



Middletown, RI Climate Resiliency Planning & Financing Strategy

Produced by the
Southeast New England Program (SNEP) Network

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PART I: INTRODUCTION AND EXECUTIVE SUMMARY.

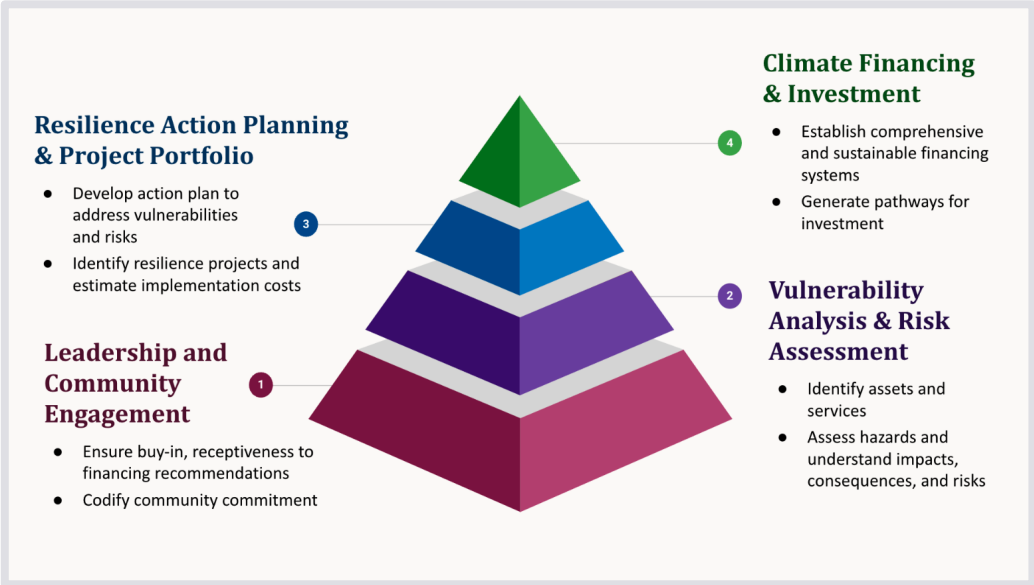
Introduction. In 2019, the US Environmental Protection Agency (US EPA) awarded a five-year cooperative agreement to the [New England Environmental Finance Center \(New England EFC\)](#) at the University of Southern Maine to establish a technical assistance network to support the work of multiple partner organizations that provide training and assistance to municipalities, organizations, and Tribes across the region. The purpose of the network is to advance stormwater management, ecological restoration, and climate resilience within Rhode Island and southeastern Massachusetts. An important overarching component of the network is to create sustainable revenue streams and financing processes to support local implementation efforts into the future.

The Southeast New England Program (SNEP) Technical Assistance Network (“the SNEP Network” or “the Network”) is composed of over 16 partner organizations from across the region, thereby offering a full complement of technical and financial services to communities in support of leadership development and peer-to-peer learning. The Network’s collective goal is to bring about a broader understanding of the impacts of stormwater facing the community, and to overcome implementation barriers through capacity building and innovative financing systems.

The SNEP Network awarded the Town of Middletown technical assistance services, led by Network partners [Throwe Environmental, LLC](#) and Elizabeth Scott Consulting (the “Project Team”), in the Fall of 2022 to develop the Climate Resiliency Planning and Financing Strategy. With similar projects completed in Newport and Portsmouth in 2021 and 2022, this project with Middletown completes this next level of climate resilience planning for all three Aquidneck Island communities and creates the opportunity for advancing projects addressing common concerns and/or of regional significance to all three Aquidneck Island communities.

Project Approach. The approach taken by the SNEP Project Team mirrored similar SNEP Network-led efforts in the Town of Portsmouth and the City of Newport. Specifically, the Project Team followed the step-by-step Resilience Financing Framework (*see Fig. 1*) laid out in the [Planning to Action: Climate Toolkit \(“PACT”\)](#). PACT is a resource developed by [Throwe](#)

Figure 1: Resilience Financing Framework (Source: Throwe Environmental)



[Environmental, LLC](#) to guide communities from the earliest stages of resilience planning through the latter stages of implementation and financing. PACT is an adaptation of the existing [US Climate Toolkit](#).

The SNEP Project Team conducted multiple resilience assessment and planning exercises to better understand the resilience challenges and opportunities facing the Town. The SNEP Project Team also used these activities to compile and refine a priority list of resilience-focused capital infrastructure projects and associated programs in the Town. The findings from these activities and the Project Team's final recommendations are detailed in the following report.

PART II: BACKGROUND AND COMMUNITY ASSESSMENT.

Background. Like most coastal communities, Middletown is frequently exposed to the impacts of climate change, including sea level rise, storm surge, and increased frequency and intensity of severe weather events. The Town's island location presents distinct challenges related to climate change and long-term climate resilience. Large shopping complexes covered in impermeable surface juxtapose with historic farmland, beaches, wetlands, and open space. A small central business district, the Atlantic Beach District, plays a significant role in the Town's economy, but faces disproportionate risks from sea level rise, storm surge, and stormwater runoff compared to other areas further upland. Extensive commercial development along state owned and maintained East Main Road and West Main Road serve as commercial hubs for the Town (and neighboring communities) but also contribute to flooding of area roads and water quality impacts to Bailey Brook and North and South Easton's Pond, two of the island's drinking water reservoirs. Though Middletown's eastern half is more rural by contrast, agricultural activities and residential development, some of which has occurred in close proximity to two other tributaries to the island's water supply reservoirs, contribute to flooding of local roads and water quality impacts to those reservoirs (Gardiner Pond and Nelson Paradise Reservoir).

While the Town has proactively worked to plan for climate change and mitigate impacts, more comprehensive resilience planning with a focus on sustainable funding, financing, and investment was needed to secure funding and move projects forward towards implementation. Unfortunately, strained budgets and limited staffing capacity makes implementing climate resilience projects increasingly more difficult. The purpose of this project was to improve the capacity of the Middletown community to establish a sustainable climate action strategy that will effectively build on collective actions to date.

This project was designed to provide a suite of actions that will advance one or more of Middletown's climate resilience goals, including 1) reducing flooding frequency, severity, and duration on priority roadways; 2) improving access to and responsiveness of Emergency Services during extreme weather events; 3) reducing and preventing stormwater/wastewater discharge into streets and vulnerable coastal areas; 4) improving the overall quality of flood prone and impaired waterbodies; 5) protecting the economic well-being of important waterfront properties, and; 6) protecting and improving the health and well-being of Middletown residents, employees, and visitors.

Assistance provided to the Town resulted in four key deliverables:

- 1) A facilitated process to refine and identify highest priority capital project needs based on a review of existing planning documents including the Town's Municipal Resilience Program report, Hazard Mitigation Strategy and various watershed/stormwater management plans.

- 2) Consultant services, provided by the SNEP Network to provide order of magnitude cost estimates for highest priority projects.
- 3) Technical support to enhance collaboration on Aquidneck Island through an Aquidneck Island Regional Climate Resilience Leadership Exchange.
- 4) Recommendations for sustainable funding, financing, and investment in climate resilience capital projects.

The findings and recommendations of this year-long technical assistance project have been compiled in this Climate Resiliency Planning and Financing Strategy.

Deliverable 1: Resilience Capital Improvement Plan. As the impacts of climate change continue to impact the Middletown community, incorporating climate resilience throughout municipal processes will become even more important. While most municipal governments are familiar with Capital Improvement Planning (CIP), few have been able to integrate climate resilience effectively into this process. The Project Team was able to guide the Town of Middletown through a CIP exercise with an explicit focus on climate resilience, resulting in the development of a Resilience Capital Improvement Plan (RCIP) that addresses top climate hazards and aims to protect the Town's most valuable assets from the impacts of climate change. The process provided the Town with the tools necessary to revisit this RCIP regularly and allow it to serve as a dynamic resource, constantly evolving to address new hazards and contribute to the Town's overall social, economic, and physical resilience to climate change.

The RCIP process included the following key activities:

Activity 1: Convene and Manage a Project Workgroup. Middletown's Community Assistance Project (CAP) was a year-long technical assistance project between the Town of Middletown and the SNEP Network Project Team. Over the course of the year, the Project Team was responsible for holding monthly workgroup meetings for the purpose of developing a 5-year Resilience Capital Improvement Plan (RCIP) as well as this Climate Resiliency Planning and Financing Strategy Report.

The project workgroup consisted of the SNEP Project Team; the Rhode Island Infrastructure Bank's Aquidneck Island Regional Resilience Coordinator; and Middletown's Town Planner, Assistant Planner, Director of Public Works, and Town Engineer. The Project Team facilitated monthly resilience assessment and planning exercises, identifying existing planning documents for review by the Project Team to identify community assets, hazards, and climate resilience capital needs; working together to prioritize top climate hazards; identify at-risk and high priority assets; develop a prioritized project portfolio; and explore various funding, financing, and investment opportunities for the Town. As part of this process, Throwing Environmental created the Resilience Capital Improvement Plan workbook with detailed inventories of hazards, assets, and climate resilience infrastructure projects identified from existing documents which were prioritized for action by the project work group, as further detailed below.

Activity 2: Hazard Identification. Before capital projects can be prioritized to increase climate resilience, there must first be a process to identify those climate hazards that pose the most significant risks to the community (**Framework Step 2.1: Hazard Assessment**). To that end, Middletown’s [Hazard Mitigation Strategy \(HMS\)](#) provided a wealth of information as to Middletown’s climate risks. In the HMS, risk was assessed based on hazard frequency and vulnerability factor (Risk = Frequency x Vulnerability Factor), with vulnerability factor accounting for potential impacts to the human population, the built environment, the natural environment, community systems, and overall impact severity. Information from the HMS was combined with findings from the [Municipal Resilience Program Summary of Findings \(MRP\)](#), the Town’s [Comprehensive Plan](#), and additional reports from Middletown, Aquidneck Island, and the State of Rhode Island¹ to develop a preliminary assessment of climate hazards. Preliminary findings from the Hazard Identification process were then presented to the Workgroup for refinement.

Figure 2. Middletown Hazard Identification

High	Medium	Low
Point and Nonpoint Source Pollution	Hurricanes and Tropical Storms	Hazardous Materials
Flooding	Drought	Dam Failure
Severe Weather	Extreme Heat	Dam Failure

The results of the Hazard Identification included a final hazard prioritization with high, medium, and low priority hazards (**see Fig. 2**). Highest priority hazards included: (1) point and nonpoint source (NPS) pollution²; (2) flooding; and (3) severe weather. For the full hazard assessment, see [Appendix B](#). Completion of this phase positioned the Project Team to begin the next step in the Resilience Financing Framework.

Activity 3: Asset Identification. With top climate hazards clearly identified, the Project Team was able to prioritize Town assets most at risk (**Framework Step 2.2 - Asset Identification**). This included a two-part process with the Project Team again relying on the Town’s HMP, MRP, Comprehensive Plan, and other plans, as well as invaluable feedback from the project Workgroup.

The first part of the asset prioritization process involved identifying broad asset categories (e.g. “flood prone roads”) within the Town. Next, the team identified and prioritized specific assets within these categories.³ Both asset categories and specific assets were ranked based on vulnerability and risk in order to assess overall implementation priorities.⁴

¹ Additional reports used throughout the RCIP activity are catalogued in [Appendix F](#).

² Please note that the primary source of nonpoint source pollution in Middletown is stormwater runoff from large expanses of impermeable surface (e.g. parking lots and large shopping complexes), other commercial and residential development, state and town roads, and agricultural operations. Flooding includes coastal and riverine flooding. Severe weather includes nor’easters, winter storms, ice storms, severe thunderstorms, windstorms, and tornados.

³ When considering vulnerable assets in Middletown, it is important to be aware of the unique relationship between the three Aquidneck Island municipalities. Some assets may be lower priority for an individual municipality, but high priority for the island as a whole. This intricate relationship between municipalities within the larger island community is explored more fully in the **Aquidneck Island Regional Climate Resilience Leadership Exchange** section of this report.

⁴ Risk = Magnitude of Consequences x Probability of Occurrence. Priority = Vulnerability x Risk.

The Project Team met three times with the Project Workgroup during the Asset Identification phase, first to confirm the prioritization of asset categories and twice to confirm the prioritization of specific assets within the high priority categories. As a result of these meetings, the Project Team identified 16 asset categories, with 9 categories being ranked by the project Workgroup as "medium priority" or higher (see **Fig. 3**). Highest priority asset categories included: (1) flood prone roads; (2) wastewater and stormwater utilities; (3) flood prone and impaired waterbodies; (4) beaches; and (5) the Atlantic Beach District. Asset categories identified in the Medium Priority were not given higher priority because in the case of Drinking Water, Navy-owned Properties, and Power Infrastructure, another entity other than the Town of Middletown is primarily responsible; Vulnerable Populations were not given a higher priority because primary risks to these populations are addressed in other asset categories.

Figure 3. Middletown Asset Categories

TOP	High	Medium
Flood-prone Roads	Flood-prone and Impaired Waterbodies	Drinking Water
	Beaches	Navy-owned Properties
Wastewater and Stormwater		Atlantic Beach District

Highest priority assets within the highest priority categories included Wave Avenue and Paradise Avenue (Flood Prone Roads), Paradise Avenue and Coddington Highway Pump Stations (Wastewater and Stormwater Utilities), and Maidford River, Bailey Brook, and Paradise Brook (Flood Prone and Impaired Waterbodies). The full list of prioritized asset categories and assets is available in [Appendix B](#).

By articulating which assets were most in need of protection from climate hazards, the Project Team was then able to identify specific climate resilience actions to be included in the RCIP.

Activity 4: Action Identification and Prioritization. The action identification and prioritization portion of the RCIP process moved the Town through the third step of the Resilience Financing Framework (**Framework Step 3 - Resilience Action Planning and Project Portfolio**). Again, this was a two-part process, which began with establishing the Town’s resilience goals to use those goals to identify and prioritize specific mitigation actions. The project team worked with Town leaders to further prioritize its top six climate resilience goals based on hazards and assets identified in previous phases, which were the basis for prioritizing resilience actions to be included in the project portfolio, or RCIP. Based on the hazard and asset identification processes, the goals of programmatic and capital infrastructure projects included within the RCIP are to:

- **Reduce flooding frequency, severity, and duration on priority roadways**, including Wave Avenue, Paradise Avenue, Green End Avenue, East Main Road, Berkeley Avenue, Shore Drive, Woolsey Road, Valley Road, Champlin Terrace, and within the Birchwood Subdivision.
- **Improve access to and responsiveness of Emergency Services during extreme weather events**, which may be hindered by flood-related road closures.

- **Reduce and prevent stormwater/wastewater discharge into streets and vulnerable coastal areas caused by flooding at the Wave Avenue Pump Station, the Paradise Avenue Pump Station, and the Coddington Highway Pump Station.**
- **Improve the overall quality of flood prone and impaired waterbodies,** which may be negatively impacted by stormwater runoff and nonpoint source pollution.
- **Protect the economic well-being of important waterfront properties,** including beaches and properties within the Atlantic Beach District.
- **Protect and improve the health and well-being of Middletown residents, employees, and visitors,** which may be negatively impacted by climate-related hazards such as sea level rise, flooding, extreme weather, stormwater-related water pollution, and other natural hazards.

After clearly articulating Middletown’s resilience goals, the Project Team used previous planning documents including the MRP, HMP, and other planning documents to compile a master list of climate resilience actions. The master list was reviewed by the project workgroup and prioritized based on responses to the following key questions:

1. **Did the project move the Town towards one or more of its resilience goals (above)?**
2. **Has funding already been identified for the project or were additional revenues necessary for the project to be implemented?**
3. **Was implementation of the project a town, state, or private responsibility?**

Projects that contributed to Middletown’s resilience by increasing its ability to meet one or more of the above goals, had not yet secured funding, and are a Town of Middletown responsibility were prioritized for inclusion in the RCIP. Additional consideration was given to projects that addressed goals related to highest priority hazards and assets identified during the Vulnerability Analysis and Risk Assessment portion of the Resilience Financing Framework.

As its name implies, the RCIP focuses primarily on capital infrastructure projects to be implemented by the Town. That said, capital projects typically require the completion of programmatic components (e.g. plans, studies, and engineering designs) before they are ready for on-the-ground implementation. For this reason, while the RCIP focuses on capital infrastructure, programmatic components of capital projects have been included when necessary for eventual implementation. While a snapshot of the highest priority action items included in the RCIP are available below (see Fig. 4), the full RCIP is available in [Appendix B](#) of this report.

Figure 4. Middletown RCIP High Priority Actions

PROJECT	DETAILS	PRIORITY
Floodproofing Paradise Avenue Pump Station*	Raise Equipment, Install berms.	TOP (#1)
Floodproofing Coddington Highway Pump Station*	Raise Equipment, Install berms.	High
Upgrades at the Shore Drive Outfall	Create a new outfall and closed drainage system within Shore Drive from Esplanade to the southeast highpoint.	High
Drainage improvements in the Birchwood Subdivision	Installation of large diameter pipes, drainage realignment, and development of a new outfall.	High
Maidford River Flood Mitigation Project	Upgrade two culverts to accommodate higher river flows, install berm at Sweet Berry Farm, raise roadway approx. 2.5ft, retrofit existing grass channel along Berkley Ave near Wyndham Hill Road ⁵ .	High
Designs and Permitting for bioretention systems at high priority outfalls*	Bioretention systems at Johnnycake Hill, East Meadow Neighborhood, and a largely commercial catchment area along Aquidneck Avenue north of its intersection with Valley Road,	High
Designs and Permitting for bioretention systems at medium priority outfalls*	Bioretention systems at Valley Road and Longmeadow Ave. and on Middletown High School property and along Valley Road	Medium

RCIP Summary of Findings. While the Town of Middletown had processes in place to identify climate hazards and mitigation actions, a gap remained in prioritizing projects for implementation. This technical assistance project has filled that gap by helping the Town to organize and prioritize their resilience goals and identify the key projects necessary to achieve these goals. Additionally, the project provided the Town with the tools and processes necessary to revisit the RCIP as needs evolve, new information is gathered and/or priorities shift over time. The outcome of the “Action Identification and Prioritization” process is a comprehensive climate resilience project portfolio that positions the Town very well to move forward with future implementation.

In addition to providing Middletown with a list of resilience projects, the RCIP also includes information on potential grant funding sources to support implementation. The Town can use this

⁵ These flood mitigation measures are among those modeled using a HEC-RAS model developed as part of the Maidford River Restoration Project that also included re-alignment of the Maidford River and restoration of its floodplain. Before advancing these flood mitigation measures, the model must be re-run to confirm effectiveness of these measures in mitigating flooding of Berkeley Ave. and ensure no increase in downstream flooding.

information to pursue immediately available funding opportunities and revisit the RCIP annually, as with traditional CIPs, to ensure long-term usability. Additionally, the RCIP can be used to demonstrate the need for included projects, therefore making the Town more competitive for grant funding that requires applicants to demonstrate a process for project prioritization. By completing this important planning process, the Town will be able to competitively pursue available funding opportunities and secure local funding for project implementation.

Deliverable 2: Consultant Cost Estimates. Understanding the total cost of resilience projects is essential to moving projects forward for implementation. While the Project Team included order of magnitude cost estimates in the RCIP, more specific estimates are necessary to fully understand the investment needed from the Town. As was agreed to in the project Memorandum of Agreement, the SNEP Network provided consultant services, free of charge, to the Town to produce cost estimates for several of the higher priority items that emerged from the RCIP exercise. The Cost Estimates process included the following key activities:

Activity 1: Project Selection and Scope of Work Development. The Project Team worked with the Town to select projects identified in the RCIP to receive consultant services to provide cost estimates for two capital infrastructure projects and scoping and cost estimates for one programmatic project encompassing conceptual designs for five interrelated stormwater projects⁶. Once projects were selected to receive these consultant services, the Project Team worked with the Town to develop a Scope of Work for consultant services. The Scope of Work delineated the various tasks required of the selected consultant and was sent out to three consultants in the SNEP Network's pre-approved consultant pool. Fuss and O'Neill was selected from the SNEP Network pre-approved consultant pool and the Project Team worked with the consultants and the Town to ensure all necessary materials were available to generate order of magnitude estimates sufficient for planning purposes. It is worth noting that several of the projects identified as high priority lacked sufficient information for a consultant to be able to provide cost estimates. It underscores the due diligence and preliminary engineering designs necessary for climate resilience infrastructure improvement projects to advance to the stage of RCIP inclusion.

