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Preliminary Design Report
Coventry High School Sewer Extension

Town of Coventry
Coventry, Rhode Island

November 2024

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1 Executive Summary

1.1 Purpose of Report

This document serves as a “road map” for the design and construction of a gravity sewer collection system extension from an existing manhole on Tiogue Avenue to The Town of Coventry High School. This report is intended to generate concurrence between the Town of Coventry and Fuss & O'Neill (F&O) on the technical and administrative aspects of the Coventry High School Sewer Extension project. This report addresses the gravity sewer collection system, sewer connection details, and permitting requirements for construction.

1.2 Recommendation

The Town of Coventry High School is an unsewered parcel located within close proximity to Johnson’s Pond. Historically, the High School's wastewater was treated by an Onsite Wastewater Treatment System (OWTS) and discharged to a subsurface disposal field. The OWTS has failed and no longer serves the High School. Based on an alternatives analysis, it was determined that extending gravity sewer West on Tiogue Avenue and North on Reservoir Road to serve the high school was in the best interest of the Town and aligned with Town’s long term sewer infrastructure plan. Extension of wastewater infrastructure to Coventry High School eliminates the need for the existing onsite treatment system.

Upon completion of the sewer extension project, wastewater will be conveyed by gravity through an 18-inch PVC gravity main along Reservoir Road and Tiogue Avenue before crossing the Mishnock River and discharging into an existing manhole adjacent to 1100 Tiogue Avenue. An 8-inch sewer will be extended from the Tiogue Avenue sewer trunkline to facilitate lateral installation for adjoining properties. An 18-inch sanitary sewer stub will be provided at the northern manhole on Reservoir Road which will facilitate the future construction of sewer infrastructure within Planning Areas 1 and 2 as defined in the Coventry, RI Wastewater Facility Plan dated December 2023. Construction of the gravity sewer will provide the opportunity for adjoining parcels to connect, eliminating their need for an onsite wastewater treatment system.

The opinion of total project cost [inclusive of engineering design, construction administration and contingency] for sanitary sewer extension is estimated in a budgetary range of -15% to +30% or $3,610,000 to $5,520,000 respectably. See **Appendix J** for breakdown of the budgetary opinion of cost for the improvements. It is anticipated that construction will take a year to complete once awarded.

2 Base Mapping

2.1 Aerial Mapping & Surveying

The digital topographic mapping used for the Coventry High School Sewer Extension drawings was developed using Town of Coventry Assessor/GIS property lines and building outlines and supplemented by Scituate Survey Inc. who provided a field survey and field editing services during the Spring/Summer of 2024. The mapping is tied into the North American Datum of 1983 (NAD 83) horizontally and to the North American Vertical Datum of 1988 (NAVD 88) vertically. The mapping is set at a scale of 1 inch = 40 feet and has 1-foot contour intervals.

2.2 Survey Base Mapping

The field survey and Assessor/GIS shapefiles have been converted into Fuss & O'Neill layering schema and field editing of the base topographic mapping has been performed. More specifically, the field survey consisted of the following:

- Buildings and features not appearing on the GIS data such as walls, fences, tree lines, hedgerows, buildings including street addresses, sheds, foundations, driveways and materials, paths and materials, edge of pavement, edge of roadway, parking lot boundaries and materials, curbs and type, guide rails and type, walks and type, large individual trees.

- The approximate location of underground utilities, top of frame and invert elevations of storm drains and sanitary sewers with pipe direction entering structures, storm drains, cross culverts and end walls, sanitary sewer structures and type, utility manholes and type, handholes and type, utility poles, anchors and numbers, signs, light poles/posts, mailboxes, etc., marked in the field by others and/or obtaining mapping available from the various utility companies.

- Water mains, water gates, blow-offs, bends, curb stops, services and drinking water wells, marked in the field by others and/or obtaining mapping available from the various utility companies.

- Gas mains, services, and appurtenances, marked in the field by others and/or obtaining mapping available from the various utility companies.

- Telecommunications and electrical power duct-banks, structures, handholes, and services. Aerial locations include all guy anchors and dead-men poles, marked in the field by others and/or obtaining mapping available from the various utility companies.

- Traffic signals, conduits, mast arms, control boxes, interconnect hardware, other appurtenances and pavement markings, marked in the field by others and/or obtaining mapping available from the various utility companies.

- Underground utility locations will be indicated on the final design plans. The accuracy of these locations is dependent on information provided by the various utility companies. Water, cable, drainage, and telephone are existing utilities which will be encountered during construction of the sewer system. Listed below are the various utilities:

- Kent County Water Authority – Water: Kent County Water Authority owns and maintains an 8-inch PVC water main along Reservoir Road before transitioning to a 12-inch AC water main and running parallel with an additional 12" DI water main along the project area on Tiogue Avenue. One water main is hung off the southern side of the Mishnock River bridge while the other is buried under the southern side of the crossing.
- Woodland Manor Association – Sewer: The Woodland Manor association maintains a 10-inch sanitary force main that extends through the project area on Tiogue. The sanitary force main coveys flow to West Warwick.
- Privately Owned Sanitary Force Main: A privately owned pump station coveys flow through a force main that extends through the project area on Reservoir Road. The force main ties into the Woodland Manor force main at the intersection of Tiogue Avenue and Reservoir Road. The pump station is located north of the intersection between Reservoir Road and Airport RoadThe exact extent and location of the sewer force main is unknown.
- Rhode Island Energy – Gas and Electrical: An 8-inch coated steel gas main extends across the project area along Reservoir Road and Tiogue Avenue. Electrical service is provided through overhead wires.

- Finished floor of buildings within the utility corridor and site. Building numbers.
- Benchmarks established along the proposed sewer route at approximately 800-foot intervals.
- Fuss & O'Neill, Inc wetlands boundary flags.
- Soil X soil boring and rock probe locations.
- Visible iron pins and other monumentation were field located and GIS property lines were updated.
- Elevations taken at key points along the proposed sewer route. The elevations were taken at 50-foot intervals along curves and 100-foot intervals on straight sections. At each transect, elevations were taken for each side top and bottom of curb, pavement surface breaks in grade (if any), and centerline.

The proposed sewer route layout presented on the preliminary design drawings is dependent on existing utilities and storm drain locations and may be modified during final design based on further correspondence with utilities companies. The gravity sewer system layout may also be modified during construction based on field information provided by "Dig Safe" and by utility location test pit work. A PDF of the survey basemap is provided in **Appendix A.**

The survey basemap and sewer extension plans have been prepared in accordance with the accuracies of a Class III Vertical Control Standard V-3 and Topographic Survey Accuracy of T-2, the property lines are in accordance with the accuracies of a Class IV Compilation Plan, pursuant to Section 9 of the Rules and Regulations adopted by the Rhode Island Board of Registration for Professional Land Surveyors.

3 Wetlands Delineation

As part of the preliminary design phase for this project, a certified soil scientist from Fuss & O'Neill, Inc. conducted a site visit to determine the extent and quality of wetlands within the project limits. During the site visit, conducted on April 1, 2024, wetland boundaries located approximately 75 feet from the road centerline were identified. Additionally, flags were placed on the Ordinary High-Water mark as determined in the field. At the conclusion of the site visit, a wetland delineation was prepared and finalized. Refer to **Appendix B** for a copy of the Wetland Delineation Report.

3.1 Summary of Site

The Mishnock River is designated as a perennial stream and is located within the South Branch of the Pawtuxet River Sub-Basin. Four (4) forested swamps, one (1) marsh, and the banks of the Mishnock River were delineated along Tiogue Ave. One (1) Area subject to storm flowage (Forested Swamp C) and three (3) Areas subject to Flooding (Forested Swamp C, Marsh G, and upstream river left of Mishnock River/Forested Swamp B) were located at the western-most and eastern-most extents of the pipe route along Tiogue Ave. A review of FEMA mapping also shows floodplain areas bordering Mishnock River which crosses below Tiogue Ave at the eastern-most extent of the pipe route. No Freshwater Wetlands or Jurisdictional Areas were identified along Reservoir Road within the project area. Freshwater Wetlands delineated are jurisdictional under the State of Rhode Island's Department of Environmental Management.

Additionally, the site is located within the boundaries of a Natural Heritage Area and as such, may contain endangered, threatened, and/or special concern species.

4 Subsurface Investigation

Fuss & O'Neill procured the services of SOIL X, Corp. based out of Leominster, MA to perform a geotechnical subsurface investigation consisting of rock probes and borings. A geotechnical memorandum and drilling logs were provided that recorded subsurface soil conditions, the extent of bedrock and depth to groundwater, when evident, within the limits of the proposed sewer extension.

The subsurface investigation occurred during the summer of 2024 and spanned approximately seven (7) weeks, due to the procurement of the RIDOT permit and work hour restrictions on Tiogue Avenue. The subsurface investigation consisted of five (5) geotechnical test borings and six (6) rock probes along the proposed sewer alignment on Tiogue Avenue, Reservoir Road, and Town of Coventry High School. Soil probes were conducted approximately every 250 feet along the proposed route of the sewer mainline, while soil borings were completed at intervals of approximately 800 feet. The location of all the borings and probes that were completed are depicted on the Preliminary Design drawings attached hereto.

The layout plan for borings and probe locations is depicted on **Appendix C**.

Due to concerns regarding the Dig Safe locations of underground water mains from Kent County Water Authority (KCWA), two rock probes were removed from the project. These probes included P-01 on the easternmost bounds of the project area on Tiogue Avenue, and P-04 at the intersection of Reservoir Road and Tiogue Avenue. The subsurface profile includes granular fill, organic matter, and sand deposits. Based on the results for the probes and borings, it appears there is an organic layer of approximately 18-inches thick which was encountered on Boring B-02 consisting of soft organic silt at a depth of 5 feet below surface level. Additionally, a 12" subsurface concrete layer was encountered in the eastern portion of Tiogue Avenue on boring B-01 and probe P-02. For the purposes of direct load support, fill and organic matter are not suitable materials, however granular fill can be used if cleaned and evaluated with the appropriate testing. Competent material for fill was encountered to extend about 6.5-feet below existing grade surface. More information regarding Fill Material Types, Recommended Soil Gradations, is provided on the attached geotechnical memorandum, in **Appendix D.**

Bedrock refusal was observed on Tiogue Avenue at depths between 15 and 12.5-feet below grade surfaces. Refusal was indicated on Log Numbers P-02, P-03, and B-01 provided in **Appendix D.** Due to the anticipated depth of sewer installation, it is anticipated that rock removal will be required along the easternmost portion of Tiogue Avenue. Based on the depth of refusal along Tiogue Avenue, there is approximately 50 feet trench that will require approximately a foot in depth of rock removal, in addition to approximately one and half feet of rock removal for Sanitary Manhole No. 7 as identified in the preliminary design plan set included in **Appendix E**. Boring and probe investigation along Reservoir Road reached a depth of 20-feet without encountering any bedrock refusal .

Groundwater was encountered at a depth of 6 to 10-feet below grade surfaces along the southern portion of Reservoir Road and the entire expanse of Tiogue Avenue within the project area. As anticipated, given the project's proximity to the Mishnock River, the depth to groundwater is shallow. Depth to groundwater on Tiogue Avenue of approximately 6-feet at its shallowest depth. Given the shallow depth to ground water, contractor will be required to implement groundwater control and dewatering methods during construction such as implementing a pump to lower water levels in a trench with accompanying sediment control measures.

A copy of the geotechnical memorandum inclusive of typed boring and probe logs is provided in **Appendix D.**

5 Wastewater Collection System

5.1 Wastewater Flow

Wastewater flows for the residential, commercial, and industrial parcels within Planning Area 1, Planning Area 2, and the parcels along Tiogue Avenue and Reservoir Road have been estimated using the Rhode Island Department of Environmental Management (RIDEM) Office of Water Resources (OWR) Flow Estimate Policy for Design of Sanitary Sewers.

The non-residential flows were estimated using the historic water usage data of the parcel, and if no historic water data was available, the RIDEM Rules Establishing Minimum Standard Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems Regulation was used for the design standard of flow based on the parcel zoning classification.

The residential flows were also estimated using the historic water usage data of the parcel, and if the historical water usage data was less than 300 gpd or there was no historic water usage data for the parcel, then 300 gpd was used for the estimate.

Infiltration for Planning Area 1, Planning Area 2, and the parcels along Tiogue Avenue and Reservoir Road was estimated based on RIDEM Flow Estimate Policy for Design of Sanitary Sewer, assuming 8-inch pipe throughout Planning Area 1 and Planning Area 2.

The peak hourly flow for Planning Area 1, Planning Area 2, and parcels along Reservoir Road and Tiogue Avenue was estimated to be 918gpm. See **Table 5-1** below for complete breakdown of wastewater flows from Planning Area 1, Planning Area 2, the parcels along Reservoir Road and Tiogue Avenue. The sewer along Reservoir Road and Tiogue Avenue was determined to be 18-inches based on the calculated peak hourly flow.

Table 5-1: Wastewater Flow Estimates

Planning Area	Average Daily Flow[1] (GPD)	Infiltration[2] (GPD)	Population[3] (Thousands)	Peaking Factor[4]	Peak Hourly Flow (GPM)
PA-1	151,200	14,500	1.13	3.76	433
PA-2	162,400	18,100	1.12	3.77	472
Parcels Along Reservoir Road and Tiogue Avenue	3,100	1,100	0	4.5	14
				Total	**919**

Notes:

1.) Assumed all zoned residential, commercial, and industrial parcels within the planning area will be connected. Using RIDEM Flow Estimation Policy for Design of Sanitary Sewers the Average Daily Flow was calculated, for residential flows the historic water usage data was used and if the historic water usage per day per household was less than 300 gpd or did not exist, 300 gpd was use. For non-residential flows, the historic water usage data was used, if no historic water data was available, the RIDEM Rules Establishing Minimum Standard Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems Regulation was used for the design standard of flow based on the parcel zoning classification.

2.) Infiltration estimated based on RIDEM Flow Estimate Policy for Design of Sanitary Sewer. Assuming 250 gallons per day per inch diameter per mile of sewer pipe.
3.) Population was estimated based on the following assumptions, for residential parcels 2.46 average persons per household from census data was used, and for non-residential parcels 0 average persons per parcel was used.
4.) The peaking factor was calculated based on the population estimated in the thousands and utilizing the formula provided in RIDEM Flow Estimation Policy for Design of Sanitary Sewers.

5.2 Gravity Sewer Layout

The recommended conceptual layout for the gravity sewer collection system along Reservoir Road and Tiogue Avenue is depicted in **Appendix F**.

Wastewater generated at the High School will be conveyed from the Southern-most existing sewer manhole along the property's collection system. Wastewater will flow by gravity through new sewer infrastructure East across the parking lot, down the main entrance road, then South along Reservoir Road and East along Tiogue Avenue, terminating at the Western-most existing sewer manhole within the Town's collection system.

A sanitary sewer stub will be installed at intersections to facilitate the future expansion of sewer infrastructure. An 18-inch stub will extend in northern direction from the proposed manhole located on the intersection of Reservoir Road and the Coventry High School entrance road. This stub will accept the combined wastewater load from Planning Area 1 and 2 as defined by the 2023 Coventry, RI Wastewater Facility Plan. The stub has been sized as 18-inch to minimize the invert depth required. It is anticipated that the invert of the stub will need to be a minimum of 16-feet below grade to facilitate future development. Due to the steep decline in elevation on the westerly side of Planning Area 1, properties adjoining the shoreline will require the construction of low-pressure sewer (LPS) to convey wastewater to the Reservoir Road trunkline. Wastewater generated from Planning Area 2 will be conveyed by low pressure sewer northwards to Club House Road where it will combine with the waste flow from Planning Area 1 before tying into the proposed manhole located at the intersection of Reservoir Road and the Coventry High School entrance road.

Based on the field survey and record drawings from the Kent County Water Authority, there are two (2) water mains within the extent of the sewer extension project. The proposed gravity sewer layout has been reviewed to limit the crossing required and maintain the minimum clearance from the water mains. In areas where minimum clearance or crossing occurs, the existing water mains will be supported through the excavation and the sanitary sewer will be encased in concrete until the minimum clearances are met. Additionally, in the project area there are RI Energy gas mains along Reservoir Road and Tiogue Avenue with nominal diameters of 4-inches and 8-inches respectively. The gas main is coated steel in material with polybutylene service connections. Finally, there are two (2) sanitary sewer force mains within the project area, the 10-inch force main along the Northern edge of Tiogue Avenue is owned by the Town of Coventry and a 6-inch force main along Reservoir Road located along the Western edge of road. Based on record mappings there are a few existing properties along Tiogue Avenue connected to the Town-owned 10-inch force main, and record mapping indicates the private force main connects to the 10-inch force main at the intersection of Reservoir Road and Tiogue Avenue.

The Mishnock River flows from the South to North and utilizing the historical record plans of the culvert on Tiogue Avenue provided by RIDOT, the crossing of the culvert was evaluated. The record plans depicted that the original culvert was constructed in 1920, with a widening of the structure in 1930s. The record plans indicate that there is approximately 7ft of field stone/masonry work beneath the invert of the original culvert section. The widening

record plans of the culvert indicate that there is a cast-in-place concrete section. After reviewing the record drawings, it was determined that the installation of the sewer main beneath the culvert was not feasible due to the field stone/masonry work not allowing for trenchless excavations to be economically feasible. Additionally, crossing the Mishnock River to the North is not feasible due to the flow direction of the stream being South to North, the river flow path and contours increase the impact to the wetlands and the Right-of-Way is limited from the edge of road.

As a result, the preferred location for crossing the Mishnock River is on the South side of Tiogue Avenue below the stream bed. Crossing the river via open cut on the South side was determined to be a viable alternative as the Right-of-Way from the edge of road to the property line is sufficient for an open cut excavation and previously KCWA installed a water main beneath the stream bed. It is anticipated that control of water will be required to construct the sanitary sewer across the river. The sanitary sewer pipe beneath the river is proposed to be ductile iron pipe encased in concrete.

In the event test pits or other evidence is found during design or construction that prevents gravity sewer laterals from being installed to a property via gravity sewers, a grinder pump instillation will be considered for the property discharge on an isolated case by case decision.

The detail and extent of the gravity sewer collection system is shown on the attached Preliminary Design drawings provided in **Appendix E**.

5.3 Design Criteria

5.3.1 Gravity Sewers

According to TR-16 (Guides for the Design of Wastewater Treatment Works 2011 ed.) by the New England Interstate Water Pollution Control Commission (NEIWPCC) sanitary sewers should be designed on a peak hourly design flow basis.

