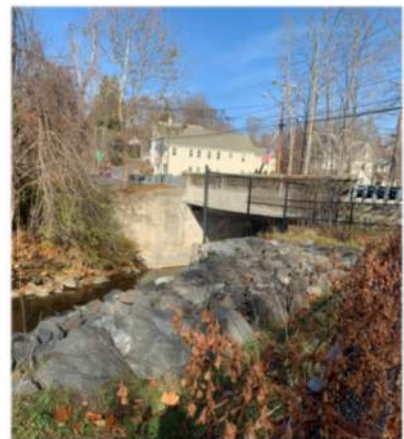
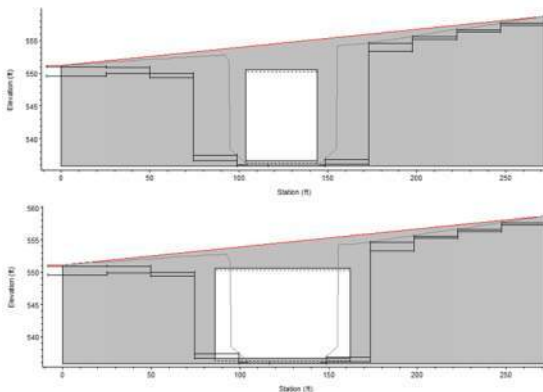


Old Cricket Hill Rd

19

Flood Resilience Projects

- Bridge/Culvert Capacity (Upsizing) – Main Street Bridge
 - Width 39 feet → 76 feet

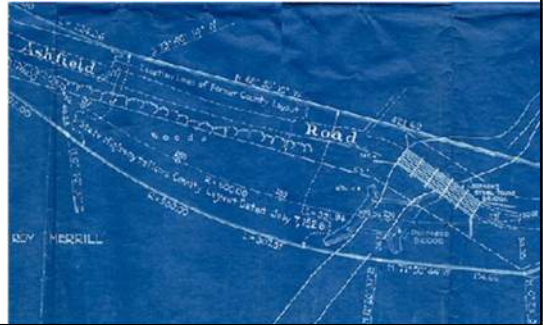


20



Downstream view of bridge – Fall 2023

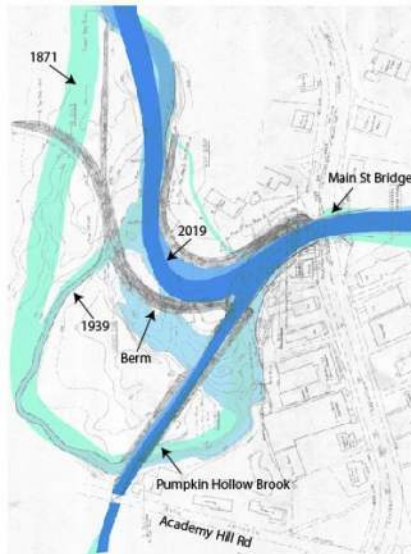
Photo of steel truss bridge, which replaced the wood trestle bridge, which was destroyed in flood of 1869 (from Picturesque Franklin, 1891, courtesy of the Conway Historical Society). The current bridge was built slightly upstream when the State Highway came through in 1926, as can be seen in the blueprints to the right. The bridge span was reduced by 31 percent from 57.1 to 39.7 feet (based on blueprints). The bridge constricts the flow during high flow events leading to increased erosion hazards.



21

Flood Resilience Projects

Berm breaching/removal



1939 – Berm blueprints (aka Dike)



22

Flood Resilience Projects

- Overview – Project Types
 - Flood Conveyance (Flood Diversion Culvert)



Source: ldpwatersheds.org



23

Flood Resilience Projects

- Overview – Projects Considered but not modeled
- Conway Swimming Pool dam
- Pumpkin Hollow Brook crossings:
 - Academy Hill Road
 - Maple Street
 - Old Cricket Hill Road