Activity 2: Development of Cost Estimates. The final output for the Cost Estimates deliverable was a technical memorandum from Fuss and O'Neill detailing their assessment of site conditions, and development of conceptual designs and cost estimates for the selected projects. While the full technical memorandum is available in **Appendix G**, final estimates are included in **Figure 5** (below). Understanding project costs is essential for implementation, and estimates included in this report will allow the Town to better understand the scale of their resilience needs and identify appropriate sources of funding for implementation.

⁶ The five stormwater projects were identified from existing watershed plans: Bioretention at East Meadow's Neighborhood (identified in Maidford River Watershed Assessment and BMP Design Report); see Table 5-2, retrofit A1); Bioretention system at Valley Rd/Middletown High School (public property locations in catchment 'BBT401' in North Easton's Pond Stormwater Attenuation and Source Reduction Strategy; see Fig 35); Bioretention system and gravel WVTs at Valley Road and Longmeadow Ave (public property locations in catchment 'New North' in North Easton's Pond Stormwater Attenuation and Source Reduction Strategy; see Fig 38); Bioretention system at Jonnycake Hill (public property locations in catchment 'New Mid' in North Easton's Pond Stormwater Attenuation and Source Reduction Strategy; see Fig 39); Bioretention at John Clarke Road (public property locations in catchment 'New South' in North Easton's Pond Stormwater Attenuation and Source Reduction Strategy; see Fig 40). Note that the Town has already installed bioretention systems on the east side of John Clarke Rd).

Cost Estimates Summary of Findings. Fuss and O'Neill's efforts were divided into two phases, one which focused on developing cost estimates to address flood related hazards to the wastewater pump stations, and one which focused on developing a scope of work and cost estimates for advancing stormwater management improvements.

For the first phase, Fuss & O'Neill evaluated several scenarios to assess order of magnitude costs for floodproofing the Town-owned wastewater pump stations on Paradise Avenue and Coddington Highway. Based on the National Oceanographic and Atmospheric Administration (NOAA) Sea Level Rise (SLR) Viewer, the following increases in regional sea level are projected for Middletown and Newport RI, based on the Intermediate High scenario (Year 2022 projections):

- Year 2030 – 0.72 ft (rounded to 1 ft for flood protection)
- Year 2050 – 1.48 ft (rounded to 2 ft for flood protection)
- Year 2070 – 2.62 ft (rounded to 3 ft for flood protection)
- Year 2100 – 5.05 ft (rounded to 5 ft for flood protection)

The Coastal Resources Management Council (CRMC) STORMTOOLS coastal flooding projections were assessed for each SLR scenario to determine water depths (feet above grade) during a 100-year coastal flooding event for each pump station. The flooding impacts on the two wastewater pumps stations from each event were evaluated. Based on these findings, short- and long-term floodproofing recommendations were developed for the Paradise Avenue pump stations and cost estimates for the short-term recommendations provided. However, since it was determined that the Coddington Highway Pump Station is not vulnerable to flooding impacts until a 100-year coastal flooding event in the year 2100, consistent with established engineering guidelines for wastewater treatment plants and pump stations which recommend design standards for upgrading existing facilities based on the current 100-year flood elevation, no floodproofing recommendations (or cost estimates) were developed for this site.

Fuss & O'Neill approached the second phase of the project with the understanding that the Town wishes to optimize stormwater treatment on public land and, to the extent practicable, at multiple locations within the selected catchment areas identified in studies that Fuss & O'Neill previously developed:

- Bioretention from East Meadow's Neighborhood
- Bioretention system at Valley Rd/Middletown High School
- Bioretention system and gravel WVTs at Valley Road and Longmeadow Ave
- Bioretention system at Jonnycake Hill
- Bioretention on the west side of John Clarke Road

With this understanding, Fuss & O'Neill updated the design concepts at these locations with consideration to current guidance to build upon standardized green infrastructure design templates, customized to the needs and preferences of the Town. Fuss & O'Neill then developed a scope of work and order of magnitude costs which the Town may utilize to advance the design, permitting and construction of the 10 stormwater improvements (retrofit projects) for which conceptual designs were developed. The technical memorandum detailing the Scope of Work, and site plan and budgetary opinion of cost for each stormwater improvement is available in **Appendix G**. The estimated costs are summarized in Table 5.

Figure 5. Middletown RCIP Cost Estimates

PROJECT	PRIORITY	COST EST.
Floodproofing Paradise Avenue Pump Station (2070 Floodproofing)	TOP (#1)	\$87,000
Design/Permitting/Construction at the East Meadow Neighborhood	High	
Winthrop Drive Lined - Sub-Surface Sand Filter		\$91,700
Bioretention Design/Permitting/Construction at Johnny Cake Hill Rd (catchment New Mid)	High	\$89,200
Bioretention and Gravel WVTS Design/Permitting/Construction at Valley Rd (catchment New North)	Medium	
Continental Drive -Sub-Surface Sand Filter		\$122,200
Design/Permitting/Construction at Middletown HS (catchment BBT401)	Medium	
Middletown HS 1 - Lined Sub-Surface Sand Filter		\$143,200
Middletown HS 2 - Lined Sub-Surface Sand Filter		\$98,600
Middletown HS 3 - Lined Sub-Surface Sand Filter		\$92,400
Bioretention Permitting/Design at John Clarke Rd / Silva Ln (catchment NEPT01)	Low	
John Clarke Rd 1 - Lined Bioretention Planter		\$66,200
John Clarke Rd 2 - Lined Bioretention Planter		\$64,200
John Clarke Rd 3 - Lined Bioretention Planter		\$65,900
John Clarke Rd 4 - Lined Bioretention Planter		\$107,400

Deliverable 3: Aquidneck Island Climate Resilience Leadership Exchange. Staffing and constrained capacity are common barriers to implementing climate resilience projects and programs in many communities, and in the communities on Aquidneck Island in particular. However, the three Aquidneck Island communities — Middletown, Portsmouth, and Newport — have a unique opportunity to overcome this challenge to implementation by coordinating approaches and mutually building capacity to achieve shared goals.

The Aquidneck Island Regional Climate Resilience Leadership Exchange was a three-part workshop series that sought to leverage this opportunity by bringing together local experts, municipal leadership, and other stakeholders to advance climate resilience across the Island. The Exchange

was led by the SNEP Network Project Team in collaboration with the Rhode Island Infrastructure Bank (RIIB), specifically leveraging RIIB's Aquidneck Island Regional Resilience Coordinator.

The SNEP Project Team worked with RIIB and the Aquidneck Island Municipal Resilience Teams to develop agendas; identify experts and leadership to invite to the Exchange; and facilitate three separate workshops focused around the topics of stormwater and water resources, emergency management and preparedness, and transportation.

The primary outcome of the Leadership Exchange was an agreement between the municipalities and Naval Station Newport (NAVSTA Newport) to coordinate regional efforts to increase Island-wide resilience. Each Leadership Exchange provided specific next steps associated with addressing pressing regional climate and environmental challenges. While the three sessions are discussed briefly below, a more in-depth discussion of each session and a summary of key takeaways is available in **Appendix C**.

Leadership Exchange Session 1: Stormwater and Water Resources. The first of three Leadership Exchanges focused on Stormwater and Water Resources. The three municipalities each face their own unique problems regarding stormwater flooding and water quality, however a shared drinking water system and shared water resources make it difficult for each municipality to mitigate these issues on its own. Chronic algal and cyanobacteria blooms, bacteria and nutrient related impacts, and stormwater-induced flooding are shared concerns that should be addressed in concert across municipal lines. During this session, each municipality shared recent resilience improvements made as it relates to stormwater management and future opportunities for collaboration and joint project implementation.

One of the primary needs identified during this session was public education. The municipalities identified lack of public understanding surrounding stormwater and water quality projects and needs as a primary barrier to accessing more sustainable revenue streams, and it was determined that public education would be an essential component of future stormwater related projects. Additionally, the municipalities identified the need to engage private property owners in stormwater management and water quality initiatives as improvements on state and local roads and facilities alone are not enough to address the island's flooding and water quality problems and build climate resilience. This can be done through incentives and requirements to reduce impervious cover and improve stormwater management on private property. Ideas discussed included creating guidelines for mitigating stormwater impacts on private properties, public-private partnerships (P3s), and creation/adoption of Green Infrastructure design/installation/maintenance certification programs, to name a few. Finally, the municipalities agreed that a regional approach to stormwater management would prove to be much more cost effective compared to current methods. However, moving forward on a regional water quality fund as well as other regionalized efforts will again require dedicated public outreach and education to overcome misconceptions and garner support.

Leadership Exchange Session 2: Emergency Management and Preparedness. The second session of the Leadership Exchange centered around emergency management and preparedness across the Island. Due to the small size of the Aquidneck Island communities' staff, emergency managers often "wear multiple hats", serving as both emergency responders and emergency planners. The part time nature of emergency planning activities and relatively short tenures of emergency planning managers (typically the Fire Chief) pose challenges in establishing a more comprehensive emergency management plan. Following a presentation of individual actions undertaken by the municipalities and Naval Station Newport, participants heard from leaders from the Barnstable County (MA) Regional Emergency Management Committee, made up of 16

communities. Informed by this regional case study, the participants then engaged in a discussion identifying future needs and next steps.

The lack of a centralized emergency management hub on the Island forces the municipalities to act in silos; however, it was agreed that to overcome the challenge of limited individual resources, emergency management and preparedness on the Island must be a coordinated effort between the three municipalities, NAVSTA Newport, and the state. A potential opportunity identified by the group to move forward on was to develop a Regional Emergency Management Plan. The plan could include, for example, development of a regional emergency planning committee, a detailed and actionable regional sheltering plan, and the framework to develop a centralized Emergency Operations Center (EOC) to serve as a hub for training, shared equipment storage, sheltering, and resource sharing. The next step is to identify funding to hire a contractor to develop a detailed plan on behalf of the municipalities and NAVSTA Newport.

Leadership Exchange Session 3: Transportation. The third and final session of the Aquidneck Island Climate Resilience Leadership Exchange centered around the topic of transportation. Roads on the island vary in ownership from Navy-owned Burma Road, to state-owned East Main and West Main Roads, to locally-owned roads traversing the island, and the three bridges (and on/off ramps) connecting the island with the mainland: Newport Pell Bridge, Mount Hope Bridge, Jamestown Verazzano Bridge, and Sakonnet River Bridge owned and operated by the Rhode Island Turnpike and Bridge Authority. These complexities in ownership can often lead to questions of who is responsible for what project, and who needs to be coordinated with for project implementation.

However, this intricate relationship between the three municipalities, the Navy, and the state also provide opportunity. According to a representative from the Rhode Island Department of Transportation (RIDOT), regional coordination and collaborative approaches to project implementation make municipalities much more competitive for grant funding at both the state and federal level. By working together to collaboratively develop transportation plans that account for local, state and federal priorities, the municipalities can identify projects that allow for efficiency and effectiveness while lessening competition for limited state and federal resources.

PART III: ANALYSIS AND RECOMMENDATIONS.

Deliverable 4: Sustainable Funding and Financing Recommendations. The fourth and final deliverable addresses the financial resources and systems that are necessary to successfully achieve Middletown's climate resilience goals and priorities. Specifically, we provide a suite of recommendations that are designed to provide the first steps towards establishing an investment and financing system that will support the implementation of the RCIP into the future.

Our approach with this process was to provide Middletown leaders with options to make iterative changes to existing financing processes. While the climate challenges facing Middletown and other coastal communities in the region are acute and growing, in the near term the Town will primarily rely on its existing budgets, funding, and financing systems to implement RCIP projects. While there are opportunities for the community to make structural changes to that system, these changes will likely occur in the future, which means that any funding and financing strategies must adjust to community needs as they evolve. Therefore, in short, the Town must make its existing system more efficient and effective. To that end, we provide **five specific recommendations** within three phases or "tiers" that are designed to progressively expand the Town's capacity to implement and finance projects within the RCIP.

Tier 1: Foundational. The goal of Tier 1 is to improve the implementation capacity and performance of existing funding and financing resources. Because an expansion of the Town's existing funding resources is unlikely to occur in the short-term, the goal is to focus existing resources towards those actions and projects that will maximize resilience return on investment. Tier 1 focuses primarily on improving the effectiveness of the existing system without making fundamental or structural changes.

Recommendation 1: Integrate the RCIP into the Town's broader infrastructure and capital funding priorities and processes. Middletown took the first steps towards creating an efficient resilience financing system by creating and implementing the RCIP process through the SNEP Network project. The RCIP prioritizes resilience and associated infrastructure projects within the town; the next step is to ensure that the highest priority RCIP projects are also recognized as priorities within the Town's overall budgeting process.

To be clear, integrating the RCIP into existing funding and financing processes means that Town leaders will have to make some very difficult decisions about budget and funding priorities. Therefore, the focus should be to maximize two financial outcomes: reducing potential climate mitigation costs in the future (i.e., avoided costs); and mitigating potential negative impacts on assets that generate revenues (i.e., asset and revenue protection).

Avoided costs is a common accounting approach at the enterprise level (i.e., utilities, companies, and other organizations), which focuses on reducing the costs associated with providing critical governmental services. In short, avoided costs refers to the incremental savings that result from not providing a specific service or outcome as compared to the costs of providing that service through a different method. In Middletown, the goal would be to reduce the costs of achieving long-term resilience by proactively mitigating climate impacts. When operational, maintenance, and reconstruction costs associated with climate hazards and events are avoided, it will reduce strain on existing revenues and Town budgets, thereby allowing the Town to reinvest these savings elsewhere.

For Middletown to fully capitalize on avoided costs, savings should be intentionally directed towards projects that do not currently have allocated funding. To ensure funding for projects is maximized using the avoided cost model, the Town should calculate anticipated savings over time and earmark those funds for specific resilience projects and programs.

Examples of avoided costs that result from implementing projects that improve climate resilience include:

- The construction of flood mitigating measures (e.g drainage improvements) to address flooding and debris accumulation on local roads requiring the deployment of town emergency response and public works crews during and after the storm event. The anticipated savings from not having to deploy town staff for flooding events projected to occur over the functional life of the drainage improvements could be calculated and that amount earmarked for other high priority resilience projects and programs.

- Protecting open space to avoid the cost of water quality restoration and urban stormwater management. This includes savings associated with avoided capital costs as well as avoided long-term operations and maintenance.⁷
- Investing in structural resilience either through retrofits or through enhanced building codes. For example, a study by the National Institute of Building Sciences estimates that for every \$1 invested in structural resilience results in a savings of \$11 in the form of improved disaster resilience.⁸
- Avoiding highway and road repair costs by investing in more consistent ongoing maintenance. Some studies suggest that for every \$1 invested in road maintenance can save governments \$4 - \$11 in avoided repairs.⁹

Asset and revenue protection is similar to avoided costs financing, in that mitigation actions are prioritized to protect critical assets that are essential for generating long-term income to the community. In Middletown and most other local governments and states across the region, the primary goal would be to protect properties and structures that generate tax revenues. This can mean preemptively mitigating acute hazard impacts such as storm damage through often aggressive structural infrastructure projects; or, it can mean protecting long-term asset value by mitigating systemic climate impacts such as sea-level rise and tidal flooding. In both cases, relatively short-term investments in the form of project financing are made to ensure long-term fiscal returns.

Both cost avoidance and revenue protection are policy approaches to climate resilience investment that can be achieved by better utilizing existing revenues and resources. In fact, the Town has taken this approach in the past as demonstrated by the establishment of the Atlantic Beach Tax Increment Financing District (TIF) to support infrastructure improvements and economic development. Our recommendation is to expand on these types of policy interventions to ensure that all existing and future revenues are being invested most efficiently and effectively in support of climate resilience.

Recommendation 2: Create a cross-departmental RCIP implementation strategy. In the short-term, it will be important for the Town to identify opportunities to create efficiencies and synergies across departments through coordinated project implementation that maximizes current revenues, funding, and budgets. By working across departments, projects can be developed in ways that address multiple Town goals and thereby reduce competition for limited resources. Additionally, the Town can ensure that a project in one department is not offsetting the work done by another department but instead all projects are collectively advancing Town priorities. This responsibility can be assumed by an existing staff person who would be responsible for engaging in all planning processes and identifying opportunities to bundle projects and synchronize action.

Tier 2: Expanded Implementation. In Tier 2, the focus is on expanding existing systems to meet increased implementation needs and demands. This includes expanding leadership of existing departments; expanding capacity to identify and secure grant funds; and working in partnership

⁷ Avoided Stormwater Impacts and Costs from Open Space Protection in the Brandywine Creek Watershed. <https://www.chesco.org/DocumentCenter/View/52015/Avoided-Stormwater-Impacts-and-Costs-from-Open-Space?bidId=>

⁸ Natural Hazard Mitigation Saves. 2019 Report. https://www.nibs.org/files/pdfs/NIBS_MMC_MitigationSaves_2019.pdf

⁹ *America's Infrastructure Crises is Really a Maintenance Crisis*. Bloomberg CityLab. <https://www.bloomberg.com/news/articles/2015-02-12/america-s-infrastructure-crisis-is-really-a-maintenance-crisis>.

with other Aquidneck Island communities to advance climate resilience project development and potentially implementation.

Recommendation 3: Leverage the Rhode Island Infrastructure Bank's Aquidneck Island Regional Climate Resilience Coordinator. While Middletown has demonstrated support for increasing the Town's resilience, a staff person is needed to facilitate deliberate and dedicated coordination of resilience projects across Town departments. Capacity is a common barrier to project implementation and while the Town may not have the ability to hire their own Climate Resilience and Sustainability Officer (CRSO) to carry out resilience projects, they can work to better leverage the capacity brought in by the Aquidneck Island Regional Resilience Coordinator. The Resilience Coordinator is able to work across Town departments to embed resilience into all Town plans and projects, as well as identify opportunities for regional collaboration on resilience projects. By synchronizing action across departments and the Island, the Town would be able to maximize the efficiency of limited resources and ensure resilience projects result in the greatest possible benefits.

Recommendation 4: Expand and leverage existing grant funding opportunities. Grants are a common source of funding for priority local infrastructure projects, and grant funding has the potential to accelerate Middletown's RCIP implementation efforts. Grants provide low-cost capital, which thereby reduces strain on the Town's budget. Though grant funds are not, and will never be, sufficient to address all the Town's infrastructure needs, they can be very effective in accelerating the implementation of key projects and programs.

Obviously, grants are primarily competitive in nature, which means it is essential that Town leaders work explicitly to make its projects as competitive as possible. The RCIP process was a significant step forward in that regard in that projects have been identified, prioritized, and analyzed to determine anticipated costs. The next step is to connect RCIP projects to potential grant funds and then pursue those funds. The most immediate and significant grant funding opportunities are associated with the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA). While the Project Team has inventoried opportunities within the BIL and IRA, the Town should establish a grant funding process that can continuously identify local, state, and federal grants available for project implementation during routine planning processes.

An important first step in developing a grant funding process is to understand where the opportunities are and the timing of application deadlines, matching requirements, and other grant requirements. To that end, the Throve Environmental Team established funding databases associated with the BIL and IRA programs to enable local leadership to identify all the potential opportunities associated with these two laws. Collectively they represent almost 400 distinct funding programs that can benefit state and local governments, resulting in an unprecedented amount of federal funding supporting a myriad of infrastructure priorities. As a result, there are funding opportunities associated with each of the Middletown community's resilience goals and priorities. [Appendix D](#) provides an initial and comprehensive list of BIL federal funding programs, categorized by issue and/or asset. [Appendix E](#) does the same for the IRA. Collectively these databases are searchable by project type as well as local government applicability; they provide an excellent starting point for establishing a grant funding strategy.

Tier 3: Sustained Funding and Financing. Finally, Tier 3 focuses on making structural changes to the financing system, including expanded institutions and establishing/codifying revenue streams.

Recommendation 5: Develop an implementation plan for establishing a dedicated department and/or organization to guide and implement environmental infrastructure and resilience investments. Our final recommendation addresses long-term capacity issues associated with the RCIP. Given the complexity and scale of the RCIP implementation process moving forward, the Town would benefit from codifying its planning, project development, and implementation within a single department or organization. The new department would house a resilience director and would be charged with developing revenue portfolio; procuring services; and organizing project financing and implementation. In addition, this new organization or department would represent the Town regarding regional implementation and coordination.