The proposed gravity sewer extension will be composed of approximately 3,400 linear feet of 18-inch and 1,400 linear feet of 8-inch gravity sewer. Pursuant to TR-16 standards, for 8-inch sanitary sewer minimum slope will be 0.40 feet per 100 feet and the 18-inch sanitary sewer minimum slope will be 0.12 feet per 100 feet. Gravity sewers will be constructed with SDR 35 PVC pipe. Further details regarding the proposed gravity collection system are as follows:

- A minimum velocity of 2.0 fps is recommended by TR-16 to prevent the settling and deposition of solids within the gravity sewer lines. Velocities in excess of 10 fps should be avoided to prevent pipe scouring.
- The minimum manhole diameter of 48-inches will be provided with heavy duty standard frames and covers. Manhole joints will be Chloroprene (neoprene) O-ring gaskets utilizing a confined groove and the structures will be subject to vacuum testing to -13 pounds per square inch (psi) for leak detection prior to being commissioned. Manhole / pipe connections will be properly sealed through the use of a flexible sleeve and flexible annular space filler.
- Manholes will be installed at all changes in alignment, at all intersections, and at a maximum interval of 400 feet along the route. This distance between manholes facilitates regular maintenance such as line cleaning and inspection.

- Pursuant to RIDEM Sewer/Water Line Separation Policy for Design of Sanitary Sewers, a ten (10) feet horizontal separation distance between water services and sewers is required for most sewer piping. When there is less than ten (10) feet horizontal separation distance, the use of eighteen (18) inch vertical separation distance will be maintained between sewer pipes and water service pipes.

- Gravity mainline sewer lines will be deep enough to prevent freezing. A minimum cover of 4.0 feet is considered for this project. Gravity sanitary sewers will be installed with additional cover as necessary to allow building sewer connections adequate grade to connect first floor sanitary building facilities via gravity. Other utility depths may require sanitary sewers to be deeper in certain areas.

- Service laterals will be assumed as 6-inch at a minimum slope of 1% (2% preferred).

- Sewer chimneys, as required, will be precast units with gasketed joints and installed in areas where the trunk line sewer is much deeper than the lateral pipes.

5.4 Sewer Connection Details

It is recommended that sewer stubs and adjacent sewer laterals for future connections be constructed at the same time of the mainline. Based on discussion with the Town of Coventry leadership, this Preliminary Design Report has been established with the understanding of the following policy decisions for the project.

- Buildings with existing septic systems will receive sewer laterals. Additionally, vacant lots will receive sewer laterals for future connection.

- The proposed sanitary sewer lateral will extend from the mainline pipe in the street to the property line.

- No combined or shared lateral stubs are allowed between separate properties. Shared lateral stubs may be provided for properties with multiple residences, however this will be determined on a case-by-case basis.

- At street intersections sewer stubs will be included for future mainline pipe where shared infrastructure manholes coincide with the intersections.

5.5 Lateral Location

To site the sanitary sewer laterals in a preferred location for the property owners in the sewer extension area, a lateral location package was sent to each property owner. The purpose of the package was to solicit information about each property that would help in identifying where and what elevation the existing outlet pipe of their building was, so that the proposed sewer lateral stubs could be properly located. The lateral location package sent to each property owner included a site plan for their respective property, an informational letter, sewer lateral location form instructions, a completed sample, and a legend to identify the features/objects in the site plan. An example package like that which was sent to each property owner is provided in **Appendix G**. All lateral location forms provided to property owners can be found in **Appendix H.**

Throughout the design phase, effort will be taken for the survey basemap to be continuously updated to reflect any missing information provided by the homeowners via the lateral location forms. This information includes the approximate location of septic tanks and leaching fields, wells, location and depth of wastewater building outlet and drinking/well water piping, as well as any other underground utilities such as underground electric lines, drainage piping, dry wells, pump champers, and propane lines. During design the property owners' preferred

locations for sewer service, as well as surficial and underground features that they would like to be preserved and maintained during construction will be recorded. When information is returned to us via the lateral location forms was unclear or preferences were deemed problematic, attempts will be made to contact the homeowner via the contact information they provided to us on the forms or via written letters to the addresses provided.

During this time, property owners were encouraged to reach out to F&O to ask any questions they might have about the project. When property owners were considering a preferred sewer service location, and were confused, clarification was provided. Efforts were made to accommodate all homeowner preferences and requests. Residents were made aware that an in-person informational session is to be held November 7th, 2024, which the opportunity to review the project information will be provided and any questions can be discussed with representatives of the Town and Fuss & O'Neill.

Proposed sewer lateral stubs were designed based on the most accurate information available. For properties that have not yet returned their lateral location forms to us, time has been extended. Proposed sewer lateral stubs were designed to minimize impacts to structures, hardscaping elements and landscaping features including trees to reduce restoration costs and risk of damage to structures.

We will continue to communicate and coordinate with homeowners to determine the most cost-effective and technically feasible locations for sewer lateral stub locations.

In addition to the sewer extension to Coventry Highschool, a total of 32 properties that are anticipated to received sewer laterals as depicted in the below:

32 Reservoir Road	8 Reservoir Road	1205 Tiogue Avenue
30 Kowal Street	6 Reservoir Road	1203 Tiogue Avenue
30 Reservoir Road	35 Reservoir Road	1193 Tiogue Avenue
28 Reservoir Road	31 Reservoir Road	1165 Tiogue Avenue
26 Reservoir Road	25 Reservoir Road	1145 Tiogue Avenue
0 Reservoir Road 0027-107.000	15 27 Reservoir Road	1055 Tiogue Avenue
24 Reservoir Road	11 Reservoir Road	1119 Tiogue Avenue
22 Reservoir Road	0 Reservoir Road 0027-116.000	1200 Tiogue Avenue
Carol Court	5 Reservoir Road	1180 Tiogue Avenue
12 Reservoir Road	10 Reservoir Road	0 Tiogue Avenue 0028-049.000

See **Appendix I** for a map summarizing the property locations and information.

5.6 Easement Agreements

Most areas of sewer construction will occur within the Town of Coventry or State of Rhode Island DOT Right of way and a blanket easement agreement will be procured from the Town of Coventry for access to the High School property prior to construction.

6 Permit Requirements

The following permits may be required prior to the construction of the sewer project:

- **RIDEM**
  - Pre-permitting meeting will be conducted to assist in the explanation of the Mishnock River crossing to confirm the permits required.
  - Both a Freshwater Wetlands Request for Regulatory Applicability Permit & Approval for Sanitary Sewer Extension will be required.

- **United States Army Corps of Engineers**
  - Pre-permitting meeting will be conducted to assist in the explanation of the Mishnock River crossing to confirm the permits required.
  - USACE Section 404 required. A SVN will be needed for the project. This permit is not typically submitted until SHPA/THPO notifications have been completed and an IPaC has been conducted.

- **Town of Coventry Planning & Zoning**
  - Applicable Planning and Zoning permits specific to the Town of Coventry, RI.

- **RIDOT**
  - Tiogue Avenue is a State-Maintained Road in Rhode Island (Route 3) and will require RIDOT Utility Permit and coordination.

7 Budgetary Level Opinion of Cost

Appendix J shows a budgetary level opinion of cost for the proposed project, the total for which is **$4,929,000**, including Engineering, Admin, Legal, Buy-ins, Financing, and Contingency.

The following assumptions have been made to estimate the costs shown:

- The 18-inch trunk line along Reservoir Road and Tiogue Avenue with accompanying lateral connections will be constructed as part of the Project. The cost of the lateral connections and sewer chimneys that are constructed along the trunk line will be paid for under the contract.
- An 8-inch sewer main extension from Reservoir Road to the Coventry High School will be constructed as part of the Project. Additionally, an 8-inch extension will be constructed on the trunk line to facilitate connection of two properties adjacent to the Mishnock River crossing.
- Dewatering will be required in increasing quantity as excavations approach Tiogue Avenue. It is expected that a trash pump will be used under normal circumstances, however, more extensive measures may be required depending on groundwater conditions.
- Sewer lateral stubs will be provided up to the property line for each existing residence.
- Fourteen (14) test pits are budgeted as part of this project.
- A total of 2,320 LF of haybales and silt fence will be required for this project.
- Temporary and Permanent Pavement repair under the specifications provided by RIDOT shall be used for work conducted on Tiogue Avene, which is a State-Maintained Road. Specifications provided by the Town shall be used for work conducted on Reservoir Road.
- Permanent roadway reconstruction will occur once all construction is complete.
- A lump sum cost for the Mishnock River Crossing is provided to account for additional costs associated with installation of sewer infrastructure across the channel.
- The opinion of cost is not inclusive of any work related to the abandonment of the existing sanitary infrastructure.

8 Recommendations

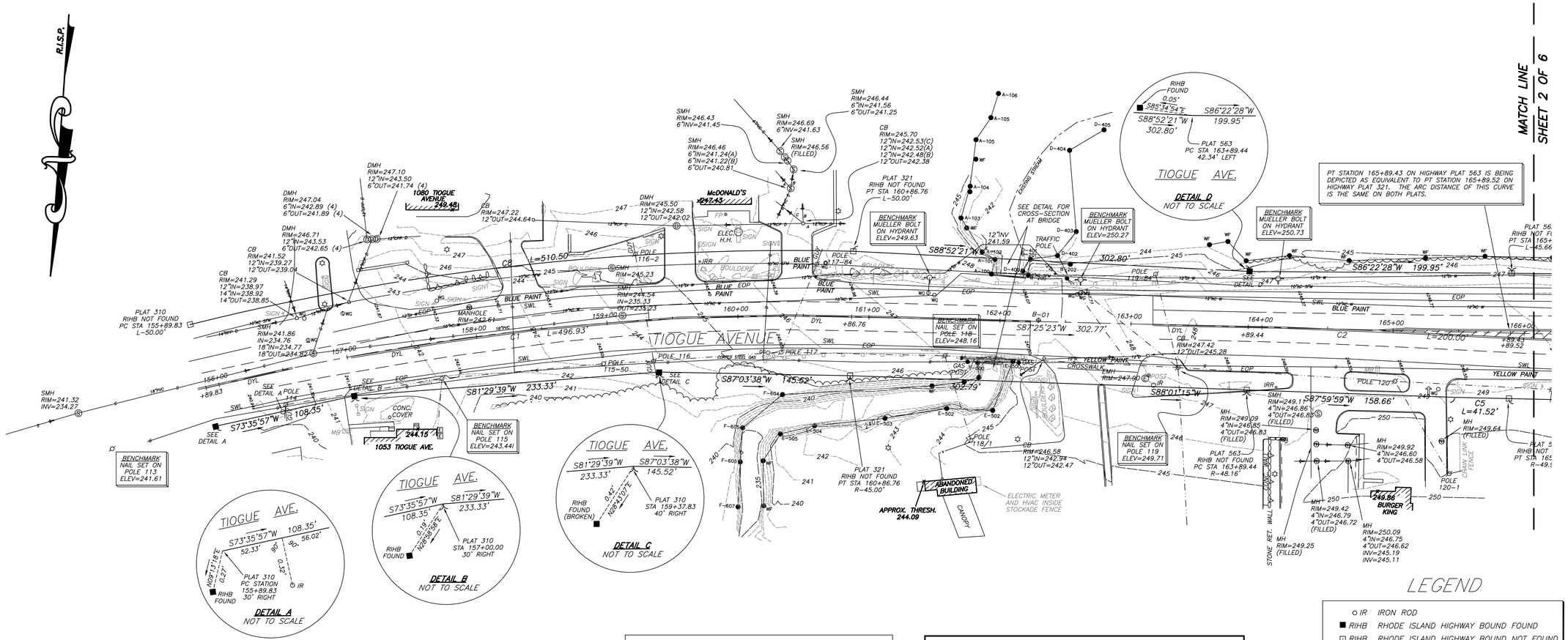
Fuss & O'Neill's recommended alternative for Town of Coventry High School Sewer Extension is to construct a 18-inch gravity sewer system that extends from the existing manhole on Tiogue Avenue (Route 3) to the High School access driveway on Reservoir Road in order to provide sanitary service to the Coventry, RI High School and parcels adjoining the sewer extension, and facilitate the future expansion of sewer infrastructure in Planning Area's 1 & 2.

Upon review of the findings presented in this report and presentations and/or meetings with the Town and residents of the Town, the following recommendations to construct the sewer extension project:

- Provide 8-inch and 18-inch PVC SDR 35 gravity sewers as depicted on the preliminary design plans.
- Provide 6-inch PVC pipe for service lateral stub connections.
- Provide temporary and permanent trench patches on disturbed roads for sewer improvements.

Appendix A

Survey Base Map



LEGEND

○ IR	IRON ROD
■ RIHB	RHODE ISLAND HIGHWAY BOUND FOUND
⊡ RIHB	RHODE ISLAND HIGHWAY BOUND NOT FOUND
⌀	UTILITY POLE
☼ L.P.	LIGHT POLE
◀	FLOOD LIGHT
⊶☼	STREET LIGHT
⊶	SIGN
● FP	FLAG POLE
□ CB	CATCH BASIN
□ CB/DI	CATCH BASIN/DROP INLET
▭□ FES	FLARED END SECTION
Ⓓ DMH	STORM MANHOLE
Ⓔ EMH	ELECTRIC MANHOLE
Ⓢ SMH	SANITARY MANHOLE
E	ELECTRIC BOX
HYDRANT	
○WG	WATER VALVE
⊕	WATER SPIGOT
Ⓦ WMH	WATER MANHOLE
⊗	WATER SHUTOFF
▣	WATER METER
Ⓦ	WELL
IRR	IRRIGATION HANDHOLE
FDC	FIRE DEPARTMENT CONNECTION
○GG	GAS GATE
G	GAS METER
▧	UTILITY PAINT SPOT
⊕	BORING HOLE
WF	WETLANDS FLAG
	DECIDUOUS TREE
MB	MAIL BOX
⊗	BOLLARD
MP	METAL POST
	EVERGREEN TREE
SWL	SINGLE WHITE LINE
DYL	DOUBLE YELLOW LINE

CROSS-SECTION AT BRIDGE

NOT TO SCALE

NORTH SIDE OF ROAD, LOOKING SOUTH

HEADWALL

CULVERT

240.48 240.53

SOUTH SIDE OF ROAD, LOOKING NORTH

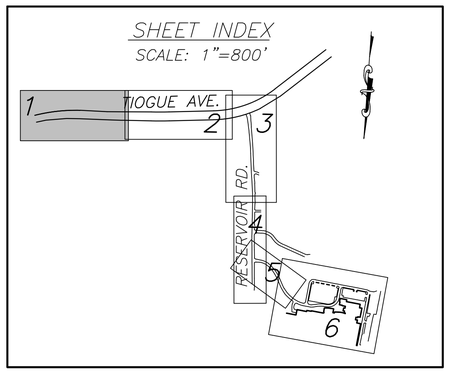
HEADWALL

CULVERT

240.45 240.41

SHEET INDEX

SCALE: 1"=800'



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CURVE DATA TABLE

CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	TANGENT	CHORD LENGTH	CHORD BEARING
C1	1831.32'	496.93'	15°32'50"	250.00'	495.41'	S79°38'58"W
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SCITUATE SURVEYS, INC.
410 TIOGUE AVENUE
COVENTRY, RHODE ISLAND 02816
401 821 5101
LAND SURVEYING/MAPPING/SITE PLANNING

SCALE IN FEET: 40 20 0 40 80 120

CERTIFICATION
THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED PURSUANT TO SECTION 9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND STATE BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON NOVEMBER 25, 2015, AS FOLLOWS:

MEASUREMENT SPECIFICATION: N/A
MEASUREMENT SPECIFICATION: VERTICAL CONTROL STANDARD, F-2
TOPOGRAPHIC SURVEY ACCURACY, F-2
TYPE OF SURVEY: OTHER
DATA ACCUMULATION SURVEY
SURVEY IS A BOUNDARY SURVEY
NOT A BOUNDARY SURVEY
STATEMENT OF PURPOSE
THE PURPOSE OF THIS PLAN IS TO DEPICT TOPOGRAPHICAL AND ELEVATION DATA FOR A SEWER EXTENSION PROJECT.

ETC. ANGELO M. RAIMONDI, PROFESSIONAL LAND SURVEYOR NO.1762 © SCITUATE SURVEYS, INC. CON. NO. A30
IF THIS MAP DOES NOT BEAR AN ORIGINAL SIGNATURE AND "WET" STAMP, THEN IT IS NOT AN AUTHORITATIVE VERSION.