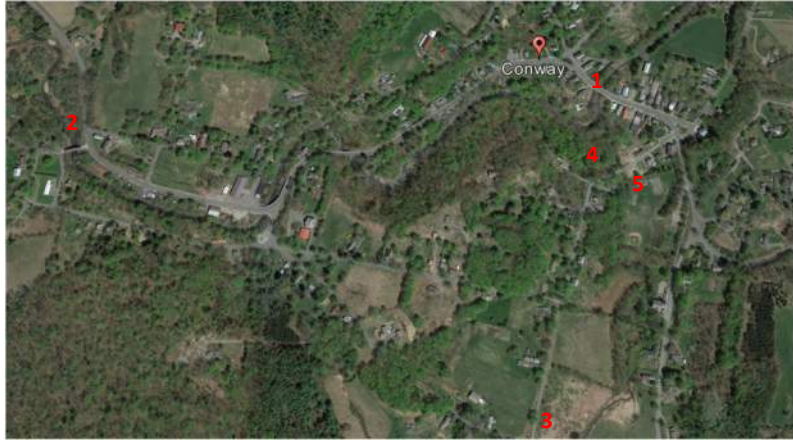
Old Cricket Hill Rd blocking floodplain



24

Modeling Results

1. Enlarge Main Street bridge over South River
2. Floodplain Lowering – Upstream of Covered Bridge
3. Floodplain Lowering – Pumpkin Hollow Brook
4. Berm Removal upstream of Main Street
5. Flood Diversion Culvert – Pumpkin Hollow Brook



25

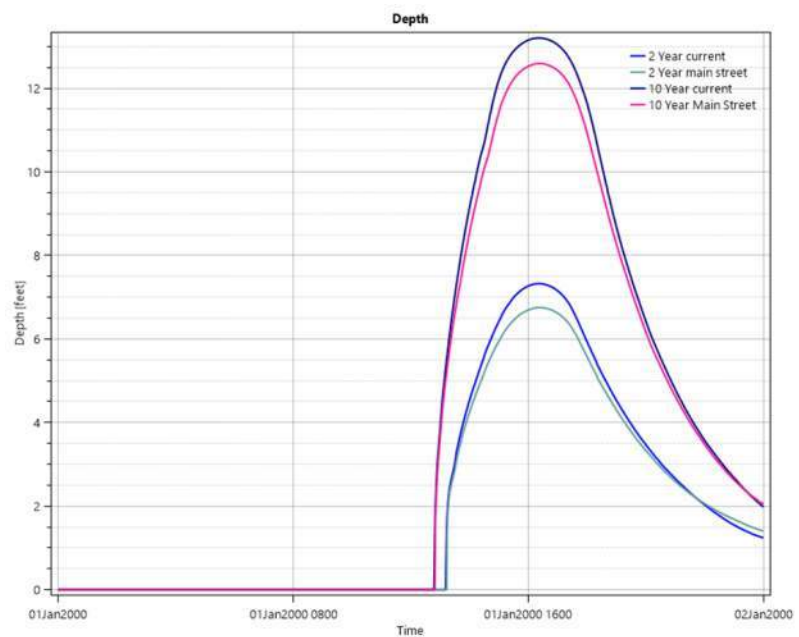
Modeling Results

Main Street Bridge

Widening Main Street Bridge to 76 feet:

10 Year Flood:

- 9 inch reduction in peak depth
- 40% reduction in peak velocity

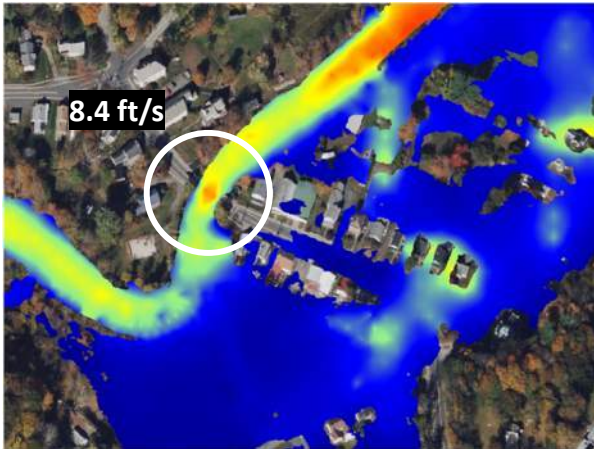


26

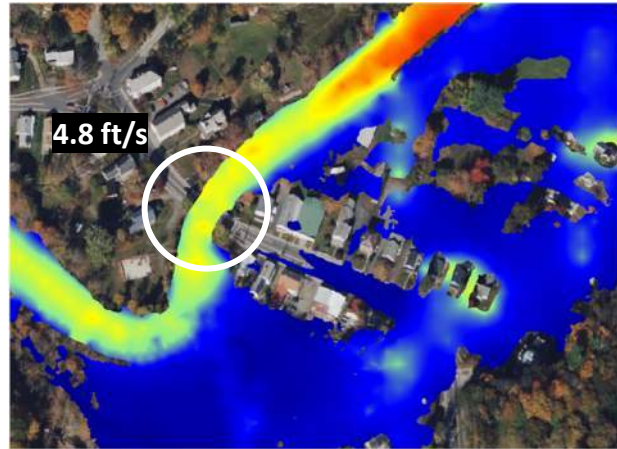
Modeling Results

Main Street Bridge

10 Year Storm with Existing Bridge



10 Year Storm with 76' Span Bridge



Reduction in peak velocity from 8.4 ft/s to 4.8 ft/s

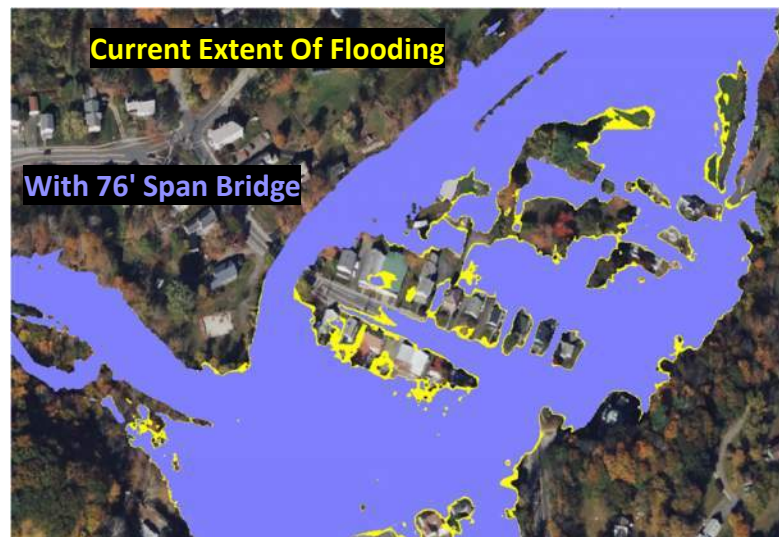