The Middletown Resilience project was the third and final SNEP project designed to address climate impacts in the communities on Aquidneck Island. Though Newport, Portsmouth, and Middletown are unique in their approaches to addressing environmental and infrastructure planning and financing issues, Throve Environmental and the SNEP Network team identified commonalities in how the three communities can best sustain resilience in the long-term. This includes expanding organizational capacity to better coordinate, manage, fund, and implement resilience infrastructure projects. Building organizational capacity within Middletown can come in the form of expanding existing departments and programs to focus on climate resilience, creating a new government-based department, or establishing an independent institution to work on behalf of the Town and its resilience goals. Regardless of the institutional approach taken, a targeted and dedicated organization and staff would result in multiple benefits, including:¹⁰

- ***Better coordination of resilience efforts across Town departments.*** A dedicated climate resilience and mitigation department or organization would be responsible for working directly with other departmental and elected Town leaders to advocate for and ensure the coordination of resilience projects and programs across all departments. This level of coordination will maximize the efficiency of dollars spent on resilience and guarantee that resilience investments meet as many shared goals as possible across departments.
- ***Expanded capacity to identify and pursue Federal and State funding opportunities, including the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA).*** It is essential that local governments like Middletown move quickly to take advantage of funding opportunities associated with the BIL and IRA legislation. Dedicated leadership would enable the Town to conduct a more in-depth analysis of available funds. In the short-term, this would include identifying opportunities that address Middletown's top RCIP priorities. In the long-term this expanded leadership and organizational capacity would enable the Town to regularly evaluate new opportunities and funding programs as they become available.
- ***Expand regional partnerships across Aquidneck Island and the State.*** The Middletown RCIP process demonstrates that the Town has many of the resources in place that it will need to address its climate impact challenges. However, there are many efficiencies that can be gained by partnering with the other Aquidneck Island communities to better plan and implement climate resilience projects. By establishing dedicated leadership, the Town would be in a more advantageous position to develop partnerships and ensure its needs are being addressed appropriately moving forward.

¹⁰ Newport, RI Climate Resilience and Financing Prioritization Report. Produced by the Southern New England Network, October 2022.

We recognize that any reorganization of the Town's departments and project implementation processes will be no small task. While there are multiple options available to the Town regarding organizational and institutional structures, identifying the most effective structure and options for the Town will require in-depth analysis, community input and engagement, and long-term planning. This in turn will require engaging substantive experts and consultants to guide the Town through the reorganization planning process. To that end, we recommend that Town leaders establish a targeted working group to draft a formal Request for Proposals (RFP) to support a formal Institutional Assessment to determine what organizational structures and systems would be best suited to address Town and Island-wide needs. This assessment should focus on primary project implementation activities, including:

- ***Maintaining the Town's Resilience Capital Improvement Plan.*** A dedicated resilience department should focus specifically on working with Town leaders to maintain and implement the Resilience Capital Improvement Plan. The plan itself is an essential component of the financing process, which is designed to ensure the flow of money and capital ensuring the most efficient risk adjusted investment possible. This begins with a clear portfolio of projects, which is the basis of the RCIP. A dedicated department or organization would potentially be tasked with project development (i.e. advancing environmental improvement and climate resilience concepts to preliminary engineering and design), and constantly evaluating project typology, implementation timing, and anticipated costs.
- ***Managing resilience projects through the RCIP process.*** A dedicated resilience department or organization would be responsible for coordinating the planning and implementation of resilience projects and programs across the Town, focusing specifically on facilitating the development and implementation of the Town's RCIP. In short, a new resilience department would maintain ownership of all resilience initiatives within the Town.
- ***Creating a comprehensive revenue and project financing plan.*** Finally, and perhaps most importantly, a dedicated resilience department or organization will be essential for coordinating project funding and financing. Establishing a dedicated resilience department or program would provide a structure for creating a long-term revenue strategy that can support the RCIP into the future. In the short-term, the Town should focus on identifying new funding opportunities through the BIL and IRA grant programs. In the long-term, however, the Town will need to think beyond grant funds and existing budgets to successfully address systemic climate hazards and impacts. This will require establishing a long-term revenue, financing, and investment plan that takes a portfolio approach, thereby expanding opportunities within a suite of potential sources. While it's clear that diversifying and scaling the Town's revenue pool will lessen strain on existing budgets and funding, identifying and leveraging the sources of these funds is challenging. Common approaches for generating revenues, such as taxes and fees, often face high levels of political resistance. For this reason, a dedicated department can help guide the Town through a sustained process of identifying funding and revenue opportunities and challenges, and then allowing specific opportunities to incubate politically over time.

PART IV: CONCLUSION

Through the completion of this technical assistance project, the Middletown community and Town leadership have clearly demonstrated their commitment to addressing their climate impacts. With a strong foundation of resilience plans, Middletown is well positioned to take the next steps to ensure its resilience vision and goals—as reflected in the RCIP—are cost-effective, efficient, and successfully implemented.

PART V: REFERENCES

All documents used to develop this report are available in [Appendix F](#).



This report was produced by the dedicated team at [Throwe Environmental, LLC](#) in the company's role as a core partner within the SNEP Network. Throwe Environmental is committed to developing climate resilience, environmental finance, and policy and governance solutions for its public, private, and nonprofit clients. As a SNEP Network partner organization, Throwe Environmental focuses on financing, training, and leadership development. Throwe Environmental is based in Bristol, RI and helps communities nationwide address their climate challenges.



Middletown, RI Climate Resiliency Planning & Financing Strategy

Appendix A: Executive Summary

Produced by the
Southeast New England Program (SNEP) Network

Fall 2023

The SNEP Network is administered by:
New England Environmental Finance Center
University of Southern Maine, UMaine System
www.snepnetwork.org | TEL: 207-228-81-64



This project has been funded, in whole or in part, by the U.S. Environmental Protection Agency's Southeast New England Program under Assistance Agreement SE-00A00655-0. The contents of the document do not necessarily reflect the views and policies of the U.S. Environmental Protection Agency, nor does the U.S. EPA endorse trade names or recommend the use of any products, services or enterprises mentioned in this document

PART I: INTRODUCTION AND EXECUTIVE SUMMARY.

Background. This SNEP Network community assistance project was designed to provide a suite of actions that will advance one or more of Middletown’s climate resilience goals based on hazards and assets identified during the process. These goals include: 1) reducing flooding frequency, severity, and duration on flood prone roadways; 2) improving access to and responsiveness of Emergency Services during extreme weather events; 3) reducing and preventing stormwater/wastewater discharge into streets and vulnerable coastal areas caused by flooding of wastewater pump stations; 4) improving the overall quality of flood prone and impaired waterbodies; 5) protecting the economic vitality of important waterfront properties, and 6) protecting and improving the health and well-being of Town residents, employees, and visitors.

Deliverables. Assistance provided to the Town resulted in four key deliverables:

- 1) A facilitated process to **refine and identify highest priority capital project needs.**
- 2) Consultant services, provided by the SNEP Network, to provide **order of magnitude cost estimates for highest priority projects.**
- 3) Technical support to enhance collaboration on Aquidneck Island through an **Aquidneck Island Regional Climate Resilience Leadership Exchange.**
- 4) **Recommendations for sustainable funding, financing, and investment** in climate resilience capital projects.

The findings and recommendations of this year-long technical assistance project have been compiled in this Climate Resiliency Planning and Financing Strategy.

Deliverable 1: Resilience Capital Improvement Plan (RCIP). Creating the Resilience Capital Improvement Plan (RCIP) consisted of identifying hazards, assets, and actions, as well as the prioritization of those actions. Highest priority hazards included: 1) point and nonpoint source (NPS) pollution; 2) flooding; and 3) severe weather. These hazards informed the asset prioritization, in which flood prone roads, wastewater and stormwater infrastructure, flood prone and impaired waterbodies, beaches, and the Atlantic Beach District were identified as the highest priority asset categories. Highest priority assets within these larger categories included Wave Avenue and Paradise Avenue (Flood Prone Roads), Paradise Avenue and Coddington Highway Pump Stations (Wastewater Infrastructure), and Maidford River, Bailey Brook, and Paradise Brook (Flood Prone and Impaired Waterbodies). The RCIP includes projects for which the Town of Middletown is the responsible entity. The projects prioritized for inclusion in the RCIP are those that contribute to increasing Middletown’s ability to meet one or more of their resilience goals and have not yet secured funding. Additional consideration was given to projects that address goals relating to the highest priority hazards and assets. Please refer to **Appendix B** for the RCIP.

Deliverable 2: Cost Estimates. As agreed upon in the project Memorandum of Agreement, the SNEP Network provided consultant services, free of charge, to the Town to produce cost estimates for several of the higher priority items that emerged from the RCIP prioritization process. These cost estimates include two (2) capital infrastructure projects and one (1) bundled programmatic project encompassing scoping and cost estimating for five interrelated projects. The final output for the Cost Estimates deliverable is a report from Fuss and O’Neill detailing the cost of each of the selected projects and is available in **Appendix G**.

Deliverable 3: Aquidneck Island Climate Resilience Leadership Exchange. The Aquidneck Island Regional Climate Resilience Leadership Exchange was a three-part workshop series cohosted

by the SNEP Network partners, the Rhode Island Infrastructure Bank, and the three island municipalities. The Exchange sought to leverage opportunities for collaboration on Aquidneck Island by bringing together local experts, municipal and state leadership, and other stakeholders to advance climate resilience across the Island. The Exchange’s workshops each focused on a different topic: 1) Stormwater and Water Resources (April); 2) Emergency Management and Preparedness (May); and 3) Transportation (June). The primary outcome of the Leadership Exchange was restarting important conversations on island-wide resilience topics, resulting in an informal agreement between the municipalities and Naval Station Newport (NAVSTA Newport) to coordinate regional resilience efforts. For more detailed information regarding the Aquidneck Island Climate Resilience Leadership Exchange, please refer to **Appendix C**.

Deliverable 4: Sustainable Funding and Financing Recommendations. The Project Team has provided Middletown leaders with options to make phased changes to existing financing processes. To that end, we provide five specific recommendations within three phases (“tiers”) designed to progressively expand the Town’s capacity to implement and finance projects within the RCIP. Recommendations include the following:

Tier 1: Foundational

- 1a) Integrate the RCIP into the Town’s broader infrastructure and capital funding priorities and processes.
- 1b) Create a cross-departmental RCIP implementation strategy.

Tier 2: Expanded Implementation

- 2a) Leverage the Rhode Island Infrastructure Bank’s Aquidneck Island Regional Resilience Coordinator.
- 2b) Expand and leverage existing grant funding opportunities.

Tier 3: Sustained Funding and Financing

- 3a) Develop an implementation plan for establishing a dedicated department and/or organization to guide and implement environmental infrastructure and resilience investments.

Conclusion. Through the completion of this technical assistance project, leadership for the Town of Middletown have demonstrated their commitment to addressing the municipality’s climate challenges. With a strong foundation of resilience actions identified, Middletown is well-positioned to take the next steps to ensure its resilience vision and goals—as reflected in the RCIP—are cost-effective, efficient, and successfully implemented.



This report was produced by the dedicated team at [Throwe Environmental, LLC](#) in the company’s role as a core partner within the SNEP Network. Throwe Environmental is committed to developing climate resilience, environmental finance, and policy and governance solutions for its public, private, and nonprofit clients. As a SNEP Network partner organization, Throwe Environmental focuses on financing, training, and leadership development. Throwe Environmental is based in Bristol, RI and helps communities nationwide address their climate challenges.



Middletown, RI Climate Resiliency Planning & Financing Strategy

Appendix B: RCIP Spreadsheet

Download: <https://throwe-environmental.com/wp-content/uploads/2023/10/Appendix-B-Middletown-RCIP-FINAL-v.10.11.23.xlsx>

Produced by the
Southeast New England Program (SNEP) Network

Fall 2023

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Middletown, RI Climate Resiliency Planning & Financing Strategy

Appendix C: Leadership Exchange Summary of Findings Memorandum

Produced by the
Southeast New England Program (SNEP) Network

Fall 2023

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MEMORANDUM

TO: Lea Hitchen (Town of Portsmouth, RI); Patricia Reynolds (City of Newport, RI); Ronald Wolanski (Town of Middletown, RI)

FROM: SNEP Network Project Team (Throwe Environmental, Elizabeth Scott Consulting); Rhode Island Infrastructure Bank

CC: New England Environmental Finance Center, Naval Station Newport

RE: Aquidneck Island Climate Resilience Leadership Exchange: Summary of Findings

DATE: September 29, 2023

The SNEP Network Project Team, in partnership with the Rhode Island Infrastructure Bank and the island's municipal resilience teams, hosted three workshops as part of the Aquidneck Island Climate Resilience Leadership Exchange in April, May, and June 2023. At the Leadership Exchange workshops, state and local experts discussed important topics pertinent to addressing common concerns and building climate resilience on Aquidneck Island including stormwater and water resources, emergency management and preparedness, and transportation. These discussions led to the identification of next steps, project bundles, and funding opportunities. The communities look forward to using a regional approach to address climate resilience moving forward. This memorandum serves to convey the summary of findings from each session of the Exchange, including key takeaways and next steps.

Background and Purpose.

As a follow-up to recent resilience work completed at the direction of the SNEP Network, Project Team partners at Throwe Environmental (TE) and Elizabeth Scott Consulting, along with the Rhode Island Infrastructure Bank (RIIB), provided technical assistance through an initiative called the Aquidneck Island Climate Resilience Leadership Exchange (hereafter called the Leadership Exchange). The purpose of the Leadership Exchange was to provide additional capacity, guidance, and support to coordinate island-wide priorities as it relates to climate resilience project needs and explore funding and financing opportunities necessary for implementation.

Planning for the Leadership Exchange began in the early spring of 2023, following the completion of SNEP climate resilience projects for Portsmouth and Newport, with a similar project underway in

Organizing Team

Joanne Throwe (TE)

Courtney Greene (TE)

Sarah Whitehouse (TE)

Elizabeth Scott (SNEP)

Paige Myatt (RIIB)

Kimberly Koriath (RIIB)

Middletown. The goal of the Leadership Exchange was to begin or reignite conversations of overlapping priorities among the island municipalities and forge a path forward for improved regional coordination on high priority topics.

The Leadership Exchange was a three-part workshop series that sought to bring together local experts, municipal leadership, and other stakeholders to advance climate resilience across the Island. The SNEP Project Team, RIIB’s Aquidneck Island Regional Resilience Coordinator, and the Aquidneck Island Municipal Resilience Teams, worked together to develop agendas, identify experts and leadership to invite to the Exchange, and facilitate three separate workshops focused on stormwater and water resources, emergency management and preparedness, and transportation.

The goal of the Leadership Exchange was to provide an inclusive process for advancing on-the-ground, climate resilient infrastructure projects within each municipality and regionally across the island. The Exchange achieved this by facilitating discussions around shared interests and benefits leading to project bundles with increased impact and efficiency, identifying funding and financing opportunities best suited for identified projects, and adding capacity to coordinate strategic planning and implementation.

The primary outcome of the Leadership Exchange was reopening lines of communication amongst island-wide leadership and an informal agreement between the municipalities and Naval Station Newport (NAVSTA Newport) to coordinate regional efforts to increase regional resilience. Each session of the Leadership Exchange provided specific next steps associated with addressing pressing regional climate and environmental challenges.

Summary of Findings.

Leadership Exchange 1: Stormwater and Water Resources

Overview. The first of three Leadership Exchanges, focusing on Stormwater and Water Resources, took place at Middletown Town Hall on April 21, 2023 and was attended by 22 participants. The three municipalities each face their own unique problems regarding stormwater flooding and water quality, however a shared drinking water system and shared water resources make it difficult for each municipality to mitigate these issues on their own. Chronic algal and cyanobacteria blooms, bacteria and nutrient related impacts, and stormwater-induced flooding are shared concerns that should be addressed in concert across municipal lines. During this session, each municipality shared updates on recent projects relating to stormwater management and shared future opportunities for collaboration and joint project implementation.

<u>Participating Organizations</u>		
Aquidneck Island Planning Commission	Newport City Council	Rhode Island General Assembly
Aquidneck Land Trust	Newport Planning Department	Save the Bay
Middletown Building and Zoning Department	Newport Public Works	University of Rhode Island Coastal Resources Center
Middletown Planning Department	Newport Tree Conservancy	
Middletown Department of Public Works	Portsmouth Emergency Management	
	Portsmouth Planning Department	

Key Takeaways. The following key takeaways emerged from the first Leadership Exchange event:

- ***Educate the Public.*** One of the primary needs identified during this session was public education. The municipalities identified lack of public understanding surrounding stormwater and water quality projects as a primary barrier to accessing more sustainable revenue streams. It was determined that public education would be an essential component of future stormwater related projects.
- ***Engage Private Property Owners.*** The municipalities identified the need to engage private property owners in stormwater management and water quality initiatives, as improvements on state and local roads and facilities alone are not enough to address the island's flooding and water quality problems. Addressing resilience in this area can be done through incentives and requirements to reduce impervious cover and improve stormwater management on private property. Ideas discussed included creating guidelines for mitigating stormwater impacts on private properties, public-private partnerships (P3s), and creation/adoption of green infrastructure design/installation/maintenance certification programs.
- ***Expand and Improve Regional Coordination.*** The municipalities agreed that a regional approach to stormwater management would prove to be much more cost effective compared to current methods. However, moving forward on a regional water quality protection fund, as well as other regionalized efforts, will again require dedicated public outreach and education to overcome misconceptions and garner support.

Recommended Next Steps. The project team recommends the following next steps to advance the findings of the first Leadership Exchange event:

- ***Incorporate public education into future water quality infrastructure projects.*** Having one Island-wide voice delivering a unified message across projects will lead to both increased efficiency and effectiveness of public education initiatives. Additionally, incorporating aspects of island-wide community education and engagement into grant proposals will increase the scale of proposed project impacts, making these proposals more attractive to state and federal funders.
- ***Explore regional approaches to stormwater and water quality management, including a regional water quality protection fund.*** Current federal funding opportunities are looking to fund larger, regional projects. Aquidneck Island will be much more competitive on a national scale with applications that put forth island-wide projects, as opposed to projects in individual municipalities. Additionally, exploring an island-wide fee dedicated to stormwater, water quality, or climate resilience, would leverage existing funding and allow for investment at scale to achieve successful implementation of high priority projects.
- ***Identify opportunities for project bundling across municipalities.*** To demonstrate proof of concept and success for regional coordination, the municipalities can work with the Aquidneck Island Regional Resilience Coordinator to bundle smaller projects for RIIB's upcoming round of Municipal Resilience Program (MRP) action grants. Additional larger grants should follow.
- ***Develop a regional Stormwater and Water Quality Action Plan.*** The plan should identify opportunities for municipalities to work in tandem and address regional assets, such as the drinking water system.

Leadership Exchange Session 2: Emergency Management and Preparedness

Overview. The second session of the Leadership Exchange focused on emergency management and preparedness across the Island and took place at Portsmouth Town Hall on May 24, 2023. This workshop was attended by 20 participants. Due to the small size of Aquidneck Island communities’ staff, emergency managers often “wear multiple hats”, serving as both emergency responders and emergency planners. The part time nature of emergency planning activities and relatively short tenures of emergency managers (typically the Fire Chief) pose challenges in establishing a more comprehensive emergency management plan. Following a presentation of individual actions undertaken by the municipalities and Naval Station Newport, participants heard from leaders from the Barnstable County (MA) Regional Emergency Management Committee, made up of 16 communities. Informed by this regional case study, the participants then engaged in a discussion identifying future needs and next steps.

<u>Participating Organizations</u>		
Aquidneck Island Planning Commission	Middletown Town Council	Portsmouth Emergency Management
Barnstable County, MA Department of Health and Environment	Middletown Planning Department	Portsmouth Police Department
Episcopal Diocese of Rhode Island	Naval Station Newport	Rhode Island Emergency Management Agency
Exeter, RI Emergency Management	Newport Fire Department	Rhode Island General Assembly
Middletown Fire Department	Newport Police Department	
	Portsmouth Business Development	
	Portsmouth Planning Department	

Key Takeaways. The following key takeaways emerged from the second Leadership Exchange event:

- **Limited Capacity and Competing Priorities.** Due to limited capacity, emergency managers in Newport and Middletown must “wear multiple hats”, filling a variety of roles with competing priorities. In this dynamic, emergency planning is frequently overlooked while emergency managers focus their efforts on response.
- **Lack of a Central Emergency Operations Center.** The lack of a centralized emergency management hub on the Island forces the municipalities to act in silos. However, the municipalities have a strong record of coordinating with the State during emergency events. A Mutual Aid Agreement signed by all Aquidneck Island communities some time ago could serve as a template for a future agreement.
- **Funding Limitations.** To overcome the challenge of limited individual resources, emergency management and preparedness on the Island must be a coordinated effort between the three municipalities, NAVSTA Newport, and the state.