DATE	REVISED INVERT INFO.
10/01/2024	

ANGELO M. RAIMONDI
No. 1762
PROFESSIONAL LAND SURVEYOR

EXISTING CONDITIONS UTILITY SURVEY
FOR
COVENTRY HIGH SCHOOL
RESERVOIR ROAD AND TIOGUE AVENUE
COVENTRY, RHODE ISLAND

SCALE: 1"=40' DATE: SEPTEMBER 26, 2024 REVISION: 10/01/24

PROJECT NO.: SS3136
DRAWING NO.: SS5158
DRAWN BY: C. J. BIITTIG

SHEET 1 OF 6

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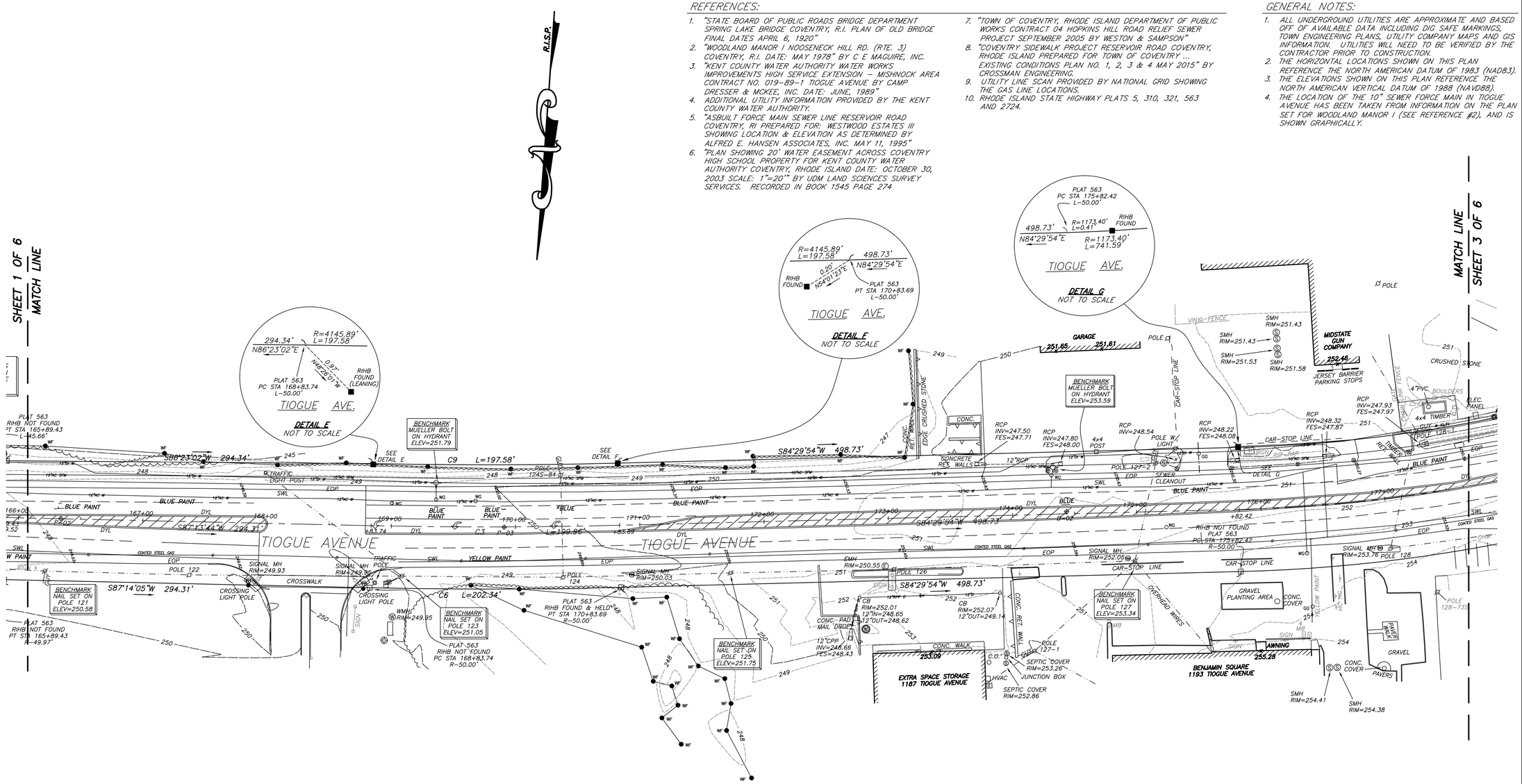

SHEET INDEX

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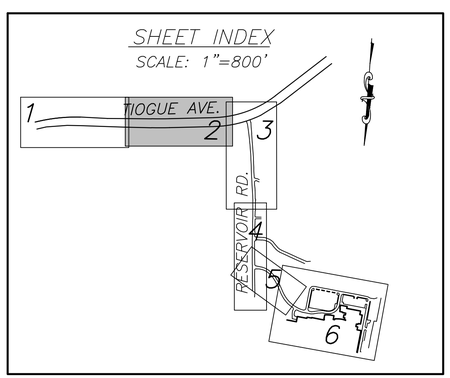

LEGEND

○ IR	IRON ROD	⊕	HYDRANT
■ RIHB	RHODE ISLAND HIGHWAY BOUND FOUND	⊙WG	WATER VALVE
⊡ RIHB	RHODE ISLAND HIGHWAY BOUND NOT FOUND	⊕	WATER SPIGOT
⌀	UTILITY POLE	Ⓦ WMH	WATER MANHOLE
☼ L.P.	LIGHT POLE	⊗	WATER SHUTOFF
◀	FLOOD LIGHT	▣	WATER METER
⊶☼	STREET LIGHT	Ⓦ	WELL
⊶	SIGN	IRR	IRRIGATION HANDHOLE
• FP	FLAG POLE	⌑ FDC	FIRE DEPARTMENT CONNECTION
□ CB	CATCH BASIN	⊙GG	GAS GATE
□ CB/DI	CATCH BASIN/DROP INLET	⊡	GAS METER
▭ FES	FLARED END SECTION	⊠	UTILITY PAINT SPOT
Ⓓ DMH	STORM MANHOLE	⊕	BORING HOLE
Ⓔ EMH	ELECTRIC MANHOLE	WF	WETLANDS FLAG
Ⓢ SMH	SANITARY MANHOLE		DECIDUOUS TREE
⊡	ELECTRIC BOX	▭ MB	MAIL BOX
SWL	SINGLE WHITE LINE	⊗	BOLLARD
DYL	DOUBLE YELLOW LINE	MP	METAL POST
			EVERGREEN TREE

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SCITUATE SURVEYS, INC.
410 TIOGUE AVENUE
COVENTRY, RHODE ISLAND 02816
401 821 5101
LAND SURVEYING/MAPPING/SITE PLANNING

SCALE IN FEET: 40 20 0 40 80 120

CERTIFICATION
THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED PURSUANT TO SECTION 9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND STATE BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON NOVEMBER 23, 2015, AS FOLLOWS:

TYPE OF SURVEY	MEASUREMENT SPECIFICATION
CLASS OF SURVEY	MEASUREMENT SPECIFICATION
ACCURACY	VERTICAL CONTROL STANDARD: $I=\frac{1}{2}$ TOPOGRAPHIC SURVEY ACCURACY: $I=\frac{1}{2}$
TYPE OF SURVEY	N/A
SURVEY BOUNDARY SURVEY	
TYPE OF SURVEY	
DATA ACCUMULATION SURVEY	

THE PURPOSE OF THIS PLAN IS TO DEPICT TOPOGRAPHICAL AND ELEVATION DATA FOR A SEWER EXTENSION PROJECT.

ETC.

ANGELO M. RAIMONDI, PROFESSIONAL LAND SURVEYOR NO. 1762

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10/01/2024 REVISED INVERT INFO.

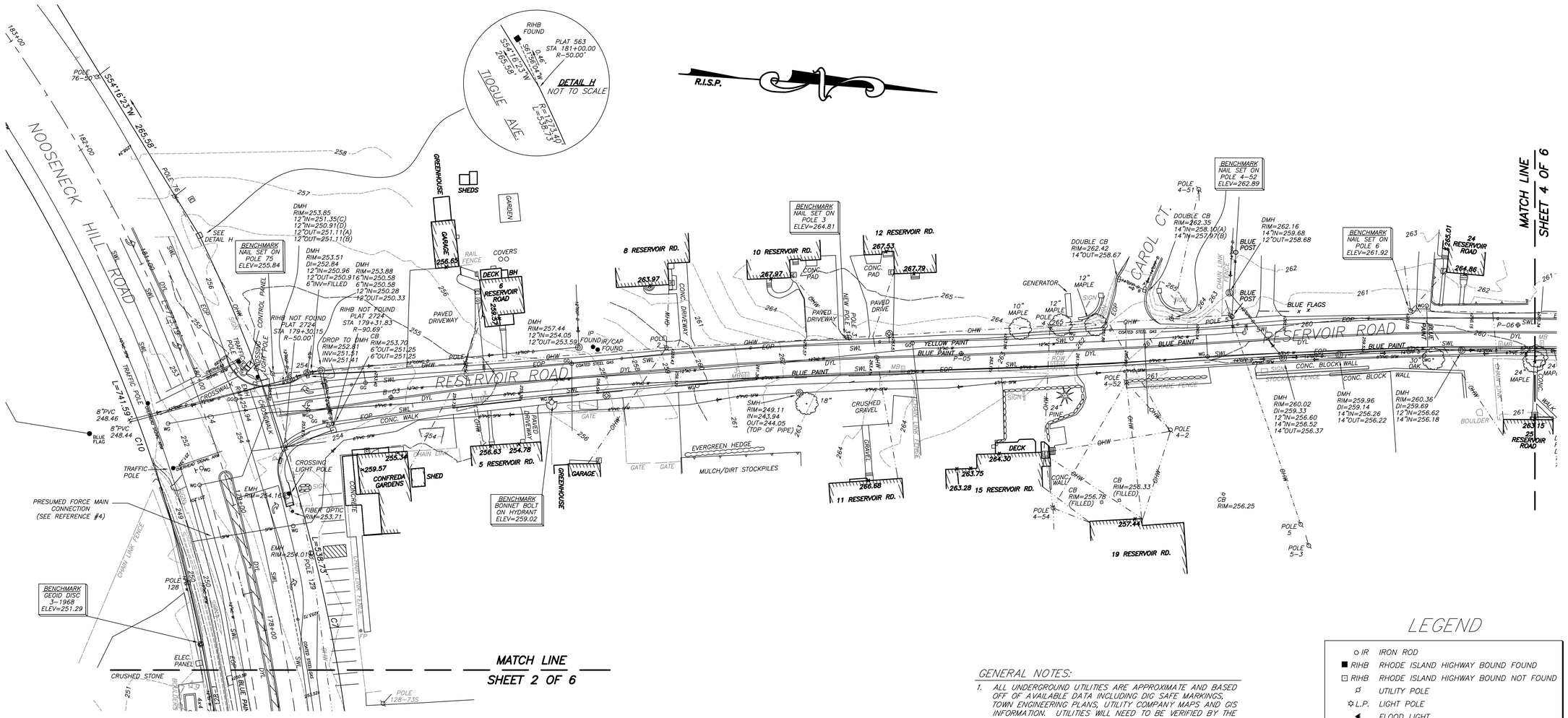
ANGELO M. RAIMONDI No. 1762 PROFESSIONAL LAND SURVEYOR

EXISTING CONDITIONS UTILITY SURVEY
FOR
COVENTRY HIGH SCHOOL
RESERVOIR ROAD AND TIOGUE AVENUE
COVENTRY, RHODE ISLAND

SCALE: 1"=40' DATE: SEPTEMBER 26, 2024 REVISION: 10/01/24

PROJECT NO.: SS3136
DRAWING NO.: SS5158
DRAWN BY: C. J. BIITTIG

SHEET 2 OF 6



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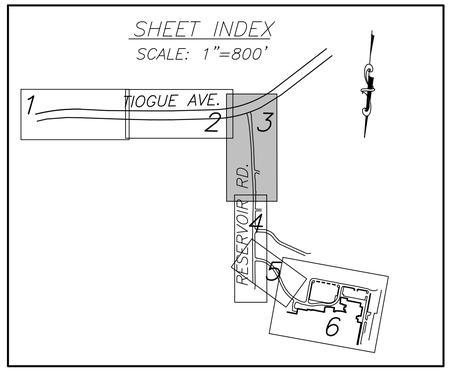

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LEGEND

○ IR	IRON ROD
■ RIHB	RHODE ISLAND HIGHWAY BOUND FOUND
□ RIHB	RHODE ISLAND HIGHWAY BOUND NOT FOUND
⌀	UTILITY POLE
☼ L.P.	LIGHT POLE
◀	FLOOD LIGHT
⊶☀	STREET LIGHT
⊶	SIGN
• FP	FLAG POLE
□ CB	CATCH BASIN
□ CB/DI	CATCH BASIN/DROP INLET
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Ⓔ EMH	ELECTRIC MANHOLE
Ⓢ SMH	SANITARY MANHOLE
E	ELECTRIC BOX
	HYDRANT
○ WG	WATER VALVE
⊕	WATER SPIGOT
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⊗	WATER SHUTOFF
W	WATER METER
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SCITUATE SURVEYS, INC.
410 TIOGUE AVENUE
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LAND SURVEYING/MAPPING/SITE PLANNING

SCALE IN FEET: 10 0 20 40 80 120

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MEASUREMENT SPECIFICATION N/A

MEASUREMENT SPECIFICATION
VERTICAL CONTROL STANDARD: I-2
TOPOGRAPHIC SURVEY ACCURACY: I-2

NOT A BOUNDARY SURVEY

TYPE OF SURVEY: UTILITY

SURVEYING DISTANCE
THE PRECISION OF THIS PLAN IS TO DEFICT TOPOGRAPHICAL AND ELEVATION DATA FOR A SEWER EXTENSION PROJECT.

Etc.

Angelo M. Raimondi

ANGELO M. RAIMONDI, PROFESSIONAL LAND SURVEYOR NO.1762 © SCITUATE SURVEYS, INC. CON. NO. A30
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ANGELO M. RAIMONDI
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PROFESSIONAL LAND SURVEYOR

EXISTING CONDITIONS UTILITY SURVEY
FOR
COVENTRY HIGH SCHOOL
RESERVOIR ROAD AND TIOGUE AVENUE
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SCALE: 1"=40' DATE: SEPTEMBER 26, 2024 REVISION: 10/01/24

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DRAWING NO.: SS5158
DRAWN BY: C. J. BIITTIG

SHEET 3 OF 6

SHEET INDEX

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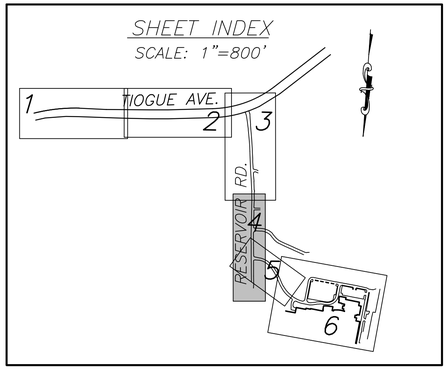

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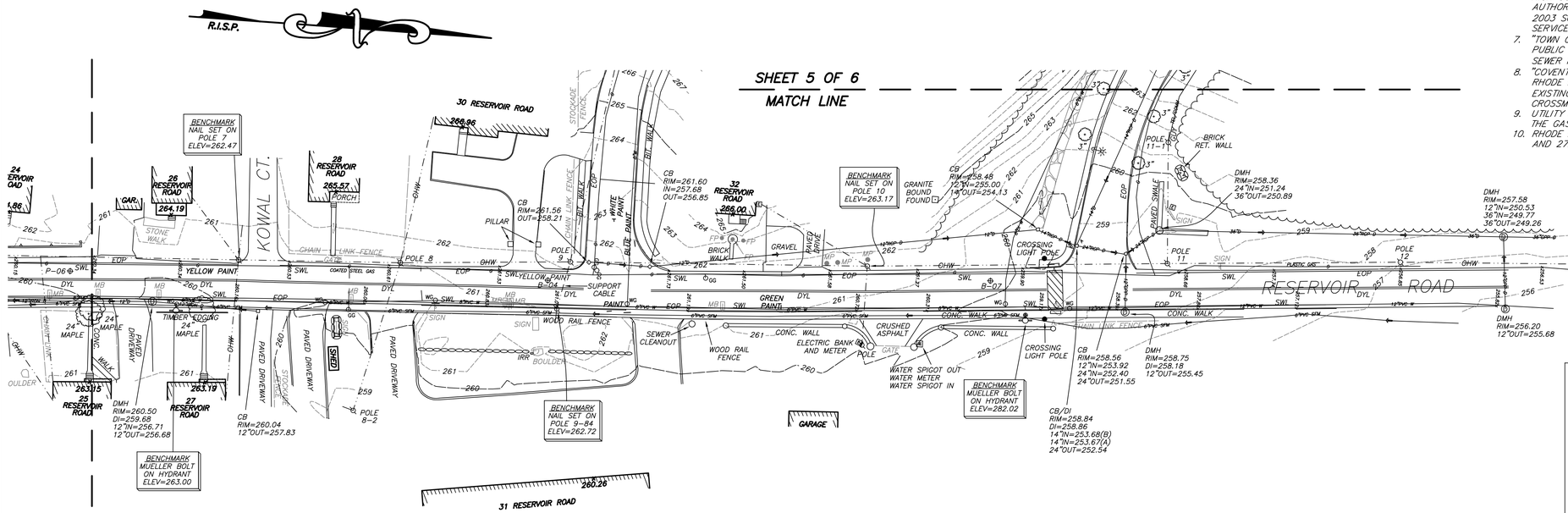

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⊠	UTILITY PAINT SPOT
⊕	BORING HOLE
WF	WETLANDS FLAG
	DECIDUOUS TREE
▭ MB	MAIL BOX
⊗	BOLLARD
MP	METAL POST
	EVERGREEN TREE
SWL	SINGLE WHITE LINE
DYL	DOUBLE YELLOW LINE

SCITUATE SURVEYS, INC.
410 TIOGUE AVENUE
COVENTRY, RHODE ISLAND 02816
401 821 5101
LAND SURVEYING/MAPPING/SITE PLANNING

SCALE IN FEET: 40 20 0 40 80 120

CERTIFICATION
THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED PURSUANT TO SECTION 9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND STATE BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON NOVEMBER 23, 2015, AS FOLLOWS:

TYPE OF SURVEY: MEASUREMENT SPECIFICATION
N/A
ACCURACY: MEASUREMENT SPECIFICATION
OTHER: VERTICAL CONTROL STANDARD: 1"=2'
TOPOGRAPHIC SURVEY ACCURACY 1"=2
ON SURVEY:

TYPE OF SURVEY: SUBDIVISION
THE PURPOSE OF THIS PLAN IS TO DEPICT TOPOGRAPHICAL AND ELEVATION DATA FOR A SEWER EXTENSION PROJECT.

BY: ANGELO M. RAIMONDI, PROFESSIONAL LAND SURVEYOR NO.1762
"THIS MAP DOES NOT BEAR AN ORIGINAL SIGNATURE AND "WET" STAMP, THEN IT IS NOT AN AUTHORITATIVE VERSION.

DATE	REVISED INVERT INFO.
10/01/2024	

ANGELO M. RAIMONDI
No. 1762
PROFESSIONAL LAND SURVEYOR

EXISTING CONDITIONS UTILITY SURVEY
FOR
COVENTRY HIGH SCHOOL
RESERVOIR ROAD AND TIOGUE AVENUE
COVENTRY, RHODE ISLAND

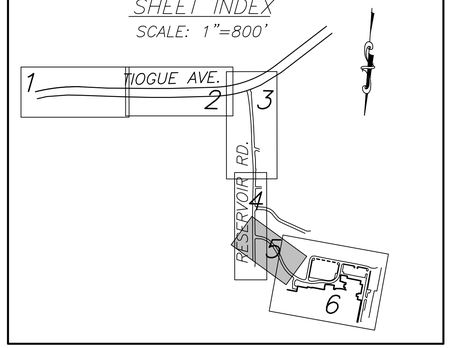
SCALE: 1"=40' DATE: SEPTEMBER 26, 2024 REVISION: 10/01/24

PROJECT NO.: SS3136
DRAWING NO.: SS5158
DRAWN BY: C. J. BIITTIG

SHEET 4 OF 6

SHEET INDEX

SCALE: 1"=800'



GENERAL NOTES:

1. ALL UNDERGROUND UTILITIES ARE APPROXIMATE AND BASED OFF OF AVAILABLE DATA INCLUDING DIG SAFE MARKINGS, TOWN ENGINEERING PLANS, UTILITY COMPANY MAPS AND GIS INFORMATION. UTILITIES WILL NEED TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. THE HORIZONTAL LOCATIONS SHOWN ON THIS PLAN REFERENCE THE NORTH AMERICAN DATUM OF 1983 (NAD83).
3. THE ELEVATIONS SHOWN ON THIS PLAN REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. THE LOCATION OF THE 10" SEWER FORCE MAIN IN TIOGUE AVENUE HAS BEEN TAKEN FROM INFORMATION ON THE PLAN SET FOR WOODLAND MANOR I (SEE REFERENCE #2), AND IS SHOWN GRAPHICALLY.