27

Modeling Results

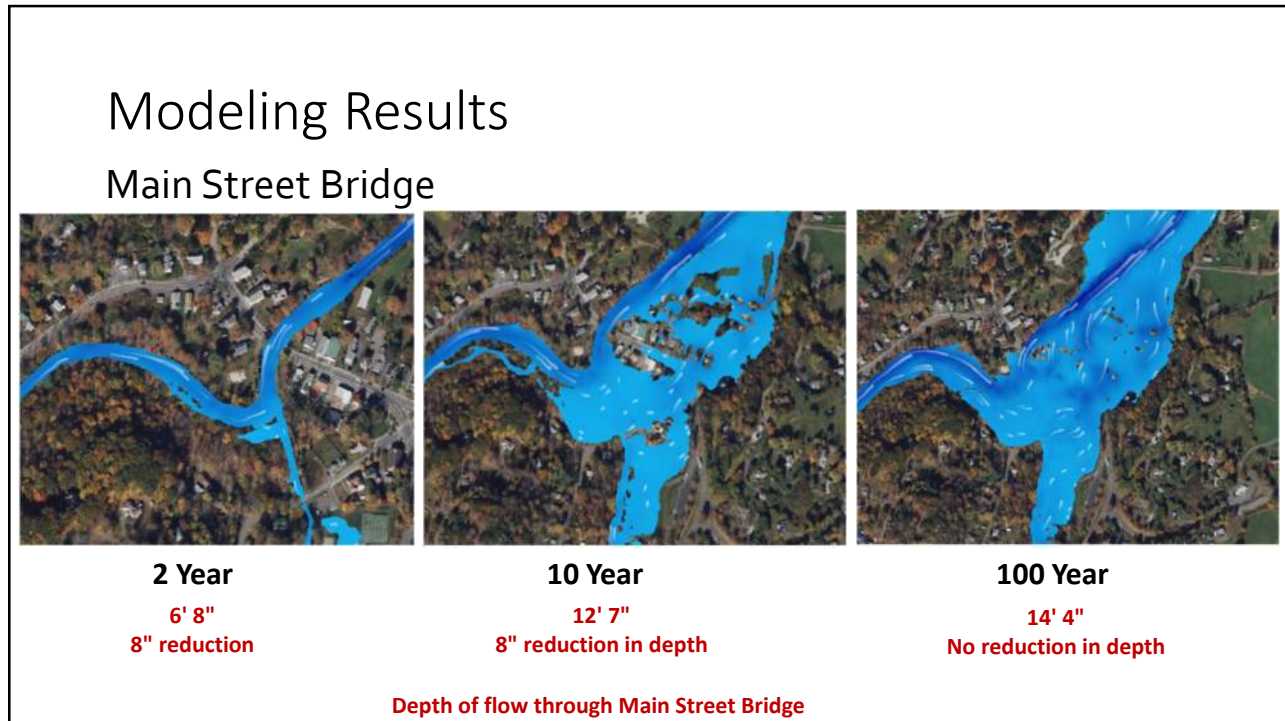
Main Street Bridge

Reduction of extent of flooding from current conditions (yellow) to 76-foot span (purple)

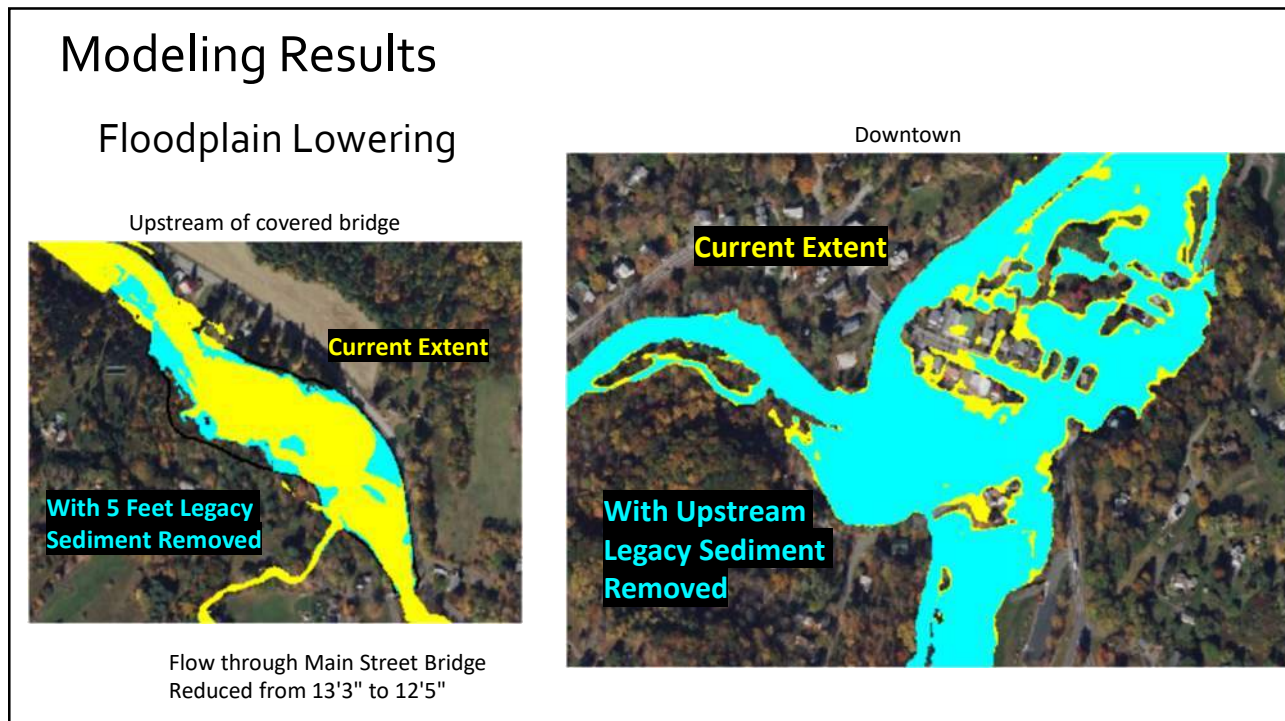
Upstream floodplain lowering has a greater effect on the extent of flooding downtown. Widening the bridge has a greater reduction in velocity.