Recommended Next Steps. The project team recommends the following next steps to advance the findings of the second Leadership Exchange event:

- ***Develop an Island-wide Emergency Management Plan.*** Identify capacity building and/or planning funding to hire a contractor to develop a detailed Regional Emergency Plan on behalf of the municipalities and NAVSTA Newport. The plan could include, for example, development of a regional emergency planning committee, a detailed and actionable regional sheltering plan, and the framework to develop a centralized Emergency Operations Center (EOC) to serve as a hub for training, shared equipment storage, sheltering, and resource sharing.
- ***Identify new sheltering locations for emergency sheltering events.*** Currently, shelters on the island do not have sufficient capacity. The community must identify additional locations to serve as shelters during an emergency event and ensure these locations will be able to provide the necessary protection for residents, tourists, and workers.
- ***Increase volunteer recruitment and training.*** Coordinated island-wide outreach to increase volunteer recruitment for emergency shelters.

Leadership Exchange Session 3: Transportation

Overview. The third and final session of the Aquidneck Island Climate Resilience Leadership Exchange centered around the topic of transportation and took place at Innovate Newport on June 14, 2023 and was attended by 15 participants. Roads on the island vary in ownership from the Navy-owned Burma Road, to state-owned East Main and West Main Roads, to other locally-owned roads traversing the island. There are also four bridges connecting the island with the mainland: the Newport Pell Bridge, the Mount Hope Bridge, the Jamestown Verazzano Bridge, and the Sakonnet River Bridge, all owned and operated by the Rhode Island Turnpike and Bridge Authority (RITBA). These complexities in ownership can often lead to complicated coordination needs for project implementation.

<u>Participating Organizations</u>		
Aquidneck Island Planning Commission	Newport Planning Department	Rhode Island Department of Transportation
Bike Newport	Portsmouth Business Development	Rhode Island Division of Statewide Planning
Middletown Bike and Pedestrian Advisory Committee	Portsmouth Emergency Management	Vanasse Hangen Brustlin, Inc.
Middletown Planning Department	Portsmouth Planning Department	
Naval Station Newport	Portsmouth Police Department	
Newport Bike and Pedestrian Advisory Committee		

Key Takeaways. The following key takeaways emerged from the third Leadership Exchange event:

- ***Regional Coordination Makes all Municipalities More Competitive.*** The intricate relationship between the three municipalities, the Navy, and the state can provide immense opportunity in regards to transportation. According to a representative from the Rhode Island Department of Transportation (RIDOT), regional coordination and collaborative approaches to project implementation make municipalities much more competitive for grant funding at both the state and federal level.
- ***Project Planning Achieved Through Collaboration.*** By working together to collaboratively develop transportation plans that account for federal, state, and local priorities, the municipalities can identify projects that allow for efficiency and effectiveness while lessening competition for limited state and federal resources.
- ***Prioritize Multimodal Transportation Options.*** For Aquidneck Island's transportation network to become more resilient, the focus must be placed on multimodal forms of transportation and "Green and Complete Streets" that simultaneously reduce emissions and congestion while increasing the absorption of stormwater runoff from paved surfaces.
- ***Recovery Includes Future Resilience Planning.*** While many opportunities for the Island to become more resilient exist now, community planners should constantly be looking for new opportunities to advance resilience. For this reason, resilience and the concept of "building back better" should be a focus during the recovery phase of emergency events. By incorporating resilience into emergency response and recovery, the Island can create efficiencies that may not otherwise exist.

Recommended Next Steps. The project team recommends the following next steps to advance the findings of the third Leadership Exchange event:

- ***Evaluate opportunities to expand multimodal transportation at the Newport Gateway Center and new Satellite lot.*** These opportunities may be able to tie in Burma Road, which is currently Navy-owned and maintained.
- ***Evaluate opportunities to bury utility lines.*** This can be paired with opportunities to widen roadways or add bike lanes or green infrastructure to existing roadways.
- ***Municipalities (and the Navy, when appropriate) should approach local, state, and federal funders collaboratively to increase competitiveness for funding and decrease local competition.*** One potential funder includes the van Buren Charitable Foundation (vBCF), who has already expressed interest in funding community-led resilience initiatives on the Island.

Conclusion.

The Leadership Exchange workshops proved successful at reigniting conversations with island-wide and state leadership on resilience topics of regional importance. There is an immediate opportunity to expand these efforts to ensure that Aquidneck Island municipalities are well positioned to attain the funding necessary to achieve implementation of climate resilience projects. With immediate priorities already identified (stormwater and water management, emergency management and preparedness, and transportation), and key personnel engaged, the Leadership Exchange presents an opportunity for the municipalities to move forward from planning to action. The Aquidneck Island Regional Resilience Coordinator is aptly positioned to continue these efforts in the following ways:

- Coordinating projects across municipalities;
- Bundling similar projects and/or those of regional significance for grant funding;
- Identifying appropriate personnel to engage; and
- Connecting the municipalities with various sources of federal, state, and local funding.

It is essential that the municipalities fully capitalize on the additional capacity this position provides, and use it to become more competitive, efficient, and resilient well into the future.



This report was produced by the dedicated team at Throwe Environmental, LLC in the company's role as a core partner within the SNEP Network. Throwe Environmental is committed to developing climate resilience, environmental finance, and policy and governance solutions for its public, private, and nonprofit clients. As a SNEP Network partner organization, Throwe Environmental focuses on financing, training, and leadership development. Throwe Environmental is based in Bristol, RI and helps communities nationwide address their climate challenges.



Middletown, RI Climate Resiliency Planning & Financing Strategy

Appendix D: BIL Spreadsheet

Download: <https://throwenvironmental.com/wp-content/uploads/2023/10/Appendix-D-BIL-Funding-Opportunities-Middletown-FINAL-v.10.11.23.xlsx>

**Produced by the
Southeast New England Program (SNEP) Network**

Fall 2023

The SNEP Network is administered by:
New England Environmental Finance Center
University of Southern Maine, UMaine System
www.snepnetwork.org | TEL: 207-228-81-64



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Middletown, RI Climate Resiliency Planning & Financing Strategy

Appendix E: IRA Spreadsheet

Download: <https://throwenvironmental.com/wp-content/uploads/2023/10/Appendix-E-IRA-Clean-Energy-Funding-Opportunities-Middletown-FINAL-v.10.11.23.xlsx>

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Middletown, RI Climate Resiliency Planning & Financing Strategy

Appendix F: Resource List

Download: <https://throwe-environmental.com/wp-content/uploads/2023/10/Appendix-F-Resource-List-FINAL-v.10.11.23.xlsx>

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Middletown, RI Climate Resiliency Planning & Financing Strategy

Appendix G: Fuss & O'Neill Cost Estimates

Produced by the
Southeast New England Program (SNEP) Network

Fall 2023

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MEMORANDUM

TO: Elizabeth Scott, Robert Hanley, and Ronald Wolanski

FROM: Shawna Little, PhD and Stefan Bengtson, MESM,

DATE: September 27, 2023

RE: Middletown RCIP Flood Proofing Measures Cost Estimates

Fuss & O'Neill evaluated several scenarios to assess order of magnitude costs for floodproofing the Town-owned wastewater pump stations on Paradise Avenue and Coddington Highway.

1 Coastal Flooding Vulnerability

1.1 Flood Scenarios

Based on the National Oceanographic and Atmospheric Administration (NOAA) Sea Level Rise (SLR) Viewer, the following increases in regional sea level are projected for Middletown and Newport RI, based on the Intermediate High scenario (Year 2022 projections):

- Year 2030 – 0.72 ft (rounded to 1 ft for flood protection)
- Year 2050 – 1.48 ft (rounded to 2 ft for flood protection)
- Year 2070 – 2.62 ft (rounded to 3 ft for flood protection)
- Year 2100 – 5.05 ft (rounded to 5 ft for flood protection)

The Coastal Resources Management Council (CRMC) STORMTOOLS coastal flooding projections were assessed for each SLR scenario to determine water depths (feet above grade) during a 100-year coastal flooding event for each pump station. It should be noted that the inundation depths depicted by STORMTOOLS do not reflect other sources of flooding, such as rainfall, riverine flooding, or stormwater backups. The flooding impacts for each location were as follows:

1. **Coddington Highway: (Figures 1-4)**
 - a. Year 2030, 100-year event – Coastal flooding was *not* projected to impact the Coddington Highway Pump Station, adjacent roadway, or connected manholes.
 - b. Year 2050, 100-year event – Coastal flooding was *not* projected to impact the Coddington Highway Pump Station, adjacent roadway, or connected manholes.
 - c. Year 2070, 100-year event – Coastal flooding was projected to overtop Coddington Highway and inundate two sewer manholes with ~1 ft of water.
 - d. Year 2100, 100-year event – Coastal flooding was projected to reach the Coddington Highway Pump Station with a water depth of ~1 ft around the periphery of the housing structure. Coddington Highway would be impassable with a water depth of ~2 ft on the roadway. Seven sewer manholes are projected to be inundated with 1-2 ft of water.

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2. **Paradise Avenue: (Figures 5-8)**

- a. Year 2030, 100-year event – Coastal flooding was *not* projected to impact the Paradise Avenue Pump Station. However, the Paradise Avenue roadway would be inundated by 2.5 ft of water at the driveway entrance to the property, making the road impassable and preventing access to the pump station. Two sewer manholes are projected to be inundated by coastal flooding.
- b. Year 2050, 100-year event – Coastal flooding was projected to inundate the Paradise Avenue roadway with ~5 ft of water depth at the driveway entrance to the property, preventing access to the pump station. Coastal flooding is projected to generate water depths of 1-2 ft around the periphery of the building, which would be sufficient to cause flooding of the doorways on the southern side of the building where elevation is lower. Four sewer manholes are projected to be inundated due to coastal flooding, as well as the HVAC units adjacent to the building.
- c. Year 2070, 100-year event – Coastal flooding was projected to inundate the Paradise Avenue roadway with ~7 ft of water depth at the driveway entrance to the property, preventing access to the pump station. Coastal flooding is projected to generate water depths of 1-3 ft around the periphery of the building, which would be sufficient to cause flooding of the southern doors as well as the larger vents on the eastern and northern sides of the building. Four sewer manholes are projected to be inundated due to coastal flooding, as well as the HVAC units adjacent to the building.
- d. Year 2100, 100-year event – Coastal flooding was projected to inundate the Paradise Avenue with ~11 ft of water depth at the driveway entrance to the property, preventing access to the pump station. Coastal flooding is projected to generate water depths of 5-7 ft around the periphery of the building, which would be sufficient to cause flooding of all the doorways and vents, except for the small vent on the northern side of the building, (6 ft above grade). Four sewer manholes are projected to be inundated due to coastal flooding, as well as the HVAC units adjacent to the building.

Due to the numerous potential entry points for flood water intrusion into the Paradise Avenue Pump Station, **Table 1** below outlines the vulnerability points and potential sources of floodwater intrusion during a 100-year coastal flooding event for three future scenarios.

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Table 1. Measured height above grade for various vulnerability points at the Paradise Avenue Pump Station compared to water depths projected by STORMTOOLS for the 2030, 2050, and 2070 100-year coastal flooding scenarios (plus sea level rise). Blue cells indicate scenarios where water depths are high enough to breach the vulnerability point and potentially cause flooding inside the pump station housing structure.

	Height above grade	Water Depth for 100-yr Event in 2030	Water Depth for 100-yr Event in 2050 (2 ft SLR)	Water Depth for 100-yr Event in 2070 (3 ft SLR) ¹
South facing small vent (left)	2.00 ft	N/A	1.24 ft	1.15 ft
South Door far left	0.75 ft	N/A	1.36 ft	1.14 ft
South facing small vent (right)	2.00 ft	N/A	1.37 ft	1.02 ft
South facing large vent/window	2.00 ft	N/A	1.41 ft	1.19 ft
South facing single door (left)	0.67 ft	N/A	1.40 ft	2.87 ft
South facing double door (right)	0.67 ft	N/A	1.40 ft	2.87 ft
East facing large vent	1.92 ft	N/A	1.44 ft	2.85 ft
North facing large vent	2.10 ft	N/A	1.38 ft	2.91 ft
North facing small vent	Not Measured (>6 ft)	N/A	1.41 ft	2.94 ft
West facing door	0.83 ft	N/A	1.31 ft	1.10 ft
HVAC Units	0.0 ft (ground level)	N/A	1.27 ft	1.41 ft
Electrical box	0.0 ft (ground level)	N/A	2.78 ft	4.60 ft

¹Coastal Resources Management Council (CRMC) STORMTOOLS data for this location is limiting the comparison for this scenario.

2 Floodproofing Recommendations

2.1 Paradise Avenue Pump Station

Due to the increased vulnerability of the Paradise Avenue Pump Station to coastal flooding, we recommend that the Town implement both short-term and long-term floodproofing solutions. Long-term solutions could include relocating the existing structure at a higher elevation outside of coastal flooding impacts. This summary does not include cost estimates or recommendations for relocation of the pump station, but this alternative could be investigated by the Town to manage flooding beyond the year 2050. In the meantime, short term recommendations include investing in custom sized vent covers and waterproof doors to reduce water infiltrating at building entry points (e.g., vents and doorways) when water depths are greater than 1.5 ft. Accessory utilities, such as the HVAC units and electrical box should also be raised to at least 2 ft above grade. Additionally, the application of a waterproofing epoxy coating to the exterior foundation slab and brick walls, above grade, may reduce water infiltration during flood events, when water depths are not breaching vulnerability points (<1.5 ft).

2.2 Coddington Highway Pump Station

The Coddington Highway Pump Station is currently located within a FEMA 500-year floodplain that has an average water depth of less than one foot. However, the New England Interstate Water Pollution Control Commission (NEIWPCC) TR-16 engineering guidelines for wastewater treatment plants and pump stations recommends design standards for upgrading existing facilities based on the current 100-year flood elevation. The TR-16 guidelines recommend flood protection up to the 100-year flood elevation plus 2 ft for noncritical equipment and plus 3 ft for critical equipment. The Coddington Highway Pump Station is at ~17 ft elevation compared to 14 ft for the 100-year floodplain elevation, thus currently meeting TR-16 recommendations. Based on this, our evaluation of coastal flood vulnerability and flood proofing measures were restricted to the impacts related to the 100-year return interval.

Of the four scenarios analyzed, the Coddington Highway Pump Station is not projected to be vulnerable to coastal flooding impacts until a 100-year coastal flooding event in the year 2100. In this scenario, a water depth of ~1 ft was projected around the pump station structure with 2 ft of water on the Coddington Highway. Seven manholes are projected to be inundated by the coastal flood waters. The flooding projected for a 100-yr storm in 2100 corresponds with the FEMA mapping for the 500-year floodplain and can be used by the Town to understand the potential impacts of a current 500-year flooding event.

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For future flood scenarios past the year 2050, it would be recommended to raise the entire pump station structure by a minimum of 2 ft to avoid flooding impacts to the pumps or electrical equipment. Future modifications to the pump station would need to meet the TR-16 design standards, accounting for 3 ft of freeboard above the 100-year floodplain elevation. This would involve elevating the pump station housing structure and all utilities contained therein, coordinating with local utilities prior to disconnecting and extending electrical and gas lines, and temporarily by-passing the current flow directed to the pump station. To that end, it is our recommendation that the Town evaluate the vulnerability of the Coddington Highway Pump Station every 10-20 years to allow for floodproofing measures to be updated based on the remaining useful lifespan of the pumps station and the most up to date climate change projections (i.e., sea level rise and precipitation).

Based on the mechanical specs provided in the O&M manual for the Coddington Highway Pump Station, the total head for the pump station should be sufficient to support increasing the elevation by 2 ft. If future modifications propose elevating the pump station more than 2 ft then the Town should confirm with the manufacturer that the maximum allowable static suction lift would not be adversely impacted.

A budgetary opinion of cost summary for floodproofing measures for the Paradise Avenue Pump Station is provided below in **Table 2**. Cost estimates provided here are based on 2023 dollars. Because the Coddington Highway Pump Station is not projected to be impacted by coastal flooding until the year 2100, floodproofing costs are not provided here. These improvements and costs will need to be assessed in the future.

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3 Opinion of Cost Estimates

Table 2: Summary of Budgetary Costs

	Total	Anticipated Range	
		Low (-30%)	High (+50%)
Paradise Ave Pump Station - Floodproofing to 2050			
Capital Costs	\$56,000	\$39,000	\$84,000
Paradise Ave Pump Station - Floodproofing to 2070			
Capital Costs	\$87,000	\$61,000	\$131,000

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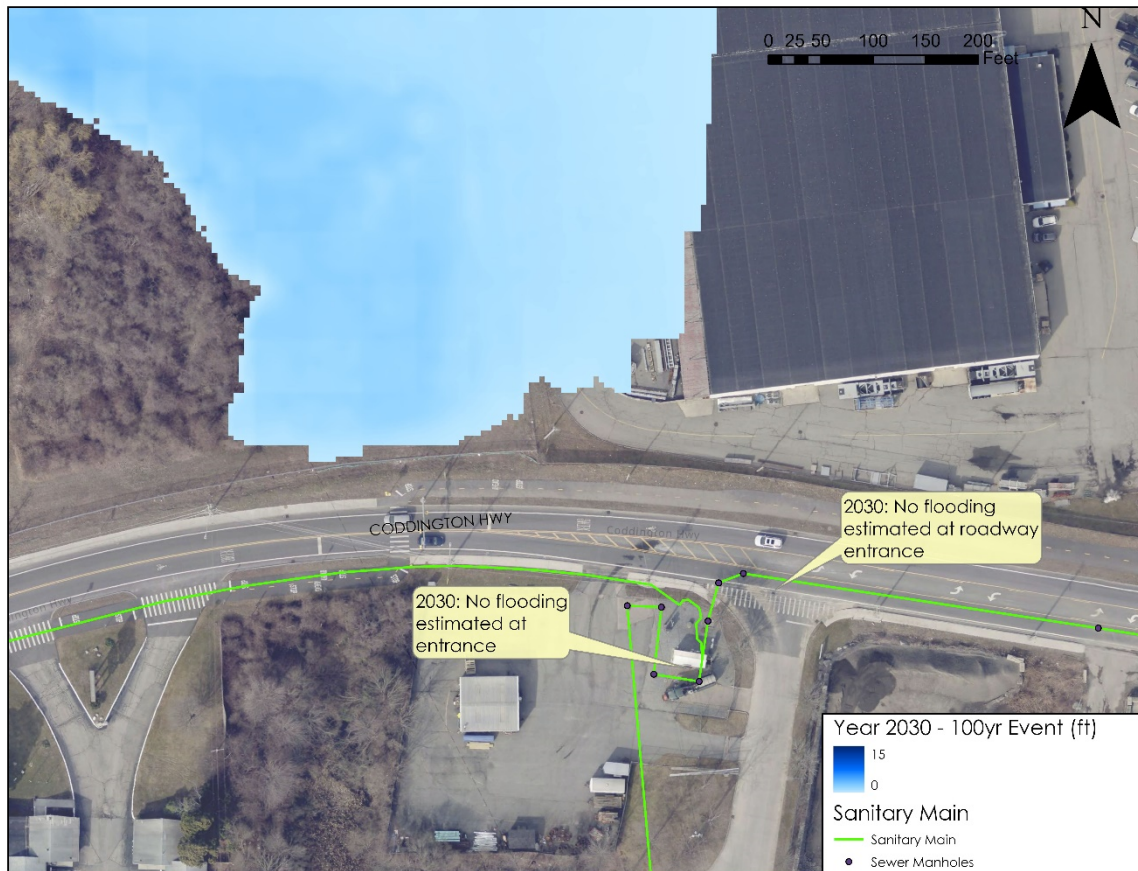


Figure 1. Projected water surface elevations around the Coddington Highway Pump Station for a 100-year coastal flooding event in the year 2030. Flood projections calculated by Coastal Resources Management Council (CRMC) STORMTOOLS, presented as water depth in feet above grade.

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Figure 2. Projected water surface elevations around the Coddington Highway Pump Station for a 100-year coastal flooding event in the year 2050, factoring in 2 ft of sea level rise (SLR). Flood projections calculated by Coastal Resources Management Council (CRMC) STORMTOOLS, presented as water depth in feet above grade.