REFERENCES:

1. "STATE BOARD OF PUBLIC ROADS BRIDGE DEPARTMENT SPRING LAKE BRIDGE COVENTRY, R.I. PLAN OF OLD BRIDGE FINAL DATES APRIL 6, 1920"
2. "WOODLAND MANOR I NOOSENECK HILL RD. (RTE. 3) COVENTRY, R.I. DATE: MAY 1978" BY C E MAGUIRE, INC.
3. "KENT COUNTY WATER AUTHORITY WATER WORKS IMPROVEMENTS HIGH SERVICE EXTENSION – MISHNOCK AREA CONTRACT NO. 019–89–1 TIOGUE AVENUE BY CAMP DRESSER & MCKEE, INC. DATE: JUNE, 1989"
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6. "PLAN SHOWING 20' WATER EASEMENT ACROSS COVENTRY HIGH SCHOOL PROPERTY FOR KENT COUNTY WATER AUTHORITY COVENTRY, RHODE ISLAND DATE: OCTOBER 30, 2003 SCALE: 1"=20'" BY UDM LAND SCIENCES SURVEY SERVICES. RECORDED IN BOOK 1545 PAGE 274
7. "TOWN OF COVENTRY, RHODE ISLAND DEPARTMENT OF PUBLIC WORKS CONTRACT 04 HOPKINS HILL ROAD RELIEF SEWER PROJECT SEPTEMBER 2005 BY WESTON & SAMPSON"
8. "COVENTRY SIDEWALK PROJECT RESERVOIR ROAD COVENTRY, RHODE ISLAND PREPARED FOR TOWN OF COVENTRY ... EXISTING CONDITIONS PLAN NO. 1, 2, 3 & 4 MAY 2015" BY CROSSMAN ENGINEERING.
9. UTILITY LINE SCAN PROVIDED BY NATIONAL GRID SHOWING THE GAS LINE LOCATIONS.
10. RHODE ISLAND STATE HIGHWAY PLATS 5, 310, 321, 563 AND 2724.

LEGEND

○ IR	IRON ROD
■ RIHB	RHODE ISLAND HIGHWAY BOUND FOUND
⊡ RIHB	RHODE ISLAND HIGHWAY BOUND NOT FOUND
⌀	UTILITY POLE
☼ L.P.	LIGHT POLE
◀	FLOOD LIGHT
⊸☼	STREET LIGHT
⊸	SIGN
•FP	FLAG POLE
□ CB	CATCH BASIN
□ CB/DI	CATCH BASIN/DROP INLET
FES	FLARED END SECTION
Ⓓ DMH	STORM MANHOLE
Ⓔ EMH	ELECTRIC MANHOLE
Ⓢ SMH	SANITARY MANHOLE
E	ELECTRIC BOX
	HYDRANT
WG	WATER VALVE
	WATER SPIGOT
Ⓦ WMH	WATER MANHOLE
	WATER SHUTOFF
W	WATER METER
Ⓦ	WELL
IRR	IRRIGATION HANDHOLE
FDC	FIRE DEPARTMENT CONNECTION
GG	GAS GATE
G	GAS METER
	UTILITY PAINT SPOT
	BORING HOLE
	WETLANDS FLAG
	DECIDUOUS TREE
MB	MAIL BOX
	BOLLARD
MP	METAL POST
	EVERGREEN TREE
SWL	SINGLE WHITE LINE
DYL	DOUBLE YELLOW LINE

SCITUATE SURVEYS, INC.
410 TIOGUE AVENUE
COVENTRY, RHODE ISLAND 02816
401 821 5101
LAND SURVEYING/MAPPING/SITE PLANNING

SCALE IN FEET: 40 20 0 40 80 120

CERTIFICATION
THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED PURSUANT TO SECTION 9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND STATE BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON NOVEMBER 24, 2015, AS FOLLOWS:

MEASUREMENT SPECIFICATION N/A

MEASUREMENT SPECIFICATION
VERTICAL CONTROL STANDARD: F-2
TOPOGRAPHIC SURVEY ACCURACY: F-2

TYPE OF SURVEY: CLASS I
NOT A BOUNDARY SURVEY

TYPE OF SURVEY: OTHER
DATA ACCUMULATION SURVEY

SIGNATURE OF SURVEYOR
THE PURPOSE OF THIS PLAN IS TO DEPICT TOPOGRAPHICAL AND ELEVATION DATA FOR A SEWER EXTENSION PROJECT.

BY: Angelo M. Raimondi
ANGELO M. RAIMONDI, PROFESSIONAL LAND SURVEYOR NO.1762 © SCITUATE SURVEYS, INC. CGA NO. A.20
IF THIS MAP DOES NOT BEAR AN ORIGINAL SIGNATURE AND "WET" STAMP, THEN IT IS NOT AN AUTHORITATIVE VERSION.

DATE	REVISED / PERMIT INFO
10/07/2024	

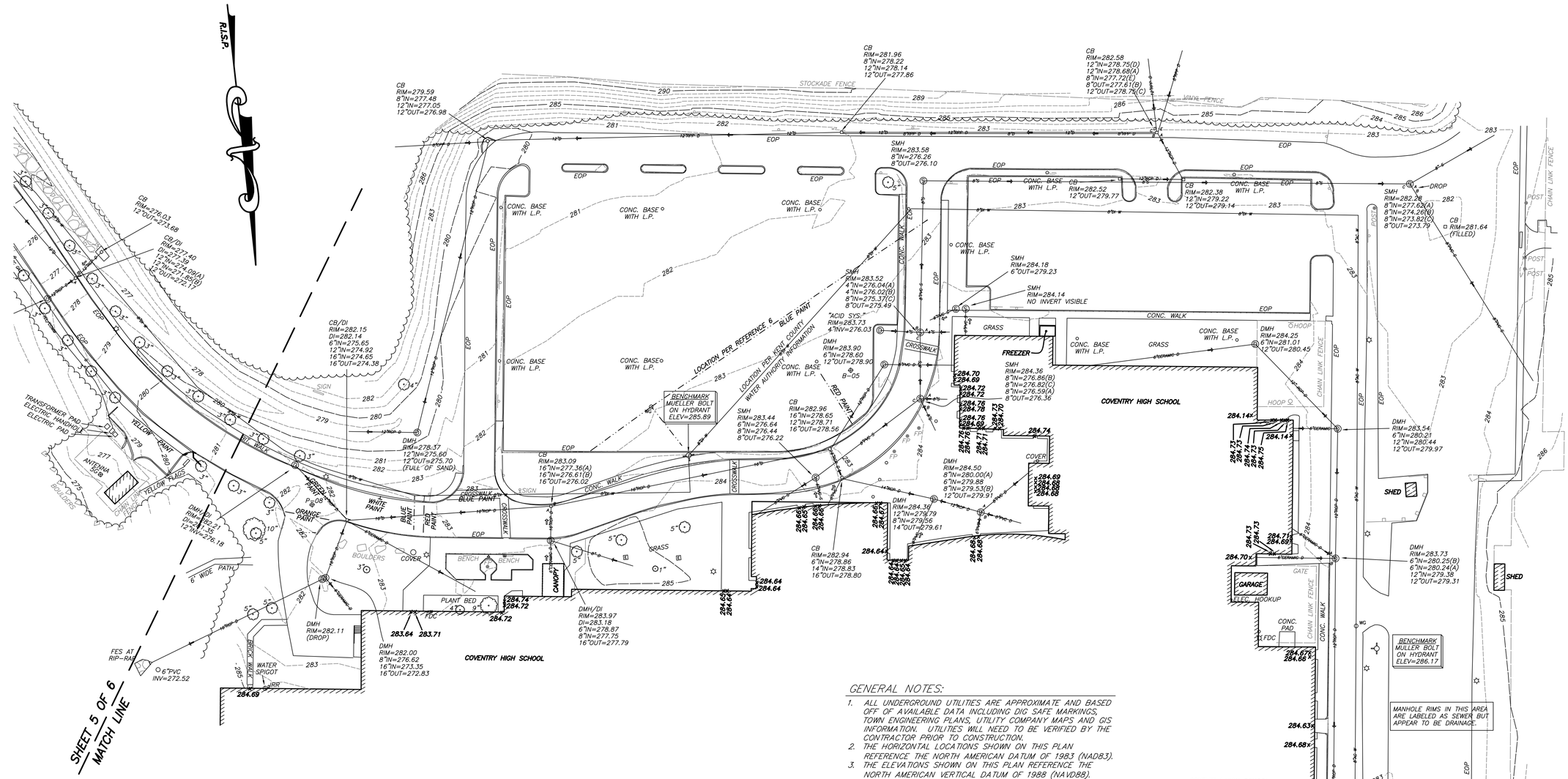
ANGELO M. RAIMONDI
No. 1762
PROFESSIONAL LAND SURVEYOR

EXISTING CONDITIONS UTILITY SURVEY
FOR
COVENTRY HIGH SCHOOL
RESERVOIR ROAD AND TIOGUE AVENUE
COVENTRY, RHODE ISLAND

SCALE: 1"=40' DATE: SEPTEMBER 26, 2024 REVISION: 10/07/24

PROJECT NO.: SS3136
DRAWING NO.: SS5158
DRAWN BY: C. J. BIITTIG

SHEET 5 OF 6



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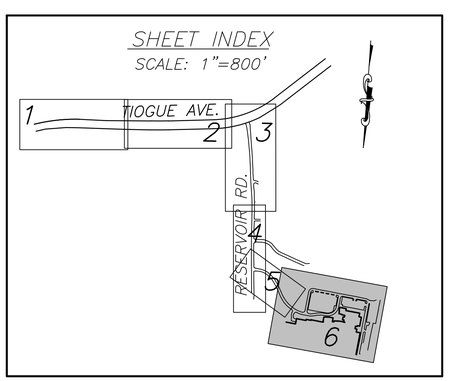
SHEET INDEX

SCALE: 1"=800'



LEGEND

○ IR	IRON ROD	⊕	HYDRANT
■ RIHB	RHODE ISLAND HIGHWAY BOUND FOUND	○WG	WATER VALVE
⊡ RIHB	RHODE ISLAND HIGHWAY BOUND NOT FOUND	⊕	WATER SPIGOT
⌀	UTILITY POLE	Ⓦ WMH	WATER MANHOLE
☼ L.P.	LIGHT POLE	⊗	WATER SHUTOFF
◄	FLOOD LIGHT	▣	WATER METER
⊶☼	STREET LIGHT	Ⓦ	WELL
⊶	SIGN	IRR	IRRIGATION HANDHOLE
• FP	FLAG POLE	⌑ FDC	FIRE DEPARTMENT CONNECTION
□ CB	CATCH BASIN	○GG	GAS GATE
□ CB/DI	CATCH BASIN/DROP INLET	⊡	GAS METER
◅□ FES	FLARED END SECTION	⊠	UTILITY PAINT SPOT
Ⓓ DMH	STORM MANHOLE	⊕	BORING HOLE
Ⓔ EMH	ELECTRIC MANHOLE	WF	WETLANDS FLAG
Ⓢ SMH	SANITARY MANHOLE		DECIDUOUS TREE
E	ELECTRIC BOX	MB	MAIL BOX
SWL	SINGLE WHITE LINE	⊗	BOLLARD
DYL	DOUBLE YELLOW LINE	MP	METAL POST
			EVERGREEN TREE

SCITUATE SURVEYS, INC.
410 TIOGUE AVENUE
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SCALE IN FEET: 40 20 0 40 80 120

CERTIFICATION
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NOT A BOUNDARY SURVEY — MEASUREMENT SPECIFICATION: N/A
NOT A BOUNDARY SURVEY — MEASUREMENT SPECIFICATION: HORIZONTAL CONTROL STANDARD: 1"=1' TOPOGRAPHIC SURVEY ACCURACY 1-2
TYPE OF SURVEY: OTHER — DATA ACCUMULATION SURVEY
STATEMENT OF PURPOSE: THE PURPOSE OF THIS PLAN IS TO DEPICT TOPOGRAPHICAL AND ELEVATION DATA FOR A SEWER EXTENSION PROJECT.
BY: ANGELO M. RAIMONDI, PROFESSIONAL LAND SURVEYOR NO.1762
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DATE	REVISED INVERT INFO.
10/01/2024	

ANGELO M. RAIMONDI No. 1762 PROFESSIONAL LAND SURVEYOR

EXISTING CONDITIONS UTILITY SURVEY
FOR
COVENTRY HIGH SCHOOL
RESERVOIR ROAD AND TIOGUE AVENUE
COVENTRY, RHODE ISLAND

SCALE: 1"=40' DATE: SEPTEMBER 26, 2024 REVISION: 10/01/24

PROJECT NO.: SS3136
DRAWING NO.: SS5158
DRAWN BY: C. J. BIITTIG

SHEET 6 OF 6

Appendix B

Coventry, RI Wetlands Delineation Report

Rhode Island Wetland Delineation Report

Report Date:	April 29, 2024		
Project Name:	Coventry High School Sewer Extension		
Site Location:	40 Reservoir Rd, Approximately 1,700 ft of Reservoir Road, and Approximately 2,000 ft of Tiogue Ave, Coventry, RI		
Prepared For:	Town of Coventry 1670 Flat River Road Coventry, RI 02816		
Date(s) of Investigation:	April 1, 2024		
Weather:	44°F, Cloudy	**Rainfall (last 24 hours):**	0 in

Soil Conditions:

☐ Dry ☒ Moist ☐ Wet ☐ Frozen (_____ in.) ☐ Snow cover (_____ in.)

Jurisdictional Areas[1]**:**

☒ Freshwater Wetlands
☒ Buffers
☒ Floodplains

☒ Areas Subject to Storm Flowage

☒ Areas Subject to Flooding

☒ Contiguous Areas that extend outward:
- ☒ 200' from the edge of a river/stream
- ☐ 200' from the edge of a drinking water supply reservoir
- ☒ 100' from the edge of all other freshwater wetlands

Method of Flag Series Mapping:

☐ Site sketch
☐ Aerial photograph
☒ GPS (sub-meter) located

Table 1
Summary of Wetland Delineation Flag Series

Flag Series	Flag Number	Description	Location
A D	A100 → A106 D400 → D405	Upstream banks of the Mishnock River delineated by the Ordinary High Water Mark.	South of Tiogue Ave
B	B200 → B227	Forested Swamp	South of Tiogue Ave
C	C300 → C307	Forested Swamp, Area Subject to Flooding	South of Tiogue Ave
E F	E500 → E507 F600 → F607	Downstream banks of the Mishnock River delineated by the Ordinary High Water Mark.	North of Tiogue Ave
G	G700 → G702	Marsh, Area Subject to Flooding	North of Tiogue Ave
H	H800 → H813	Forested Swamp	North of Tiogue Ave
I	I900 → I905	Forested Swamp	North of Tiogue Ave

[1] Pursuant to R.I. Gen. Laws § 2-1-20(9) and 250-RICR-150-15-3 §3.4(A)(39), effective July 15, 2022.

Inland resource areas were delineated in accordance with applicable local, state, and federal statutes, as detailed within this Wetland Delineation Report. This delineation does not constitute an official wetland boundary until such time as it is accepted and approved by local, state, or federal regulatory agencies.

The wetland delineation was conducted by:

Kristin Connell
Wetland Scientist, Qualified Soil Scientist

Figures:

1 Wetland Delineation Sketch
2 FEMA Map (FIRMette Panel 44003C0112H; effective 10/2/2015)
3 RIDEM Environmental Resource Map
4 RIDEM Freshwater Wetlands Buffer Regions
5 RIDEM Surface Water Buffer Zone Designations
6 National Wetland Inventory Map

Attachments:

A Site Photographs
B Rhode Island Department of Environmental Management Wetland Edge Delineation Forms
C NRCS Hydric Rating by Map Unit
D Explanation of the Terms Used in Wetlands/Watercourses Functions and Values Assessments

1 Methodology

1.1 Regulatory Context

Freshwater wetlands are regulated in the State of Rhode Island by the Rhode Island General Laws Section 2-1-18 to 2-1-27; the Freshwater Wetlands Act and the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act (effective July 1, 2022). **Freshwater wetlands** includes, but are not limited to, those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support a prevalence of vegetation adapted for life in saturated soil conditions. Freshwater wetlands includes, but is not limited to: marshes, swamps, bogs, emergent and submergent plant communities, and for the purposes of this chapter, rivers, streams, ponds, and vernal pools. **Jurisdictional Areas** regulated by Rhode Island's Department of Environmental Management (RIDEM) include: Freshwater wetlands, buffers, floodplains, areas subject to storm flowage, areas subject to flooding, and contiguous areas that extend outward: (A) two hundred feet from the edge of a river or stream; (B) two hundred feet from the edge of a drinking water supply reservoir; and (C) one hundred feet from the edge of all other freshwater wetlands. In accordance with Section 3.9.3(D) of the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act, any delineation or identification of freshwater wetlands completed by a person other than the RI DEM shall be valid only after review and written verification by the RIDEM. Activities occurring within Jurisdictional Areas are regulated by RIDEM and will require a Freshwater Wetlands General Permit or Freshwater Wetlands Permit from RIDEM. Activities will also be subject to approval by the U.S. Army Corps of Engineers (USACE), New England District.

The wetland delineation was conducted in conformance with local, state, and federal regulations and guidelines including:

- Section 3.21: Specific Criteria for Identifying Freshwater Wetlands and Floodplain Edges in the *Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act (effective July 1, 2022).*
- *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1 (January 1987)
- *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (January 2012)
- *Field Indicators for Identifying Hydric Soils in New England in New England* (Version 4, April 2019)

The 1972 amendments to the Clean Water Act established federal jurisdiction over "navigable waters," defined in the Act as "waters of the United States" (WOTUS), CWA Section 502(7). The U.S. Environmental Protection Agency and the USACE have defined WOTUS in regulations 40 CFR 120.2(a) and 33 CFR 328.3(a). The lateral limits of federally jurisdictional **non-tidal WOTUS in the absence of adjacent wetlands** are defined by the Ordinary High Water Mark (OHWM). The OHWM "means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character or soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." Federally jurisdictional **wetlands** have a continuous surface water connection to waters identified in 33 CFR 328.3(a)(1), 33 CFR 328.3(a)(2), or 33 CFR 328.3(a)(3) and are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

When present, federal wetlands were delineated in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (Version 2.0, January 2012). When present, federal non-tidal watercourses in the absence of wetlands were delineated in accordance with the US Army Corps of Engineers *National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams* (Interim Version, November 2022). Activities occurring within wetlands and waters within the State of Rhode Island are also subject to approval by the US Army Corps of Engineers (USACE), New England District.

During the April 1, 2024 delineation, the Fuss & O'Neill wetland and soil scientist reviewed the Site Location, observed vegetation and soils, and verified the presence or absence of wetlands. Where Freshwater Wetlands

were observed, boundaries were delineated and information regarding vegetation, soils, and hydrology was collected. Each flag location was named based on an alpha-numeric nomenclature.