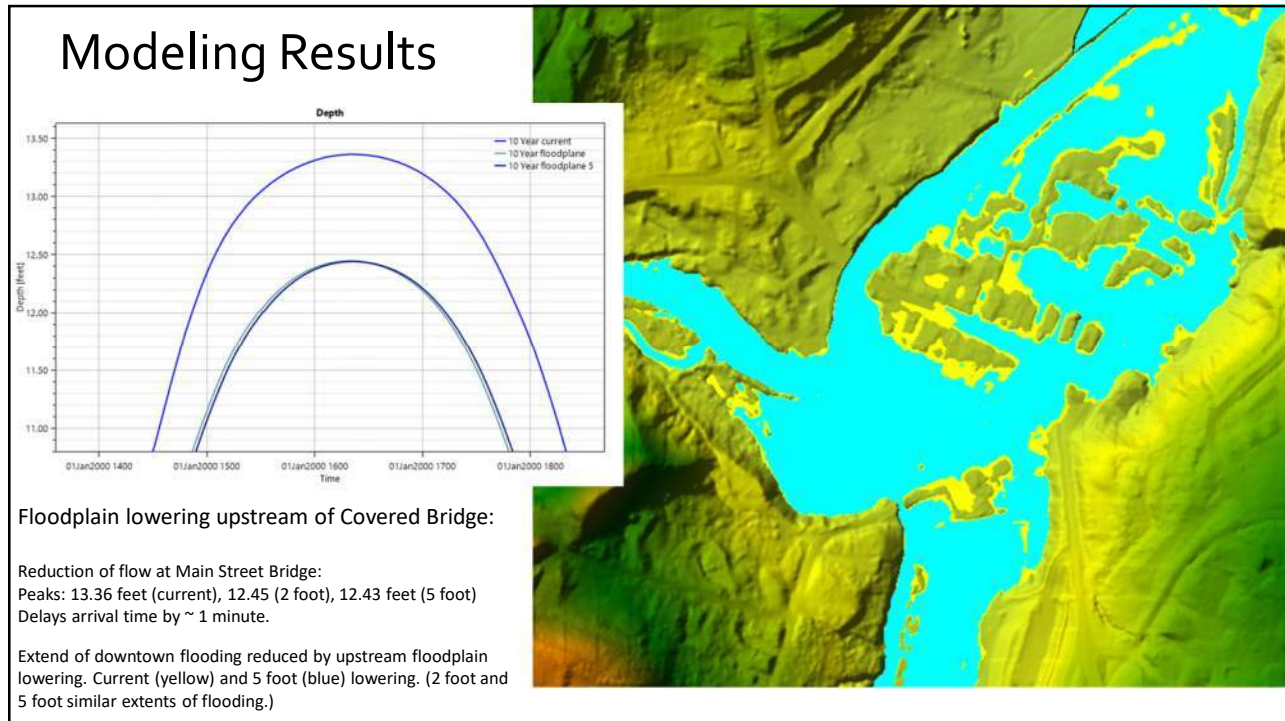
28



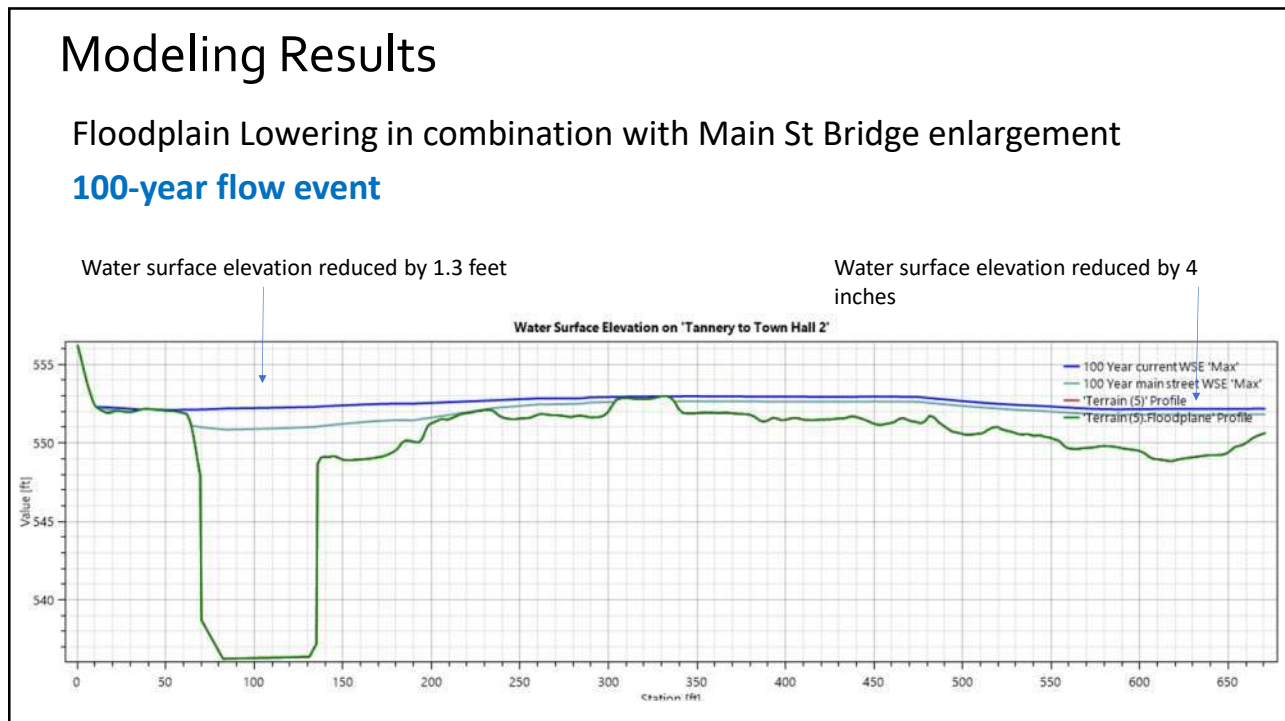
29



30



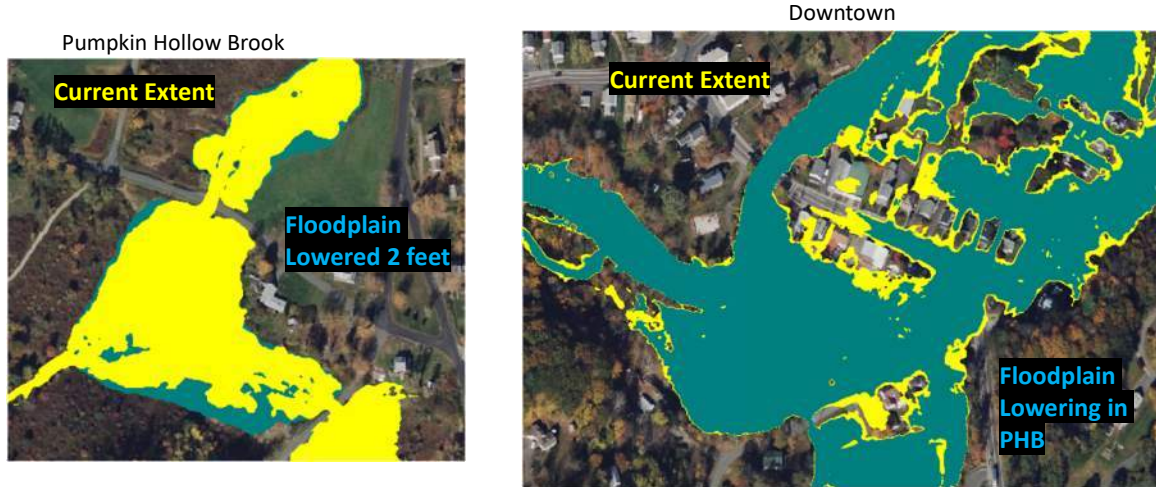
31



32

Modeling Results