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Figure 3. Projected water surface elevations around the Coddington Highway Pump Station for a 100-year coastal flooding event in the year 2070, factoring in 3 ft of sea level rise (SLR). Flood projections calculated by Coastal Resources Management Council (CRMC) STORMTOOLS, presented as water depth in feet above grade.

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Figure 4. Projected water surface elevations around the Coddington Highway Pump Station for a 100-year coastal flooding event in the year 2100, factoring in 5 ft of sea level rise (SLR). Flood projections calculated by Coastal Resources Management Council (CRMC) STORMTOOLS, presented as water depth in feet above grade.

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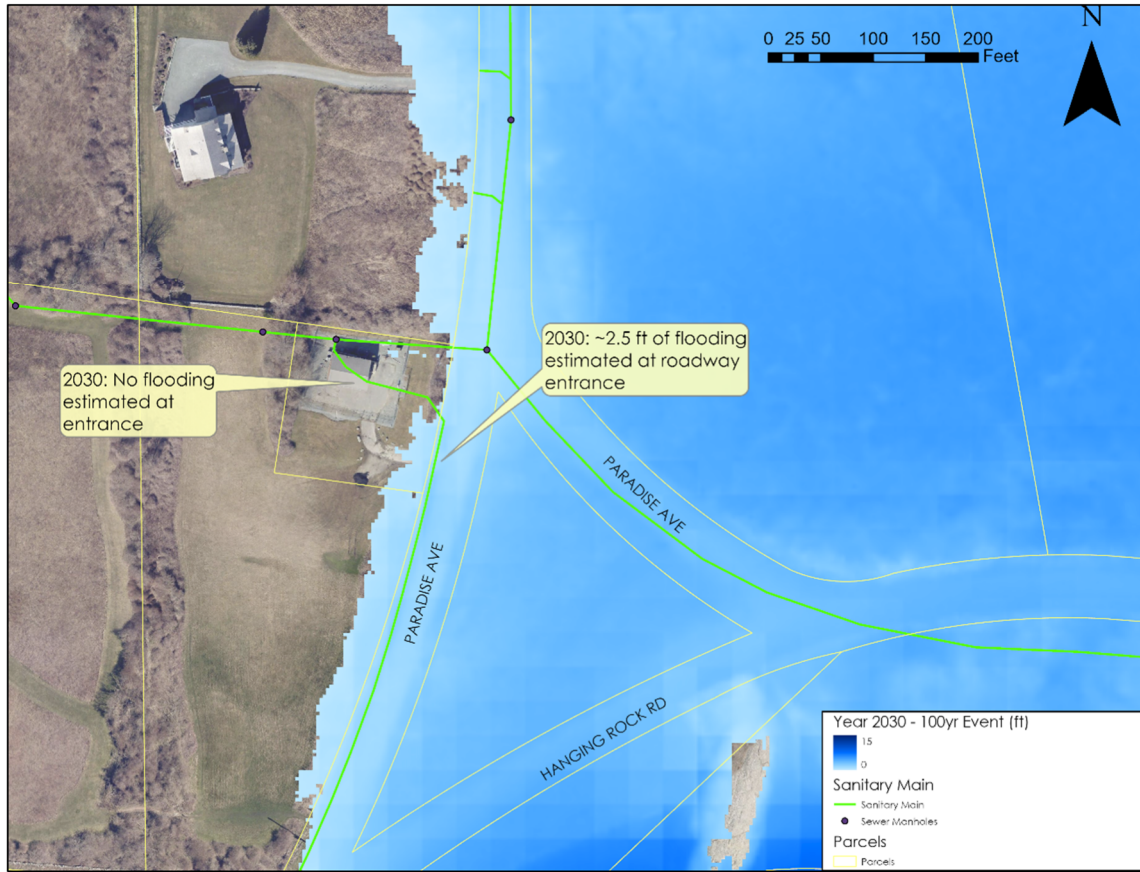


Figure 5. Projected water surface elevations around the Paradise Avenue Pump Station for a 100-year coastal flooding event in the year 2030. Flood projections calculated by Coastal Resources Management Council (CRMC) STORMTOOLS, presented as water depth in feet above grade.

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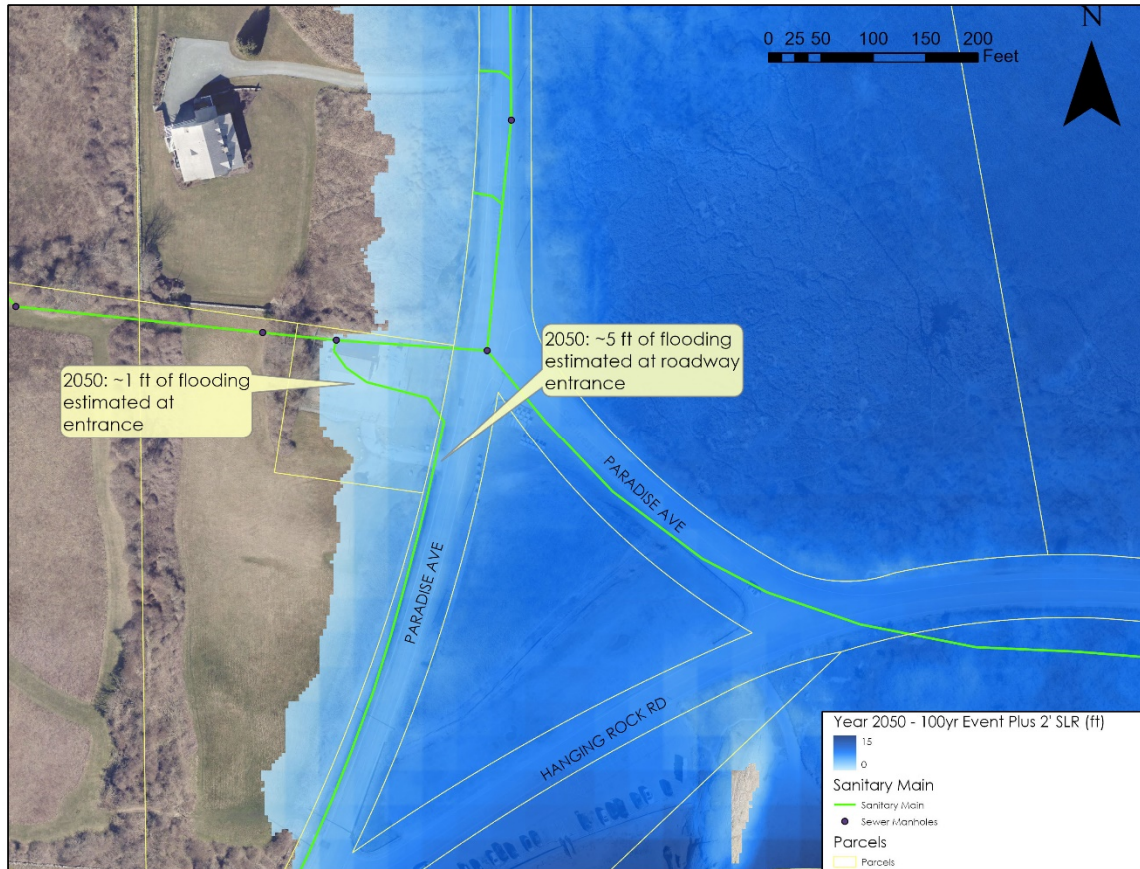


Figure 6. Projected water surface elevations around the Paradise Avenue Pump Station for a 100-year coastal flooding event in the year 2050, factoring in 2 ft of sea level rise (SLR). Flood projections calculated by Coastal Resources Management Council (CRMC) STORMTOOLS, presented as water depth in feet above grade.

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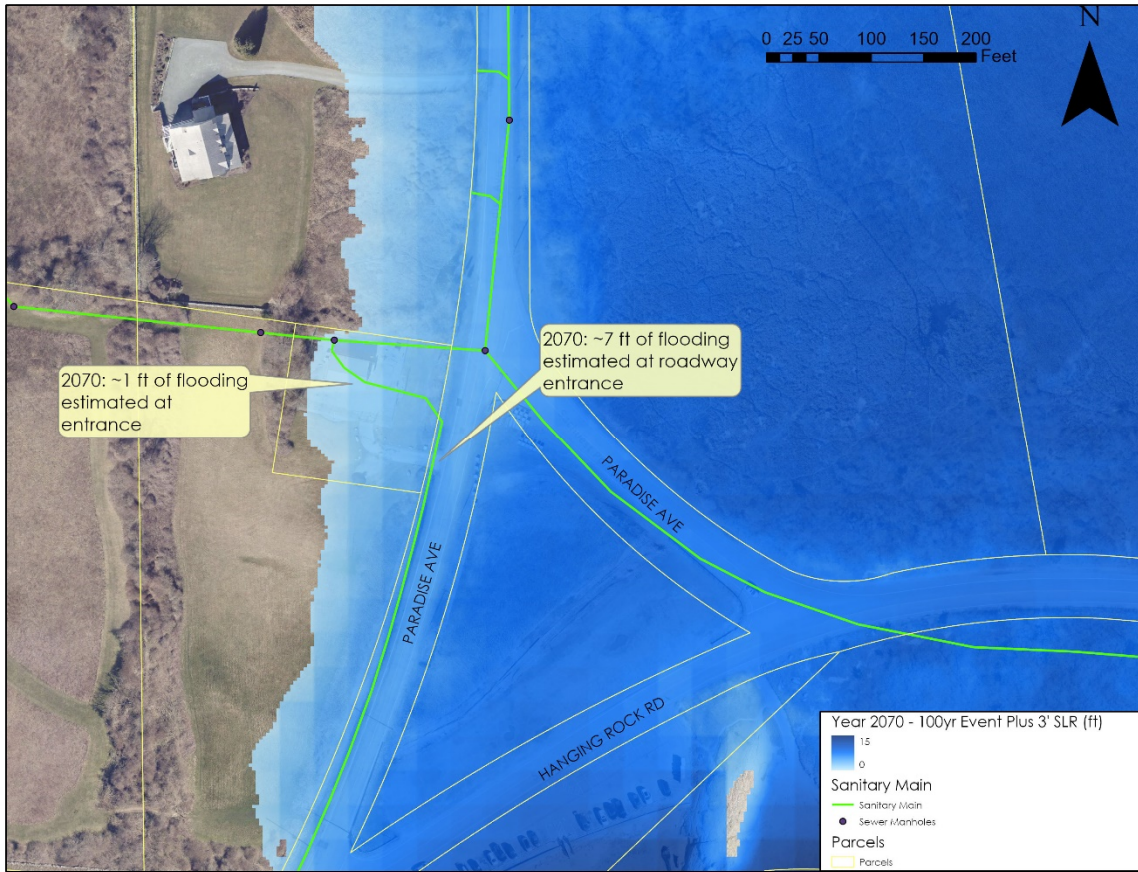


Figure 7. Projected water surface elevations around the Paradise Avenue Pump Station for a 100-year coastal flooding event in the year 2070, factoring in 3 ft of sea level rise (SLR). Flood projections calculated by Coastal Resources Management Council (CRMC) STORMTOOLS, presented as water depth in feet above grade.

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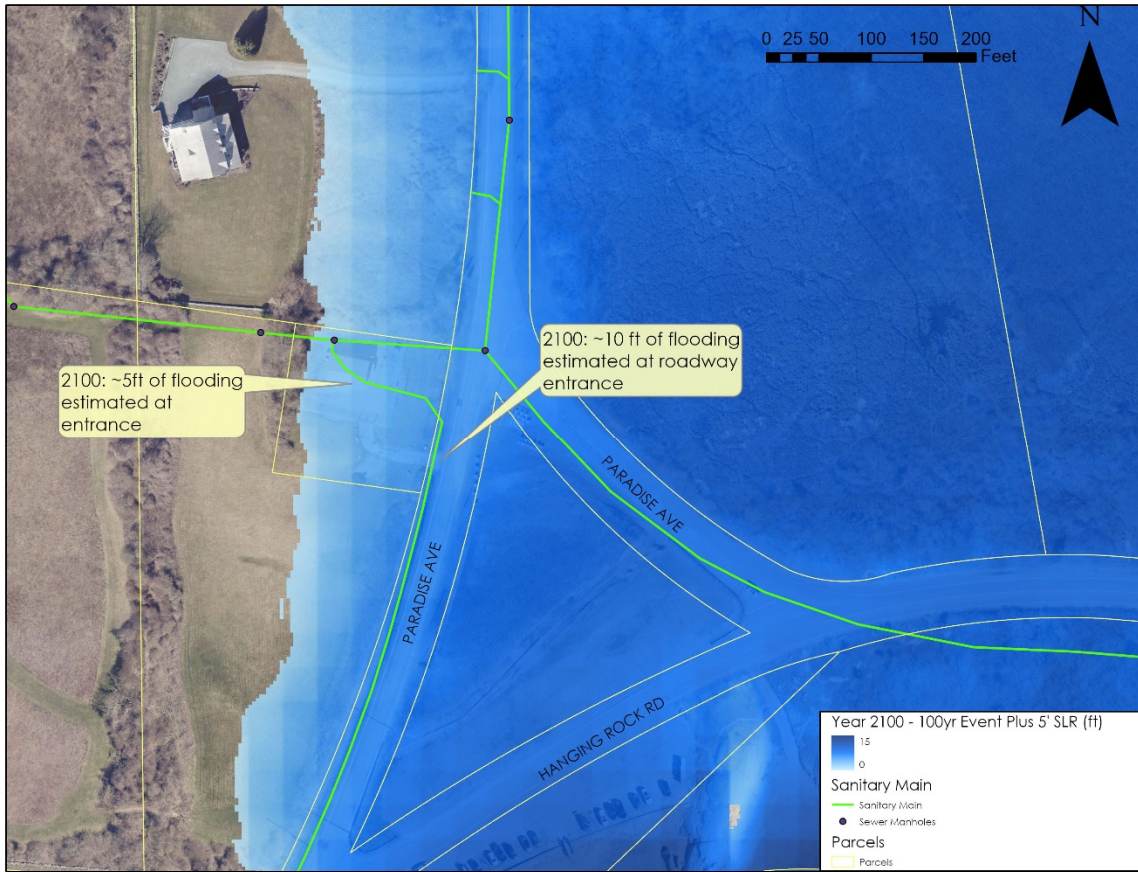


Figure 8. Projected water surface elevations around the Paradise Avenue Pump Station for a 100-year coastal flooding event in the year 2100, factoring in 5 ft of sea level rise (SLR). Flood projections calculated by Coastal Resources Management Council (CRMC) STORMTOOLS, presented as water depth in feet above grade.

DRAFT

FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST- YEAR 2050 FLOODPROOFING		DATE PREPARED :	09/13/23	SHEET	1	OF	1
PROJECT : Town of Middletown RCIP		BASIS : 2023 RS Means and Previous Construction Projects.					
LOCATION : Paradise Avenue Pump Station							
DESCRIPTION Budgetary Opinion of Cost							
DRAWING NO Construction Plans		ESTIMATOR :	SNL	CHECKED BY :			
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s)' methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>							
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST		
1 General							
	Mobilization & Demobilization (5%)	LS	1	\$1,500.00	\$1,500		
	Insurance and Bonds (5%)	LS	1	\$1,500.00	\$1,500		
	Engineering (35%)	LS	1	\$10,000.00	\$10,000		
	General Subtotal				\$13,000		
2 Moisture Protection							
	Waterproofing membrane for foundation walls 3' high (exterior)	SF	450	\$5.00	\$2,300		
	Floodproof barriers for vents	SF	0	\$200.00	\$0		
	Floodproof door (replacing existing doors)	SF	120	\$140.00	\$16,800		
	Moisture Protection Subtotal				\$19,100		
3 Utilities - Raising HVAC Units							
	Raise HVAC Units	EA	3	\$2,000.00	\$6,000		
	Utilities - HVAC Subtotal				\$6,000		
4 Utilities - Manhole							
	Gasketed Manhole Covers	EA	4	\$750.00	\$3,000		
	Utilities Manhole Subtotal				\$3,000		
	CONSTRUCTION TOTAL (Including Miscellaneous Items)				\$41,100		
	CONTINGENCY (35%)				\$14,400		
	OVERALL TOTAL INCLUDING CONTINGENCY				\$56,000		
SUBTOTAL -30% TO +50% (ROUNDED TO NEAREST \$1,000)					\$39,000	TO	\$84,000

DRAFT

FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST- YEAR 2070 FLOODPROOFING		DATE PREPARED :	09/13/23	SHEET	1	OF	1
PROJECT : Town of Middletown RCIP		BASIS : 2023 RS Means and Previous Construction Projects.					
LOCATION : Paradise Avenue Pump Station							
DESCRIPTION Budgetary Opinion of Cost							
DRAWING NO Construction Plans		ESTIMATOR :	SNL	CHECKED BY :			
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s)' methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>							
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST		
1 General							
	Mobilization & Demobilization (5%)	LS	1	\$2,200.00	\$2,200		
	Insurance and Bonds (5%)	LS	1	\$2,200.00	\$2,200		
	Engineering (35%)	LS	1	\$15,500.00	\$15,500		
	General Subtotal				\$19,900		
2 Moisture Protection							
	Waterproofing membrane for foundation walls 3' high (exterior)	SF	450	\$5.00	\$2,300		
	Floodproof barriers for vents	SF	80	\$200.00	\$16,000		
	Floodproof door (replacing existing doors)	SF	120	\$140.00	\$16,800		
	Moisture Protection Subtotal				\$35,100		
3 Utilities - Raising HVAC Units							
	Raise HVAC Units	EA	3	\$2,000.00	\$6,000		
	Utilities - HVAC Subtotal				\$6,000		
4 Utilities - Manhole							
	Gasketed Manhole Covers	EA	4	\$750.00	\$3,000		
	Utilities Manhole Subtotal				\$3,000		
	CONSTRUCTION TOTAL (Including Miscellaneous Items)				\$64,000		
	CONTINGENCY (35%)				\$22,400		
	OVERALL TOTAL INCLUDING CONTINGENCY				\$87,000		
SUBTOTAL -30% TO 50% (ROUNDED TO NEAREST \$1,000)					\$61,000	TO	\$131,000

MEMORANDUM

TO: Elizabeth Scott, Robert Hanley, Ronald Wolanski
FROM: William Guenther, MS, Stefan Bengtson, MESM
DATE: September 27, 2023
RE: Town of Middletown RCIP – Design of Bailey Brook Stormwater Improvements

This Scope of Work is recommended for use when contracting professional engineering services to design several green infrastructure projects at various locations within the Baily Brook subwatershed. Since many of these retrofit projects are relatively small, it is recommended that projects be bundled together as much as possible to create economies of scale that help to reduce costs.

Instructions: Throughout this document, this text box will be used to provide task, community, or site-specific information needed to complete a particular task. The symbol '##' has been used to represent locations where community or site-specific information is required.

1 Site Investigation

1.1 Site Visit

It is anticipated that the selected consultant will conduct one (1) site visit at each location to collect photographs, observe the location of the utility mark out by Dig Safe, and confirm the location of current site features and topography compared to the previous concept plan. The site photographs will be incorporated as an attachment to any required permit submission.

Deliverables:

- Site Photographs (PDF Format)

1.2 Land Survey

Instructions: Concept plans should be included for each location where survey is requested. Plans should describe and/or delineate the anticipated limit of disturbance at each retrofit location.

For locations selected for survey along John Clark Road the gas line should be located and marked out ahead of any procured survey services. It will be critical for survey to capture the pipe invert elevations at structures where practices are conceptually designed to overflow to.

The selected consultant will conduct a partial boundary, existing conditions, and topographic survey at the approximate limits identified in the attached **##CONCEPT PLAN**. The datum for the topography will be based upon NAVD88, and the horizontal will be Rhode Island State Plane Coordinates (NAD83). The survey at each green infrastructure project location will include:

- Property boundaries conforming to Class I measurement standards;

- Spot elevations/topography conforming to Class T-1 accuracy standards;
- Location of physical features, both artificial and natural, such as edges of pavement, curbing, roadways, sidewalks, buildings, existing trees and canopy, landscaping, and visible utility structures (manholes, poles, valves, gates, etc.) conforming to Class III measurement standards; and
- Location and elevation of utilities and drainage infrastructure, including pipe inverts, based on features that are observable at the surface and available mapping from the Town Sewer Department, Newport Water and RI Energy.

The survey work will conform to the standards defined in "Procedural and Technical Standards for the Practice of Land Surveying in the State of Rhode Island and Providence Plantations adopted by the Rhode Island Board of Registration for Professional Land Surveyors, effective January 4, 2022."