Fuss & O'Neill also conducted a desktop review of available online resources prior to performing the wetland delineation including:

- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRMette)
- Local Mapping – Town of Coventry RI GIS Map (*https://next.axisgis.com/CoventryRI/*)
- National Wetlands Inventory Wetlands Mapper
- Natural Resources Conservation Service Hydric Rating by Map Unit
- RIDEM Environmental Resource mapping
- RIDEM Freshwater Wetlands Buffer Regions
- RIDEM RI Drinking Water Supply
- RIDEM Surface Water Buffer Zone Designations
- RI Geographic Information System: Natural Heritage Areas (2023)

2 Results and Findings

2.1 Summary of Site

The entirety of the proposed gravity sewer pipe route and approximately 75 feet from existing roadways was evaluated for the presence of Freshwater Wetlands. The pipe route is anticipated to be installed within the existing roadways and will extend west from an existing manhole near 1100 Tiogue Ave to the intersection of Tiogue Ave and Reservoir Rd. The pipe route will then extend north from the intersection to Coventry High School (40 Reservoir Rd), within the existing roadway until it enters the Coventry High School property. Four (4) forested swamps, one (1) marsh, and the banks of the Mishnock River were delineated along Tiogue Ave (*Figure 1)*. One (1) Area subject to storm flowage (Forested Swamp C) and three (3) Areas subject to Flooding (Forested Swamp C, Marsh G, and upstream river left of Mishnock River/Forested Swamp B) were located at the western-most and eastern-most extents of the pipe route along Tiogue Ave. A review of FEMA mapping also shows floodplain areas bordering Mishnock River which crosses below Tiogue Ave at the eastern-most extent of the pipe route (*Figure 2)*. No Freshwater Wetlands or Jurisdictional Areas were identified along Reservoir Rd within the project area.

All Freshwater Wetlands delineated are jurisdictional under the State of Rhode Island's Department of Environmental Management.

Refer to *Section 2.2* below for further descriptions of the delineated Freshwater Wetlands and their associated Buffers and Contiguous Areas. Refer to *Table 2* for a summary of the Freshwater Wetlands delineated and their potential jurisdictional status.

Table 2.
Summary of Water Resource Features

Resource Feature	Flag Series	Description	Potential Jurisdictional Status *
Mishnock River (Upstream)	A100 → A106 D400 → D405	Upstream banks of the Mishnock River (flows north) delineated by the Ordinary High Water Mark.	• RIDEM considers Mishnock River a jurisdictional Freshwater Wetland River. • Mishnock River would be considered a federally jurisdictional WOTUS.

Resource Feature	Flag Series	Description	Potential Jurisdictional Status *
Wetland B200	B200 → B227	Forested wetland area south of Tiogue Ave with pockets of standing water.	• Under the Freshwater regulations, RIDEM would consider B200 as a forested swamp. • B200 is likely federally jurisdictional due to its surface water connection with Mishnock River.
Wetland C300	C300 → C307	Forested swamp wetland and Area subject to flooding (ASF) from an Area subject to storm flowage (ASSF).	• Under the Freshwater regulations, RIDEM would consider C300 as a forested swamp and ASF. • C300 is likely federally jurisdictional due to its surface water connection with Mishnock River as mapped by RIDEM.
Mishnock River (Downstream)	E500 → E507 F600 → F607	Downstream banks of the Mishnock River (flows north) delineated by the Ordinary High Water Mark.	• RIDEM considers Mishnock River a jurisdictional Freshwater Wetland River. • Mishnock River would be considered a federally jurisdictional WOTUS.
Wetland G700	G700 → G702	Marsh area hydraulically connected to the Mishnock River containing standing water and emergent plants. Area subject to flooding (ASF) from Mishnock River.	• Under the Freshwater regulations, RIDEM would consider G700 as a marsh and ASF. • G700 is likely federally jurisdictional due to its surface water connection with Mishnock River.
Wetland H800	H800 → H813	Observed to be forested swamp area with standing water and water stained leaves. Note that RIDEM maps this area as scrub shrub wetland.	• Under the Freshwater regulations, RIDEM would consider H800 as a forested swamp. • H800 may have historically had direct surface water connection to Mishnock River. However, at this time is likely not federally jurisdictional due to a lack of continuous surface water connection to a WOTUS.

Resource Feature	Flag Series	Description	Potential Jurisdictional Status *
Forested Swamp Wetland I	I900 → I905	Hydraulically isolated forested swamp wetland with standing water.	• Under the Freshwater regulations, RIDEM would consider I900 as a forested swamp. • I900 is likely not federally jurisdictional due to a lack of continuous surface water connection to a WOTUS.

* Potential jurisdictional status for onsite features is based on our professional experience and our understanding of current regulatory definitions and guidance. It is important to note this assessment is not an agency-approved determination of jurisdictional status of onsite water resources. The USACE and RIDEM should be consulted to obtain concurrence on the jurisdictional status of Freshwater Wetlands on site. See *Methodology* section for further description of regulatory context.

2.2 Freshwater Wetlands

"Freshwater wetlands" includes, but is not limited to, those areas that are inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support a prevalence of vegetation adapted for life in saturated soil conditions. Freshwater wetlands includes, but is not limited to: marshes, swamps, bogs, emergent, and submergent plant communities, and for the purposes of this chapter, rivers, streams, ponds, and vernal pools.

2.2.1 Swamps

"Swamp" means a place, wholly or partly within the state, where ground water is near or at the surface of the ground for a significant part of the growing season or runoff water from surface drainage collects frequently and/or where a vegetational community is made up of a significant portion of one or more of, but not limited to nor necessarily including all of, the following: red maple (Acer rubum), elm (Ulmus americana), black spruce (Picea mariana), white cedar (Chamaecyparis thyoides), ashes (Fraximus), poison sumac (Rhus vernix), larch (Larix laricina), spice bush (Lindera benzoin), alders (Alnus), skunk cabbage (Symplocarpus foetidus), hellebore (Veratrum viride), hemlock (Thuja canadensis), sphagnums (Sphagnum), azaleas (Rhododendron), black alder (Ilex verticillata), coast pepperbush (Clethra alnifolia), marsh marigold (Caltha palustris), blueberries (Vaccinium), buttonbush (Cephalanthus occidentalis), willow (Salicaceae), water willow (Decodon verticillatus), tupelo (Nyssa sylbatica), laurels (Kalmia), swamp white oak (Quercus biscolor), or species indicative of marsh.

Wetland B200 would be defined as a Forested Swamp under the RI Freshwater Wetland Act. Common vegetation identified within the wetland and adjacent to the project area includes [common name (*scientific name*), wetland indicator status]: false glossy buckthorn (*Frangula alnus)*, FAC; sedge species (*Carex spp.*); green briar (*Smilax rotundifolia)*, FAC; multiflora rose (*Rosa multiflora)*, FACU; and sweet pepperbush (*Clethra alnifolia)*, FAC. Located at the toe of a slope, standing water and saturated soils at the surface were present within the wetland. Although out of scope for this delineation, RIDEM Environmental Resource mapping depicts Wetland B200 within River Protection Region 2 and as part of a larger wetland complex (Mishnock Swamp) extending south and greater than 10 acres (*Figure 3 and 4)*. Therefore, a 75-foot jurisdictional buffer zone and 100-ft contiguous area would be associated with this Forested Swamp.

Wetland C300 would be defined as a Forested Swamp under the RI Freshwater Wetland Act. Common vegetation identified within the wetland and adjacent to the project area includes [common name (*scientific name*), wetland indicator status]: white pine (*Pinus strobus)*, FACU; red maple (*Acer rubrum)*, FAC; Eastern white oak (*Quercus bicolor*), FACW; green briar (*Smilax rotundifolia)*, FAC; and Japanese barberry (*Berberis thunbergia)*, FACU. Saturated soils at the surface and groundwater at 6 inches were present within the wetland. Additionally, two stormwater channels originating from Reservoir Rd and Tiogue Ave discharge into this wetland. Although out of scope for this delineation, RIDEM Environmental Resource mapping depicts Wetland C300 within River Protection Region 2 and as part of a larger wetland complex (Mishnock Swamp) extending south and greater than 10 acres (*Figure 3 and 4)*. It is likely C300 is connected to Wetland B200. Therefore, a 75-foot jurisdictional buffer zone and 100-ft contiguous area would be associated with this Forested Swamp.

Wetland H800 would be defined as a Forested Swamp under the RI Freshwater Wetland Act. Common vegetation identified within the wetland includes [common name (*scientific name*), wetland indicator status]: white pine (*Pinus strobus)*, FACU; red maple (*Acer rubrum)*, FAC; green briar (*Smilax rotundifolia)*, FAC; sweet pepperbush (*Clethra alnifolia)*, FAC; and grapevines (*Vitis spp.)*. Standing water, saturated soils at the surface and water-stained leaves were present within the wetland. Although out of scope for this delineation, RIDEM Environmental Resource mapping depicts Wetland H800 within River Protection Region 2 and as part of a larger wetland complex extending north between 1 and 10 acres (*Figure 3 and 4)*. Therefore, a 50-foot jurisdictional buffer zone and 100-ft contiguous area would be associated with this Forested Swamp.

Wetland I900 would be defined as a Forested Swamp under the RI Freshwater Wetland Act. Common vegetation identified within the wetland includes [common name (*scientific name*), wetland indicator status]: red maple (*Acer rubrum)* and an unidentified sapling species. Standing water and saturated soils at the surface were present within the wetland. This delineated wetland is within River Protection Region 2 and smaller than an acre and therefore, a 25-foot jurisdictional buffer zone and 100-ft contiguous area would be associated with this Scrub-shrub Swamp (*Figure 4)*.

2.2.2 Marshes

"Marsh" means a place wholly or partly within the state where a vegetational community exists in standing or running water during the growing season and/or is made up of one or more of, but not limited to nor necessarily including all of, the following plants or groups of plants: hydrophytic reeds (Phragmites), grasses (Cramineae), mannagrasses (Glyceria), cutgrasses (Leersia), pickerelwoods (Pontederiaceae), sedges (Cyperaceae), rushes (Juncaceae), cattails (Typha), water plantains (Alismataceae), bur-reeds (Sparganiazceae), pondweeds (Zosteraceae), frog's bits (Hydrocharitaceae), arums (Araceae), duckweeds (Lemmaceae), water lilies (Nymphaeceae), water-milfoils (Haloragaceae), water-starworts (Callitrichaeceae), bladder-worts (Utricularia), pipeworts (Eriocaulon), sweet gale (Myrica gale), and buttonbush (Cephalanthus occidentalis).

Wetland G700 would be defined as a Freshwater Marsh under the RI Freshwater Wetland Act. Common vegetation identified within the wetland includes [common name (*scientific name*), wetland indicator status]: sedge species (*Carex spp.*); skunk cabbage (*Symplocarpus foetidus*), OBL; and red maple (*Acre rubrum*), FAC. Standing water, bare ground, and a 10-inch layer of organic muck were present within the wetland. Although out of scope for this delineation, RIDEM Environmental Resource mapping depicts Wetland G700 extending north and bordering the Mishnock River (*Figure 3)*. A 100-foot jurisdictional buffer zone and contiguous area would be associated with this marsh.

2.2.3 Rivers

"River" means a body of water designated as a perennial stream by the United States Department of Interior geologic survey (USGS) on 7.5 minute series topographic maps.

The Mishnock River is designated as a perennial stream by the USGS and is located within the South Branch Pawtuxet River Sub-Basin with a drainage area of approximately 10,645 acres. The Mishnock River within the Project Location flows north and crosses below Tiogue Ave, spanning approximately 15-30 feet in width. Upstream banks were delineated by Flag Series A100 and D400 and downstream banks by Flag Series E500 and F600. Banks A100, E500, and F600 were defined by steep topography and large rocks/boulders. Bank D400 was defined by a gradual slope adjacent to delineated wetlands. Flags were hung based on the Ordinary High Water Mark and observed physical characteristics in the field.

According to RIDEM's Surface Water Buffer Zone Designations (*Figure 3*), the Mishnock River has a 150-foot buffer zone width due to its designation as a cold water fishery and a 200-ft contiguous area. The buffer zone within the Project Location is comprised of Tiogue Ave, marsh areas, forested swamp areas, residential and commercial buildings, and upland forest.

2.3 Floodplains

"Floodplain" means that land area adjacent to a river or stream or other body of flowing water which is, on the average, likely to be covered with flood waters resulting from a one-hundred (100) year frequency storm. A "one-hundred (100) year frequency storm" is one that is to be expected to be equaled or exceeded once in one hundred (100) years; or may be said to have a one percent (1%) probability of being equaled or exceeded in any given year.

Floodplains on site were determined based on FEMA mapping (*Figure 2)*. FEMA Flood Insurance Rate Map (FIRM) Panel 44003C0112H (effective 10/1/2015) depicts floodplain within 75 ft of Tiogue Ave at the Mishnock River (Regulatory Floodway) crossing. FEMA's limit of study occurs approximately 55 feet south of the road edge. Floodplain likely extends further than depicted on mapping. Additionally, the regulatory floodway north of Tiogue Ave likely follows Flag Series E500 and F600. Further investigation may be needed to determine the proper extent and floodplain elevations on site.

2.4 Areas subject to storm flowage and flooding

"Area subject to flooding" shall include, but not be limited to, low-lying areas that collect, hold, or meter out storm and flood waters from any of the following: rivers, streams, intermittent streams, or areas subject to storm flowage.

"Area subject to storm flowage" includes drainage swales and channels that lead into, out of, pass through, or connect other freshwater wetlands or coastal wetlands, and that carry flows resulting from storm events, but may remain relatively dry at other times.

One Area subject to storm flowage was identified at the southwestern-most extent of the project area. Two outlets from Reservoir Rd discharge stormwater south into Wetland C, following a well-defined stormwater channel with a sandy bottom.

Three Areas subject to flooding were identified:

1. Forested Swamp C receives flood waters from the Area subject to storm flowage mentioned above. See *Section 2.2.1* for a further description of the area.
2. Marsh G collects storm and flood waters from Mishnock River.
3. The upstream area river left of the Mishnock River is a low-lying area that transitions into wetland B200 and would receive flood waters from the river.

3 Summary of Wetland Function & Values Assessment

Function & values assessments were conducted in the field of the Freshwater Wetlands delineated at the Site. The assessments are largely based on the procedure outlined in the U.S. Army Corps of Engineers "Highway Methodology Work Book: Supplement. Wetland Functions and Values: A Descriptive Approach" (1999, NAEEP-360-1-30a). This methodology is descriptive and does not rely upon semi-quantitative numerical models to identify principal functions and values. In addition, other assessment methods were considered (e.g. Wisc. DNR, 1992, "Rapid Assessment Methodology for Evaluating Wetland functions and Values." and Ammann, et al., 1996, "Method for the Evaluation of Inland Wetlands in Connecticut.") as well as professional experience.

Table 3, below, provides a summary of the assessments of wetlands and watercourses conducted at the Site. Resource areas with similar Functions and Values (e.g., forested wetlands, watercourses) are assessed jointly. The 8 terms used to identify the Functions and Values are described in the attachment, *Explanation of the Terms Used in Wetlands/Watercourses Functions and Values*.

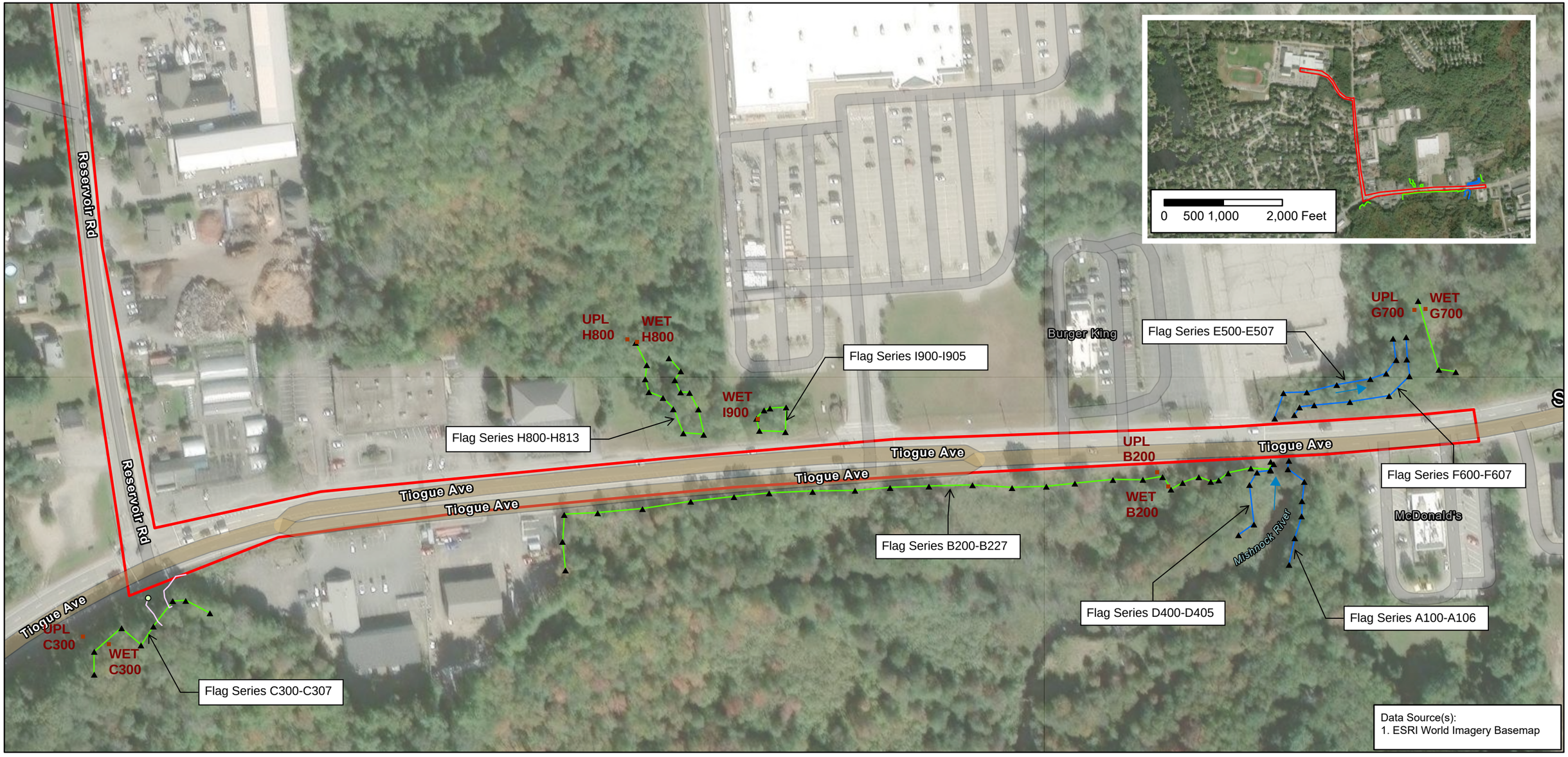
Table 3: Summary of Wetland/Watercourse Functions and Values

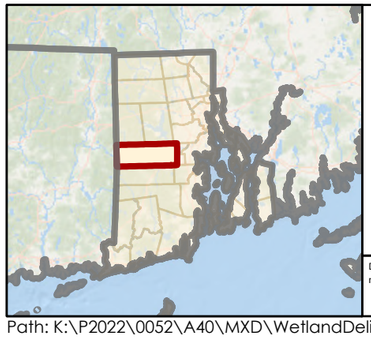
Wetland/ Watercourse delineated at the Site		Mishnock River	B200	C300	G700	H800	I900
FUNCTIONS & VALUES	Groundwater Recharge/Discharge	S	P	P	P	S	S
	Floodflow Alteration and Protection	-	P	P	P	-	-
	Fish & Shellfish Habitat	P	-	-	-	-	-
	Sediment/Toxicant/ Nutrient Retention	-	P	P	P	S	S
	Production Export	S	P	S	P	S	S
	Wildlife Habitat	P	P	P	P	P	P
	Educational/Scientific/ Recreation Value	-	-	-	-	-	-
	Uniqueness/Heritage*	-	-	-	-	-	-

"P" = Principal Function or Value; "S" = Secondary Function or Value; "-" = assessed, no P or S assigned.