Pumpkin Hollow Brook Floodplain Lowering

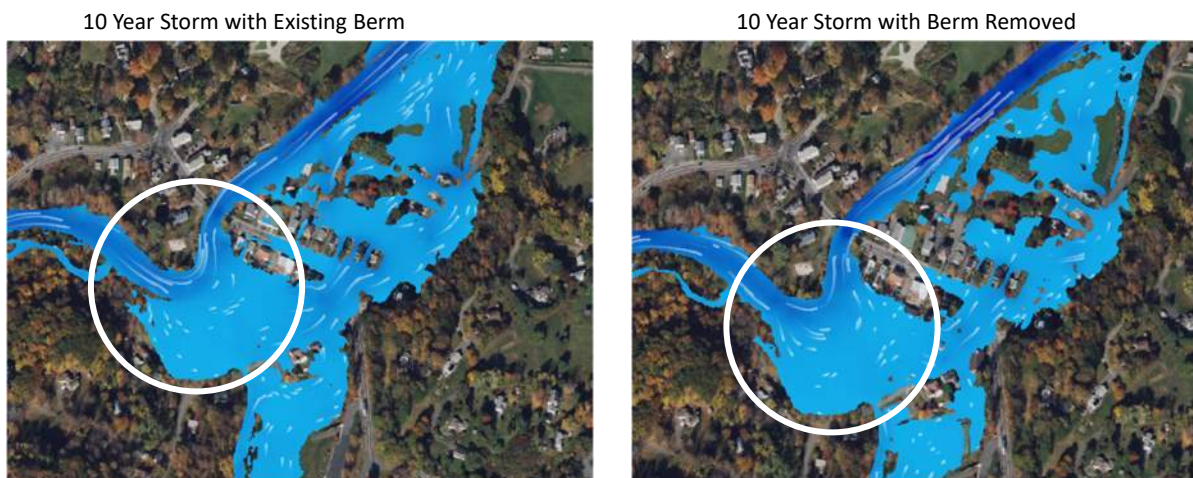


Reduces peak at Main Street from 13'3" to 12'5"

33

Modeling Results

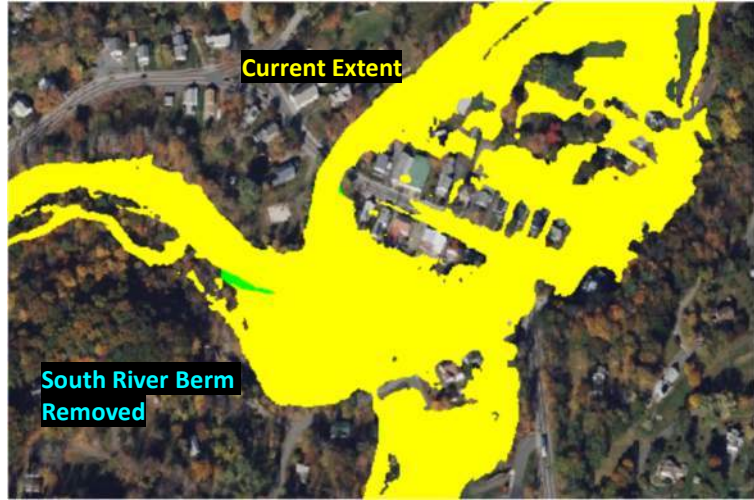
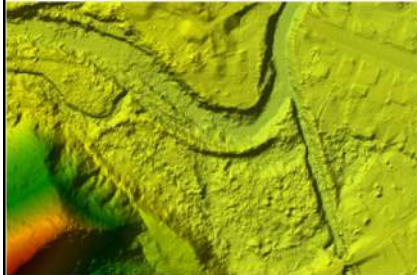
South River Berm Removal



34

Modeling Results

South River Berm Removal

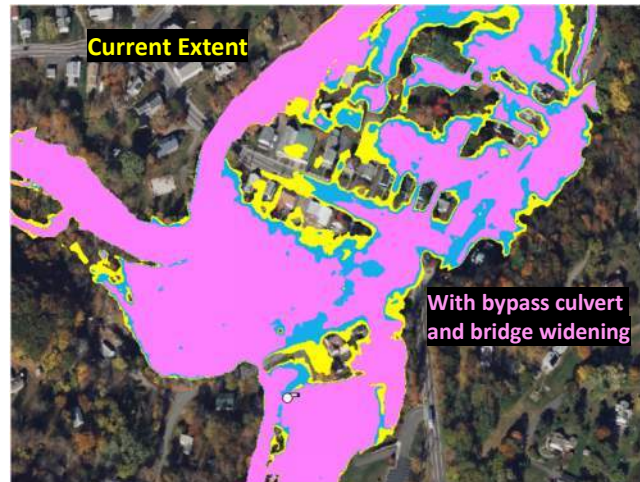
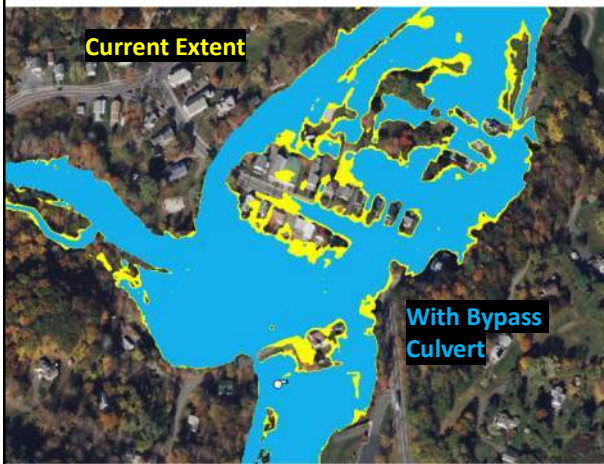