Deliverable:

- Original ink-on-mylar (if required), signed and sealed by a professional land surveyor, and electronic copies of the plan in AutoCAD and PDF formats.

1.3 Test Pits

Instructions: Test pits will be needed on a site-specific basis to determine depth to ground water and any potential for infiltration at retrofit locations. Test pits should conform to recommendations and requirements of the Rhode Island Stormwater Design and Installation Standards Manual, 2015. It is anticipated that infiltration will not be possible at locations identified for these retrofits. Should areas be suitable for infiltration it is recommended that designs be altered in these locations to infiltrate as much water as possible. Care should be taken along John Clarke Road, where a gas line is believed to exist within only a few feet of the proposed retrofits.

The selected consultant will provide all equipment and Dig Safe notification to excavate test pits. Labor safety controls (e.g., police detail/traffic control), if required, are the responsibility of the Town. The selected consultant will also supply staff to observe the test pit(s), evaluate the soil conditions, and conduct infiltration testing to assess the suitability of the soils for infiltration stormwater practices.

This task assumes the work will be done during normal business hours. Upon completion of the field work, the consultant will prepare a log for each test pit that includes soil descriptions and textures, estimates of seasonal high groundwater elevation, and infiltration rates based on infiltration testing. In accordance with the current Rhode Island Stormwater Design and Installation Standards Manual, the consultant should budget for one test pit per 5,000 square feet of green infrastructure practice at each project location.

Deliverable:

- Test Pit Logs (PDF format)

2 70 % Design Plans

The selected consultant will prepare design documents, a drawing set to a level appropriate for typical permitting applications should they be required, and a preliminary opinion of cost. The design documents will include output from the hydrologic and hydraulic modeling, which will be completed to determine the treatment capacity and sizing of the proposed retrofit. The permitting design plan set will include the following sheets:

- Cover Page
- General Notes and Legend
- Existing Conditions
- Site Preparation and Soil Erosion & Sedimentation Control Plan
- Stormwater Improvement Plan
- Details

Deliverable:

- One (1) electronic copy of the design drawings (PDF Format);
- One (1) electronic copy of the opinion of cost (PDF Format); and
- One (1) electronic copy of hydrologic/hydraulic modeling report including, but not limited to, drainage area mapping, water quality volume calculations, pretreatment and green infrastructure practice sizing computations, a Sediment Erosion and Control Plan, and a Long-Term Operation and Maintenance Plan (PDF Format).

Assumption:

It is assumed for purposes of this bid proposal that permitting with State/Federal Agencies will not be required since there does not appear to be freshwater or coastal wetlands within the vicinity of the project locations; it appears that all project sites are outside of Rhode Island Department of Environmental Management (RIDEM) and Coastal Resources management Council (CRMC) jurisdictions. It is likely that estimated seasonal high groundwater levels will be relatively shallow and the soil infiltration rates will be less than 0.5 inches per hour and not be suitable for infiltration. However, if it is determined through soil testing that infiltration is suitable and subsurface infiltration is a viable option, then permitting with the RIDEM Groundwater Discharge & Underground Injection Control (GWD/UIC) Program shall be performed under a supplemental task.

3 Final Design Plans

Prepare site plans and construction specifications suitable to be issued for construction (100% complete). This design phase does not include changing the project design approach that was accepted by the Town during the previous design phases. This task will include:

- Incorporating one round of comments received during review of 70% designs.
- Finalizing design drawings and details.
- Preparing technical specifications following the Construction Specifications Institute (CSI) format
- Updating the detailed opinion of cost.

Deliverable:

- One (1) electronic copy of the Final Design drawings, opinion of cost, and technical specifications (PDF Format)

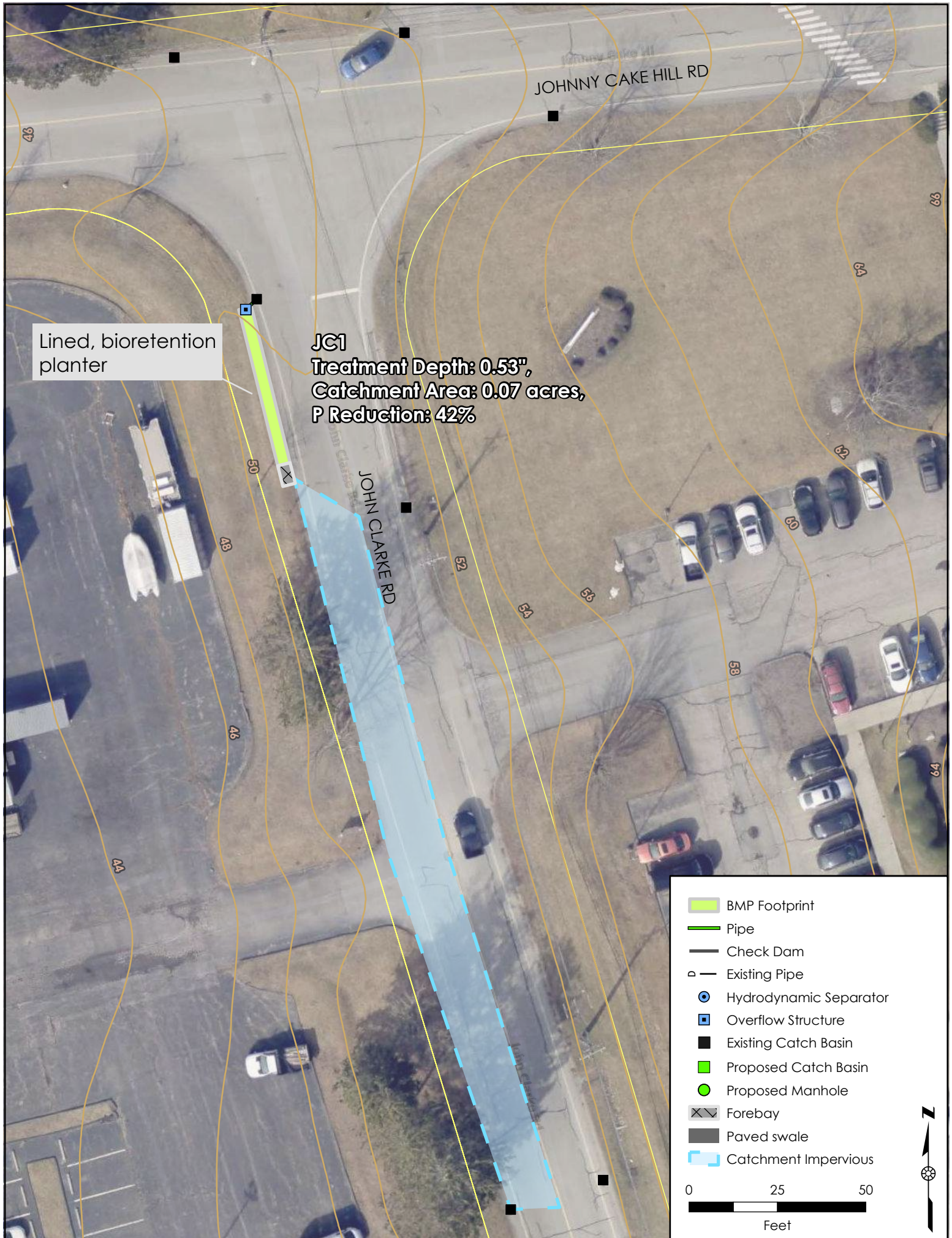
4 Project Management/Meetings

Instructions: Should the Town seek and procure grant funding for the design and construction of some, or all, of the identified retrofit projects, the Town should include a task for periodic progress meetings, project management, and grant reporting. Specifics will vary depending on the needs of specific grant programs.

The selected consultant will be expected to budget for one project kick-off/coordination meeting with the Town and for **two** progress/review meetings at the 70% and Final Design Plan stages (each). If required, the selected consultant will also be responsible for providing all periodic progress reports to funding entities.

Deliverable:

- Attendance and Preparation for Up To 5 Meetings
- Meeting Notes (PDF)
- Progress Reports (PDF) (If required)



- BMP Footprint
- Pipe
- Check Dam
- Existing Pipe
- Hydrodynamic Separator
- Overflow Structure
- Existing Catch Basin
- Proposed Catch Basin
- Proposed Manhole
- Forebay
- Paved swale
- Catchment Impervious

0 25 50
 Feet

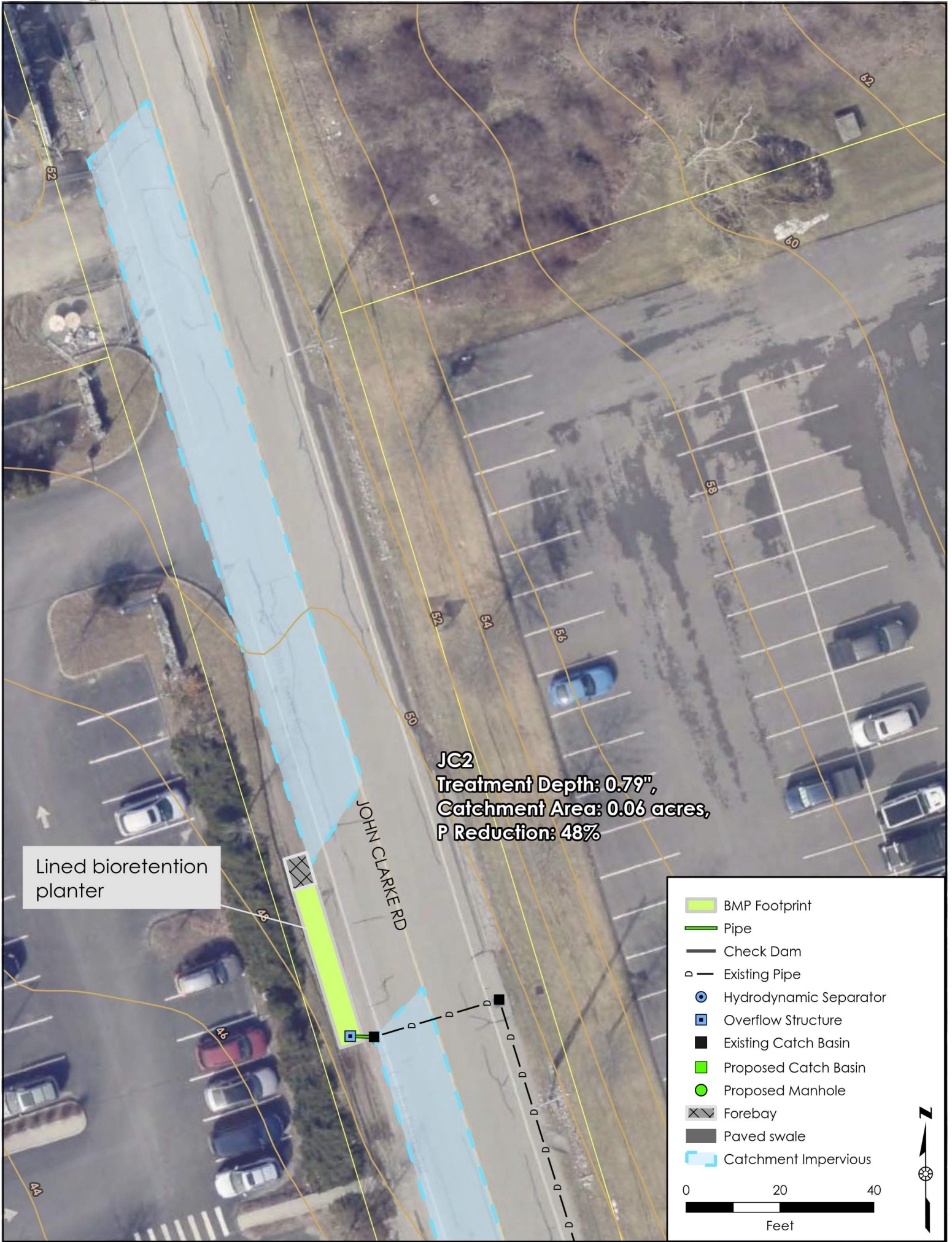
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FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1	
PROJECT : Town of Middletown RCIP		BASIS :						2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.
LOCATION : John Clarke Road 1								
DESCRIPTION : Budgetary Opinion of Cost								
DRAWING NO : Construction Plans		ESTIMATOR :		SPB		CHECKED BY :		
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>								
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST			
1 Site Demolition								
202.01	EARTH EXCAVATION	CY	41	\$25	\$1,100			
181.11	DISPOSAL OF UNREGULATED SOIL	TON	51.25	\$64	\$3,300			
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	25	\$2	\$100			
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	4	\$13	\$100			
Site Demolition Subtotal					\$4,600			
2 Site and Stormwater Improvements								
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	1	\$4,025	\$4,100			
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	1	\$1,075	\$1,100			
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400	\$4,400			
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053	\$1,100			
SP-1	GROUTED FOREBAY (4'x3')	EA	1	\$600	\$600			
906.0562	CEMENT CONCRETE EDGING 24 INCH LOT CURB STANDARD 7.2.3	LF	100	\$71	\$7,100			
SP-2	ENGINEERED BIORETENTION SOIL MEDIA	CY	13	\$80	\$1,100			
152	PROCESSED GRAVEL	CY	7	\$56	\$400			
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	10	\$85	\$900			
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	50	\$75	\$3,800			
SP-3	IMPERMEABLE LINER 30 MIL	SY	46	\$16	\$800			
920.02	FILTER FABRIC FOR RIP-RAP	SY	37	\$8	\$300			
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	0.35	\$160	\$100			
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	0.40	\$160	\$100			
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	0.58	\$180	\$200			
Site and Stormwater Improvements Subtotal					\$25,700			
3 Miscellaneous Lump Sum Items								
	Mobilization & Demobilization	LS	1	\$1,970	\$1,970			
	Construction Survey Layout and As-Built Mapping	LS	1	\$1,250	\$1,300			
	Flaggers and Traffic Control	LS	1	\$5,000	\$5,000			
	Field and Laboratory Testing	LS	1	\$1,000	\$1,000			
	Insurance and Bonds	LS	1	\$455	\$500			
	Design and Permitting	LS	1	\$15,000	\$15,000			
Miscellaneous Item Subtotal					\$24,770			
CONSTRUCTION TOTAL (Including Miscellaneous Items)					\$55,070			
CONTINGENCY (20%)					\$11,100			
OVERALL TOTAL INCLUDING CONTINGENCY					\$66,200			
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)			\$56,000	TO	\$86,000			



JC2
Treatment Depth: 0.79",
Catchment Area: 0.06 acres,
P Reduction: 48%

Lined bioretention
 planter

JOHN CLARKE RD

- BMP Footprint
- Pipe
- Check Dam
- Existing Pipe
- Hydrodynamic Separator
- Overflow Structure
- Existing Catch Basin
- Proposed Catch Basin
- Proposed Manhole
- Forebay
- Paved swale
- Catchment Impervious

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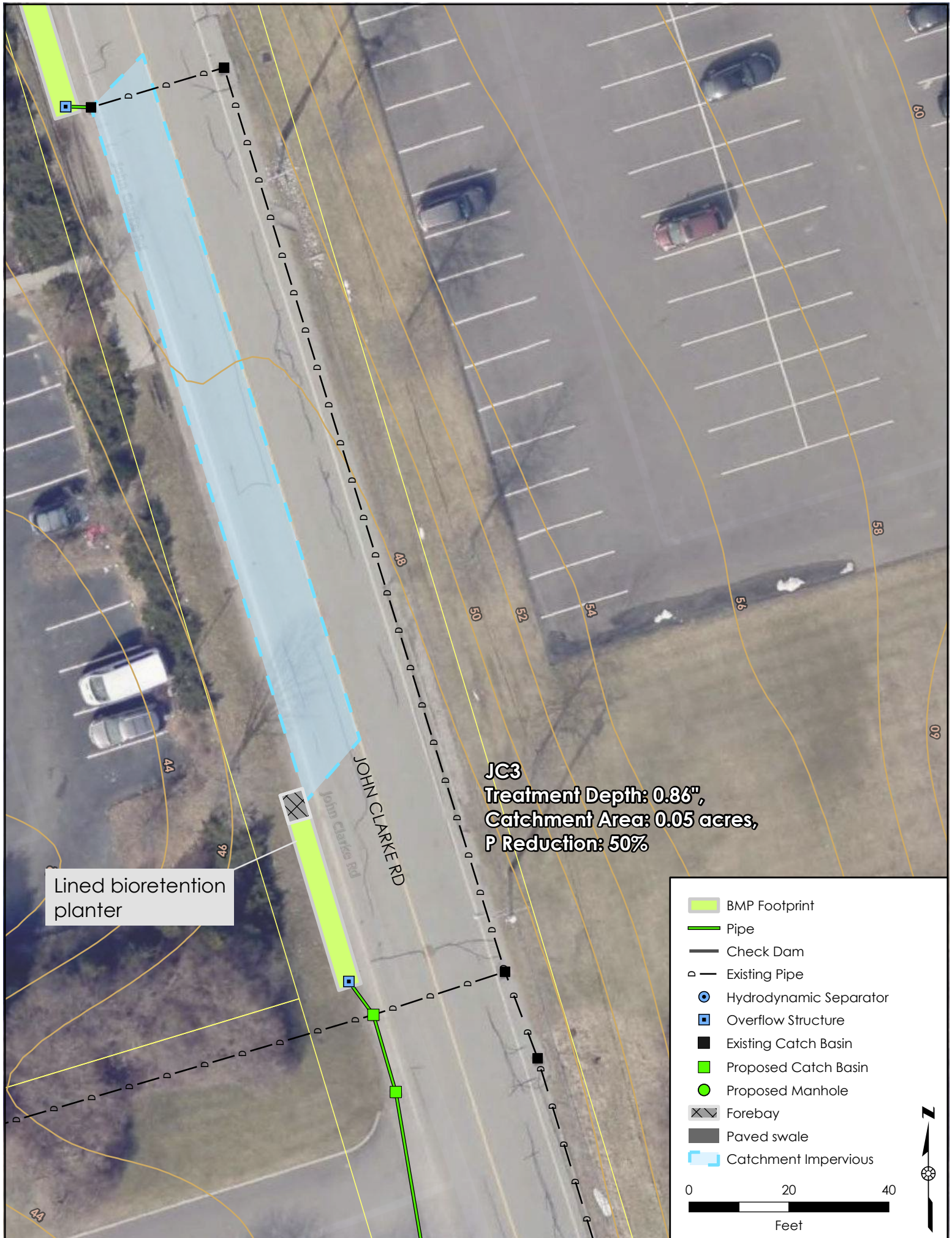
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FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1	
PROJECT : Town of Middletown RCIP		BASIS :						2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.
LOCATION : John Clarke Road 2								
DESCRIPTION : Budgetary Opinion of Cost								
DRAWING NO : Construction Plans		ESTIMATOR :		SPB		CHECKED BY :		
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>								
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST			
1 Site Demolition								
202.01	EARTH EXCAVATION	CY	43	\$25	\$1,100			
181.11	DISPOSAL OF UNREGULATED SOIL	TON	53.75	\$64	\$3,500			
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	25	\$2	\$100			
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	4	\$13	\$100			
Site Demolition Subtotal					\$4,800			
2 Site and Stormwater Improvements								
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	1	\$4,025	\$4,100			
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	1	\$1,075	\$1,100			
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400	\$4,400			
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053	\$1,100			
SP-1	GROUTED FOREBAY (4'x3')	EA	1	\$600	\$600			
906.0562	CEMENT CONCRETE EDGING 24 INCH LOT CURB STANDARD 7.2.3	LF	80	\$71	\$5,700			
SP-2	ENGINEERED BIORETENTION SOIL MEDIA	CY	16	\$80	\$1,300			
152	PROCESSED GRAVEL	CY	8	\$56	\$500			
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	9	\$85	\$800			
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	40	\$75	\$3,000			
SP-3	IMPERMEABLE LINER 30 MIL	SY	59	\$16	\$1,000			
920.02	FILTER FABRIC FOR RIP-RAP	SY	37	\$8	\$300			
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	0.35	\$160	\$100			
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	0.40	\$160	\$100			
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	0.58	\$180	\$200			
Site and Stormwater Improvements Subtotal					\$24,000			
3 Miscellaneous Lump Sum Items								
	Mobilization & Demobilization	LS	1	\$1,872	\$1,872			
	Construction Survey Layout and As-Built Mapping	LS	1	\$1,250	\$1,300			
	Flaggers and Traffic Control	LS	1	\$5,000	\$5,000			
	Field and Laboratory Testing	LS	1	\$1,000	\$1,000			
	Insurance and Bonds	LS	1	\$432	\$500			
	Design and Permitting	LS	1	\$15,000	\$15,000			
Miscellaneous Item Subtotal					\$24,672			
CONSTRUCTION TOTAL (Including Miscellaneous Items)					\$53,472			
CONTINGENCY (20%)					\$10,700			
OVERALL TOTAL INCLUDING CONTINGENCY					\$64,200			
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)			\$55,000	TO	\$83,000			