Note: The site *may* contain endangered, threatened, and/or special concern species, as it is located within a Natural Heritage Area, mapped by the University of Rhode Island Environmental Data Center and RIGIS. While RIGIS maps show the approximate locations of endangered, threatened, and special concern species, this mapping does not confirm their presence or absence at the Site. State and Federal species list should be reviewed, and best management practices should be adhered to.

Figures





- Approximate Project Area
- Delineation Flag
- Sample Plot
- Approximate Ordinary High Water Flag Line
- Approximate Wetland Flag Line
- Culvert
- ASSF

The wetlands depicted in this sketch were identified and delineated in the field by Kristin Connell, Wetland Scientist (Fuss & O'Neill) and Qualified Soils Scientist on April 1, 2024.

0 38 75 150 Feet

N

Wetland Delineation Sketch Map

Coventry High School Sewer Extension

Coventry Rhode Island

FUSS & O'NEILL
146 Hartford Road
Manchester, CT 06040
860.646.2469 | www.fando.com

Figure 1

Path: K:\P2022\0052\A40\MXD\WetlandDelineation2024.aprx Layout Name: Wetland Sketch Map Name:
Date Exported: 6/13/2024 9:11 AM User: Alison.Baranovic Date Saved: 6/4/2024 9:30 AM

National Flood Hazard Layer FIRMette

FEMA

71°35'35"W 41°41'9"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

71°34'57"W 41°40'42"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/29/2024 at 8:25 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

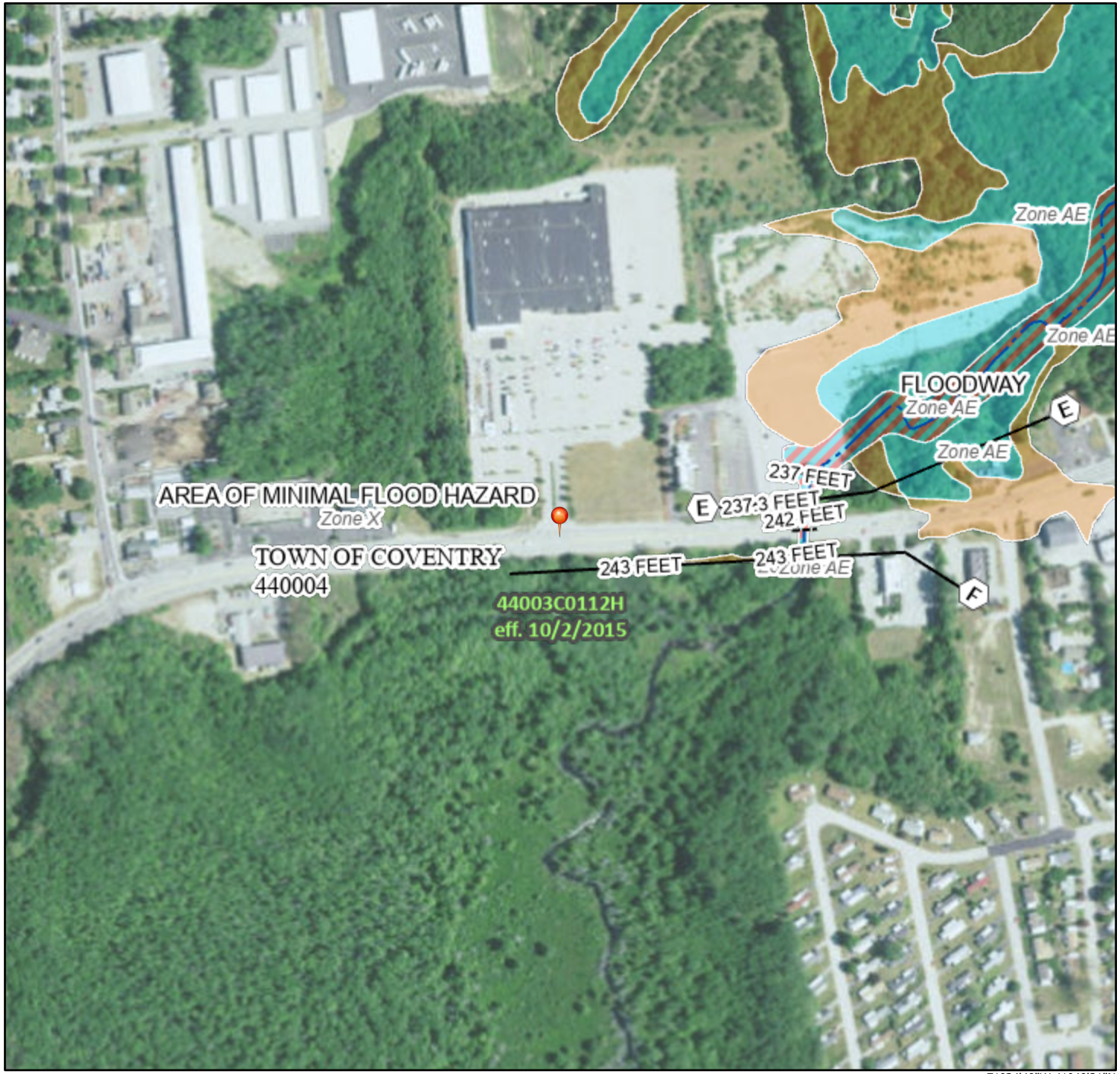
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure 2A

National Flood Hazard Layer FIRMette

FEMA

71°35'18"W 41°40'58"N



71°34'40"W 41°40'31"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

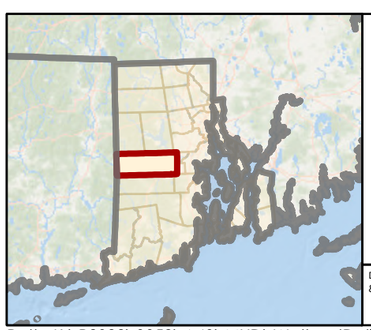
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/29/2024 at 8:24 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure 2B

Coventry High School
Reservoir Rd
Sugar Maple Dr
Butternut Dr
Sugar Maple Dr
Lynn Dr
Kowal Ct
Lynn Dr
Carol Ct
Extra Space Storage
Blue Spruce Dr
Winterberry Dr
W View Dr
Winterberry Dr
Reservoir Rd
Burger King
Tiogue Ave
Tiogue Ave
McDonald's
Tiogue Ave
Morningside
W View Dr
Tiogue Ave

Data Source(s):
1. ESRI World Imagery Basemap
2. RIDEM Freshwater Rivers and Streams (1:5000), 2016
3. RIDEM Natural Heritage Areas, 2023
4. RIDEM Wetland Types, 1993



Approximate Project Area
RIDEM Freshwater Rivers and Streams
Natural Heritage Areas

RIDEM Wetland Types

Emergent Wetland: Marsh/Wet Meadow
Forested Wetland: Coniferous
Forested Wetland: Deciduous
Palustrine Open Water
Scrub-Shrub Swamp
Scrub-Shrub Wetland: Shrub Fen or Upland

N

0 80 160 320 Feet

Environmental Resources Map

Coventry High School Sewer Extension

Coventry Rhode Island

FUSS & O'NEILL
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Manchester, CT 06040
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Figure 3

Path: K:\P2022\0052\A40\MXD\WetlandDelineation2024.aprx Layout Name: RIDEM Environmental Resources Map Name:
Date Exported: 6/13/2024 9:30 AM User: Alison.Baranovic Date Saved: 6/4/2024 9:30 AM

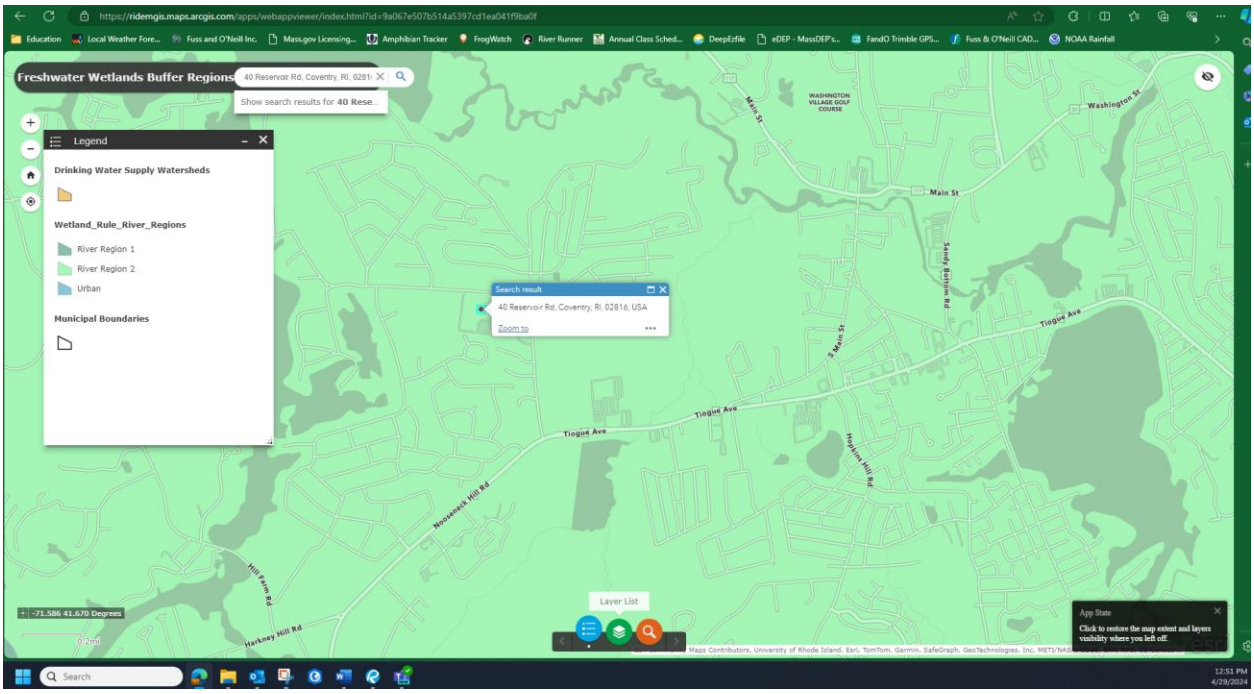


Figure 4
RIDEM Freshwater Wetlands Buffer Regions, accessed April 29, 2024.

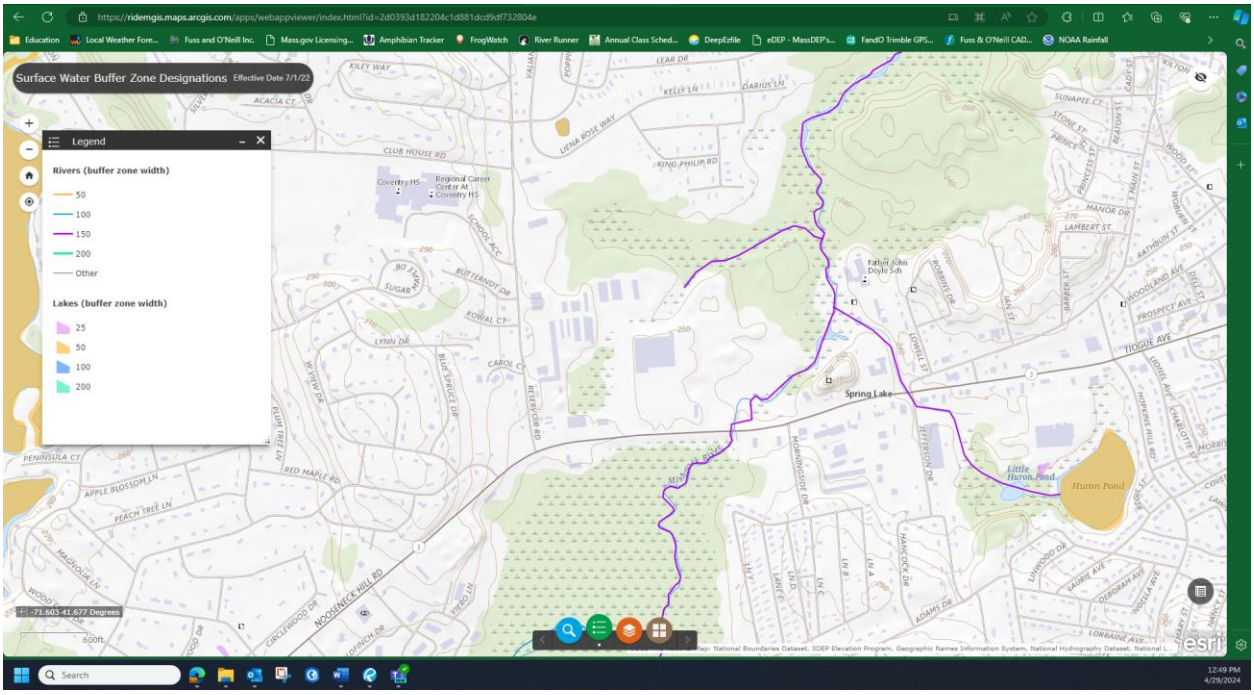


Figure 5
RIDEM Surface Water Buffer Zone Designations, accessed April 29, 2024

Attachment A

Site Photographs

Photo 1. Mishnock River, upstream of crossing with Tiogue Ave. Ordinary High Water delineated by flag series "A100" and "D400", looking west near flag A100.

Photo 2. Mishnock River, upstream of crossing with Tiogue Ave. Ordinary High Water delineated by flag series "A100" and "D400", looking south near flag A100 and D400.

Photo 3. Scrub shrub swamp area delineated by flag series "B200" looking south near wetland flag B205.

Photo 4. Scrub shrub swamp area delineated by flag series "C300" looking south near wetland flag C301.

Photo 5. Mishnock River, downstream of crossing with Tiogue Ave. Ordinary High Water delineated by flag series "E500" and "F600", looking east near flag E500.

Photo 6. Emergent marsh area delineated by flag series "G700", looking south near wetland flag G700.

Photo 7. Emergent marsh area delineated by flag series "G700", looking east near wetland flag G700.

Photo 8. Forested swamp area delineated by flag series "H800", looking east near wetland flag H802.

Photo 9. Forested swamp area delineated by flag series "I900". Photo from Google Maps, looking north (August 2023).

Attachment B

RI DEM Wetland Edge Delineation Forms

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES - Groundwater and Freshwater Wetlands Protection
FRESHWATER WETLANDS PROGRAM
235 Promenade Street, Providence, RI 02908
Telephone: 401-222-6820; Rhode Island Relay: 711
www.dem.ri.gov/wetlands

WETLAND EDGE DELINEATION FORM INSTRUCTIONS

Pursuant to § 3.9.3(E) of the Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act (Rules) [250-RICR-150-15-3], applicants must complete, and provide to RIDEM, documentation which describes the reasoning used to delineate wetland edges whenever requesting verification of a wetland edge. For this purpose, the applicant must complete the attached Wetland Edge Delineation Forms. These forms (see attached) are not meant to provide quantitative plot data, but rather to provide RIDEM with an outline of the reasoning used to delineate a particular **wetland edge**. While the vegetative community may change abruptly in some circumstances, other plant communities may transition very gradually to upland. In these cases, other hydrologic indicators, such as soil redoximorphic features, often must be considered in determining existing hydrological conditions. Completion of these data forms will provide RIDEM biologists with a clearer understanding of all the factors considered by an applicant or their consultant in delineating the boundary of a given wetland area.

At a minimum, one set of data forms (upland and wetland) must be completed for each wetland on the site. More than one set should be provided wherever changes in vegetative community composition, soil characteristics, topography, or other factor(s) might cause a change in reasoning for determination of the wetland edge. For example, if the edge of wetland "X" is located at the base of a steep slope with a clear vegetative break in one area (Flag Nos 1-27), but within a broad, transitional zone dominated by facultative vegetation in another area (Flag Nos. 28-56), at least two sets of data forms should be filled out for that wetland, since the reasoning behind the delineation (changes in vegetative species, topography and/or soil characteristics) is different in the two areas. If only one set of data forms is provided for a given wetland, it will be assumed that the same reasoning was used for determination of the entire wetland edge and the wetland flagging will be reviewed accordingly.

Properly completed forms which support an accurate edge only increase the speed by which RIDEM's verification can be completed. This in turn will get a quicker, less troublesome answer back to the applicant. Substantial inaccuracies can often be attributed to a lack of supporting data used to locate the wetland edge. In turn, these inaccuracies only increase delays and problems with verifying the wetland edge.

All wetland edge delineations are to be accomplished in accordance with § 3.21 of the Rules.

Wetland Edge Delineation Data Form (UPLAND)

Applicant: Town of Coventry
Wetland No. B200
Project Name: Coventry High School Sewer Extension
Flag No. Sequence: B200-B227
City/Town: Coventry
Delineation Date: April 1, 2024v

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status

List other vegetative species noted which may have affected determination of the wetland edge: Wetland edge along upland with maintained grasses.

Soil: SCS Soil Survey Mapping Unit: Udorthents-Urban land complex (UD)

On Hydric Soils List? ☐ YES ☐ NO

Soil Profile (Note wetland flag no. nearest soil test pit): B209

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-2	10YR 3/3	None	N/A	N/A
A	2-10	10YR 4/3	None	N/A	N/A
A	10-14	10YR 5/4	None	N/A	N/A

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.):

Landscape position:

Altered/atypical situation? (describe): Along road right of way.