Minimal reduction in flooding for 10 Year Storm

35

Modeling Results

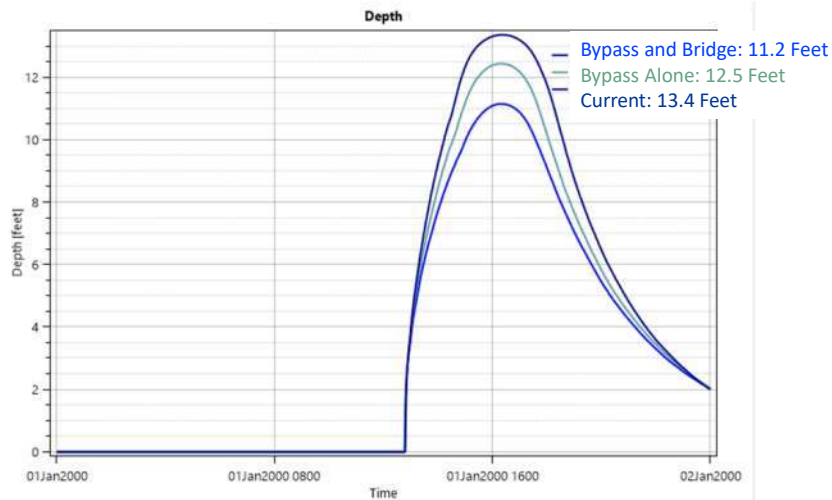
Bypass Culvert



36

Modeling Results

Bypass Culvert



A bypass culvert from PHB in combination with Main Street Bridge widening result in a peak flow reduction of 2.2 feet at Main Street.

Minimal effect on downstream velocities during 10 year flood.

37

Flood Resilience Projects

- Prioritization/ Discussion

Project/Project Type	Benefits	Limitations
Floodplain Reconnection (Floodplain Lowering, Berm Removal)	<ul style="list-style-type: none"> • Increase upstream storage of floodwater • Improve downstream water quality (Sediment and nutrient storage) • Benefits for instream and riparian habitat 	Constraints in available area/depth can limit downstream flood mitigation benefit
Bridge/Culvert Widening (Main Street Bridge)	<ul style="list-style-type: none"> • Some reduction in flood depth and extent of flood inundation • Larger reduction in scour/erosion potential • Reduced erosion hazards/risk to crossing • Improve sediment continuity/transport through crossing • Structure has aged out (built 1925-26) 	Potential impacts to abutting properties to fit the abutments for the wider bridge
Flood Diversion Culvert	<ul style="list-style-type: none"> • Convey floodwaters around developed areas • Reduced flood inundation/flood depth 	<ul style="list-style-type: none"> • Not nature-based • High cost

38

Next Steps

- Conceptual designs for 2 resilience projects with cost opinions
- Pursue grant funding for priority designs

39

Questions and Discussion

Rosalie Starvish, GZA

Rosalie.Starvish@GZA.com

Nicolas Miller, Field Geology Services

Nicolas.Miller1@GMAIL.com



40

Provide your Input

Drop 1 card in the box for your 2 most preferred projects.

1. Enlarge Main Street bridge over South River
2. Floodplain Lowering – Upstream of Covered Bridge
3. Floodplain Lowering – Pumpkin Hollow Brook
4. Berm Removal upstream of Main Street
5. Flood Diversion Culvert – Pumpkin Hollow Brook



Online feedback – fill out the survey at the Town of Conway website

<https://conwayma.gov/p/39/South-River-Flood-Mitigation>



GZA GeoEnvironmental, Inc.