JC3
Treatment Depth: 0.86",
Catchment Area: 0.05 acres,
P Reduction: 50%

Lined bioretention planter

JOHN CLARKE RD
 John Clarke Rd

	BMP Footprint
	Pipe
	Check Dam
	Existing Pipe
	Hydrodynamic Separator
	Overflow Structure
	Existing Catch Basin
	Proposed Catch Basin
	Proposed Manhole
	Forebay
	Paved swale
	Catchment Impervious

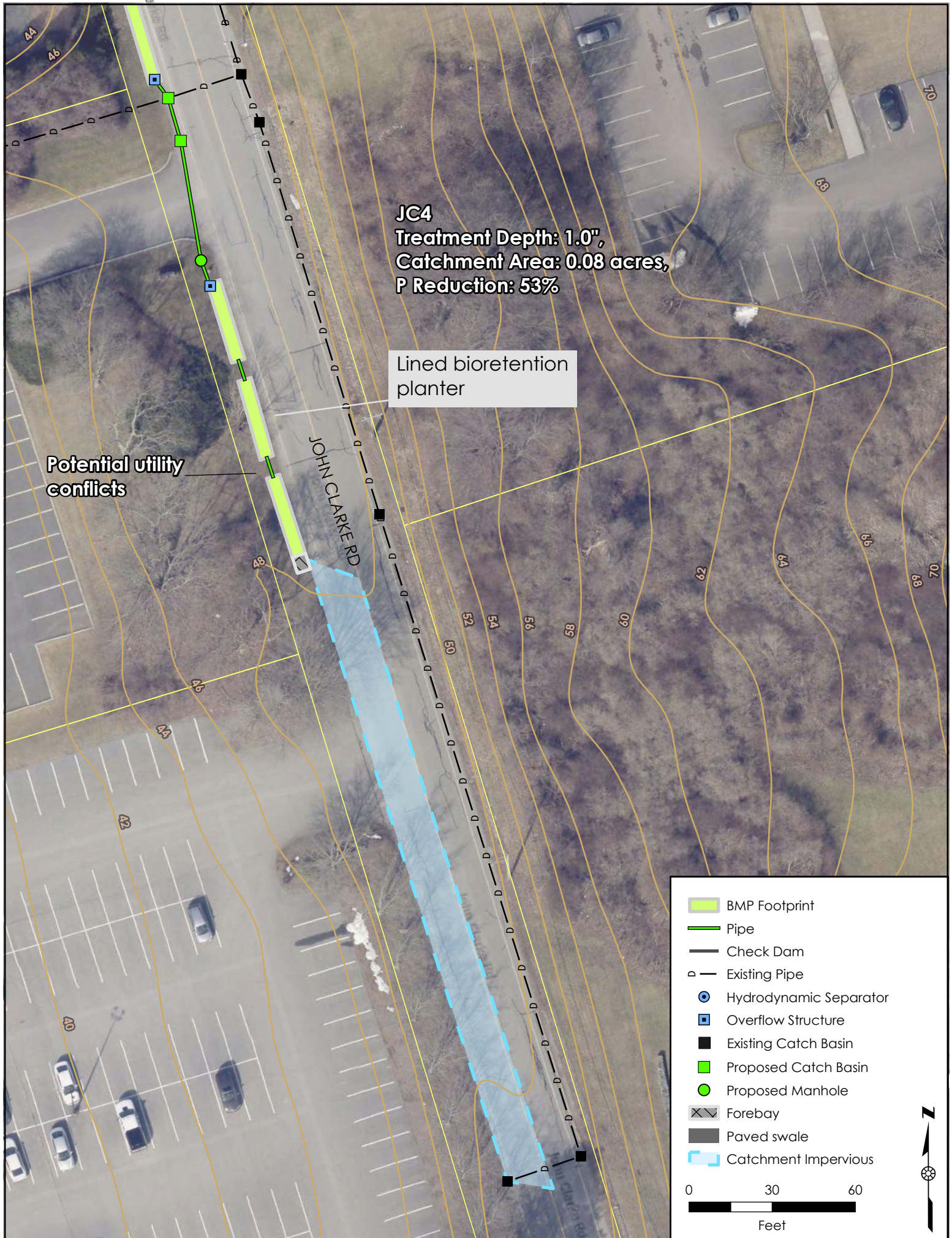
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FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1
PROJECT : Town of Middletown RCIP		BASIS : 2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.					
LOCATION : John Clarke Road 3							
DESCRIPTION : Budgetary Opinion of Cost							
DRAWING NO : Construction Plans		ESTIMATOR :	SPB	CHECKED BY :			
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>							
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST		
1	Site Demolition						
202.01	EARTH EXCAVATION	CY	41	\$25		\$1,100	
181.11	DISPOSAL OF UNREGULATED SOIL	TON	51.25	\$64		\$3,300	
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	25	\$2		\$100	
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	4	\$13		\$100	
	Site Demolition Subtotal						\$4,600
2	Site and Stormwater Improvements						
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	1	\$4,025		\$4,100	
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	1	\$1,075		\$1,100	
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400		\$4,400	
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053		\$1,100	
SP-1	GROUTED FOREBAY (4'x3')	EA	1	\$600		\$600	
906.0562	CEMENT CONCRETE EDGING 24 INCH LOT CURB STANDARD 7.2.3	LF	80	\$71		\$5,700	
SP-2	ENGINEERED BIORETENTION SOIL MEDIA	CY	13	\$80		\$1,100	
152	PROCESSED GRAVEL	CY	7	\$56		\$400	
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	30	\$85		\$2,600	
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	40	\$75		\$3,000	
SP-3	IMPERMEABLE LINER 30 MIL	SY	59	\$16		\$1,000	
920.02	FILTER FABRIC FOR RIP-RAP	SY	37	\$8		\$300	
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	0.35	\$160		\$100	
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	0.40	\$160		\$100	
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	0.58	\$180		\$200	
	Site and Stormwater Improvements Subtotal						\$25,500
3	Miscellaneous Lump Sum Items						
	Mobilization & Demobilization	LS	1	\$1,957		\$1,957	
	Construction Survey Layout and As-Built Mapping	LS	1	\$1,250		\$1,300	
	Flaggers and Traffic Control	LS	1	\$5,000		\$5,000	
	Field and Laboratory Testing	LS	1	\$1,000		\$1,000	
	Insurance and Bonds	LS	1	\$452		\$500	
	Design and Permitting	LS	1	\$15,000		\$15,000	
	Miscellaneous Item Subtotal						\$24,757
	CONSTRUCTION TOTAL (Including Miscellaneous Items)						\$54,857
	CONTINGENCY (20%)						\$11,000
	OVERALL TOTAL INCLUDING CONTINGENCY						\$65,900
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)			\$56,000	TO	\$86,000		



JC4
Treatment Depth: 1.0",
Catchment Area: 0.08 acres,
P Reduction: 53%

Lined bioretention
 planter

Potential utility
 conflicts

JOHN CLARKE RD

	BMP Footprint
	Pipe
	Check Dam
	Existing Pipe
	Hydrodynamic Separator
	Overflow Structure
	Existing Catch Basin
	Proposed Catch Basin
	Proposed Manhole
	Forebay
	Paved swale
	Catchment Impervious

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 Feet

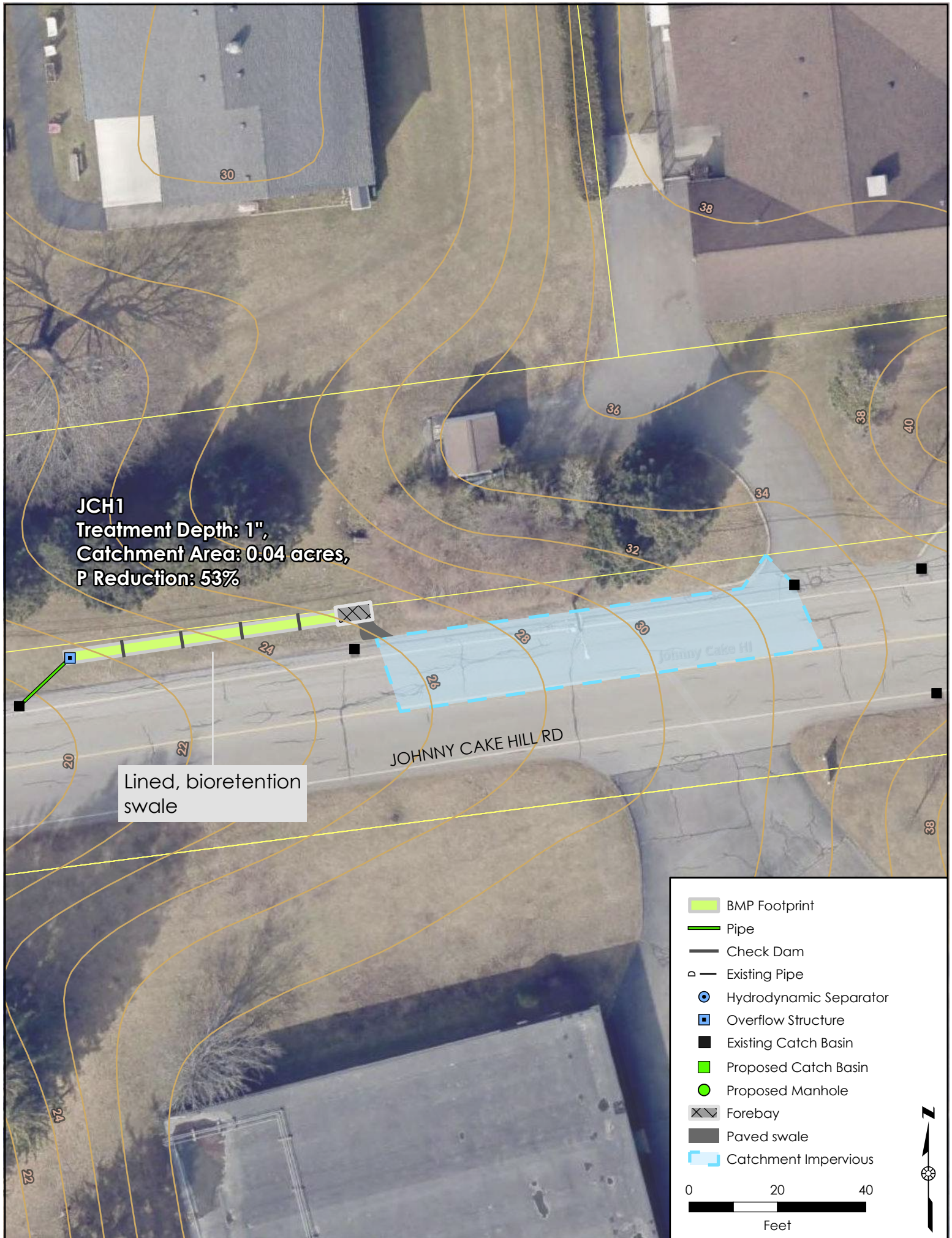
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FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1	
PROJECT : Town of Middletown RCIP		BASIS :						2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.
LOCATION : John Clarke Road 4								
DESCRIPTION : Budgetary Opinion of Cost								
DRAWING NO : Construction Plans		ESTIMATOR :		SPB		CHECKED BY :		
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>								
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST			
1	Site Demolition							
202.01	EARTH EXCAVATION	CY	72	\$25		\$1,800		
181.11	DISPOSAL OF UNREGULATED SOIL	TON	90	\$64		\$5,800		
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	154	\$2		\$400		
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	19	\$13		\$300		
	Site Demolition Subtotal						\$8,300	
2	Site and Stormwater Improvements							
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	2	\$4,025		\$8,100		
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	2	\$1,075		\$2,200		
707.09	ADJUST MANHOLES TO GRADE	EACH	2	\$250		\$600		
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400		\$4,400		
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053		\$1,100		
SP-1	GROUTED FOREBAY (4'x3')	EA	1	\$600		\$600		
906.0562	CEMENT CONCRETE EDGING 24 INCH LOT CURB STANDARD 7.2.3	LF	200	\$71		\$14,200		
SP-2	ENGINEERED BIORETENTION SOIL MEDIA	CY	25	\$80		\$2,000		
152	PROCESSED GRAVEL	CY	17	\$56		\$1,000		
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	100	\$85		\$8,500		
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	100	\$75		\$7,500		
SP-3	IMPERMEABLE LINER 30 MIL	SY	156	\$16		\$2,500		
920.02	FILTER FABRIC FOR RIP-RAP	SY	100	\$8		\$800		
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	1.65	\$160		\$300		
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	1.92	\$160		\$400		
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	2.75	\$180		\$500		
	Site and Stormwater Improvements Subtotal						\$53,800	
3	Miscellaneous Lump Sum Items							
	Mobilization & Demobilization	LS	1	\$4,037		\$4,037		
	Construction Survey Layout and As-Built Mapping	LS	1	\$1,250		\$1,300		
	Flaggers and Traffic Control	LS	1	\$5,000		\$5,000		
	Field and Laboratory Testing	LS	1	\$1,000		\$1,000		
	Insurance and Bonds	LS	1	\$932		\$1,000		
	Design and Permitting	LS	1	\$15,000		\$15,000		
	Miscellaneous Item Subtotal						\$27,337	
	CONSTRUCTION TOTAL (Including Miscellaneous Items)						\$89,437	
	CONTINGENCY (20%)						\$17,900	
	OVERALL TOTAL INCLUDING CONTINGENCY						\$107,400	
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)								
						\$91,000	TO	
							\$140,000	



JCH1
 Treatment Depth: 1",
 Catchment Area: 0.04 acres,
 P Reduction: 53%

Lined, bioretention
 swale

JOHNNY CAKE HILL RD

	BMP Footprint
	Pipe
	Check Dam
	Existing Pipe
	Hydrodynamic Separator
	Overflow Structure
	Existing Catch Basin
	Proposed Catch Basin
	Proposed Manhole
	Forebay
	Paved swale
	Catchment Impervious

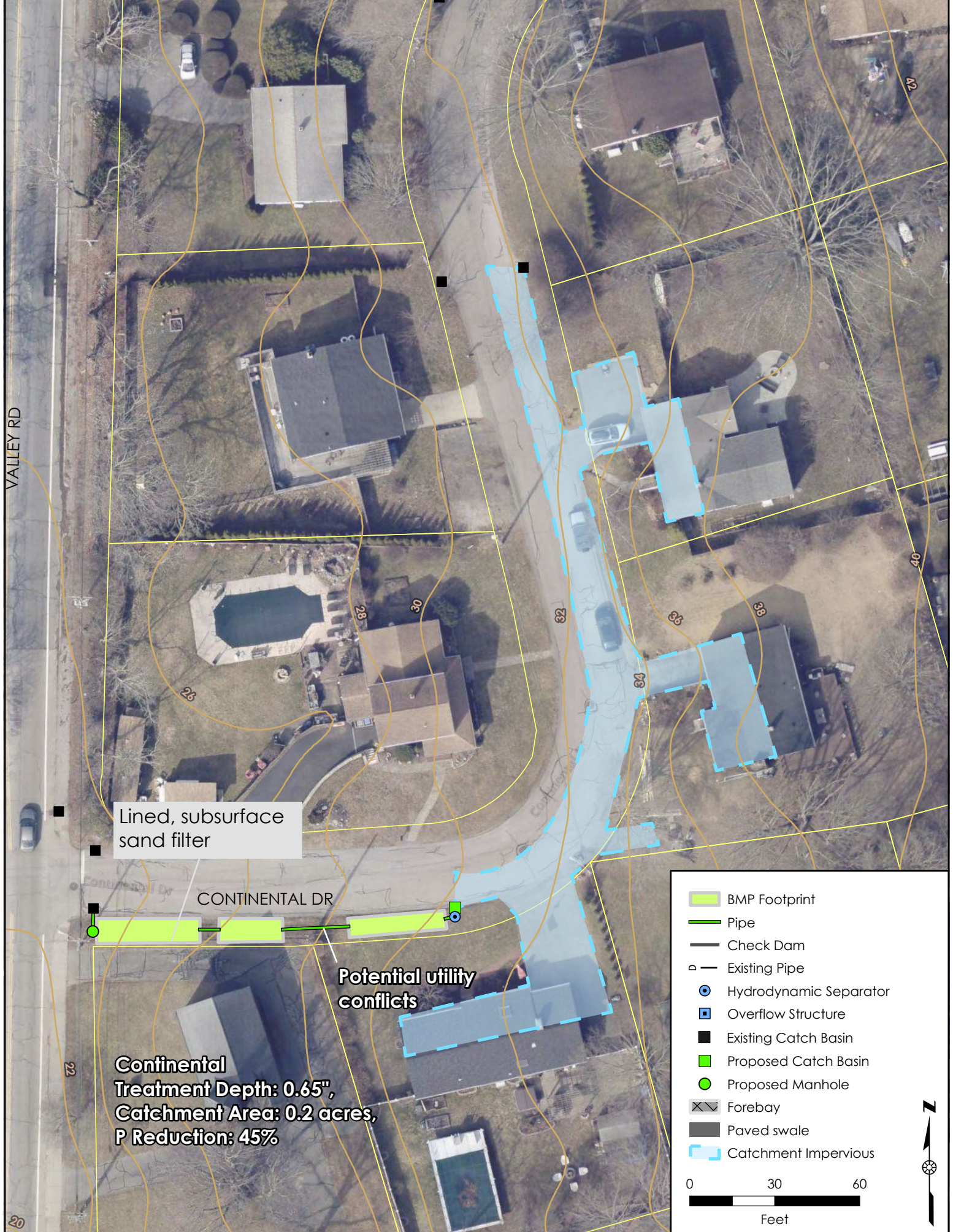
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FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1	
PROJECT : Town of Middletown RCIP		BASIS :						2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.
LOCATION : Johnny Cake Hill Road								
DESCRIPTION Budgetary Opinion of Cost								
DRAWING NO Construction Plans		ESTIMATOR :		SPB		CHECKED BY :		
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>								
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST			
1 Site Demolition								
202.01	EARTH EXCAVATION	CY	103	\$25	\$2,600			
181.11	DISPOSAL OF UNREGULATED SOIL	TON	129	\$64	\$8,300			
Site Demolition Subtotal					\$10,900			
3 Site and Stormwater Improvements								
SP-1	GROUTED FOREBAY (4'x3')	EA	1	\$600	\$600			
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400	\$4,400			
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053	\$1,100			
SP-2	ENGINEERED BIORETENTION SOIL MEDIA	CY	10	\$80	\$800			
152	PROCESSED GRAVEL	CY	10	\$56	\$600			
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	20	\$85	\$1,700			
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	75	\$75	\$5,700			
SP-3	IMPERMEABLE LINER 30 MIL	SY	142	\$16	\$2,300			
751.1	LOAM FOR LAWNS	CY	18	\$79	\$1,500			
L02.0102	RESIDENTIAL SEEDING (TYPE 2)	SY	100	\$3	\$300			
920.02	FILTER FABRIC FOR RIP-RAP	SY	205	\$8	\$1,600			
906.021	CEMENT CONCRETE CURB PRECAST STRAIGHT STANDARD 7.1.0	LF	120	\$38	\$4,700			
482.4	SAWCUTTING PORTLAND CEMENT CONCRETE	FT	18	\$8	\$200			
Site and Stormwater Improvements Subtotal					\$25,500			
Miscellaneous Lump Sum Items								
	Mobilization & Demobilization	LS	1	\$10,000	\$10,000			
	Construction Survey Layout and As-Built Mapping	LS	1	\$2,500	\$2,500			
	Flaggers and Traffic Control	LS	1	\$5,500	\$5,500			
	Field and Laboratory Testing	LS	1	\$1,000	\$1,000			
	Insurance and Bonds	LS	1	\$383	\$400			
	Design and Permitting	LS	1	\$18,500	\$18,500			
Miscellaneous Item Subtotal					\$37,900			
CONSTRUCTION TOTAL (Including Miscellaneous Items)					\$74,300			
CONTINGENCY (20%)					\$14,900			
OVERALL TOTAL INCLUDING CONTINGENCY					\$89,200			
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)			\$76,000	TO	\$116,000			