Comments:

Wetland Edge Delineation Data Form (WETLAND)

Applicant: Town of Coventry
Wetland No. B200
Project Name: Coventry High School Sewer Extension
Flag No. Sequence: B200-B227
City/Town: Coventry
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
False Glossy Buckthorn (Frangula alnus)	FAC	Misc Sedge	
		Green Briar (Smilax rotundifolia)	FAC

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status
Multiflora Rose (Rosa multiflora)	FACU		
Sweet Pepperbush (Clethra alnifolia)	FAC		

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: Udorthents-Urban land complex (UD)

On Hydric Soils List? ☐ YES ☐ NO

Soil Profile (Note wetland flag no. nearest soil test pit): B208

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6	10YR 2/1	None	0 in	0 in
A	6-10	10YR 4/2	None	0 in	0 in
A	10-18	10YR 2/2	None	0 in	0 in

Other indicators exhibiting an absence of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres, etc.; see § 3.21.1 (D) of the Rules): _____

Landscape position: Toe of slope

Altered/atypical situation? (describe): _____

Comments: _____

Wetland Edge Delineation Data Form (UPLAND)

Applicant: Town of Coventry
Project Name: Coventry High School Sewer Extension
City/Town: Coventry
Wetland No. C300
Flag No. Sequence: C300-C307
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
Red Maple (Acer Rubrum)	FAC	Green Briar (Smilax rotundifolia)	FAC

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status

List other vegetative species noted which may have affected determination of the wetland edge: Upland separated by maintained grass.

Soil: SCS Soil Survey Mapping Unit: Walpole sandy loam, 0 to 3 percent slopes (Wa)

On Hydric Soils List? ☑ YES ☐ NO

Soil Profile (Note wetland flag no. nearest soil test pit): C301

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6	10YR 3/4	None	N/A	N/A

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.):

Landscape position:

Altered/atypical situation? (describe):

Comments:

Wetland Edge Delineation Data Form (WETLAND)

Applicant: Town of Coventry
Project Name: Coventry High School Sewer Extension
City/Town: Coventry
Wetland No. C300
Flag No. Sequence: C300-C307
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
White Pine (Pinus strobus)	FACU	Green Briar (Smilax rotundifolia)	FAC
Red Maple (Acer rubrum)	FAC		
Eastern White Oak (Quercus bicolor)	FACW		

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status
Japanese Barberry (Berberis thunbergii)	FACU		

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: Walpole sandy loam, 0 to 3 percent slopes (Wa)
On Hydric Soils List? ☑ YES ☐ NO

Soil Profile (Note wetland flag no. nearest soil test pit): C301

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Organic	0-2	10YR 2/1	None	0 in	6 in
A	2-14	10YR 2/1	None	0 in	0 in
B	14-20	10YR 3/3	None	0 in	0 in
B	20-22	10YR 4/3	None	0 in	0 in

Other indicators exhibiting an absence of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres, etc.; see § 3.21.1 (D) of the Rules): _____
Landscape position: _____
Altered/atypical situation? (describe): _____

Comments: _____

Wetland Edge Delineation Data Form (UPLAND)

Applicant: Town of Coventry
Project Name: Coventry High School Sewer Extension
City/Town: Coventry
Wetland No. G700
Flag No. Sequence: G700-G702
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
Red Maple (Acer rubrum)	FAC		

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status
Multiflora Rose (Rosa multiflora)	FACU	*Vitis spp.*	
Japanese Barberry (Berberis thunbergii)	FACU		

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: Scarboro mucky fine sandy loam, 0 to 3 percent slopes (Sb)
On Hydric Soils List? ☑ YES ☐ NO
Soil Profile (Note wetland flag no. nearest soil test pit): G700

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6	10YR 3/2	None	N/A	N/A

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): _____
Landscape position: _____
Altered/atypical situation? (describe): _____

Comments: _____

Wetland Edge Delineation Data Form (WETLAND)

Applicant: Town of Coventry
Project Name: Coventry High School Sewer Extension
City/Town: Coventry
Wetland No. G700
Flag No. Sequence: G700-G702
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
Red Maple (Acer Rubrum)	FAC	Sedges (Carex spp.)	
		Skunk Cabbage (Symplocarpus foetidus)	OBL

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status
		Vitis spp.	

List other vegetative species noted which may have affected determination of the wetland edge:

Soil: SCS Soil Survey Mapping Unit: Scarboro mucky fine sandy loam, 0 to 3 percent slopes (Sb)
On Hydric Soils List? ☑ YES ☐ NO
Soil Profile (Note wetland flag no. nearest soil test pit): G700

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Organic	0-10	10YR 2/1	None	0 in	0 in

Other indicators exhibiting an absence of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres, etc.; see § 3.21.1 (D) of the Rules): Water-stained leaves and standing water present.
Landscape position: Toe of slope
Altered/atypical situation? (describe): Wetland borders a man-made rock wall to the east and connects with the Mishnock River to the northwest.

Comments:

Wetland Edge Delineation Data Form (UPLAND)

Applicant: Town of Coventry
Project Name: Coventry High School Sewer Extension
City/Town: Coventry
Wetland No. H800
Flag No. Sequence: H800-H813
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
Red Maple (Acer rubrum)	FAC	Green Briar (Smilax rotundifolia)	FAC
White Pine (Pinus strobus)	FACU		

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: Udorthents-Urban land complex (UD)
On Hydric Soils List? ☐ YES ☐ NO
Soil Profile (Note wetland flag no. nearest soil test pit): H800

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
Organic	0-1	10YR 2/1	None	N/A	N/A
A	1-3	10YR 2/2	None	N/A	N/A
A	3-5	10YR 3/3	None	N/A	N/A
A	5-8	10YR 4/6	None	N/A	N/A

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): _____
Landscape position: _____
Altered/atypical situation? (describe): _____

Comments: _____

Wetland Edge Delineation Data Form (WETLAND)

Applicant: Town of Coventry
Wetland No. H800
Project Name: Coventry High School Sewer Extension
Flag No. Sequence: H8-H813
City/Town: Coventry
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
White Pine (Pinus strobus)	FACU	Green Briar (Smilax rotundifolia)	FAC
Red Maple (Acer rubrum)	FAC		

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status
Sweet Pepperbush (Clethra alnifolia)	FAC	Vitis spp.	

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: Scarboro mucky fine sandy loam, 0 to 3 percent slopes (Sb)
On Hydric Soils List? ☑ YES ☐ NO

Soil Profile (Note wetland flag no. nearest soil test pit): H800

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-8	10YR 2/1	None	0 in	0 in
A	8-24	10YR 4/6	30% 10YR 5/6	0 in	0 in

Other indicators exhibiting an absence of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres, etc.; see § 3.21.1 (D) of the Rules): Water stained leaves and standing water present.
Landscape position: Depression
Altered/atypical situation? (describe): _____

Comments: _____

Wetland Edge Delineation Data Form (UPLAND)

Applicant: Town of Coventry
Wetland No. I900 - See H800 upland plot
Project Name: Coventry High School Sewer Extension
Flag No. Sequence: I900-I905
City/Town: Coventry
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: _____
On Hydric Soils List? ☐ YES ☐ NO
Soil Profile (Note wetland flag no. nearest soil test pit): _____

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water

Other indicators exhibiting an absence of wetland hydrology (e.g. absence of water marks, lack of redoximorphic features, lack of oxidized rhizospheres, etc.): _____
Landscape position: _____
Altered/atypical situation? (describe): _____

Comments: _____

Wetland Edge Delineation Data Form (WETLAND)

Applicant: Town of Coventry
Project Name: Coventry High School Sewer Extension
City/Town: Coventry
Wetland No. I900
Flag No. Sequence: I900-I904
Delineation Date: April 1, 2024

Vegetation: List the three dominant species in each vegetative strata along with their NWI status:

Tree	Indicator Status	Herbs	Indicator Status
Unknown Tree 2			
Red Maple (Acer rubrum)	FAC		

Saplings/Shrubs	Indicator Status	Woody Vines	Indicator Status

List other vegetative species noted which may have affected determination of the wetland edge: _____

Soil: SCS Soil Survey Mapping Unit: Udorthents-Urban land complex (UD)
On Hydric Soils List? ☐ YES ☐ NO
Soil Profile (Note wetland flag no. nearest soil test pit): I900

Horizon	Depth	Matrix Color	Mottling Description	Depth to Saturation	Depth to Free Water
A	0-6	10YR 3/2	None	0 in	0 in
A	6-8	10YR 4/4	None	0 in	0 in

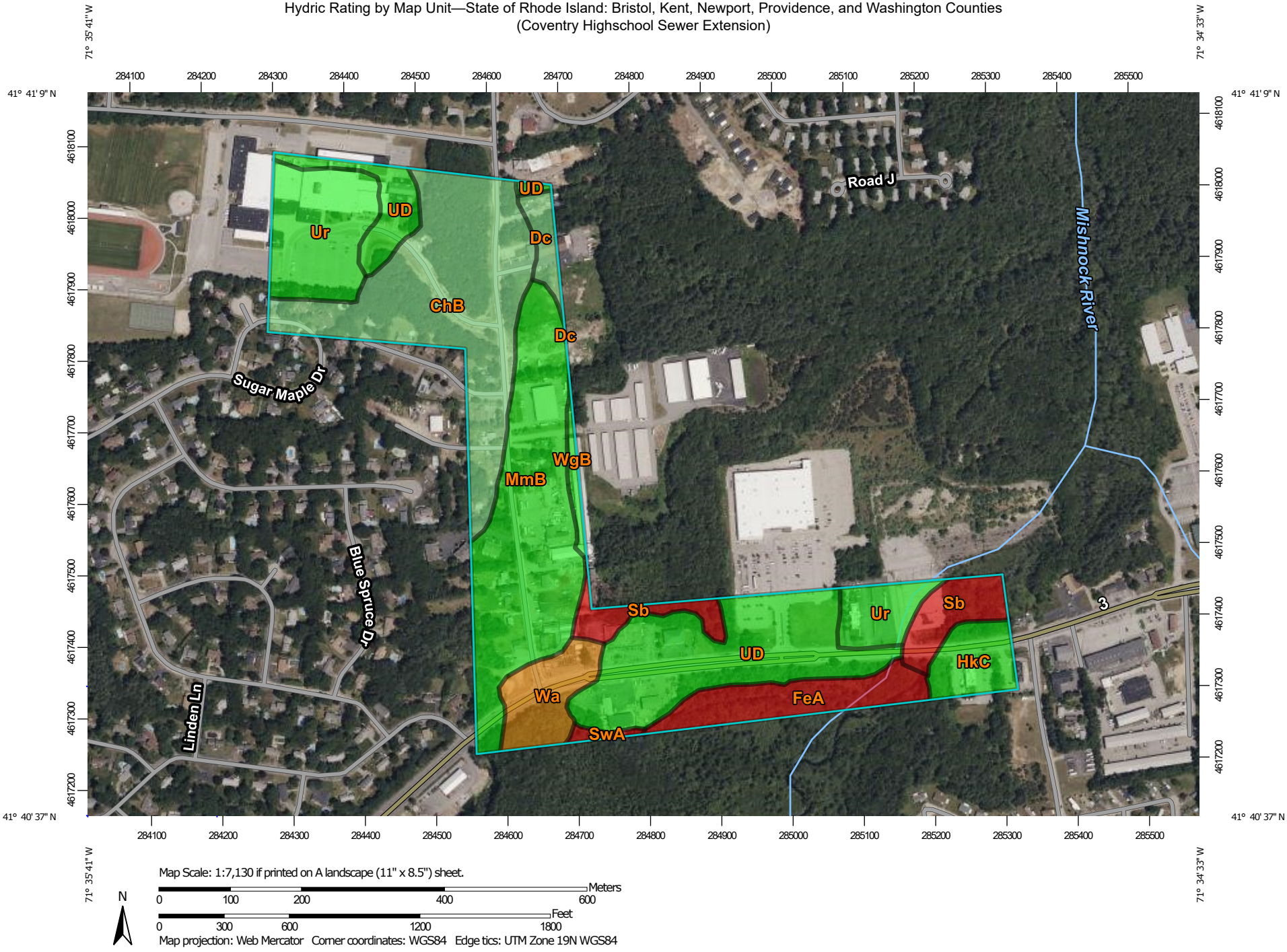
Other indicators exhibiting an absence of wetland hydrology (e.g. water marks, drainage patterns, root rhizospheres, etc.; see § 3.21.1 (D) of the Rules): Standing water present.
Landscape position: _____
Altered/atypical situation? (describe): _____

Comments: _____

Attachment C

NRCS Hydric Rating by Map Unit

Hydric Rating by Map Unit—State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
(Coventry Highschool Sewer Extension)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
Survey Area Data: Version 23, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Jul 1, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ChB	Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony	5	16.3	22.7%
Dc	Deerfield loamy fine sand, 0 to 3 percent slopes	5	1.3	1.8%
FeA	Freetown muck, 0 to 1 percent slopes	100	4.5	6.3%
HkC	Hinckley loamy sand, 8 to 15 percent slopes	0	2.7	3.8%
MmB	Merrimac fine sandy loam, 3 to 8 percent slopes	0	14.9	20.8%
Sb	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	100	4.3	6.0%
SwA	Swansea muck, 0 to 1 percent slopes	100	0.3	0.5%
UD	Udorthents-Urban land complex	0	14.4	20.1%
Ur	Urban land	0	8.7	12.1%
Wa	Walpole sandy loam, 0 to 3 percent slopes	90	3.5	4.9%
WgB	Windsor loamy sand, 3 to 8 percent slopes	0	0.7	0.9%
Totals for Area of Interest			**71.5**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Percent Present" returns the cumulative percent composition of all components of a map unit for which a certain condition is true. For example, attribute "Hydric Rating by Map Unit" returns the cumulative percent composition of all components of a map unit where the corresponding hydric rating is "Yes". Conditions may be simple or complex. At runtime, the user may be able to specify all, some or none of the conditions in question.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Attachment D

Explanation of Terms Used in Wetlands/
Watercourse Functions and Values Assessments

FUSS & O'NEILL

Explanation of Terms Used in Wetlands/Watercourses Function and Values

According to the U.S. Army Corps of Engineers "Highway Methodology Work Book: Supplement. Wetland Functions and Values: A Descriptive Approach" (1999, NAEEP-360-1-30a):

> **Functions** are self-sustaining properties and processes of a wetland. They result from living and non-living components of a specific wetland and describe its ecological significance independent of human valuation. **Values** are benefits that derive from one or more functions and characteristics associated with a wetland. Most wetlands have corresponding societal value that is recognized in federal, state, and/or local legislation to protect these resources.
>
> An assessment of *Primary* or *Secondary* indicates the relative number of satisfied criteria used as "considerations and qualifiers" for a particular function or value.

Terms

Groundwater Recharge & Discharge The capacity or potential for a wetland to interact with groundwater such that water moves from surface water to ground water (Recharge) or from ground water to surface water (Discharge).

Floodflow Alteration The storage of inflowing water from storm or flooding events, resulting in detention and retention of water on the wetland surface.

Fish and Shellfish Habitat (Streams & Rivers) Considers the quality of the aquatic habitat of a perennial watercourse, and its capacity to support finfish.

Sediment/Toxicant/Nutrient Retention The capacity of a wetland to remove dissolved, suspended and floatable material from and prevent the degradation of water quality.

Production Export The capacity to produce wildlife food sources, or to export biomass that sustains downstream ecosystems and local wildlife populations.

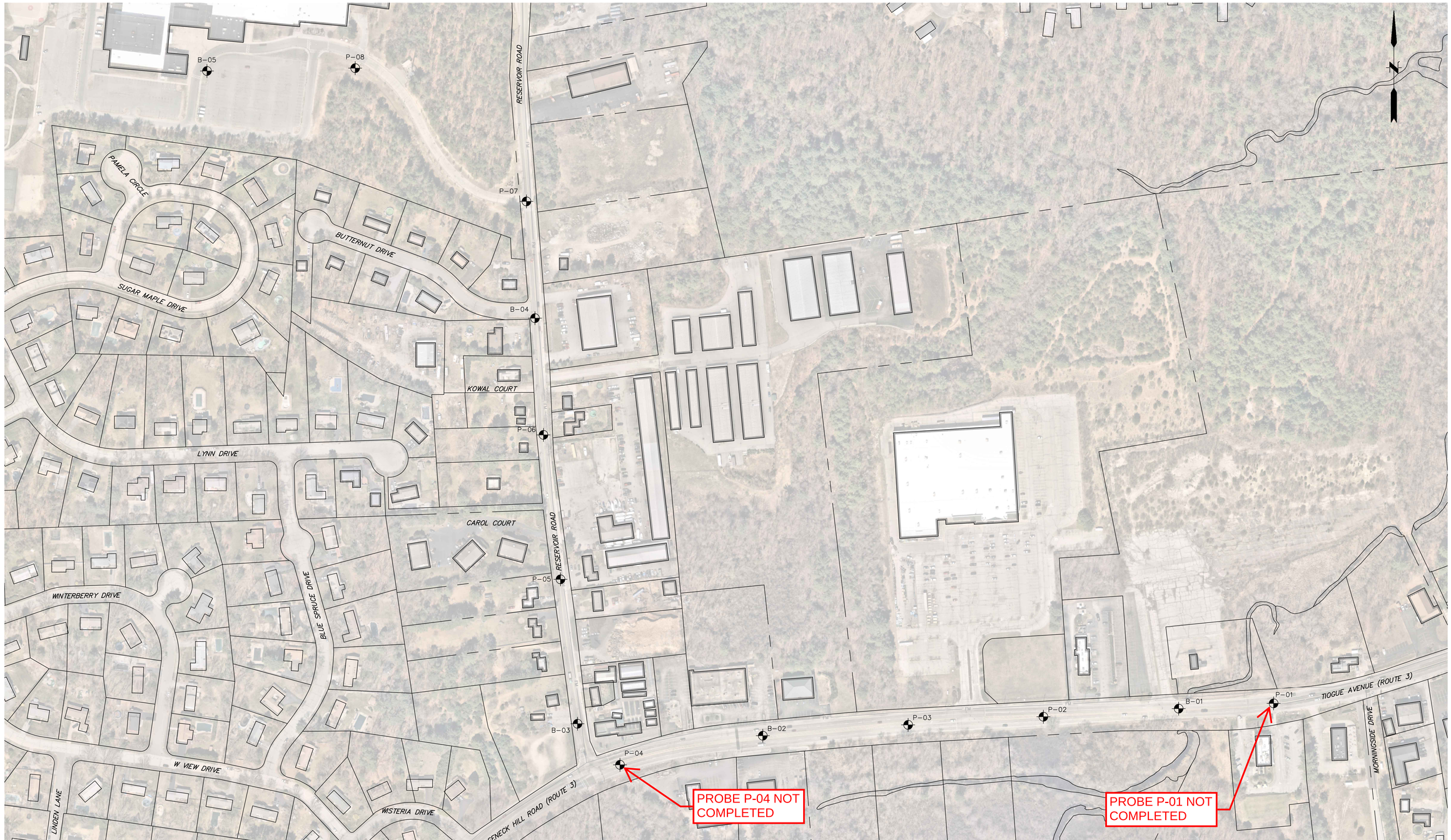
Wildlife Habitat The capacity of a wetland to support a diverse and abundant wildlife community typically associated with wetland and wetland edges.

Educational/Scientific/Recreation Value The suitability of a wetland for classroom field trips or scientific research. The ability of watercourses to provide passive or active recreational opportunities such as canoeing, boating, fishing, hunting, and other activities.