VALLEY RD

Lined, subsurface sand filter

CONTINENTAL DR

Potential utility conflicts

Continental
Treatment Depth: 0.65",
Catchment Area: 0.2 acres,
P Reduction: 45%

- BMP Footprint
- Pipe
- Check Dam
- Existing Pipe
- Hydrodynamic Separator
- Overflow Structure
- Existing Catch Basin
- Proposed Catch Basin
- Proposed Manhole
- Forebay
- Paved swale
- Catchment Impervious

0 30 60
 Feet



DRAFT

FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1
PROJECT : Town of Middletown RCIP		BASIS :					
LOCATION : Continental Drive		2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.					
DESCRIPTION Budgetary Opinion of Cost		ESTIMATOR :		CHECKED BY :			
DRAWING NO Construction Plans		SPB					
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>							
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST		
1 Site Demolition							
202.01	EARTH EXCAVATION	CY	200	\$25	\$5,000		
181.11	DISPOSAL OF UNREGULATED SOIL	TON	137.5	\$64	\$8,800		
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	25	\$2	\$100		
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	4	\$13	\$100		
201.0419	REMOVE AND DISPOSE FENCE	LF	80	\$5	\$500		
Site Demolition Subtotal					\$14,500		
2 Site and Stormwater Improvements							
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	2	\$4,025	\$8,100		
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	1	\$1,075	\$1,100		
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400	\$4,400		
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053	\$1,100		
SP-1	HYDRODYNAMIC SEPARATOR	EACH	1	\$12,000	\$12,000		
154	SAND BORROW	CY	55	\$80	\$4,400		
152	PROCESSED GRAVEL	CY	28	\$56	\$1,600		
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	50	\$85	\$4,300		
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	200	\$75	\$15,000		
SP-3	IMPERMEABLE LINER 30 MIL	SY	192	\$16	\$3,100		
751.1	LOAM FOR LAWNS	CY	14	\$79	\$1,100		
L02.0102	RESIDENTIAL SEEDING (TYPE 2)	SY	81	\$3	\$300		
920.02	FILTER FABRIC FOR RIP-RAP	SY	162	\$8	\$1,300		
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	0.35	\$160	\$100		
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	0.40	\$160	\$100		
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	0.58	\$180	\$200		
Site and Stormwater Improvements Subtotal					\$57,900		
3 Miscellaneous Lump Sum Items							
Mobilization & Demobilization		LS	1	\$4,706	\$4,706		
Construction Survey Layout and As-Built Mapping		LS	1	\$2,500	\$2,500		
Flaggers and Traffic Control		LS	1	\$5,000	\$5,000		
Field and Laboratory Testing		LS	1	\$1,000	\$1,000		
Insurance and Bonds		LS	1	\$1,086	\$1,100		
Design and Permitting		LS	1	\$15,000	\$15,000		
Miscellaneous Item Subtotal					\$29,306		
CONSTRUCTION TOTAL (Including Miscellaneous Items)					\$101,706		
CONTINGENCY (20%)					\$20,400		
OVERALL TOTAL INCLUDING CONTINGENCY					\$122,200		
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)			\$104,000	TO	\$159,000		

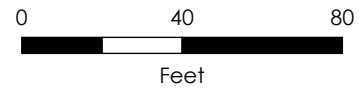


MHS1
 Treatment Depth: 0.48",
 Catchment Area: 0.38 acres,
 P Reduction: 40%

MHS2
 Treatment Depth: 0.38",
 Catchment Area: 0.15 acres,
 P Reduction: 36%

Lined, subsurface
 sand filters

- BMP Footprint
- Pipe
- Check Dam
- Existing Pipe
- Hydrodynamic Separator
- Overflow Structure
- Existing Catch Basin
- Proposed Catch Basin
- Proposed Manhole
- Forebay
- Catchment Impervious



DRAFT

FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1	
PROJECT : Town of Middletown RCIP		BASIS :						2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.
LOCATION : Middletown High School 1								
DESCRIPTION : Budgetary Opinion of Cost								
DRAWING NO : Construction Plans		ESTIMATOR :		SPB		CHECKED BY :		
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>								
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST			
1	Site Demolition							
		SY	147	#VALUE!				
202.01	EARTH EXCAVATION	CY	72	\$25		\$1,800		
181.11	DISPOSAL OF UNREGULATED SOIL	TON	90	\$64		\$5,800		
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	154	\$2		\$400		
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	25	\$13		\$400		
201.041	REMOVE AND DISPOSE CATCH BASINS	EACH	8	\$693		\$5,600		
	Site Demolition Subtotal						\$14,000	
2	Site and Stormwater Improvements							
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	2	\$4,025		\$8,100		
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	1	\$1,075		\$1,100		
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	2	\$4,400		\$8,800		
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	2	\$1,053		\$2,200		
SP-1	HYDRODYNAMIC SEPARATOR	EACH	1	\$12,000		\$12,000		
154	SAND BORROW	CY	75	\$80		\$6,000		
152	PROCESSED GRAVEL	CY	50	\$56		\$2,800		
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	25	\$85		\$2,200		
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	350	\$75		\$26,300		
SP-3	IMPERMEABLE LINER 30 MIL	SY	342	\$16		\$5,500		
751.1	LOAM FOR LAWNS	CY	25	\$79		\$2,000		
L02.0102	RESIDENTIAL SEEDING (TYPE 2)	SY	147	\$3		\$400		
920.02	FILTER FABRIC FOR RIP-RAP	SY	294	\$8		\$2,300		
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	0.69	\$160		\$200		
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	0.81	\$160		\$200		
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	1.15	\$180		\$300		
	Site and Stormwater Improvements Subtotal						\$79,900	
3	Miscellaneous Lump Sum Items							
	Mobilization & Demobilization	LS	1	\$6,104		\$6,104		
	Construction Survey Layout and As-Built Mapping	LS	1	\$1,667		\$1,700		
	Flaggers and Traffic Control	LS	1			\$0		
	Field and Laboratory Testing	LS	1	\$1,000		\$1,000		
	Insurance and Bonds	LS	1	\$1,409		\$1,500		
	Design and Permitting	LS	1	\$15,000		\$15,000		
	Miscellaneous Item Subtotal						\$25,304	
	CONSTRUCTION TOTAL (Including Miscellaneous Items)						\$119,204	
						CONTINGENCY (20%)	\$23,900	
	OVERALL TOTAL INCLUDING CONTINGENCY						\$143,200	
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)						\$122,000	TO	
							\$186,000	

DRAFT

FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1	
PROJECT : Town of Middletown RCIP		BASIS :						2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.
LOCATION : Middletown High School 2								
DESCRIPTION : Budgetary Opinion of Cost								
DRAWING NO : Construction Plans		ESTIMATOR :		SPB		CHECKED BY :		
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>								
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST			
1	Site Demolition							
101	CLEARING AND GRUBBING	SY	36	\$12.40			\$500	
202.01	EARTH EXCAVATION	CY	45.13888889	\$25			\$1,200	
181.11	DISPOSAL OF UNREGULATED SOIL	TON	154	\$64			\$9,900	
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	25	\$2			\$100	
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	8	\$13			\$200	
	Site Demolition Subtotal						\$11,900	
2	Site and Stormwater Improvements							
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	2	\$4,025			\$8,100	
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	1	\$1,075			\$1,100	
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400			\$4,400	
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053			\$1,100	
SP-1	HYDRODYNAMIC SEPARATOR	EACH	1	\$12,000			\$12,000	
154	SAND BORROW	CY	25	\$80			\$2,000	
152	PROCESSED GRAVEL	CY	13	\$56			\$800	
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	50	\$85			\$4,300	
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	140	\$75			\$10,500	
SP-3	IMPERMEABLE LINER 30 MIL	SY	114	\$16			\$1,900	
751.1	LOAM FOR LAWNS	CY	7	\$79			\$600	
L02.0102	RESIDENTIAL SEEDING (TYPE 2)	SY	36	\$3			\$100	
920.02	FILTER FABRIC FOR RIP-RAP	SY	72	\$8			\$600	
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	0.69	\$160			\$200	
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	0.81	\$160			\$200	
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	1.15	\$180			\$300	
	Site and Stormwater Improvements Subtotal						\$47,700	
3	Miscellaneous Lump Sum Items							
	Mobilization & Demobilization	LS	1	\$3,874			\$3,874	
	Construction Survey Layout and As-Built Mapping	LS	1	\$1,667			\$1,700	
	Flaggers and Traffic Control	LS	1				\$0	
	Field and Laboratory Testing	LS	1	\$1,000			\$1,000	
	Insurance and Bonds	LS	1	\$894			\$900	
	Design and Permitting	LS	1	\$15,000			\$15,000	
	Miscellaneous Item Subtotal						\$22,474	
	CONSTRUCTION TOTAL (Including Miscellaneous Items)						\$82,074	
	CONTINGENCY (20%)						\$16,500	
	OVERALL TOTAL INCLUDING CONTINGENCY						\$98,600	
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)			\$84,000	TO	\$128,000			



MHS3
 Treatment Depth: 0.60",
 Catchment Area: 0.10 acres,
 P Reduction: 44%

Lined, subsurface
 sand filters

	BMP Footprint
	Pipe
	Check Dam
	Existing Pipe
	Hydrodynamic Separator
	Overflow Structure
	Existing Catch Basin
	Proposed Catch Basin
	Proposed Manhole
	Forebay
	Paved swale
	Catchment Impervious

0 40 80
 Feet

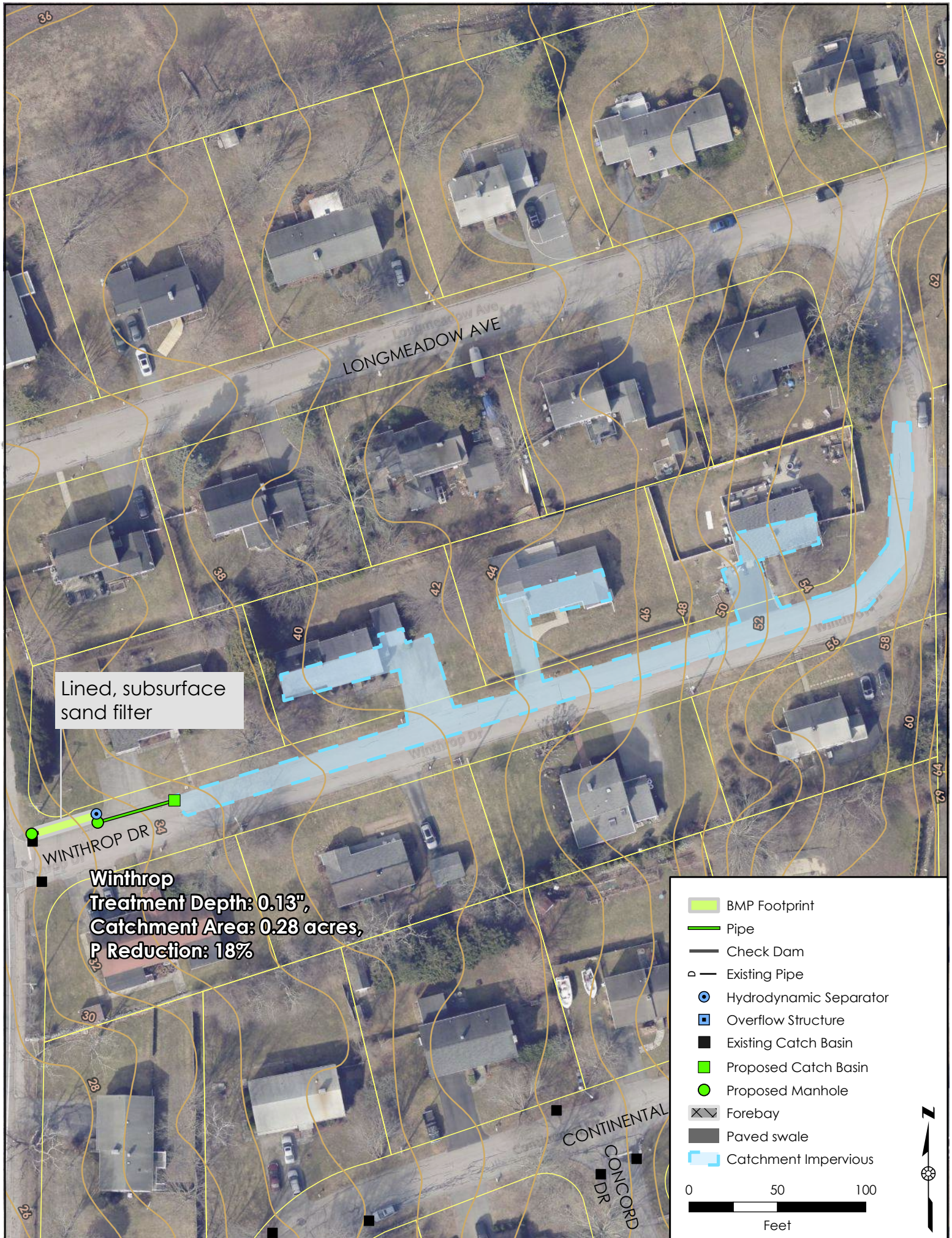
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FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1	
PROJECT : Town of Middletown RCIP		BASIS :						2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.
LOCATION : Middletown High School 3								
DESCRIPTION : Budgetary Opinion of Cost								
DRAWING NO : Construction Plans		ESTIMATOR :		SPB		CHECKED BY :		
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>								
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST			
1	Site Demolition							
101	CLEARING AND GRUBBING	SY	37	\$12.40			\$500	
202.01	EARTH EXCAVATION	CY	59	\$25			\$1,500	
181.11	DISPOSAL OF UNREGULATED SOIL	TON	74	\$64			\$4,800	
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	25	\$2			\$100	
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	8	\$13			\$200	
	Site Demolition Subtotal						\$7,100	
2	Site and Stormwater Improvements							
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	2	\$4,025			\$8,100	
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	1	\$1,075			\$1,100	
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400			\$4,400	
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053			\$1,100	
SP-1	HYDRODYNAMIC SEPARATOR	EACH	1	\$12,000			\$12,000	
154	SAND BORROW	CY	25	\$80			\$2,000	
152	PROCESSED GRAVEL	CY	13	\$56			\$800	
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	50	\$85			\$4,300	
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	140	\$75			\$10,500	
SP-3	IMPERMEABLE LINER 30 MIL	SY	114	\$16			\$1,900	
751.1	LOAM FOR LAWNS	CY	7	\$79			\$600	
L02.0102	RESIDENTIAL SEEDING (TYPE 2)	SY	37	\$3			\$100	
920.02	FILTER FABRIC FOR RIP-RAP	SY	73	\$8			\$600	
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	0.69	\$160			\$200	
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	0.81	\$160			\$200	
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	1.15	\$180			\$300	
	Site and Stormwater Improvements Subtotal						\$47,700	
3	Miscellaneous Lump Sum Items							
	Mobilization & Demobilization	LS	1	\$3,562			\$3,562	
	Construction Survey Layout and As-Built Mapping	LS	1	\$1,667			\$1,700	
	Flaggers and Traffic Control	LS	1				\$0	
	Field and Laboratory Testing	LS	1	\$1,000			\$1,000	
	Insurance and Bonds	LS	1	\$822			\$900	
	Design and Permitting	LS	1	\$15,000			\$15,000	
	Miscellaneous Item Subtotal						\$22,162	
	CONSTRUCTION TOTAL (Including Miscellaneous Items)						\$76,962	
	CONTINGENCY (20%)						\$15,400	
	OVERALL TOTAL INCLUDING CONTINGENCY						\$92,400	
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)			\$79,000	TO	\$120,000			



LONGMEADOW AVE

Lined, subsurface sand filter

WINTHROP DR

Winthrop
Treatment Depth: 0.13",
Catchment Area: 0.28 acres,
P Reduction: 18%

CONTINENTAL
 CONCORD DR

	BMP Footprint
	Pipe
	Check Dam
	Existing Pipe
	Hydrodynamic Separator
	Overflow Structure
	Existing Catch Basin
	Proposed Catch Basin
	Proposed Manhole
	Forebay
	Paved swale
	Catchment Impervious

0 50 100
 Feet

DRAFT

FUSS & O'NEILL, INC.

317 Iron Horse Way
Providence, RI 02908

OPINION OF COST		DATE PREPARED :	09-13-23	SHEET	1	OF	1	
PROJECT : Town of Middletown RCIP		BASIS :						2023 RIDOT Weighted Average Unit Prices, 2023 Mass Highway Weighted Average Bid Prices, 2023 RS Means, and Previous Construction Projects.
LOCATION : Winthrop Drive								
DESCRIPTION : Budgetary Opinion of Cost								
DRAWING NO : Construction Plans		ESTIMATOR :		SPB		CHECKED BY :		
<p>Since Fuss & O'Neill has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor(s) methods of determining prices, or over competitive bidding or market conditions, Fuss & O'Neill's opinion of probable Total Project Costs and Construction Cost are made on the basis of Fuss & O'Neill's experience and qualifications and represent Fuss & O'Neill's best judgment as an experienced and qualified professional engineer, familiar with the construction industry; but Fuss & O'Neill cannot and do not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable cost prepared by Fuss & O'Neill. If prior to the bidding or negotiating Phase the Owner wishes greater assurance as to Total Project or Construction Costs, the Owner shall employ an independent cost estimator.</p>								
ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST			
1	Site Demolition							
202.01	EARTH EXCAVATION	CY	60	\$25		\$1,500		
181.11	DISPOSAL OF UNREGULATED SOIL	TON	75	\$64		\$4,800		
932.02	FULL-DEPTH SAWCUT OF BITUMINOUS PAVEMENT	LF	120	\$2		\$300		
201.0409	REMOVE AND DISPOSE FLEXIBLE PAVEMENT	SY	18	\$13		\$300		
	Site Demolition Subtotal						\$6,900	
2	Site and Stormwater Improvements							
702.0605	PRECAST CATCH BASIN 4' DIAMETER STANDARD 4.4.0	EACH	2	\$4,025		\$8,100		
702.0511	FRAME AND COVER STANDARD 6.1.0	EACH	1	\$1,075		\$1,100		
702.0630	PRECAST MANHOLE 4' DIAMETER STANDARD 4.2.0	EACH	1	\$4,400		\$4,400		
702.0521	FRAME AND COVER STANDARD 6.2.0	EACH	1	\$1,053		\$1,100		
SP-1	HYDRODYNAMIC SEPARATOR	EACH	1	\$12,000		\$12,000		
154	SAND BORROW	CY	15	\$80		\$1,200		
152	PROCESSED GRAVEL	CY	8	\$56		\$500		
701.4312	12 INCH SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE	LF	70	\$85		\$6,000		
269.06	6 INCH SLOT-PERFORATED CORRUGATED PLASTIC PIPE (SUBDRAIN)	FT	75	\$75		\$5,700		
SP-3	IMPERMEABLE LINER 30 MIL	SY	64	\$16		\$1,100		
751.1	LOAM FOR LAWNS	CY	4	\$79		\$400		
L02.0102	RESIDENTIAL SEEDING (TYPE 2)	SY	22	\$3		\$100		
920.02	FILTER FABRIC FOR RIP-RAP	SY	44	\$8		\$400		
450.23	SUPERPAVE SURFACE COURSE - 12.5 (SSC - 12.5)	TON	1.55	\$160		\$300		
450.32	SUPERPAVE INTERMEDIATE COURSE - 19.0 (SIC - 19.0)	TON	1.81	\$160		\$300		
450.42	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5)	TON	2.59	\$180		\$500		
	Site and Stormwater Improvements Subtotal						\$42,400	
3	Miscellaneous Lump Sum Items							
	Mobilization & Demobilization	LS	1	\$3,205		\$3,205		
	Construction Survey Layout and As-Built Mapping	LS	1	\$2,000		\$2,000		
	Flaggers and Traffic Control	LS	1	\$5,000		\$5,000		
	Field and Laboratory Testing	LS	1	\$1,000		\$1,000		
	Insurance and Bonds	LS	1	\$740		\$800		
	Design and Permitting	LS	1	\$15,000		\$15,000		
	Miscellaneous Item Subtotal						\$27,005	
	CONSTRUCTION TOTAL (Including Miscellaneous Items)						\$76,305	
						CONTINGENCY (20%)	\$15,300	
	OVERALL TOTAL INCLUDING CONTINGENCY						\$91,700	
SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST \$1,000)						\$78,000	TO	
							\$119,000	