Uniqueness/Heritage The degree to which a wetland is considered a unique natural and/or historical resource.

Appendix C

Soil Boring & Probe Figure



NOT FOR CONSTRUCTION

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
			WTD	DGB

SEAL

SEAL

SCALE:
HORZ.: 1" = 40'
VERT.:
DATUM:
HORZ.:
VERT.:
40 20 0 40
GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

TOWN OF COVENTRY

SOIL BORINGS AND PROBES LAYOUT

COVENTRY HIGH SCHOOL SEWER EXTENSION

COVENTRY RHODE ISLAND

PROJ. No.: 20220052.A40
DATE: APRIL 2024

FIG-01

File: J:\DWG\P2022\00052.A40\Civil\Plan\20220052A40_STP01.dwg Layout: FIG-01 Plotted: 2024-04-02 8:20 AM Saved: 2024-04-01 2:27 PM User: WDylag
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
LAYER STATE:
MS VIEW:

Appendix D

Soil X Geotechnical Report

SOIL X, Corp.

THE EXPLORATION YOUR PROJECT NEEDS.

July 15, 2024

Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040

Attention: Mr. Marshall Gaston, PE

RE: GEOTECHNICAL MEMORANDUM
COVENTRY HIGH SCHOOL SEWER EXTENSION
Coventry, RI
Project Ref. No.: 24-04014
Revision: 15 July 2024

Dear Mr. Gaston:

Soil X Corp completed the preliminary geotechnical investigation for the Coventry High School Sewer Extension in Coventry, RI. The geotechnical explorations were conducted in accordance with our proposed scope of services and in general conformance with the applicable requirements of the Rhode Island Department of Transportation and applicable local codes.

This memorandum summarizes the available project information and review of the subsurface investigation and describes the conditions encountered based on the field information. Our review is based on the field boring logs and inspection provided by Fuss & O'Neill.

It does NOT include any environmental assessment relative to oil, gasoline, solid waste, and/or other hazardous materials. Similarly, this evaluation did not include review of site design or construction issues such as infiltration systems, underground utilities, protection of existing structures, and/or other site/temporary design issues unless specifically addressed herein. The contents of this report are subject to the attached Limitations.

The objective of the geotechnical investigation was to characterize subsurface conditions at the site and provide construction considerations for the design of the proposed sewer extension.

We appreciate the opportunity to participate in the site investigation. Please do not hesitate to contact us if you have any questions or require additional information.

Sincerely,

Severino Luna, PE
Soil X Corp.

SL/cdl

1.0 GEOTECHNICAL CHARACTERIZATION

Soil X Corp. executed five (5) geotechnical test borings and six (6) rock probes. The boreholes were designated as B-01 through B-05. Planned rock probes were label P-01 through P-08, however, rock probes P-01 and P-04 were removed from the project to avoid Kent County Water Authority conflict concerns. Fuss & O'Neill coordinated and inspected the field activities.

All borings were performed by a truck mounted rig using continuous flight hollow stem auger and/or driving and wash techniques while the soil samples were obtained using standard split-spoon samplers driven by a 140-pound automatic hammer in general accordance with ASTM D1586 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling Soils. The test borings were advanced from the existing ground surface and upon completion of each borehole, groundwater observations were recorded.

2.0 SUBSURFACE CONDITIONS

A generalized subsurface condition based on the test borings information are summarized in the following subsections.

2.1 Soils

The conditions exposed in the borings show the soil types and stratigraphy is generally uniform to the depths investigated and reflects the local geology as well as the historical developments at the site. Based on the borings, the generalized subsurface profile can be briefly described as:

2.1.1 GRANULAR FILL

Fill materials were encountered at the ground surface at all boring locations. The fill consists of poorly graded fine to coarse SAND, traces of silt (SP). The fill extends to about 5-feet below grade surface and is underlain by.

2.1.2 ORGANIC MATTER

An organic layer of approximately 18-inches thick was encountered on Boring B-02. It consists of soft organic silt (PT).

2.1.3 SAND DEPOSITS

Native glaciofluvial stratified deposits were encountered beneath the granular fill and organic matter. This stratum consists of fine to coarse sand with varying proportions of sand, silt, and gravel (SW); and can be described as medium dense to very dense based on the SPT N-values.

2.2 Bedrock

Practical refusal to further penetration of the auger and/or split-spoon sampler occurred only on Boring B-01 at about 15-ft below grade surface (bgs). In the same area, Rock Probe P-2 reached refusal at 14.5-ft bgs and P-03 at 12.5-ft bgs. Other probes reached the required 20-ft length without refusal.

2.3 Groundwater

Water levels were measured after completion of the test borings and probes. Water levels depth ranged from approximately 6 to 10-ft below existing grade surface. Groundwater observation wells were not installed and were not part of the scope of services.

Groundwater levels vary and are influenced by seasonal changes, local climatic conditions, precipitation, and other environmental factors. Short-term water levels observed in test borings should be considered approximate.

3.0 GEOTECHNICAL ANALYSIS

The evaluation of the site and the proposed development was based on the review of the subsurface conditions encountered on the test borings; and the assumed structural loading conditions, as described herein.

Fill and/or organic matter materials are NOT suitable for direct load support. Granular fill, if clean and without organic material, loam, snow/ice, or other objectionable material, can be used and/or prepared to support foundations or as base of pavement structure. Appropriated testing is needed to evaluate material to be used as structural fill.

The granular fill encountered at the exploration locations is used as base for the asphalt pavement and some appears clean. No information was available of the pavement base, and we are considering undocumented granular fill. However, it may be suitable for support and/or re-use contingent on careful testing and inspection.

Based on the results of the subsurface investigation, competent material was encountered beneath the fill and organics that extended to about 6.5-ft below existing grade surface.

The proposed foundations shall bear directly on properly prepared native soil and/or on top of the rock strata, and/or structural fill or crushed stone built-up from the competent stratum. The dense natural soil encountered on all borings can resist the allowable bearing pressure of 6,000-psf (pounds per square foot).

Final grades shall be studied to accommodate the existing rock elevation, otherwise rock removal should be expected. Refusal was encountered about 12-ft below existing grade at the eastern locations along Route 3. At these subject areas, bedrock might impact the proposed construction if any excavation or underground construction is planned to be beyond 12-ft in depth. Therefore, rock removal should be anticipated and budgeted for (obtain unit costs).

Rock removal includes mechanical excavation, ripping, hoe-ram, and blasting.

The site appears located on the shoulders of a moraine formation and on the limits of what appears to be an outwash within the valley of the Mishnock River. Coventry High School is on the shoulders of the hill and slopes down towards the south along Reservoir Road and east along Route 3.

Groundwater levels observed at the completion of the borehole ranged from 6 to 10-ft below grade surface. It should be accounted to be about 6-ft below existing grade at the end of Reservoir Road and along Route 3. Therefore, dewatering is expected during excavation for work to proceed in dry conditions.

Safe temporary excavation and/or fill slopes are the responsibility of the Contractor. All excavations must be conducted in accordance OSHA requirements or following local, state, and federal regulations. If an excavation cannot be properly sloped or benched due to space limitations, adjacent structures, and/or seepage, the Contractor must install an engineered shoring system to support the temporary excavation.

Summary Table:

Exploration No.	Water Level Depth *	End of Hole Depth
B-01	9’	15’ (Refusal)
P-02	6’	14.5’ (Refusal)
P-03	6’	12.5’ (Refusal)
B-02	7’	17’
B-03	6’	17’
P-05	10’	20’
P-06	10’	20’
B-04	10’	17’
P-07	NW**	20’
P-08	NW**	20’
B-05	NW**	17’

* Water Level observed upon completion of the borehole.
** NW = No Groundwater observed upon completion of the borehole.
The borehole was completed at the required depth (EOB/EOP).

3.1 Seismic Considerations

Earthquake loadings must be considered under requirements of the current edition of the Rhode Island State Building Code (RI-Code) which refers to the International Building Code (IBC) and applicable amendments. ASCE/SEI 7 Table 20.3-1 is used to establish the site class based on the average density, and hence the ability of the soil to transmit shear waves during a seismic event. The average density is based on the material, both soil and rock, within 100 feet below the building. The site classification is then used to determine the site coefficient and mapped spectral response for a given structure. The response to earthquake loading is controlled by the presence of the dense sand and the rock. Based on the requirements of the Code, the site is classified as:

Site Class C: Dense Soil and Rock Profile.

3.2 Site Preparation

All unsuitable materials which include but are not limited to organic soils, loam, snow, ice, frozen soils, and other objectionable materials shall be completely removed.

Any loose, soft, wet, and/or otherwise unsuitable soils (typically evidenced by rutting, pumping, and/or deflection of the subgrade) should be over-excavated to expose suitable soils or rock, or other remedial measures should be taken, as approved by the on-site geotechnical engineer. Any over-excavations should be completed with properly placed and compacted structural fill.

Any unstable areas that cannot be stabilized by additional compaction should be excavated to competent material and the area backfilled with compacted structural fill or ¾" stone.

3.3 Soil Excavation

As a minimum, temporary excavations should be sloped or braced, as required by Occupational Safety and Health Administration (OSHA) regulations, to provide stability and safe working conditions. The contractors are usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations, as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, State and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

A temporary shoring system shall be used. Temporary support of excavation may consist of trench box and/or slide rail shoring system. Consideration should be given to the groundwater levels and to the tight working conditions.

3.4 Rock Excavation

Depending on the rock type and conditions, rock excavation may occur by fragmenting with conventional excavating equipment instead of blasting. Fragmenting must be done using mechanical means which include hoe rams or breakers, drilling, and splitting, or drilling and chemical expansive agents. Since any means of rock removal will generate potentially damaging ground vibrations, measures shall be taken to limit the potential for damage, including:

Developing project specifications to provide guidelines for rock removal procedures and providing performance criteria. Performing vibration monitoring during rock removal operations so that the contractor's procedures can be modified in the field if monitoring data indicates vibrations approach or exceed threshold limits.

The exposed bedrock must be scraped clean of soil and any loose material should be removed. The footing subgrade should be approximately level and bedrock surfaces that exceed 6H:1V slope should be step-serrated or suitably benched.

3.5 Backfill and Compaction Requirements

Select backfill or structural fill should consist of granular soils free of cinder, brick, asphalt, ash, and other unsuitable materials. Such material should not contain any boulders or cobbles larger than about 3 inches across and should have less than 10% fines content (material passing the No. 200 sieve). The subgrade underneath the backfill should be properly prepared.

All backfill should be placed in lifts not exceeding 9-inches in loose thickness. Backfill placed beneath shallow foundations (e.g., footings, mat, and/or paved areas) should be compacted to a minimum of 95% of the maximum dry density. In-situ density testing should be performed to confirm that 95% compaction has been achieved. Special inspection is not required in areas without structural consideration, such as underneath sidewalks. However, it is recommended in unpaved areas the backfill be compacted to a minimum of 90% of the maximum dry density to reduce the potential for settlement of the backfill.

AASHTO Guide for Design of Pavement Structures shall be used on the reconstruction and backfill of the pavement structure. However, general directions are presented on Table 1 that shows recommended fill material types based on USCS Classification; Table 2 shows the recommended soil gradation for structural fill; and Table 3 shows recommended soil gradation for clean granular fill.

Table 1: Fill Material Types.

Fill Type [1]	USCS Classification	Acceptable Location for Placement
Structural Fill [2]	GW, GW-GM, SW, SW-SM, SP, GP	All locations and elevations
Pavement Subbase	GW, GW-GM, SW, SW-SM, SP, GP	Selected fill beneath pavement
Common Fill [3]	Varies	Used for general site grading. Not to be used under settlement or frost-sensitive structures
Crushed Stone	GP	Used on wet subgrades, and as drainage fill. Should be uniform ¾-inch angular crushed stone.
Lean Concrete	Not Applicable	Used to level subgrades between foundations and native soils

1. Compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used. Fill should not be places on a frozen subgrade.
2. Imported Structural Fill should consist of inorganic, readily compactable, well-graded granular soils with a maximum particle size of 6 Inches and no more than 10 percent by weight passing the US No. 200 sieve.
3. Common Fill should have a maximum particle size of 6 inches and no more than 20 percent by weight passing the US No. 200 sieve.

Table 2: Recommended Soil Gradation for **Structural Fill**.

Sieve Size	Percent Passing
3-inch	100
½-inch	50 - 85
No. 4	40 - 75
No. 50	8 - 28
No. 200	0 - 10

Notes:

1. The notes below are for reference in the event any of the exposed situations occur. The design and/or a geotechnical engineer shall determine the relevance.
2. For use as structural load support below pavement and/or foundations, and within the structural element footprint.
3. Structural Fill placed beneath construction foundations should include the Footing Zone of Influence which is defined as that area extending laterally one foot from the edge of the footing then outward and downward at a 1:1.5 (H:V) splay.
4. Structural Fill should be free of construction and demolition debris, frozen soil, organic soil, peat, stumps, brush, trash, and refuse.
5. Structural Fill should not be placed on soft, saturated, or frozen subgrade soils.
6. Structural Fill should be placed in lifts not exceeding 12 inches for heavy vibratory rollers and 9 inches for vibratory plate compactors.
7. Place and compact within ± 3% of optimum moisture content.
8. Compact to at least 95% standard density compaction per ASTM D1557.
9. The adequacy of the compaction efforts should be verified by field density testing.

Table 3: Recommended Soil Gradation for **Clean Granular Fill**.

Sieve Size	Percent Passing
3-inch	100
¾-inch	60 - 90
No. 4	20 - 70
No. 200	2 - 8

Notes:

1. For use as base below construction foundations.
2. For use as backfill behind unbalanced foundation/retaining walls.
3. Place in lifts not exceeding 12 inches for heavy vibratory rollers and 9 inches for vibratory plate compactors.
4. Place and compact within ± 3% of optimum moisture content.
5. Compact to at least 95% standard density compaction per ASTM D1557.
6. Compaction efforts should be verified by field density testing.

3.6 Re-Use of Site Soils

The granular material encountered at the exploration locations may be suitable for re-use contingent on careful inspection and testing.

3.7 Construction Monitoring

It is recommended that a geotechnical engineer familiar with the subsurface conditions and design criteria review and approve the foundation contractors' procedures and provide inspection services during excavation and construction of the proposed sewer system. Geotechnical related inspection services should include:

- Observation and documentation of all phases of excavation and backfill construction.
- Quality control testing and review of monitoring data.

Professional judgments were necessary in relation to determining stratigraphy and soil properties from the subsurface investigations. Such judgments were based partly on the evaluation of the technical information gathered, and partly on our experience with similar projects. If further investigation reveals differences in the subsurface conditions and/or groundwater level, or if the proposed building elevations or design are different from those indicated herein, it is recommended that we be given the opportunity to review this new information and modify our recommendations, if deemed appropriate.

3.8 Additional Considerations

Additional recommendations are provided as follows:

- Proper groundwater control and stormwater management are necessary to maintain site stability. Groundwater should be removed in advance of excavation and continuously maintained at least 2 feet below the working construction grade, usually bottom of the excavation (BOE) until earthworks, installation of the elements and/or backfilling are complete.
- Subgrade conditions will be influenced by excavation methods, precipitation, stormwater management, groundwater control(s), and/or construction activities. Most of the site soils are moisture-sensitive and considered susceptible to disturbance when exposed to wet conditions and construction activities. As such, the Contractor shall be aware of these conditions and must take precautions to minimize subgrade disturbance. Such precautions may include diverting storm run-off away from construction areas, reducing traffic in sensitive areas, minimizing the extent of exposed subgrade if inclement weather is forecast, backfilling excavations and footings as soon as practicable, and maintaining an effective dewatering program, as necessary.
- All slopes should be protected from erosion during (and after) construction

4.0 LIMITATIONS

Explorations

1. The analyses and recommendations presented in this report are based on based in part upon the data obtained from widely spaced subsurface explorations. Subsurface conditions between exploration locations may vary from those encountered at the exploration locations. The nature and extent of variations between explorations may not become evident until construction. If variations appear, it will be necessary to re-evaluate the recommendations of this report.
2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual strata transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.
3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

Review

4. In the event that any changes in the nature, design, or location of the proposed structure or areas planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and conclusions of the report modified or verified in writing. It is recommended that this firm be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Use of Report

5. This report has been prepared for the exclusive use and for the specific application to the project entitled *Coventry High School Sewer Extension* in Coventry, Rhode Island. All considerations are based on the available information and are in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
6. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid.

Client: FUSS & O'NEILL	**SOIL X, Corp.** 148 Pioneer Drive, Leominster, MA 01453 (978) 840-0391	Boring No. **B-01** Sheet 1 of 1 Scale: N.T.S.

City / Town: Coventry, RI	Assignment: N/A	Project File No. 24-04014	Contract No. N/A
Location: Nooseneck Hill Road (Route 3).		Date and Time Started: 6/14/24	Total Hours: N/A
Groundwater Depth: 9'0" Date & Time: 6/14/2024		Date and Time Completed: 6/14/24	
Coordinates: Per Project Plans		Driller's Name: George Guinto	Helper's Name: AV
Ground Elevation: N/A	Inspector's Name (Print): N/A	Inspector's Signature: N/A	Inspector's Company: F&O

Sample Number	Depth Range (Feet)	Blows per 6 Inches / Coring Times (Min/Ft)	Recovery (inches)	Field Description	Strata Changes
	0'0"-0'4"			ASPHALT	4"
	0'4"-1'4"			CONCRETE	1'4"
1	1'4"-3'4"	15-15-12-7	8"	Medium dense, brown, dry to wet, fine to coarse SAND, some gravel, trace of silt.	
2	5'0"-6'0"	9-10-16-30	13"		
3	10'0"-12'0"	7-6-5-15	15"		
					15'0"
				EOB @ 15' BGS GW at 9' BGS upon completion.	

Remarks:
EOB = End of Boring
BGS = Below Grade Surface
GW = Groundwater
No Wells installed

Protective Device: Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

Penetration Resistance (N) Guide

Cohesionless Soils (Sands, Gravels)		Cohesive Soils (Silts, Clays)	
Relative Density:	Penetration Resistance:	Consistency	Penetration Resistance
Very Loose	0 – 4	Very Soft	0 – 2
Loose	4 - 10	Soft	2 – 4
Medium Dense	10 - 30	Medium Stiff	4 – 8
Dense	30 - 50	Stiff	8 – 15
Very Dense	Over 50	Very Stiff	15 – 30
		Hard	Over 30

N = Sum of Second and Third 6" Blow Counts

Terms Used for Second Entry of Descriptions: and = 40–50% Some = 10–40% trace = 10% or less

Type of Drill Rig: Truck Mounted Rig
Hollow Stem Auger 4 ¼
Casing Type: Size:
Depth: Fall:
Hammer Weight:
Sampler Type: Size:
Automatic Hammer Weight: 140lbs
Safety Hammer Weight: NONE
Donut Hammer Weight: NONE
Fall: 30"
Core Barrel Type: Size: