City of Newport, Rhode Island

Application for State Assent: Vegetative Clearing & Stabilization Plan for Old Sediment Basin (North & South Easton Pond)

Department of Utilities, Newport Water Division

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100 Bliss Mine Rd, Newport, RI 02840
2/20/25

1. **INTRODUCTION**

1.1. PURPOSE

This report details interim stabilization measures for the North Easton Pond embankment downstream of the auxiliary spillway near the old sediment basin. The area currently remains in violation of the Rhode Island Dam safety regulations, as identified in RIDEM NOV issued April 13, 2016, and has been increasingly impacted by intense storms. These measures outline priority work for dam safety compliance while adhering to Rhode Island Department of Environmental Management (RIDEM) dam safety regulations, Coastal Resources Management Council (CRMC) requirements, and other relevant regulations, guidance, and best practices.

The Easton Pond Dam system is essential to the drinking water supply for Aquidneck Island. North and South Easton Ponds serve as critical water impoundments. Failure to stabilize the embankment poses significant risks to potable water security, regulatory compliance, and infrastructure resilience.

1.2. NEWPORT WATER SYSTEM

The original Newport water works system dates back to 1876 when the City accepted George Norman's proposal to build the Easton Ponds and a waterworks system. In 1881, the Newport Water Works Company was incorporated and was later succeeded by the Newport Water Corporation in 1929. The City of Newport has owned and operated the water system since 1936. The City Charter indicates the City's legal authority to own and operate the water system. The water system is currently known as the City of Newport, Department of Utilities, Newport Water Division (NWD). The Station No. 1 Site, AP 11 Lot 731, Bliss Mine Road, has been developed with ongoing improvements, operations, and maintenance since 1876. Supporting aerial photos, plans, and other documentation have been previously provided and can be provided again on request.

The NWD is a division of the City of Newport Department of Utilities, which is responsible for the day-to-day operations and maintenance of the water system. The NWD water system consists of nine (9) surface water reservoirs, two (2) treatment plants, five (5) water storage facilities, nine (9) raw and treated water booster pump stations, and approximately 200 miles of distribution piping. There are 14,895 customer service accounts within the water system, including ten (10) connections with the Naval Station Newport, serving over 40,000 customers in Newport, Middletown, and Portsmouth. The NWD also maintains a wholesale connection with the PWFD, where water is sold wholesale to the Portsmouth Water and Fire District.

The adjacent North and South Easton Ponds are located in Newport and Middletown and are separated by an earthen embankment known as North Easton Pond Dam (NEPD). NEPD is an approximately 2,780-foot-long earthen dam with a maximum reported structural height of approximately 14-feet and an estimated hydraulic height of about 10-feet. The NEPD embankment divides the open waters of North Easton Pond (NEP) and South Easton Pond (SEP) to form a hydraulic barrier between the impoundments. NEPD primary spillway, a 130-foot-long concrete weir lined with riprap, is located at the southeastern corner of the reservoir. A 100-foot-wide auxiliary spillway and its discharge channel are situated at the southwestern corner of the reservoir, directly to the south of the NWD treatment plant. A vegetated sediment basin lies to the south of the NEPD auxiliary spillway between the two impoundments.

South Easton Pond Dam (SEPD) is directly downstream and south of NEP Dam. SEP Dam is surrounded by critical infrastructure including a state highway (Memorial Boulevard, Route 138A), an ultraviolet stormwater disinfection system, a sewage pumping station, and a public beach (Easton Beach). There are numerous residential and commercial properties in the direct vicinity of the dam, in addition to the roads and utilities that connect them. South Easton Pond was constructed in portions of what was previously a low-lying marsh area, necessitating a ringed embankment and moat around the impoundment. SEPD is an approximately 9,700-foot-long earthen dam with a maximum reported structural height of approximately 13 feet and a hydraulic height of about 10 feet. The embankment runs around 85% percent of the perimeter of the impoundment, with the NEPD along the northeastern side of the pond extending across the last 15% to fully surround the pond. These ponds function as storage and distribution reservoirs, collecting runoff from Bailey's Brook watershed. Water is pumped more than the system demand from the Paradise and Gardiner Ponds, which flows into NEP. The total storage capacity of the North and South Easton’s Ponds is 685.1 MG, and the total usable capacity of the ponds is 650.8 MG and represents a critical portion of NWD safe yield. Without these reservoirs, Newport Water’s capacity would decrease from 16 million gallons per day (MGD) to 7 MGD, posing a significant risk to public water supply reliability.

These ponds and the moat are not naturally occurring but rather manmade structures designed in the 1800s specifically to supply drinking water for the City of Newport. The water supply system has significantly changed since its initial construction. Due to the impacts of the increased scale of operations, urbanization, climate change, and aging infrastructure, action to strengthen the resiliency of these structures is necessary and overdue. In fact, the

NWD has been actively working on these issues since the late 1980s; this is documented in the 1991 USDA Flood Prevention Evaluation for Ellery Road and Eustis Avenue (1991 USDA Study). While flooding and water quality issues predate this study, numerous studies, reports, engineering design, and construction have followed including but not limited to:

- Easton Pond Dam and Moat Study
- Easton Beach Ultraviolet Light Disinfection Pilot Study Report
- Easton Beach Ultraviolet Light Disinfection Preliminary Design Report
- Easton Beach Ultraviolet Light Disinfection Final Design and Bid Documents
- Complete Permitting and Associated Bidding Bid and Construction
- Easton Beach Ultraviolet Light Disinfection
- South Easton Pond Dam Repairs and Improvements – Design and Construction
- Easton Pond Dam Spillways and Lawton Valley Reservoir Dam Evaluation and Design Project
- Climate Resiliency Assessment Technical Memorandum - North and South Easton Pond Reservoirs
- Easton Pond Dam North Spillway Repairs

1.3. 2007 NOR'EASTER DAM IMPACTS

In April 2007, a powerful nor'easter struck Newport, Rhode Island, causing significant damage to the dam system of SEP & NEP. This required an emergency response from City workers and crews from Naval Station Newport to stabilize the embankments and prevent a breach. Immediate stabilization efforts included reinforcing the eroded sections with stone riprap to mitigate further erosion. Following the emergency repairs, a long-term solution was designed, permitted, and constructed, culminating in the 2013 completion of the articulated concrete matting system on a portion of south, north, and west embankments to enhance structural resilience and prevent future failures.

1.4. 2020 ABANDONMENT OF LEGACY PIPELINES

Numerous legacy issues, such as the 2020 abandonment of legacy pipelines in response to water loss by conduit, such legacy conditions continue to require ongoing and preventive maintenance while we sign, permit, and fund long-term solutions.

1.5. RECENT FILLING AND STABILIZATION

Over the last few years, beneficial reuse and strategic filling by NWD has been employed to maintain and enhance these structures, helping to improve their stability, resilience, and longevity. The interim project focuses on stabilizing the sediment basin to extend its functional lifespan and stabilize the NEPD while the design and permitting phases for a long-term resilience project proceed.

This approach aligns with projected climate conditions. Present-day 50-year inland precipitation events could exceed the capacity of both dams, leading to overtopping at existing low points in their embankments. Flow transfer currently occurs near the sediment basin and over the SEP.

Modeling indicates that, under present-day conditions, overtopping due to inland flooding would occur during a 10-year storm event, while saltwater intrusion would result from a 10-year coastal surge event; both of which have been observed in recent intense storms. Under projected 2070 climate conditions, the SEPD's capacity would be exceeded by a 10-year inland flood, significantly increasing the risk of overtopping and failure for storms of smaller return periods.

Additionally, overtopping of the existing dam embankments due to coastal surge could occur during present-day 100-year (SEPD) and 200-year (NEPD) events. By 2070, this risk escalates, with overtopping predicted during 5-year (SEPD) and 50-year (NEPD) coastal surge events. Overtopping and subsequent erosion remain critical failure mechanisms for both structures.

1.6. 2070 RESILIENCY PROJECT

Newport has continued to work with Fuss & O'Neill, Inc. (F&O) on two alternatives to improve the resilience of the NEPD and SEPD against future intense coastal and inland storms in Newport and Middletown, Rhode Island from a previous phase of work summarized in Fuss & O'Neill's Report titled Climate Change Resiliency Assessment - Technical Memorandum North and South. This resulted in a December 2023 design report that is essentially a continuation of the previous work.

The recommended plan is as follows: now in active design, advance to a permitted shovel-ready project.

1.6.1. EMBANKMENTS

A total of 7,900 feet of embankments surrounding the NEP and SEP would be raised and armored, and 1,150 feet would just be armored.

Raised to an elevation of 13.4 feet for the NEP embankments to limit overtopping due to inland flooding and

Raised to an elevation of 12.1 feet for the SEP embankments to limit overtopping due to inland and coastal flooding.

Armored with Articulated Concrete Block (ACB) matting, similar to the repairs done on the SEP western embankment, to reduce risk of erosion and protect against wave action, moat flows, and overtopping events.

1.6.2. SPILLWAYS

The NEP auxiliary spillway was removed and replaced in kind in the Summer of 2023.

The removal and reconstruction of the SEP primary spillway and the installation of a hydraulically powered crest gate. The SEP primary spillway would be widened from its current hydraulic width of 100 feet and height of 4.5 feet to have a hydraulic width of 120 feet and 7 feet to prevent saltwater intrusion through the SEP spillway. The gate would connect to constructed concrete piers on either side of the gate.

1.6.3. TIDAL GATE(S)

Tidal gates at J Paul Braga Jr. Memorial Field would span across the Moat and perpendicular to the SEP north embankment to prevent saltwater intrusion through the NEP auxiliary spillway. The final location and any required modifications to the Moat will be designed and permitted under the 2070 Resiliency Project.

1.6.4. 2070 RESILIENCY PROJECT – COST AND FUNDING

The current design poses substantial mitigation benefits from risks under current conditions, including the mitigation of loss of services, including potable water, sanitary sewer, electric, UV plant generators, and emergency response. Additionally, the design mitigates traffic detours, embankment breach repairs, roadway repair costs, UV plant damage, and, most importantly, loss of life.

The budgetary opinion of construction costs associated with embankment raising, armoring alternatives, and hydraulic barriers is $37.0 to 52.2 million. Even with these conditions, the peak water surface elevations in NEP Dam still exceed the dams' proposed embankment elevations during the ½ PMF event; the embankment separating NEPD and SEPD should be designed and constructed to overtop without forming a breach. As design advances, we will look to maximize flow from North to South.

The only funding option for this project is FEMA's Building Resilient Infrastructure and Communities (BRIC) grant. The future of this program is currently unknown as the BRIC notice of funding was removed for changes that align with the new administration. The program would fund 75% of the final design and construction costs if awarded. The NWD would need to provide a 25% match, about $10.5 million.

2. INTERIM STABILIZATION PROJECT

The interim project is developed in alignment with dam safety regulations and critical drinking water supply protections, acknowledging prior dam safety violations and an existing consent agreement. Given the increased storm frequency and intensity we've experienced in recent years, additional structural reinforcements are required to prevent further damage and risks until the long-term resiliency plan can be implemented. The sediment basin is no longer used for its original purpose, resulting in vegetation, safety, maintenance issues, increased seepage concerns, and the associated risk of structural failure, necessitating urgent mitigation measures.

3. INTERIM PROJECT OBJECTIVES

The Interim primary objectives of this interim stabilization effort are:

- Prevent further sediment loss and environmental degradation.
- Improve site stability and reduce problematic vegetation coverage.
    - Phragmites grow back very quickly
    - Even if cut, its underground rhizomes
    - Phragmites cut in spring or early summer; they can regrow to nearly full height (10- 15 feet) by late summer.
    - If the area is not adequately addressed, Phragmites will require indefinite maintenance combined with herbicide treatment.
    - Mitigate vegetative cover for burrowing animals.
- Enhance flood resilience in the short term, installing riprap protection to mitigate erosion.
- Maintain compliance with regulatory requirements while planning long-term improvements.
- Address dam safety concerns and ensure continued compliance with the consent agreement.
- Prioritize the protection of the critical drinking water supply system.
- Mitigate seepage risks through reinforcement strategies and controlled drainage improvements, if necessary.
- Leverage beneficial reuse and controlled filling efforts to reinforce embankments and improve long-term stability.
- Allow for a complete regular inspection and monitoring without interference from vegetation.

4. SITE CONDITIONS & CHALLENGES

4.1. CURRENT CONDITIONS

- The SEPD (State ID#585, Federal ID# RI09101) is comprised of earthen embankments and a spillway structure enclosing the SEP.
- The NEPD (State ID#584, Federal ID# RI09103) is comprised of an earthen embankment berm, primary spillway, auxiliary spillway, sediment basin and separates NEP & SEP.
- The SEPD embankment extends from the emergency overflow auxiliary spillway of the NEP running along the western perimeter and continuing along Memorial Boulevard, reaching a height of approximately 13 feet from toe to crest.
- The embankment continues along the eastern border of the SEP in Middletown, connecting to the NEP overflow primary spillway.
- The NEPD embankment between NEP & SEP serves a critical water quality function by increasing detention time in NEP and protecting pressure mains carrying raw and treated water to the distribution system.
- The Moat is a manmade channel that surrounds the SEP on its west, south, and east sides. The southern end of the Moat meets the eastern portion at the spillway to the SEP. It then flows under Memorial Boulevard, splitting Easton Beach and Atlantic Beach before entering Easton's Bay between the two beaches.
- A smaller embankment forms the southwestern boundary of the NEP near the treatment plant, with an approximate height of 5 feet and grassed downstream slopes.
- Upstream slopes of all embankments were originally armored with riprap or stone, but severe scarp formation and high vegetation growth are now evident.
- Localized erosion is continuously being addressed by NWD maintenance crews responsible for mowing embankment crests and downstream slopes.
- Historical modifications include repairs after hurricane damage in 1938 and 1985 and after nor'easter damage in 2007, with portions of the embankment reconstructed to restore dam integrity.
- Over the past few years, controlled filling and beneficial reuse efforts have been implemented to improve embankment integrity, mitigate erosion, enhance overall flood resilience, and protect water supply.
- Trespassing and passive use have caused localized trampling and path formation,

resulting in ruts directly impacting erosion and channeling. This is particularly concerning in areas of legacy riprap more suitable to disturbance.

4.2. IDENTIFIED CHALLENGES

- Potential coastal surge and saltwater intrusion during extreme weather events.
    - Modeling indicated that saltwater intrusion would occur in a present-day 10-year coastal surge event.
- Potential capacity exceedance and overtopping during inland precipitation events.
    - Modeling indicated that overtopping resulting from inland flooding would occur in a present-day 10-year storm event.
- Insufficient spillway capacity to manage increased flood levels.
- Encroachment of invasive vegetation affecting inspection, maintenance and structural integrity.
- Compliance with the consent agreement regarding dam safety and stabilization.
- Increased suspected seepage identified in visual inspections due to deteriorating structural conditions and lack of effective drainage.
- The auxiliary spillway is only intended to be activated in flood conditions; however, the existing system is vulnerable in most storm events, such as a present-day 10-year storm event that could result in overtopping via inland flooding.
- Seepage pathways in the old sediment basin are contributing to water loss and stability concerns, requiring mitigation efforts to maintain the integrity of the drinking water supply system.
- The Moat serves three critical purposes:
    - Provides a pathway for stormwater to discharge around the drinking water supply without entering it. Several stormwater outfall pipes collect runoff from surrounding areas and discharge into the Moat.
    - Prevents saltwater intrusion into the drinking water supply. Tidal flow backs up into the Moat, but an impoundment structure prevents this flow from contaminating the ponds.
    - Provides a discharge path when SEP reaches full capacity.
- The Moat receives flow from multiple sources, including:

- Groundwater discharge and sanitary sewer overflow.
- Tidal backflow.
- Stormwater discharge from land adjacent to the ponds.
- Stormwater runoff from Memorial Boulevard.
- Overflow from SEP.
- Wave Avenue Pump Station.

5. DAM SAFETY

5.1. SAFETY & STRUCTURAL

Seepage & Stability Risks: Identified seepage could cause internal erosion, piping, and structural failure, requiring immediate mitigation.

Hydraulic Pressures & Overtopping Risks: Hydrologic modeling predicts system overtopping by inland flooding in a present-day 10-year storm event. Increased vulnerability to storm events, overtopping, and soil migration threatens embankment stability. These conditions have been experienced in recent storm conditions.

Structural Integrity of Spillways & Embankments: Previous assessments highlighted existing structural vulnerabilities, necessitating intervention for regulatory compliance and resilience. The City has updated its Operation & Maintenance Plan to include active monitoring during significant storms and inspections after one foot or greater storms. Additionally, the plan includes a minimum of once-a-year RTK Drone inspections and thermal inspections as needed.

Regulatory Obligations: This project aligns with prior dam safety consent agreements and ensures adherence to state-mandated maintenance protocols.

5.2. STABILIZATION WORK

5.2.1. FILLING OF OLD SEDIMENT BASIN:

Eliminates potential for uncontrolled seepage pathways, reducing hydraulic gradients and internal erosion risks.

Provides a stable inspection area for ongoing maintenance and compliance monitoring.

Reinforces embankment stability, mitigating failure indicators such as settlement, piping, and animal burrowing.

5.2.2. EROSION & SEEPAGE CONTROL MEASURES:

Installation of armored riprap on downstream slopes exceeding 3:1 to protect embankments.

Implementation of toe drains and relief wells to manage seepage and reduce subsurface pressure build-up, per US Army Corps of Engineers (USACE) design criteria if needed. Follow up material will be provided prior to installation for review and approval.

Vegetation management to limit root penetration and prevent soil destabilization. The area will be planted in alignment with our Vegetation Plan to ensure a low-maintenance program that effectively mitigates geese and other wildlife adversely impacting water quality and system stability while delivering a sustainable ecosystem for bees and other pollinators. See Appendix A for Vegetation Plan.

5.2.3. STRUCTURAL MONITORING ENHANCEMENTS:

The seepage visual monitoring points field is marked to track hydraulic changes.

To mitigate potential seepage pathways from the old sediment basin, an AquaBlok cutoff dam trench will be installed. AquaBlok, a bentonite-coated aggregate, will create a low-permeability barrier that effectively reduces water infiltration and controls subsurface migration. The trench will be strategically placed to intercept and block seepage, ensuring the structural integrity of the surrounding area while preventing contamination or unintended water movement. This installation is a proactive measure to enhance long-term stability and environmental protection

Routine inspection and embankment maintenance per the Operation & Maintenance Plan.

5.2.4. BENEFICIAL SOIL REUSE

North and South Easton Ponds were constructed in the late 1800s and underwent repairs in the 1930s. Due to the availability of existing glacial till with slowly permeable soil, construction utilized locally sourced materials. The naturally occurring fragipan in the area, which restricts water movement, was leveraged to enhance water retention. Fragipan is typically composed of **silt and fine sand,** but its dominant texture is usually **silt loam to silty clay loam**. This m, material is easily detained in the field by Feel Test (Ribbon Test), Sedimentation Test (Jar Test), Hand-Washing Test or Smear Test.

Test	Silt Loam	Silty Clay Loam
Feel (Ribbon) Test	Smooth, short ribbon (<1 inch)	Sticky, longer ribbon (1-2 inches)
Jar Test	Thick silt layer, minor clay	More clay, cloudier water
Hand-Washing Test	Washes off easily	Leaves sticky residue
Smear Test	Smooth, slight sheen	Sticky, resists spreading

Because the materials were locally sourced, they do not fully meet modern construction specifications. To address this, the city has implemented a soil management strategy for beneficial reuse, as the island's soil composition closely aligns with that originally used in the dam's construction.

The Department of Utilities Soil Management Plan allows for the reuse of excavated materials unless there are clear signs of contamination. Materials in this region are generally considered urban fill, which may include a mix of sand, gravel, brick, ash, cinders, and construction debris. The soil in the project area is primarily silty and sandy loam, aligning with regional material composition. However, reuse is restricted if the soil exhibits potential contamination indicators. Soil reuse poses many benefits, including reduced environmental impact & waste, improved soil quality, reduced erosion, and improved site drainage.

Indicators of potential contamination include visual, olfactory, textural & physical, and chemical & analytical indicators.

When soil shows indicators of potential contamination, the Soil Management Plan directs staff to follow a structured approach: identify, segregate, contain, document, and dispose.

Following the successful disposal, staff conduct post-work cleanup and documentation, including the decontamination of equipment, documentation of sampling results, disposal manifest & site conditions, and submission of reports as required. See Appendix B for Soil Management Plan.

6. HYDROLOGIC & HYDRAULIC CONSIDERATIONS

6.1. HYDRAULIC MODELING & RISK ASSESSMENT

HEC-RAS hydraulic modeling assessed spillway discharge under various storm return periods, modeling predicts system overtopping via inland flooding in a present-day 10-year storm event.

Visual confirmation of active seepage but not indicative of internal erosion and full scale of stability issues, necessitating targeted control measures and continuous monitoring.

Flood scenarios evaluated for future climate conditions show increased risks by 2070 without mitigation, but funding for the implementation of the long-term resiliency project remains unknown.

6.2. EMBANKMENT RESILIENCE & SPILLWAY DISCHARGE CONSIDERATIONS

Storm Resilience: Present-day 10-year storms pose a risk of overtopping, requiring the implementation of an interim stabilization project to stabilize our ponds and water supply until the recommended long-term project is funded and constructed.

Interconnectivity: NEPD embankment overtops during the present-day 50-year inland precipitation event could result in a “domino” breach scenario in which SEPD subsequently overtops and fails. In recent years, we've increasingly experienced high-intensity, short-duration storm events that overwhelm our systems, necessitating expedited interim stabilization measures.

Failure Risk Mitigation: The NEP spillway overflows the South Pond embankment, increasing failure risk until long-term hardening measures are implemented. The interim project creates a controlled overflow design, ensuring dam safety without embankment breach formation.

7. IMPACT AVOIDANCE & MINIMIZATION STRATEGIES

7.1. RULES AND REGULATIONS FOR DAM SAFETY APPENDIX

1) Minimize the impacts of lowering the water elevation in a reservoir during a repair project, such as installing a temporary cofferdam. This is necessary to reduce detrimental impacts to fish and wildlife associated with the wetland environment and to reduce loss of aquatic vegetation that serves as wildlife habitat. If a dam owner is unable to install controls to maintain water in the reservoir to assist in protecting fish and wildlife habitat, the dam owner must specifically inform the Director of this situation and document in writing why water is not proposed to be maintained upstream of the dam during the repair activity. Efforts must be made to avoid drawdowns between April 15 to July 1, and to avoid significant drawdowns between October 15 and March 15.

    - The project, as proposed, has no impact on the water elevation in the reservoir.

2) Use best management practices for installing sediment and erosion controls to prevent sediment from entering adjacent waters of the state.

    - Erosion and sediment control (ESC) measures will be employed in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook, as indicated in the drawings provided. Temporary controls will be used if necessary. Permanent controls generally consist of vegetation and riprap stone armor protection.

3) Minimize construction disturbance to keep disturbed soils and areas subject to erosion to a minimum.

    - As mentioned above, erosion and sediment control (ESC) measures will be employed in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook. The area of disturbance will be limited only to what is deemed necessary for project construction activities, and staff will follow best practices relating to soil preparation, topsoiling, low-impact equipment, monitoring, and maintenance to minimize disruption.

4) Prevent any hazardous substances injurious to aquatic life used during the repair activity from entering any adjacent water and freshwater wetlands.

- All materials which could be a potential source of pollution, such as gasoline, diesel fuel, hydraulic oil, etc. will be stored in a safe location and properly disposed consistent with all applicable law and/or regulations. See Appendix B for Soil Management Plan.

5) Stabilize all disturbed soils following construction activities to ensure erosion will not take place.

   - Project will be implementing both temporary and permanent best management practices for sediment and erosion control. Additionally, project will follow the Vegetation Plan (Appendix A) to stabilize soil, prevent erosion, and maintain ecosystem health.

6) Minimize clearing of vegetation to that necessary to conduct the project and remove the slash material from adjacent freshwater wetlands and water bodies.

   - Removal of excessive woody vegetation that contributes to soil instability. Targeted clearing along embankments while preserving beneficial root systems and maintaining stability. Implementation of erosion and sediment control measures to prevent runoff impacts. Ensure vegetation management aligns with freshwater wetland and coastal management regulations.

7) Use only the amount of fill of other material necessary to complete the project and minimize the placement of material in any flood plain.

   - All filling is associated with the embankment stabilization and is necessary to ensure stability, proper operation, and ongoing maintenance. The amount of fill used is limited to only what is required to complete the project while minimizing placement within any floodplain. Materials to be used in the completion of project maintenance and repairs are consistent with materials currently used in the area. No new above-ground structures are proposed under this project. The Station No. 1, AP 11 Lot 731, Bliss Mine Road has been developed with ongoing improvements, operations and maintenance since 1876.

8) Replace, restore or mitigate alterations to freshwater wetlands as deemed necessary in the opinion of the Department.

   - The primary purpose of the project is to ensure the protection and continued viability of the drinking water complex. All freshwater wetlands within the project area play a critical role in this system.

7.2. STABILIZATION MEASURES

- Application of a stabilization seed mix suitable for wetland-adjacent areas.

- Use of biodegradable erosion control blankets to promote root establishment.
- Strategic placement of riprap in areas vulnerable to scour.
- Incorporate storm damage mitigation measures to address resiliency needs in the face of increasing extreme weather events.
- Reinforcement of embankments with geogrid riprap to prevent structural failure from repeated storm events and increased hydraulic pressure.
- Incorporation of controlled filling and beneficial reuse strategies to improve embankment stability and long-term resilience. See Appendix B for Soil Management Plan.

7.3. HYDROLOGIC & HYDRAULIC ENHANCEMENTS

- Temporary grading adjustments to improve drainage patterns.
- Clearing of obstructed spillways and installation of sediment control barriers.
- Monitoring and adaptive management during storm events as detailed in the Operation & Maintenance Plan.
- Installation of toe drains and relief wells to address seepage concerns and prevent internal erosion if needed. Subject to review and approval from Dam Safety.
- Consideration of cutoff walls or upstream impervious blankets at toe of proposed embankment to reduce seepage risks.

7.4. EROSION & SEDIMENTATION CONTROL PLAN (ESCP)

Erosion and sediment control (ESC) measures will be employed in accordance with the Rhode Island Soil Erosion and Sediment Control Handbook. Project will be implementing both temporary and permanent best management practices for sediment and erosion control.

8. CONCLUSION

The interim stabilization project for the old sediment basin provides a necessary bridge between current vulnerabilities and long-term resilience planning. By implementing targeted clearing, stabilization techniques, and beneficial reuse efforts, Newport can mitigate erosion risks while advancing efforts to secure funding and develop a comprehensive resilience strategy. The project prioritizes dam safety, critical drinking water supply protection, and continuous stabilization to address prior regulatory concerns and prevent future violations. The interim stabilization and later resiliency projects are necessary to protect the long-term reliability of Aquidneck Island's primary raw water supply and, subsequently, the public's health.

APPENDIX A: VEGETATION PLAN

Vegetation Plan

City of Newport, Department of Utilities: Newport Water Division

Overview:

The vegetation plan is formulated to the unique needs of embankment dams near freshwater and coastal areas, focusing on stabilizing soil, preventing erosion, and maintaining ecosystem health. It recommends selecting plant species that can thrive in the project area, ensuring biodiversity and resilience to changing conditions.

Key Criteria:

- **Resistant to geese** (they avoid strong-smelling, fibrous, or tough plants)
- **Low maintenance** (minimal mowing, drought/salt tolerance)
- **Erosion control** (stabilizes soil near freshwater sources)

Recommended Plants:

Ground Covers:

1. **Creeping Thyme (Thymus serpyllum or Thymus praecox)** – Aromatic, geese avoid it, low-growing, minimal mowing.
2. **Seaside Goldenrod (*Solidago sempervirens*)** – Thrives in coastal conditions, deep-rooted for stability.
3. **Bearberry (*Arctostaphylos uva-ursi*)** – Dense, low-maintenance, salt/drought tolerant.
4. **Wild Strawberry (*Fragaria virginiana*)** – Forms a ground mat, spreads easily, wildlife-friendly.
5. **Common Yarrow (*Achillea millefolium*)** – Drought/salt-resistant, tolerates poor soil, fibrous leaves deter geese.

Native Grasses & Sedges:

6. **Little Bluestem (*Schizachyrium scoparium*)** – Deep-rooted, erosion-resistant, drought/salt tolerant.
7. **Switchgrass (*Panicum virgatum*)** – Good for stabilization, upright growth.
8. **Baltic Rush (*Juncus balticus*)** – Thrives in moist areas, controls erosion.
9. **Pennsylvania Sedge (*Carex pensylvanica*)** – Dense, low-growing, geese-resistant.
10. **Beach Grass (*Ammophila breviligulata*)** – Ideal for coastal stabilization, low maintenance.

Implementation Tips:

- **Diverse mix** of ground covers and grasses for resilience.
- **Avoid manicured turf**; geese prefer open, mowed areas.
- **Native plants** attract pollinators, enhance biodiversity.
- **Minimal mowing** – once or twice a year max for aesthetic control.

For **embankment dams**, vegetation must provide **erosion control, soil stabilization, and low maintenance** while being resistant to geese. Below is an **updated list** of plant species well-suited for embankment dams near freshwater and the coast:

Ground Covers (Erosion Control, Low Maintenance)

1. **Creeping Red Fescue (*Festuca rubra*)** – Deep-rooted, drought/salt-tolerant, excellent for stabilizing slopes.
2. **Creeping Juniper (*Juniperus horizontalis*)** – Drought-resistant, geese avoid it, effective at holding soil.
3. **Pennsylvania Sedge (*Carex pensylvanica*)** – Low-growing, dense roots prevent erosion, thrives in sandy/rocky soil.
4. **Bearberry (*Arctostaphylos uva-ursi*)** – Excellent erosion control, drought/salt-tolerant.
5. **Wild Strawberry (*Fragaria virginiana*)** – Forms a ground mat, spreads easily, stabilizes soil.

Native Grasses (Slope Stability, Deep Roots)

6. **Little Bluestem (*Schizachyrium scoparium*)** – Deep-rooted, prevents soil washout, low maintenance.
7. **Switchgrass (*Panicum virgatum*)** – Erosion-resistant, deep-rooted, geese generally avoid it.
8. **Big Bluestem (*Andropogon gerardii*)** – Tall, fibrous roots, holds embankment soil well.
9. **Saltmeadow Cordgrass (*Spartina patens*)** – Great for coastal embankments, tolerates wet/dry conditions.
10. **Indiangrass (*Sorghastrum nutans*)** – Strong root system, drought-resistant, stabilizes slopes.

Sedges & Rushes (Moisture Control, Erosion Prevention)

11. **Baltic Rush (*Juncus balticus*)** – Deep fibrous roots, grows well in moist embankment zones.

12. **Fox Sedge (*Carex vulpinoidea*)** – Thrives in fluctuating water conditions, holds soil in place.
13. **Woolgrass (*Scirpus cyperinus*)** – Strong roots, excellent for embankments near water.
14. **Soft Rush (*Juncus effusus*)** – Clumping growth, stabilizes damp embankment areas.
15. **Tussock Sedge (*Carex stricta*)** – Thrives in wetlands, builds soil stability.

Implementation Tips for Embankment Dams

- **Avoid shallow-rooted turf grasses** (e.g., Kentucky bluegrass) – poor erosion resistance.
- **Use deep-rooted perennials** to anchor soil and reduce slippage.
- **Mix species** to prevent monoculture failure and enhance biodiversity.
- **Minimal mowing** – reduces maintenance, discourages geese.

Vegetation Recommendations for Embankment Dams Based on Slope Gradient

1. Steep Slopes (Greater than 3:1 Slope)

Key Requirements:

- Deep-rooted plants to prevent soil erosion and slippage.
- Low-maintenance vegetation to reduce mowing needs.
- Drought and salt-resistant plants if near coastal conditions.

Recommended Plants:

- **Deep-Rooted Grasses & Sedges** (Strong Soil Holders)
    1. **Little Bluestem (*Schizachyrium scoparium*)** – Drought/salt-tolerant, fibrous roots stabilize soil.
    2. **Switchgrass (*Panicum virgatum*)** – Excellent erosion control, adaptable to wet and dry conditions.
    3. **Big Bluestem (*Andropogon gerardii*)** – Tall, strong roots hold steep slopes.
    4. **Tussock Sedge (*Carex stricta*)** – Handles seasonal wet/dry soil shifts, prevents soil movement.
    5. **Baltic Rush (*Juncus balticus*)** – Ideal for embankments near water, strong root structure.
- **Low-Growing Ground Covers (Slope Protection, Geese-Resistant)**
    6. **Creeping Juniper (*Juniperus horizontalis*)** – Evergreen, spreads to form erosion-resistant mat.
    7. **Bearberry (*Arctostaphylos uva-ursi*)** – Excellent for dry slopes, low-maintenance, strong roots.
    8. **Wild Strawberry (*Fragaria virginiana*)** – Spreads easily, holds soil in place.
    9. **Common Yarrow (*Achillea millefolium*)** – Deep fibrous roots, tough and drought-

resistant.
10. **Red Creeping Fescue (*Festuca rubra*)** – Low-growing, erosion control, geese tend to avoid it.

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2. Gentle Slopes (Less than 3:1 Slope)

Key Requirements:

- Adaptable plants that allow for some mowing if needed.
- Mixture of grasses and native perennials for biodiversity.
- Salt and drought-resistant species for coastal environments.

Recommended Plants:

- **Moderate-Height Grasses & Perennials (Erosion & Aesthetics)**
    1. **Indiangrass (*Sorghastrum nutans*)** – Stabilizes soil, provides seasonal color.
    2. **Saltmeadow Cordgrass (*Spartina patens*)** – Great for wet areas near water.
    3. **Soft Rush (*Juncus effusus*)** – Works well in damp embankments, holds soil in place.
    4. **Golden Alexanders (*Zizia aurea*)** – Attracts pollinators, low-maintenance.
    5. **Seaside Goldenrod (*Solidago sempervirens*)** – Coastal erosion control, strong roots.
- **Mowable, Low-Growing Grasses & Sedges (Blended with Perennials)**
    6. **Creeping Red Fescue (*Festuca rubra*)** – Low-maintenance, good for gentle slopes.
    7. **Pennsylvania Sedge (*Carex pensylvanica*)** – Soft texture, can be mowed occasionally.
    8. **Woolgrass (*Scirpus cyperinus*)** – Excellent for moisture control.
    9. **Blue Grama (*Bouteloua gracilis*)** – Short native grass, geese-resistant.
    10. **Fox Sedge (*Carex vulpinoidea*)** – Holds soil, great for semi-wet areas.

Maintenance & Planting Strategy

- **For Steep Slopes:**
    - Plant **deep-rooted grasses and ground covers** to prevent erosion.
    - Use a **hydroseeding mix** with native species for quick establishment.
    - **No mowing** – let vegetation grow naturally.
- **For Gentle Slopes:**
    - Use **a mix of mowable grasses and native wildflowers** for aesthetics.
    - Mowing can be limited to **once or twice per year** to discourage geese.
    - **Encourage deep-rooting species** to maintain soil stability.

Recommended Native Plants for Embankment Stabilization:

1. **American Beachgrass (*Ammophila breviligulata*)**
   Thrives in sandy soils, excellent for dune and embankment stabilization, and tolerates salt spray.
2. **Seaside Goldenrod (*Solidago sempervirens*)**
   Salt-tolerant with deep roots, provides erosion control, and adds aesthetic value with yellow blooms.
3. **Switchgrass (*Panicum virgatum*)**
   Deep-rooted, adaptable to various soils, and offers excellent erosion control.
4. **Little Bluestem (*Schizachyrium scoparium*)**
   Drought-resistant, forms dense clumps aiding in soil stabilization.
5. **Pennsylvania Sedge (*Carex pensylvanica*)**
   Low-growing, forms a dense mat, suitable for gentle slopes, and requires minimal maintenance.
6. **Creeping Red Fescue (*Festuca rubra*)**
   Shade-tolerant, forms a dense sod, and is effective for erosion control on slopes.

Seed Mix Recommendations:

For effective establishment, using a specialized seed mix designed for erosion control and suitable for Rhode Island's coastal environment is recommended. One such option is the **New England Erosion Control/Restoration Mix for Dry Sites**, which includes a blend of native grasses and wildflowers tailored for dry and well-drained soils. This mix is particularly appropriate for areas requiring quick cover during ecological restoration.

New England Wetland Plants

Implementation Tips:

- **Site Preparation:** Clear existing invasive vegetation and prepare the soil to ensure good seed-to-soil contact.
- **Seeding Time:** Optimal seeding periods are spring and late summer to early fall, aligning with favorable growing conditions.
- **Seeding Method:** Broadcast seeding followed by light raking or rolling ensures seeds are adequately embedded in the soil.
- **Mulching:** Applying a layer of straw mulch helps retain soil moisture and protects seeds from erosion.
- **Maintenance:** Minimal mowing is required; once or twice a year is sufficient. Regular monitoring for invasive species is crucial to maintain the integrity of the native plant community.

APPENDIX B: SOIL MANAGEMENT PLAN

Soil Management Plan

City of Newport, Department of Utilities

Overview

The City of Newport Department of Utilities Soil Management Plan (SMP) allows for the reuse of excavated materials unless there are clear signs of contamination. Materials in this region are generally considered urban fill, which may include a mix of sand, gravel, brick, ash, cinders, and construction debris. However, reuse is restricted if the soil exhibits potential contamination indicators.

Indicators of Potential Contamination

Visual Indicators:

- Staining (e.g., black, green, blue, or rust-colored soil)
- Oily sheens on soil or pooled liquid in excavations
- Presence of non-native materials like plastic, glass, or metal debris

Olfactory Indicators:

- Strong chemical odors (e.g., petroleum, solvents, sulfur, or burning smells)
- Rotten egg smell (indicative of hydrogen sulfide or other volatile compounds)

Textural and Physical Indicators:

- Unusually soft or sludge-like material
- Presence of tar or asphalt residues
- High moisture content inconsistent with surrounding soil

Chemical and Analytical Indicators:

- Field screening with a Photoionization Detector (PID) showing elevated volatile organic compound (VOC) levels
- Known historical industrial or waste disposal activities in the area
- Past environmental reports indicating contamination in the vicinity

Soil Segregation for Suspected Contamination

Bottom Line Up Front

When dealing with potentially contaminated soil during emergency utility work, follow a structured approach: **identify, segregate, contain, document, and dispose.**

1. Initial Assessment

Identify Potential Contaminants:

- Observe contamination signs such as odors, discoloration, sheen, or debris.
- Review site history (e.g., industrial sites, old fuel stations, landfills).
- Utilize field testing tools like a PID or soil test kits for real-time assessment.

Notify the Relevant Authorities:

- Local environmental agency
- On-site safety officer or emergency response team
- Wastewater or stormwater management team (if applicable)

2. Segregation Methods

Establish a Clean vs. Contaminated Zone:

- Place **plastic sheeting (6-mil or thicker)** on the ground.
- Maintain **separate stockpiles** for suspected contaminated and clean soil.
- Label stockpiles with **hazard markers**.

Minimize Cross-Contamination:

- Use **dedicated equipment** for different soil piles (if feasible).
- Clean buckets, shovels, and machinery between uses.
- Prevent mixing clean backfill with questionable soil.

Tarp and Contain Stockpiles:

- **Cover soil piles** with polyethylene sheeting to prevent runoff.
- Secure edges with sandbags or weights.
- Ensure **proper slope** to avoid pooling of water.

3. Temporary Storage & Testing

Sampling & Analysis:

- Collect **representative soil samples**.
- Test for **common contaminants.**
- If time-sensitive, use **field test kits** before lab confirmation.

Containment & Holding Area:

- If contamination is confirmed, store soil in a **lined roll-off dumpster** or **sealed drums**.
- Use **secondary containment trays** for soil containing free liquids.

4. Handling & Disposal

Regulatory Compliance:

- Coordinate with the **local Department of Environmental Management (DEM)**.

Disposal Options:

- **Clean soil** → Can be reused as backfill.
- **Contaminated soil** → Transport to an **approved hazardous waste facility** or **thermal treatment site**.

Backfilling Considerations:

- If native soil is contaminated, import **certified clean fill**.
- Use **geotextile fabric** as a barrier if needed.

5. Post-Work Cleanup & Documentation

Decontaminate Equipment:

- Power-wash and **collect rinse water** for proper disposal.
- Use **absorbent pads** for residual contamination.

Report & Record Keeping:

- Document **sampling results, disposal manifests, and site conditions**.
- Submit reports to regulatory agencies as required.

Key Takeaways

✔ **Pre-plan and notify authorities** in case of contamination concerns.
✔ **Separate, tarp, and test soils** to prevent environmental impact.
✔ **Follow regulatory guidelines** for proper handling and disposal.
✔ **Ensure proper documentation** to maintain compliance.

This Soil Management Plan ensures that emergency utility work is conducted safely, minimizing environmental risks while complying with all relevant regulations.

APPENDIX C: EASTON POND NORTH DAM: VISUAL INSPECTION/EVALUATION REPORT

-- EASTON POND NORTH DAM --
VISUAL
INSPECTION / EVALUATION REPORT

Dam Name:	*Easton Pond North Dam*
State Dam ID#:	*584*
Owner:	*City of Newport*
Town:	*Middletown*
Consultant:	*Pare Corporation*
Date of Inspection:	*October 26, 2023*

PARE CORPORATION

PREFACE

The assessment of the general condition of the dam reported herein was based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations were beyond the scope of this report unless reported otherwise.

In reviewing this report, it should be realized that the reported condition of the dam was based on observations of field conditions at the time of inspection, along with data available to the inspection team.

It is critical to note that the condition of the dam is evolutionary in nature and depends on numerous and constantly changing internal and external conditions. It would be incorrect to assume that the reported condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Allen R. Orsi, P.E., Senior Vice President
RI PE License No. 8982
PARE CORPORATION

1.0 DESCRIPTION OF PROJECT

1.1 General

1.1.1 Authority

The City of Newport, Rhode Island has retained Pare Corporation perform a visual inspection and develop a report of conditions for the Easton Pond North Dam along the Bailey Brook in Middletown, Rhode Island. This inspection and report were performed in accordance with current Rhode Island laws.

In accordance with 250-RICR-130-05-1.11C, a qualified engineer or a Department dam engineer must perform a visual inspection. The visual inspection shall include an assessment of the condition of the major components of the dam subjectively rated as good, fair or poor. The major components of a dam are the embankment(s), the spillway(s) and the low level control structure(s).

Good: meeting minimum guidelines, where no irregularities are observed and the component appears to be maintained properly.
Fair: a component that requires maintenance.
Poor: a component that has deteriorated beyond a maintenance issue and requires repair; the component no longer functions as it was originally intended.

1.1.2 Purpose of Work

The purpose of this investigation was to inspect and evaluate the present condition of the dam and appurtenant structures in accordance with current dam safety regulations to provide information that will assist in both prioritizing dam repair needs and planning/conducting maintenance and operation.

The investigation was divided into three parts: 1) obtain and review reports, investigations, and data pertaining to the dam and appurtenant structures available within the Rhode Island Department of Environmental Management files; 2) perform a visual inspection of the site; and; 3) prepare and submit a final report presenting the evaluation of the structure, including recommendations for additional studies, repairs, and remedial actions.

1.1.3 Common Dam Safety Definitions

To provide the reader with a better understanding of the report, definitions of commonly used terms associated with dams are provided at the end of this report. Many of these terms may be included in this report. The terms are presented under common categories associated with dams which include: 1) orientation; 2) dam components; 3) hazard classification; 4) general; and 5) condition rating.

1.2 Description of Project

1.2.1 Location

The Easton Pond North Dam is located in the Town of Middletown with a small section

The auxiliary spillway is located near the south west corner of Green End Pond and consists of a 90-foot wide sharp crested concrete weir concrete training walls and riprapped approach and discharge aprons. The right downstream wall is stone masonry. Discharges would flow in a westerly direction toward the moat encompassing Easton Pond.

The low level outlet is situated a short distance left of the junction of the embankment with Easton Pond South Dam and consist of 12-inch low level out pipe through the embankment. The outlet is controlled by a gate valve. Flow can be regulated out of and into Green End Pond at this location.

An apparent intake line to the water treatment facility, marked by a steel pile in the impoundment, is located approximately 150 feet right of the auxiliary spillway. No details of this structure were available during the preparation of this report.

Recent construction completed on the dam includes replacement of the auxiliary spillway, resurfacing of the primary spillway training walls, and repairs to the concrete in the primary spillway weir.

1.2.5 Operations and Maintenance

The City of Newport is responsible for operations and maintenance at the dam, including undertaking maintenance of vegetation along the crest of the dam, completing regular inspection, and completing other maintenance as required. In addition, the City of Newport regularly operates the low level outlet and monitors real time water level data and bacteria.

1.2.6 Hazard Potential Classification

In accordance with current classification procedures under State of Rhode Island dam safety rules and regulations, Easton Pond North Dam has been classified as a ***High*** hazard potential dam by RIDEM.

Sta 3+98 – 5+00

Crest:	bare between auxiliary spillway and 4+75. crest is level.
Upstream Slope:	new riprap between auxiliary spillway and 4+75.
Downstream Slope:	grass covered variable slope, with reeds encroaching on the toe.
Downstream Toe:	overgrown with wetland type vegetation

Sta 5+00 – 6+00

Crest:	grassed crest is level
Upstream Slope:	the lower half of the slope is riprap covered; the upper half has been cleared of vegetation and is generally uniform.
Downstream Slope:	grass covered variable slope, with reeds encroaching on the toe. At 5+40 the slope becomes steeper and continues at this slope for the remainder of the embankment; erosion 5+95 and 6+00.
Downstream Toe:	overgrown with wetland type vegetation

Sta 6+00 – 7+00

Crest:	grassed crest is level.
Upstream Slope:	the lower half of the slope is riprap covered; the upper half has been cleared of vegetation and is generally uniform, possible beaching or loss of soil below the riprap at 6+46.
Downstream Slope:	grass covered variable slope.
Downstream Toe:	overgrown with wetland type vegetation.

Sta 7+00 – 8+00

Crest:	grassed crest is level
Upstream Slope:	the lower half of the slope is riprap covered; the upper half has been cleared of vegetation and is generally uniform, some scarping along the upper third
Downstream Slope:	grass covered variable slope
Downstream Toe:	overgrown with wetland type vegetation

Sta 8+00 – 9+00

Crest:	grassed crest is level
Upstream Slope:	the lower half of the slope is riprap covered; the upper half has been cleared of vegetation and is generally uniform, some scarping along the upper third at 8+60; bowl between 8+95 and 9+00.
Downstream Slope:	overgrown grass covered variable slope
Downstream Toe:	overgrown with wetland type vegetation

Sta 9+00 – 10+00

Crest:	grassed crest is level
Upstream Slope:	the lower half of the slope is riprap covered; the upper half has been cleared of vegetation and is generally uniform; bowl between 9+05 to 9+10 and 9+60 to 9+80.
Downstream Slope:	overgrown grass covered variable slope
Downstream Toe:	overgrown with wetland type vegetation

At 10+00 the Easton Pond South Dam enters from the left (west). At this point the Easton Pond North Dam becomes a causeway between the Green End Pond and Easton Pond with water on both the upstream and downstream sides.

Sta 10+00 – 11+00

Crest:	grassed crest is level, exposed geotextile 10+25.
Upstream Slope:	riprapped, cleared vegetation

Downstream Slope:	steep, with vegetation choked riprap, which appears to have been cut. Riprap repair 19+25 to 19+75, consisting of gabions, with broken areas of the steel mesh.
Sta 20+00 – 21+00	
Crest:	grassed crest is level
Upstream Slope:	riprapped, cleared vegetation.
Downstream Slope:	eroded, near vertical slope 20+50 through 21+00. Depression in new riprap near 20+45.
Sta 21+00 – 22+00	
Crest:	grassed crest is level
Upstream Slope:	riprapped, cleared vegetation.
Downstream Slope:	steep, with vegetation choked riprap, which appears to have been cut.
Sta 22+00 – 25+00	
Crest:	grassed crest is level
Upstream Slope:	riprapped, cleared vegetation. New riprap on slope starting at 23+00 to the primary spillway.
Downstream Slope:	steep, with vegetation choked riprap, which appears to have been cut. Some fallen stones throughout.
Sta 25+00 – 25+55	
Crest:	grassed crest is level, 9-12" dip in the crest noted at 25+11
Upstream Slope:	riprapped, covered with vegetation in the lower third; upstream repair at 25+11. Top third of crest bare and eroded.
Downstream Slope:	steep, with vegetation choked riprap, which appears to have been cut. Erosion and bare area near right training wall of primary spillway.

The primary spillway starts at 25+55 and is approximately 120 feet wide terminating at the left abutment.

2.1.3 Appurtenant Structures

Primary Spillway

- The approach appeared to be clear.
- Flow was noted to be confined to the right half of the spillway. The left half is higher in elevation than the right half.
- Previously noted open construction joints and cracks on the weir have been repaired. The repairs appear to be in good condition. Approximately 5 feet of the left end of the weir was reconstructed. This area was previously missing.
- The right and left training walls have been resurfaced with new concrete. The repair appears to be in good condition with no cracks noted.
- In select locations, the area immediately downstream from the concrete weir has been filled in with wire reinforced anchors and stone riprap, possibly to fill apparent sour holes that may have developed previously.
- The discharge area consists of a stone apron with some missing stones. Some voids are present between the stones.
    - o Wire gabion baskets with stacked stones were noted at the right training wall and adjacent to the weir along the right side.

2.3.2 Maintenance of Dam and Operating Facilities

There was no maintenance manual for the dam available at the time of the inspection. However, it is evident that routine maintenance is completed along the crest to control vegetation and the city reported the dam was cleared of vegetation within the week before the inspection.

3.2.1 Studies & Evaluations

It is recommended that the owner of the dam arrange for the following investigations to be performed by a qualified registered professional engineer experienced with embankment dams and hydrology, maintenance and monitoring activities.

1. Complete detailed hydrologic and hydraulic (H&H) analyses to evaluate the capacity pf the structure to accommodate various storm events that would be typical for the watershed. It is recommended that the analyses consider flows associated with the 100-year through the one half probable maximum flood (1/2 PMF) storm events; while Rhode Island Dam Safety regulations do not currently dictate a spillway design flood, it is anticipated that upcoming changes to the regulations will require that High hazard dams can accommodate the ½ PMF storm event. The analysis should account for the routed inflow that utilizes the full storage capacity within the impoundment and drainage area. A structure that cannot discharge the inflow associated with normal storm events will be overtopped in an uncontrolled manner that could damage the structure and threaten downstream areas.

2. A formalized Operations and Maintenance Manual should be developed for this structure. This manual should include procedures for maintaining the level of the impoundment, including adjusting the level of the impoundment in anticipation of rain events to provide additional free board during the wetter months. Additionally, the manual should include periodic inspection schedules and operational and maintenance procedures required to ensure satisfactory operation and minimize deterioration of the facility. The manual should also provide record keeping procedures for ongoing inspection and monitoring, such that the condition of deficiencies can be documented overtime and progressing issues can be noticed. The manual should include schedule for regular maintenance activities which are to be continued to control and prevent the further growth of unwanted vegetation and include an operation schedule for each of the gates at the structure.

3. Continue regular inspection and monitoring of the dam. As the dam is currently classified as a High hazard potential dam, the completion of a formal visual inspection by a RI registered professional engineer familiar with dam engineering is recommended every 2 years.

3.2.2 Repairs & Maintenance

The minor repairs presented below should be implemented to help maintain the integrity of the structure.

1. The upstream and downstream slopes of the dam should be protected from erosion, as wave action can develop across the surfaces of both Green End Pond and Easton Pond. Riprap should be augmented in areas of missing slope protection along the upstream and downstream slope and in the sections of damaged gabions along the downstream slope.

2. Repair the erosion and scarping along the upstream and downstream slope and assess the effectiveness of the current riprap. Incorporation of larger slope protection stone if necessary.

3. Level the dam crest. Loam and seed and establish a healthy stand of grass.

4. Continue regular maintenance activities including control of vegetation, exercising of the low-level outlet, and regular inspections.

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions refer to State of Rhode Island Rules and Regulations for Dam Safety, or other reference published by FERC, Dept. of the Interior Bureau of Reclamation, or FEMA.

Orientation

Upstream – Shall mean the side of the dam that borders the impoundment.
Downstream – Shall mean the high side of the dam, the side opposite the upstream side.
Right – Shall mean the area to the right when looking in the downstream direction.
Left – Shall mean the area to the left when looking in the downstream direction.

Dam Components

Dam – means any barrier made by humans, including appurtenant works, which impounds or diverts water.
Embankment – means the fill material, including but not limited to rock or earth, placed to provide a permanent barrier that impounds water.
Crest – Shall mean the top of the dam, usually provides a road or path across the dam.
Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.
Appurtenant Works – means any ancillary feature of a dam including such structures as dikes, training walls, spillways, either in the dam or separate there from, low level outlet works, and water conduits such as tunnels, channels, pipelines or penstocks, either through the dam or its abutments.
Spillway – means a structure, a low area in natural grade or any part of the dam which has been designed or relied upon to allow normal flow or major flood flow to pass over or through while being discharged from a reservoir.

Hazard Classification

High Hazard – means a dam where failure or misoperation will result in probable loss of human life.
Significant Hazard – means a dam where failure or misoperation results in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public's health, safety or welfare. Examples of major economic loss include but are not limited to washout of a state or federal highway, washout of two or more municipal roads, loss of vehicular access to residences, (e.g. a dead end road whereby emergency personnel could no longer access residences beyond the washout area) or damage to a few structures.
Low Hazard – means a dam where failure or misoperation results in no probable loss of human life and low economic losses.

General

EAP – Emergency Action Plan – Shall mean a predetermined (and properly documented) plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam failure.
O&M Manual – Operations and Maintenance Manual; Document identifying routine maintenance and operational procedures under normal and storm conditions.
Normal Pool – Shall mean the elevation of the impoundment during normal operating conditions.
Acre-foot – Shall mean a unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre feet.

REFERENCES AND RESOURCES

The following reports were provided by the City of Newport or otherwise referenced within reviewed documentation.

1. Nonquit Pond Dam Visual Inspection Report, Pare Corporation, October 2019.
2. Nonquit Pond Dam Visual Inspection Report, Arcadis, June 2018.
3. Nonquit Pond Dam Phase I Dam Safety Report, Arcadis, June 2018.
4. Nonquit Pond Dam Inspection Report, Pare Corporation, September 2013
5. Nonquit Pond Dam Inspection Report. McMahon Associates, Boston, Massachusetts, November 15, 2010.

The following were referenced during the completion of the visual inspection and preparation of this report and the development of the recommendations presented herein

1. "Design of Small Dams", United States Department of the Interior Bureau of Reclamation, 1987.
2. "ER 110-2-106 - Recommended Guidelines for Safety Inspection of Dams", Department of the Army, September 26, 1979.
3. "Guidelines for Reporting the Performance of Dams" National Performance of Dams Program, August 1994.

The following provides an abbreviated list of resources for dam owners to locate additional information pertaining to dam safety, regulations, maintenance, operations, and other information relevant to the ownership responsibilities associated with their dam.

1. RIDEM Office of Compliance and Inspection Website: http://www.dem.ri.gov/programs/benviron/compinsp/
2. "Dam Owner's Guide To Plant Impact On Earthen Dams" *FEMA L-263,September 2005.*
3. "Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams" *FEMA 534, September 2005.*
4. "Dam Safety: An Owners Guidance Manual" *FEMA 145,December 1986.*
5. Association of Dam Safety Officials – Website: www.asdso.org/
6. "Dam Ownership – Responsibility and Liability", ASDSO.

Photo No. 1.: Stumps at the right abutment.

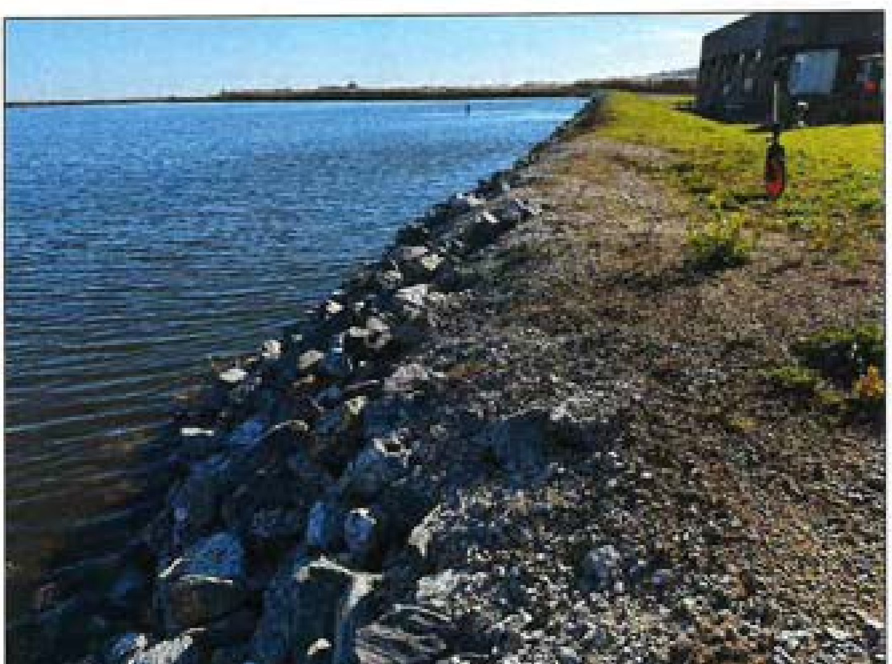


Photo No. 2.: Upstream slope from the right abutment looking left.

Photo No. 5.: Upstream slope near STA 18+00 looking left. Note new riprap placed along the slope.

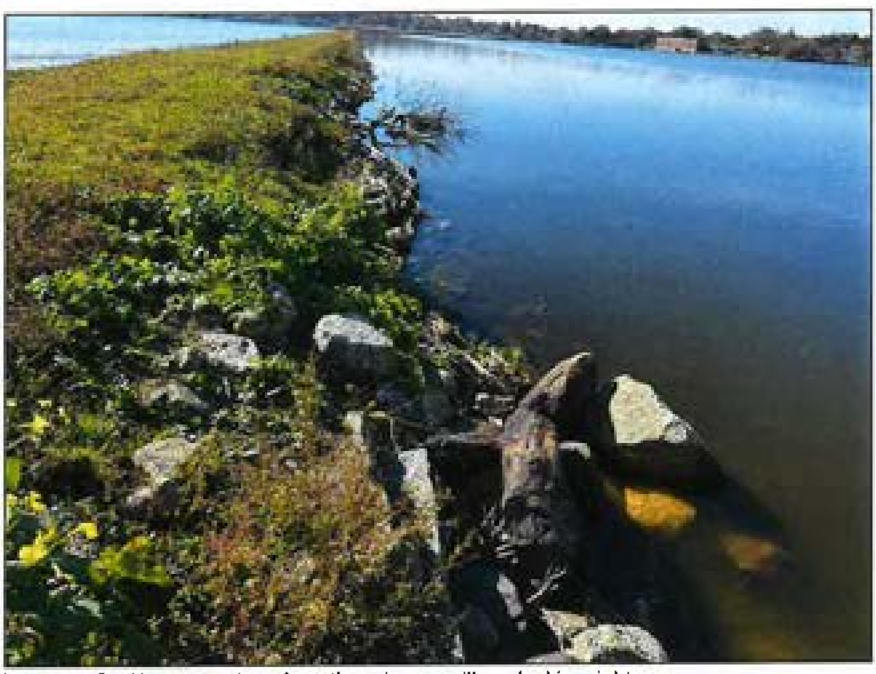


Photo No. 6.: Upstream slope from the primary spillway looking right.

Photo No. 9.: Crest from the auxiliary spillway looking left. Note bare soils due to replacement of the auxiliary spillway.

Photo No. 10.: Crest from the bend in the embankment near STA 10+50 looking left. Note bare soils at the bend.

Photo No. 13.: Saturated area at downstream toe between STA 1+65 and 1+90.

Photo No. 14.: Downstream slope from the auxiliary spillway looking right.

Photo No. 17.: Broken gabions near STA 16+50.

Photo No. 18.: Downstream slope near STA 18+50 looking left. Note riprap repair, typical throughout the slope.

Photo No. 21.: Primary spillway from the right end looking left. Note difference in elevation of the spillway crest.

Photo No. 22.: Right training wall of the spillway. Note new surface concrete.

Photo No. 25.: Discharge apron of the spillway.

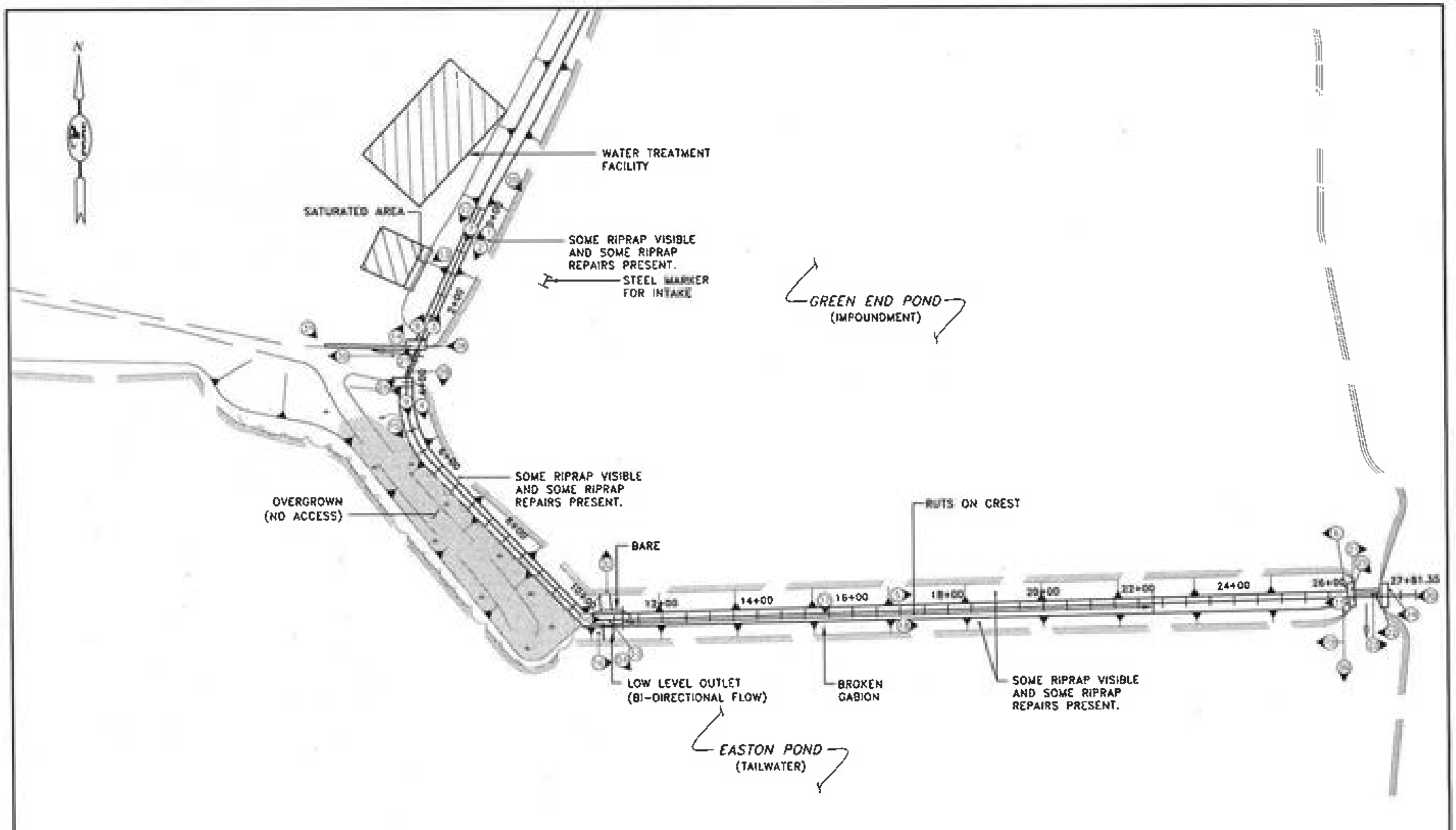
Photo No. 26.: Auxiliary spillway from the left end looking right.

Photo No. 29.: Left training wall of the auxiliary spillway.

Photo No. 30.: Discharge of the auxiliary spillway.

Photo No. 33.: Low level outlet valve cover.

Photo No. 34.: City of Newport operating the low level outlet. Outlet is operable.



NOTES AND LEGEND

1. PLAN DEVELOPED FROM NOTES TAKEN DURING THE INSPECTION AND AVAILABLE AERIAL IMAGERY FROM RIGIS. INFORMATION IS PROVIDED FOR REFERENCE PURPOSES ONLY.

DENOTES APPROXIMATE LOCATION AND DIRECTION OF PHOTOGRAPH.

1+00 BASELINE AND STATIONING

PARE CORPORATION

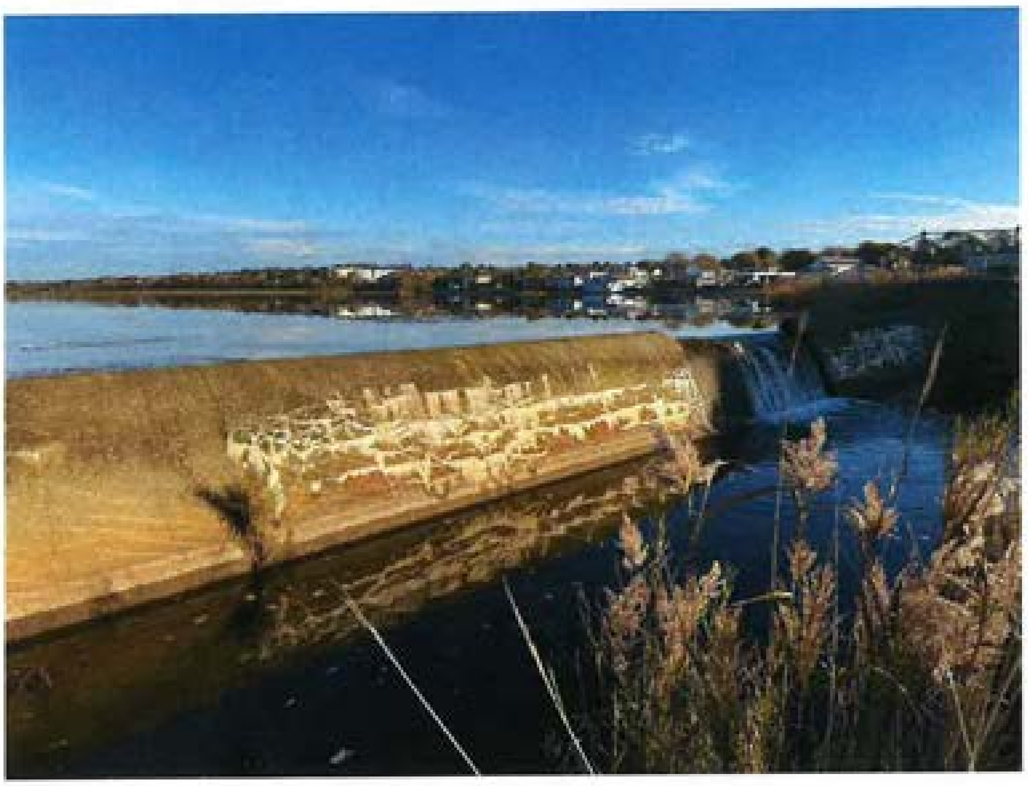
EASTON POND NORTH DAM
RI DAM No. 584
MIDDLETOWN, RHODE ISLAND
OWNER: CITY OF NEWPORT

SITE SKETCH

FIGURE NO: 3

APPENDIX D: EASTON POND SOUTH DAM: VISUAL INSPECTION/EVALUATION REPORT

-- EASTON POND SOUTH DAM --
VISUAL
INSPECTION / EVALUATION REPORT



Dam Name: *Easton Pond South Dam*

State Dam ID#: *585*

Owner: *City of Newport*

Town: *Newport / Middletown*

Consultant: *Pare Corporation*

Date of Inspection: *October 26, 2023*

PARE
CORPORATION

PREFACE

The assessment of the general condition of the dam reported herein was based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations were beyond the scope of this report unless reported otherwise.

In reviewing this report, it should be realized that the reported condition of the dam was based on observations of field conditions at the time of inspection, along with data available to the inspection team.

It is critical to note that the condition of the dam is evolutionary in nature and depends on numerous and constantly changing internal and external conditions. It would be incorrect to assume that the reported condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Allen R. Orsi, P.E., Senior Vice President
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PARE CORPORATION

ALLEN R. ORSI
No. 8982
REGISTERED
PROFESSIONAL ENGINEER
(CIVIL)

1.0 DESCRIPTION OF PROJECT

1.1 General

1.1.1 Authority

The City of Newport has retained Pare Corporation of Foxboro, Massachusetts and Lincoln, Rhode Island to perform a visual inspection and develop a report of conditions for the Easton Pond South Dam along the Bailey Brook in Newport, Rhode Island. This inspection and report were performed in accordance with current Rhode Island laws.

In accordance with 250-RICR-130-05-1.11C, a qualified engineer or a Department dam engineer must perform a visual inspection. The visual inspection shall include an assessment of the condition of the major components of the dam subjectively rated as good, fair or poor. The major components of a dam are the embankment(s), the spillway(s) and the low-level control structure(s).

Good: meeting minimum guidelines, where no irregularities are observed and the component appears to be maintained properly.
Fair: component that requires maintenance.
Poor: a component that has deteriorated beyond a maintenance issue and requires repair; the component no longer functions as it was originally intended.

1.1.2 Purpose of Work

The purpose of this investigation was to inspect and evaluate the present condition of the dam and appurtenant structures in accordance with current dam safety regulations to provide information that will assist in both prioritizing dam repair needs and planning/conducting maintenance and operation.

The investigation was divided into three parts: 1) obtain and review reports, investigations, and data pertaining to the dam and appurtenant structures available within the Rhode Island Department of Environmental Management files; 2) perform a visual inspection of the site; and; 3) prepare and submit a final report presenting the evaluation of the structure, including recommendations for additional studies, repairs, and remedial actions.

1.1.3 Common Dam Safety Definitions

To provide the reader with a better understanding of the report, definitions of commonly used terms associated with dams are provided at the end of this report. Many of these terms may be included in this report. The terms are presented under common categories associated with dams which include: 1) orientation; 2) dam components; 3) hazard classification; 4) general; and 5) condition rating.

1.2 Description of Project

1.2.1 Location

The Easton Pond South Dam is located in the City of Newport and Town of Middletown and with a layer of placed riprap. The crest of the dam is primarily grass covered and varies from 8 to 12 feet wide. The downstream slope is a grass slope averaging near 2H:1V.

A manmade channel (moat) runs along the majority of the downstream toe of the embankment.

The spillway, situated near the southeast corner of the impoundment, includes an approximately 100-foot wide modified ogee oncrete weir with a 20-foot long 1-foot deep notch near the center. A low level outlet, operated by a valve in a chamber on the crest behind the right training wall, discharges through the downstream right training wall to the spillway channel. Discharge from the spillway and low level outlet flow in southerly directions before converging with flow from the moat and passing beneath Memorial Boulevard and into Easton Bay.

1.2.5 Operations and Maintenance

The City of Newport is responsible for operations and maintenance at the dam, including undertaking routine maintenance of vegetation along the length of the dam, completing regular inspection, and completing other maintenance as required. In addition, the City of Newport regularly operates the low level and monitors real time water level data.

1.2.6 Hazard Potential Classification

In accordance with current classification procedures under State of Rhode Island dam safety rules and regulations, Easton Pond South Dam has been classified as a High hazard potential dam by RIDEM.

Downstream Slope:	grass covered; slough 2+45, bottom half of slope
Downstream Toe:	moat is eroded towards the dam, decreasing the area between the toe of the slope and the channel.
Sta 3+00 – 4+00	
Crest:	grass covered, no disturbances noted
Upstream Slope:	steeper slope with little vegetation within the riprap; slightly irregular slope at waterline
Downstream Slope:	3+10 through 3+30 sloughing and mower scars; 3+90 through 4+10 apparent bulge
Downstream Toe:	3+50 an 18-inch mound noted with a soft depression noted to the left, erosion of the moat bank 3+50 through 4+00, depression at 3+90
Sta 4+00 – 5+00	
Crest:	slight dip at 4+50
Upstream Slope:	bowl in upper third of the slope at 4+50
Downstream Slope:	depression in the lower third of the slope at 4+80, flattening of the slope apparent at 4+95 through 5+15
Downstream Toe:	bank of the moat eroded to within 3.5 feet of the toe along much of this reach, within 2 feet of slope 4+10 through 4+15, and almost at toe near 4+70
Sta 5+00 – 6+00	
Crest:	grass covered with bare areas, no disturbances noted
Upstream Slope:	irregular slope, bowl in the upper third at 5+50
Downstream Slope:	irregular 5+15 through 5+70, path from rodents, or runoff in the lower third extending to the moat at 5+40
Downstream Toe:	grassed and firm
Sta 6+00 – 7+00	
Crest:	grass covered, no disturbances
Upstream Slope:	slightly irregular slope, minor vegetation
Downstream Slope:	grass covered, no disturbances noted
Downstream Toe:	grassed, firm, depression at 6+90
Sta 7+00 – 8–00	
Crest:	different type of grass 7+00 to 7+20, grassed with minor exposed gravel 7+90 through 8+00, depression at 7+50
Upstream Slope:	bowl at 7+50
Downstream Slope:	mowing scars at 7+15, depression along the toe at 7+90 through 8+10, mowing scars along the upper third
Downstream Toe:	grassed, firm
Sta 8+00 – 9+00	
Crest:	grassed, bare soils upstream edge at 8+05 through 8+45, depression along the upstream edge at 8+45
Upstream Slope:	bowl at 8+45
Downstream Slope:	grass covered, no disturbances noted
Downstream Toe:	grass covered, firm, moat appears to be eroding into the slope more than previous.
Sta 9+00 – 10+00	
Crest:	grass covered
Upstream Slope:	slope is slightly flatter, with wetland type vegetation present along the waterline, riprap choked with vegetation and weed debris, irregular between 9+40 to 9+50 with soils eroded
Downstream Slope:	previously observed mowing ruts along the lower third from 9+00 through 9+40 and mowing scars upper third 9+60 through 10+00 not observed due to length of grass, slope steeper between 9+85 to 10+00
Downstream Toe:	grass covered, firm
Sta 10+00 – 11+00	
Crest:	grass covered but more sparse than other areas, crest pitches downstream in this section, and is crossed by a path at 10+50

Upstream Slope:	repaired area with new riprap 17+45 through 18+25
Downstream Slope:	repaired between 17+45 through 18+25 with TRM and new grass growth.
Downstream Toe:	grassed, moat bank is "calfing" at 17+30; rut along toe of the slope for the full length; moat bank eroding toward toe 17+55

Change in alignment at 18+36 with a slight mound noted in the crest elevation.

Sta 18+00 – 19+00	
Crest:	grassed with better vegetation coverage, pitched in the downstream direction, TRM missing in small sections between 18+00 and 18+25.
Upstream Slope:	sparse riprap in the upper third with a bowl forming at 18+25 and 18+90
Downstream Slope:	grassed with rutting midslope at 18+90, steeper at bend
Downstream Toe:	grassed, depression 18+20, depressed and saturated 18+90
Sta 19+00 – 20+00	
Crest:	grassed, good vegetation coverage, crest level, minor bare areas
Upstream Slope:	steep riprap slope with vegetation debris choking the stones, irregular, bowl 19+45
Downstream Slope:	grassed, saturated 6 inches up from the toe 19+00
Downstream Toe:	grassed but soft and wet at 19+00 to 19+50
Sta 20+00 – 21+00	
Crest:	grassed, good vegetation coverage, crest level
Upstream Slope:	riprap stone size appears larger, and slope is less vegetated
Downstream Slope:	grassed; holes at the toe of the slope at 20+40 noted in 2019, but not observed in 2023; scarping from mower ruts in the top third 20+95 to 21+20
Downstream Toe:	grassed, saturated between 20+40 and 20+45
Sta 21+00 – 22+00	
Crest:	grassed, good vegetation coverage, crest level
Upstream Slope:	large riprap stone size continues, minor stone movement throughout
Downstream Slope:	grassed with mower damage in the upper third from 21+50 to 22+00
Downstream Toe:	grassed, bank eroding toward slope 21+35 through 21+50
Sta 22+00 – 23+00	
Crest:	grassed, good vegetation coverage, crest level
Upstream Slope:	riprapped with some vegetation; irregularities throughout; vegetation thins out towards 22+70, depression top half 22+95
Downstream Slope:	grassed; ruts upper third 22+20 through 22+50; slight bowl in the upper third from 22+50 to 22+80
Downstream Toe:	grassed, moat bank within 4 feet of toe 22+90
Sta 23+00 – 24+00	
Crest:	grassed, good vegetation coverage, crest level
Upstream Slope:	riprapped with vegetation developing in the upper third, sloughed riprap 23+95 through 24+00 with a bulge in the center of the slope.
Downstream Slope:	grassed with minor mowing scars
Downstream Toe:	grassed and firm, the moat bank migrates to within 3.5 feet of the toe
Sta 24+00 – 25+00	
Crest:	grassed; pitched in the upstream direction
Upstream Slope:	riprapped with vegetation developing in the upper third, movement between 21+15 through 21+45
Downstream Slope:	grassed with a slight bowl in the upper third at 24+40
Downstream Toe:	grassed and firm; moat has eroded to within 3 feet of the toe of slope
Sta 25+00 – 26+00	
Crest:	grassed; pitched in the upstream direction
Upstream Slope:	riprapped with vegetation developing in the upper third
Downstream Slope:	grassed with minor rutting
Downstream Toe:	grassed; firm; moat bank eroding between 25+00 through 26+00

From 37+00 to 68+00 the dam has been rehabilitated with articulated concrete block mattresses installed below surface treatments from below the waterline to the downstream toe. The upstream slope surface includes a thin layer of topsoil, the crest includes a stone dust path with grassed shoulders, and the downstream slope is a grassed surface with partially buried riprap along the toe. The following specific observations were made along the rehabilitated section.

- 37+30 and at various locations along the first several hundred feet soil has been eroded from between the concrete black "mattresses" installed along the upstream slope
- Near 37+10 the ACB unit have been exposed along the downstream side of the dam.
- 38+10 to 39+20 there is an apparent hump in the lower third of the downstream slope.

The alignment of the dam changes at 37+70 with a designed bend. At the bend the joints between the mattresses are filled with concrete/grout. Along the length of the bend, 37+10 to 37+60 the toe of the downstream slope is at the edge of the moat.

- From 40+50 to 49+50 the downstream slope is grassed with minor variations in the slope noted and rip rap in the lower third of the slope.
- At 43+05 the downstream slope is very steep and appears to be vegetated riprap.
- At 43+90 and 53+30 minor rutting was noted along the lower third of the downstream slope.
- From 45+50 to 53+10 the vegetation along the upstream slope provides more uniform coverage.

The dam alignment curves about 90 degrees to the west at 57+10.

- At 57+10 the ACB blocks along the upstream slope are exposed and the upstream edge appears raised, or exposed due to soil loss along the crest.
- Between 58+80 and 58+90, iron oxide staining in moat at the toe.
- Between 59+50 and 59+90 the upstream slope appears steeper than in adjacent areas.
- At 60+70 the ACBs are exposed along the lower third of the downstream slope and appear to be misaligned/damaged.
- Between 62+40 and 62+70 the slope is near vertical for the lower half of the slope.
- From 62+90 to 66+70 the lower third of the downstream slope is nearly vertical with exposed joints between the ACB mattresses.
- Between 63+00 and 63+10 and at 63+60, the downstream toe is wet with iron oxide staining.
- From 64+75 to 64+48 the ACBs on the downstream slope appear shifted with voids visible within the cells.
- At 66+70 the elevation of the dam crest drops by 12 to 18" at the end of the reconstructed portion.

From 66+70 to the gate at 68+70 the downstream slope is vegetated with brush and weeds that have been recently cut leaving an exposed soil surface. The crest of the dam is vegetated with tire tracks worn into the surface, and the upstream slope is scarped to near vertical in the upper third with overgrown riprap continuing to the water surface.

At 68+70 there appears to be a portion of natural ground that interrupts the continuity of the Easton Pond South Dam. The Easton's Pond North Dam continues to the north and swings around towards the west past the extension of the Easton Pond South Dam which continues for about 500 feet before joining the Easton's Pond North Dam. The embankment along this reach is similar in condition to the

- On the right training wall, a construction joint with spalling was noted 10 feet downstream of the toe of the spillway. Leakage of up to 2 GPM was noted throughout the spall at the waterline.
- Minor scouring of the concrete was noted at the normal water surface.
- The weir is a notched crest.
    - Longitudinal and transverse cracking was noted along the weir length. The cracking appears to be in a concrete overlay.
    - The exposed surface in the notch has more advanced cracking and deterioration.
    - Stop log channels were present along each side of the notch with corrosion noted.

Low Level Outlet

- The controls for the low level outlet are located within a vault set below the dam crest and behind the right training wall.
- The concrete of the vault is cracked similar to the concrete of the spillway.
- The vault is sealed with a locking steel hatch which provides access to the valve controls.
- The valve is opened by a T-wrench. During the inspection the gate was opened and closed by a 2-person effort. It was noted that during operation the proximity of the valve to the top of the training wall could pose a safety hazard during winter or icing conditions. The gate was opened approximately 20 turns. 85 turns are required to fully open. The operators indicated that the gate is fully operated several times a year.
    - During the operation, the operator fell off the valve when removing the T-wrench. The City indicated it is likely that the set screw rotted out.

2.1.4 Downstream Area

The area downstream of the toe of the dam consists of a moat system conveying stormwater discharge to Easton Bay. Beyond the moat the downstream area varies from Memorial Boulevard and Easton's beach to upland and lowland properties and recreation areas.

2.1.5 Reservoir Area

As indicated previously, the dam encompasses nearly 3 sides of the impoundment with the spillway situated along the southern shore. The impoundment is generally open with large water surface areas over which waves may develop, especially due to winds coming off the ocean.

2.2 Caretaker Interview

The City of Newport is responsible for operation and maintenance at the dam. Mr. Josh Ponte was present for a portion of the inspection and provided details relative to the dam's operation. Information provided by Mr. Ponte has been incorporated into this report. Mr. Ponte highlighted the wet toe at the corner (intersection of Memorial Boulevard and Old Beach Road), as well as the low level outlet operating procedures.

2.3 Operation and Maintenance Procedures

There was no formal operations and maintenance manual for the dam available at the time of the inspection.

3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 Assessments

Based upon the observed conditions, the overall condition of the Easton Pond South Dam is currently considered FAIR with the embankment, spillway, and low level outlet remaining in Fair conditions. It should be noted that the condition of the concrete on the primary spillway is continuing to deteriorate, due to potential ASR and recent losses. The concrete condition could be approaching poor due to those deficiencies. The dam was found to have the following deficiencies:

1. Minor rutting and areas of bare and/or eroded soils.
2. Variations in the crest elevation corresponding to upstream and downstream erosions or anomalies.
3. Missing riprap and eroded upstream slopes in select locations on the eastern and western shores.
4. Evidence of animal activity.
5. Holes, scarping and wet areas near the downstream toe and moat.
6. Deteriorated and cracked concrete at the spillway with open joints, relatively fresh spalls observed.
7. Rotted set screw and displaced operator on the value of the low level.
8. Leakage through the left training wall of the primary spillway.

The dam was most recently inspected in 2019 by Pare Corporation, at which time the dam was found to be in Fair condition. Based upon a comparison to that report, some repairs have been completed; however some deficiencies still remain and have continued to deteriorate. The following table provides a summary of the condition reported at that time, associated recommendations, and the current status/resolution of those items.

Previously Identified Deficiency (2019)	***Resolution or Current Condition / Recommendation***
Repair upstream slope with emphasis at the at the north east corner	New riprap was installed at the northeast corner of the dike. Additional erosion repair required.
Clear upstream and downstream slopes	Slopes were generally clear and show evidence of regular maintenance
Fill and regrade eroded areas, ruts and holes	Rutting and erosion is still present
Supplement upstream riprap	Some newer riprap apparent; additional riprap required
Evaluate soft/wet areas along the dam toe	No change
Rehabilitate spillway	No change
Install moat scour protection (2008)	Some visible riprap; additional scour protection required.
Complete detailed seepage analysis of the embankment	No change
Complete detailed H&H analysis	No change
Develop formalized O&M Manual	No change
Improve accessibility and operability of the LLO	No change/LLO screw operator fell off during operation.

The following recommendations and remedial measures generally describe the recommended approach to address current deficiencies at the dam. Prior to undertaking recommended maintenance, continued to control and prevent the further growth of unwanted vegetation and include an operation schedule for each of the gates at the structure.

5. Continue regular inspection and monitoring of the dam. As the dam is currently classified as a High hazard potential dam, the completion of a formal visual inspection by a RI registered professional engineer familiar with dam engineering is recommended every 2 years.

3.2.2 Repairs & Maintenance

The minor repairs presented below should be implemented to help maintain the integrity of the structure.

1. Based upon the results of the seepage analysis, implement repairs or modifications to address the soft conditions along the toe of the embankment at the intersection of Memorial Boulevard and Old Beach Road

2. Repair the eroded portions along the entire upstream slope. Repairs should include filling areas of erosion to restore a uniform, stable slope section. Upon completion of filling, properly designed slope protection should be installed.

3. Continue clearing the upstream and downstream slopes to maintain accessibility and promote healthy grass growth. Clearing should extend 20-feet from the downstream toe. Expand current maintenance activities to prevent regrowth of unwanted vegetation in all areas of the dam.

4. Fill and regrade eroded areas, ruts and holes observed along the crest and slopes.

5. Supplement areas of missing riprap noted on the upstream slopes. This will require that the eroded slopes are filled to a uniform surface. The upstream face of a dam is then protected against wave erosion by placement of a layer of rock riprap over a layer of filter material. Sometimes, materials such as concrete facing, bricks or concrete blocks are used for this upstream slope protection. Generally, rock riprap provides the most economical and effective protection.

6. Continue to control animal activity.

7. Improve accessibility and operability of the low level outlet during winter or adverse conditions by installing railing, elevating the operator above the dam crest, or other means.

8. Replace the operator of the low level outlet.

9. Install moat scour protection to prevent further erosion of the moat towards the dam embankment.

3.2.3 Remedial Measures

Remedial modifications may be necessary if additional evaluations and/or observations at the dam identify dam safety deficiencies beyond those apparent at the time of the inspection.

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions refer to State of Rhode Island Rules and Regulations for Dam Safety, or other reference published by FERC, Dept. of the Interior Bureau of Reclamation, or FEMA.

Orientation

Upstream – Shall mean the side of the dam that borders the impoundment.
Downstream – Shall mean the high side of the dam, the side opposite the upstream side.
Right – Shall mean the area to the right when looking in the downstream direction.
Left – Shall mean the area to the left when looking in the downstream direction.

Dam Components

Dam – means any barrier made by humans, including appurtenant works, which impounds or diverts water.
Embankment – means the fill material, including but not limited to rock or earth, placed to provide a permanent barrier that impounds water.
Crest – Shall mean the top of the dam, usually provides a road or path across the dam.
Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.
Appurtenant Works – means any ancillary feature of a dam including such structures as dikes, training walls, spillways, either in the dam or separate there from, low level outlet works, and water conduits such as tunnels, channels, pipelines or penstocks, either through the dam or its abutments.
Spillway – means a structure, a low area in natural grade or any part of the dam which has been designed or relied upon to allow normal flow or major flood flow to pass over or through while being discharged from a reservoir.

Hazard Classification

High Hazard – means a dam where failure or misoperation will result in probable loss of human life.
Significant Hazard – means a dam where failure or misoperation results in no probable loss of human life but can cause major economic loss, disruption of lifeline facilities or impact other concerns detrimental to the public's health, safety or welfare. Examples of major economic loss include but are not limited to washout of a state or federal highway, washout of two or more municipal roads, loss of vehicular access to residences, (e.g. a dead end road whereby emergency personnel could no longer access residences beyond the washout area) or damage to a few structures.
Low Hazard – means a dam where failure or misoperation results in no probable loss of human life and low economic losses.

General

EAP – Emergency Action Plan – Shall mean a predetermined (and properly documented) plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam failure.
O&M Manual – Operations and Maintenance Manual; Document identifying routine maintenance and operational procedures under normal and storm conditions.
Normal Pool – Shall mean the elevation of the impoundment during normal operating conditions.
Acre-foot – Shall mean a unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre feet.

REFERENCES AND RESOURCES

The following reports were provided by the City of Newport or otherwise referenced within reviewed documentation.

1. Easton Pond South Dam Visual Inspection/Evaluation Report, Pare Corporation, November 7, 2019.
2. Easton Pond South Dam Visual Inspection/Evaluation Report, Pare Corporation, August 22, 2013.
3. "Application to Repair South Easton Pond Dam", Fuss & O'Neill, August, 2010.
4. "Design Criteria Memorandum South Easton Pond Dam Repairs and improvements" Fuss & O'Neill, August, 2010.
5. "Final Report Easton Pond Dam and Moat Study", Fuss & O'Neill, September, 2007.
6. Site Photographs, 1980.
7. "Plan of Waste –Way in North dam at Easton Pond", Newport, January 1898.

The following were referenced during the completion of the visual inspection and preparation of this report and the development of the recommendations presented herein

1. "Design of Small Dams", United States Department of the Interior Bureau of Reclamation, 1987.
2. "ER 110-2-106 - Recommended Guidelines for Safety Inspection of Dams", Department of the Army, September 26, 1979.
3. "Guidelines for Reporting the Performance of Dams" National Performance of Dams Program, August 1994.

The following provides an abbreviated list of resources for dam owners to locate additional information pertaining to dam safety, regulations, maintenance, operations, and other information relevant to the ownership responsibilities associated with their dam.

1. RIDEM Office of Compliance and Inspection Website: http://www.dem.ri.gov/programs/benviron/compinsp/
2. "Dam Owner's Guide To Plant Impact On Earthen Dams" *FEMA L-263,September 2005.*
3. "Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams" *FEMA 534, September 2005.*
4. "Dam Safety: An Owners Guidance Manual" *FEMA 145,December 1986.*
5. Association of Dam Safety Officials – Website: www.asdso.org/
6. "Dam Ownership – Responsibility and Liability", ASDSO.

Photo No. 1.: Interior of the low level outlet chamber. Note the city operating the valve during the inspection.

Photo No. 2.: Water flow from the low level outlet during operation.

Photo No. 5.: Left training wall of the primary spillway.

Photo No. 6.: Right training wall of the primary spillway.

Photo No. 9.: Upstream slope from the primary spillway looking right.

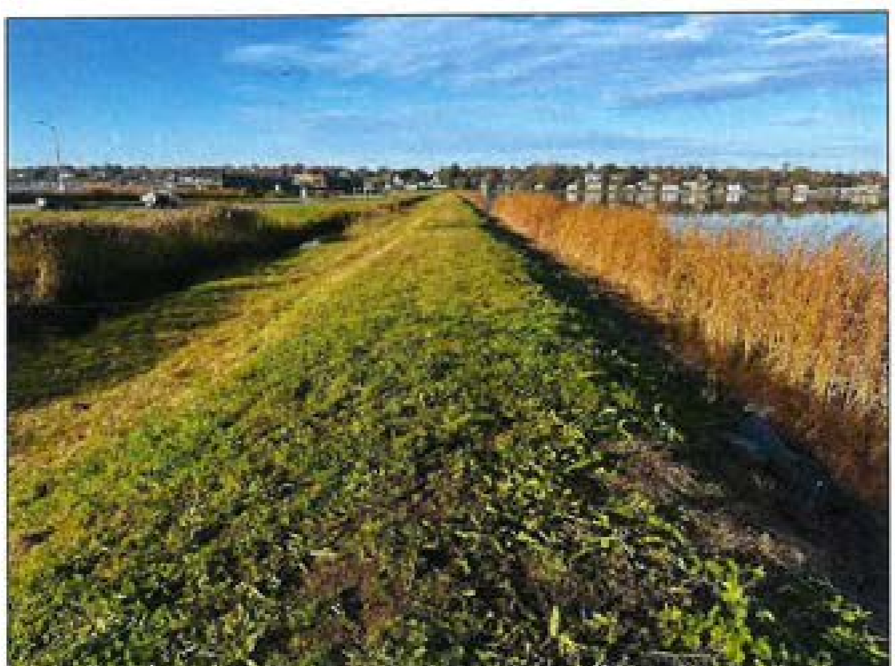


Photo No. 10.: Crest from the primary spillway looking right.

Photo No. 13.: Bowl/depression in the upstream slope near STA 10+40. Typical of the depressions throughout the upstream slope.

Photo No. 14.: Iron oxide stained seepage from the moat bank near STA 12+90.

Photo No. 17.: Downstream slope from STA 18+00 looking left.

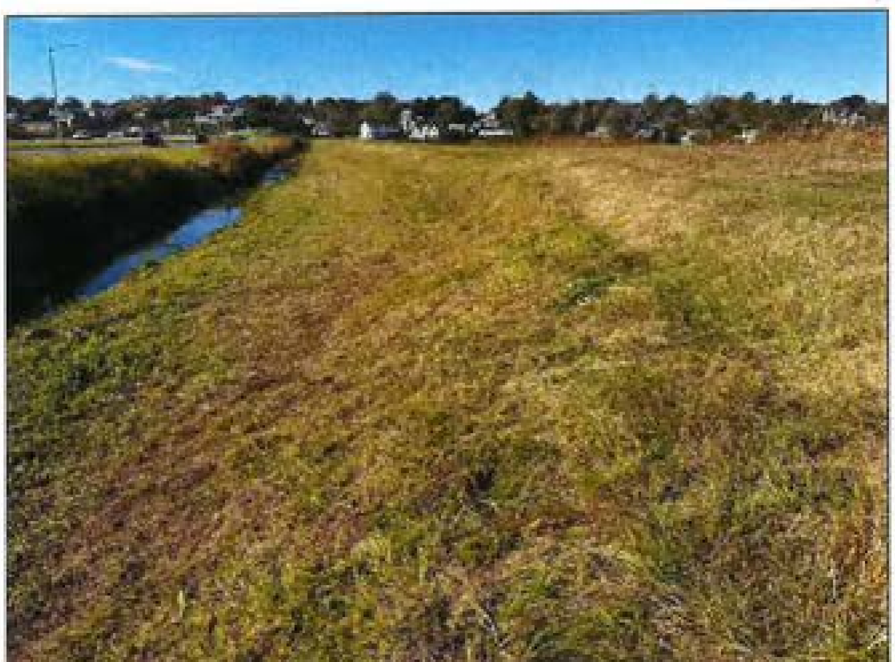


Photo No. 18.: Downstream slope from STA 18+00 looking right.

Photo No. 21.: Upstream slope from STA 18+00 looking left.

Photo No. 22.: Upstream slope from STA 18+00 looking right. Note riprap repair.

Photo No. 25.: Saturated toe and downstream area near STA 28+00 looking right.

Photo No. 26.: Upstream slope from STA 30+00 looking right.

Photo No. 29.: Overview looking left near STA 32+00.

Photo No. 30.: Upstream slope looking left near STA 32+00.

Photo No. 33.: Downstream slope from STA 37+50 looking right.

Photo No. 34.: Erosion on downstream slope near STA 54+00.

Photo No. 37.: Upstream slope from STA 57+00 looking left.

Photo No. 38.: Exposed ACBs slightly higher than the crest at the bend near STA 57+10.

Photo No. 41.: Downstream slope from STA 58+00 looking right.

Photo No. 42.: Iron oxide staining at the tow of the downstream slope near STA 63+10.

Photo No. 45.: Downstream slope from STA 70+00 looking left.

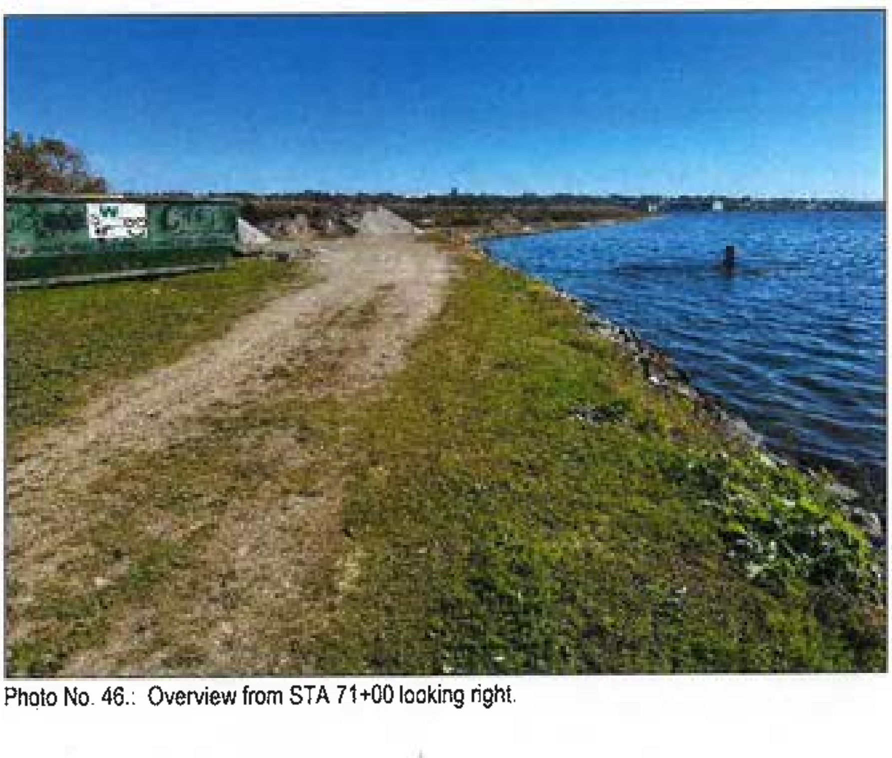


Photo No. 46.: Overview from STA 71+00 looking right.

Photo No. 49.: Upstream slope to the left of the primary spillway. Note erosion.

Photo No. 50.: Crest from the primary spillway looking left.

Photo No. 53.: Overview of embankment looking from the bend 900 feet left of the left abutment looking right.

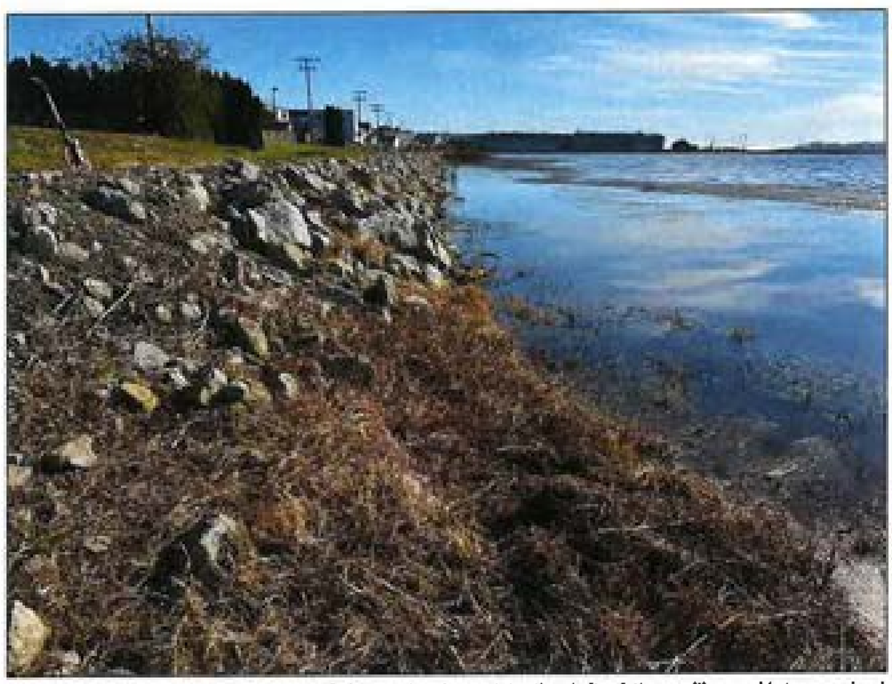


Photo No. 54.: Upstream slope of the embankment to the left of the spillway. Note repaired riprap.

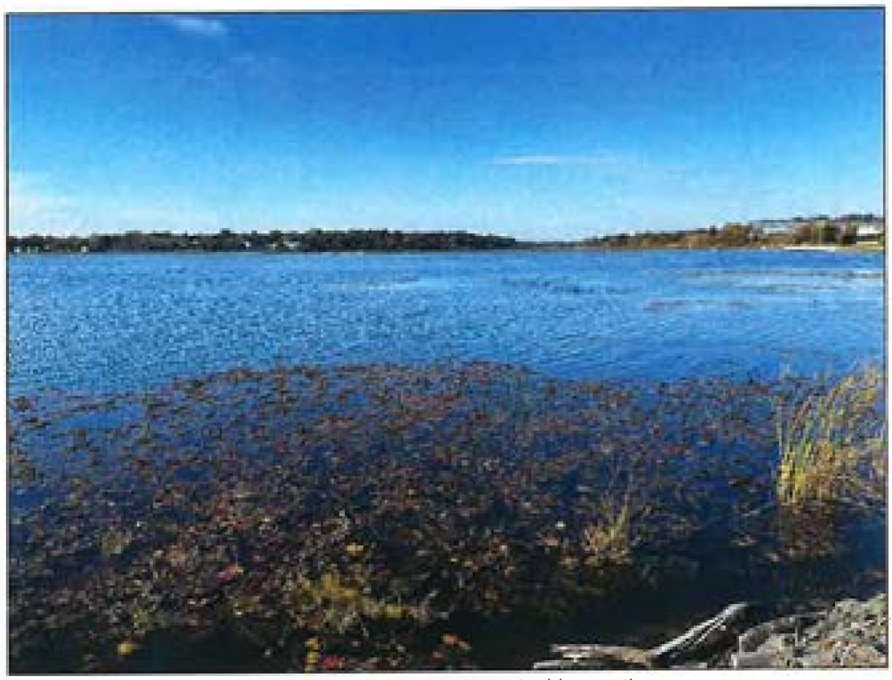


Photo No. 57.: Impoundment from the primary spillway looking north.

APPENDIX E: CONCEPTUAL DESIGN REPORT: NORTH AND SOUTH EASTON POND DAMS RESILIENCY PROJECT

Conceptual Design Report
North and South Easton Pond Dams Resiliency Project

City of Newport
Newport, RI

December 2023

FUSS & O'NEILL

317 Iron Horse Way
Suite 204
Providence, RI 02908

Table of Contents

Conceptual Design Report
North and South Easton Pond Dams Resiliency Project
City of Newport

1 Project Overview

The City of Newport Department of Utilities (NWD) has retained Fuss & O'Neill, Inc. (F&O) to further evaluate two alternatives to improve the resilience of the North Easton Pond Dam (NEPD) and South Easton Pond Dam (SEPD) against future intense coastal and inland storms in Newport and Middletown, Rhode Island. This design report is a continuation from a previous phase of work summarized in Fuss & O'Neill's Report titled Climate Change Resiliency Assessment - Technical Memorandum North and South Easton Pond Reservoirs, dated April 2019. This current report summarizes the following primary elements:

- Updated topographic survey,
- Refined hydrologic and hydraulic analysis for the dams and their contributing watersheds,
- Conceptual resiliency alternatives including designation of the recommended alternative, and
- Updated opinion of costs and a Benefit Cost Analysis following the FEMA Toolkit for the recommended plan.

The recommended alternative is an amended version of Alternative 4 that was presented from the 2019 Climate Resiliency Memorandum. The recommended alternative includes:

- Raising and armoring the South Easton Pond (SEP) south, east, and a portion of the north embankments to elevation 12.1 feet,
- Rasing and armoring the North Easton Pond (NEP) south and west embankments to elevation 13.4 feet,
- Removing and reconstructing the SEP primary spillway to a width of 120-feet and installing a hydraulic crest gate to operate over a range of elevations, and
- Installing a flap and/or tide gate across the Moat channel near J Paul Braga Jr. Memorial Field.

References to "right" and "left" herein are made from the perspective of a person facing in a downstream direction.

2 Data Collection

As part of the current evaluation program, a topographic survey and site visit were completed. These investigations and evaluations are described in the following sections.

2.1 Topographic Survey

A limited topographic survey was completed by Control Point Associates, of Southborough, MA in June and August 2022. The survey references the North American Vertical Datum of 1988 (NAVD88) datum and NAD State Plan (NAD83) coordinates.

Fuss & O'Neill visited the site on August 3, 2022 to field verify conditions identified in the topographic survey at visible portions of the site above the water surface.

The topographic survey was reviewed to identify new information that was not available at the time that the 2019 Climate Resiliency Memorandum was prepared. The survey included the following:

- Bathymetric survey performed within 50 feet of the upstream and downstream area of the two primary spillways.

- Centerline crest elevations obtained at approximately 50-foot intervals at sections of the NEPD and SEPD embankments that did not have previous topographic survey data available. These segments include:
    - South Dam: East and south embankments.
    - North Dam: Embankment between the North and South Ponds and dike embankment east of the Newport Water Plant at 100 Bliss Mine Road.

The topographic survey provided new information regarding the embankment elevations assumed in the 2019 Climate Resiliency Memorandum. The topographic survey data indicated that the general elevations assumed in past evaluations were higher than the current observed conditions. The assumed elevations and updated elevations that were used in the modeling are summarized in Table 1: Updated Elevations. The difference was noted at both NEPD and SEPD.

Table 1: Updated Elevations

Embankments	Lowest Assumed Embankment Elevations (2019)	Lowest Surveyed Embankment Elevations (June and August 2022)
NEPD	13.38	11.55
SEPD	11.13	9.64

Upon further discussion with the City, the apparent source of the discrepancy in embankment elevations was likely due to embankment erosion, which the City frequently repairs, caused by wind generated pond waves . Some of these repairs have been conducted since the previous topographical survey in 2019. Figures 1 and 2 depict photos provided by the City of the NEP embankments after Hurricane Ida (September 1 to 5, 2021) that shows the severe erosion due to the wind generated wave action. Without further improvements, portions of the dam are expected to continue to experience erosion due to these waves.


Figures 1 and 2: Embankment damage following Hurricane Ida on the NEP embankment (Photo provided by City)

The implications of the irregular crest elevations and lower elevations than previously considered in 2019 are as follows:

- The earthen embankments are susceptible to overtop under more frequent and less severe storm conditions than previously identified. The potential for overtopping is increased for both coastal and inland flood.
- Although the City makes repairs to the embankments, the embankments are still unprotected against overtopping and at risk of eroding.

3 Hydrologic & Hydraulic Analysis

3.1 Summary of 2023 Hydrologic & Hydraulic Analysis

An updated hydrologic & hydraulic analysis of the project area was prepared in order to:

- Provide a refined understanding of the existing infrastructure and its ability to accommodate relevant inland and tidal flooding events,
- Analyze the system's vulnerability to present-day and future flood scenarios (as informed by 2070 climate predictions),

- Evaluate two alternatives for improvement of the dams as identified in the 2019 Climate Resiliency Memorandum,
- Recommend an alternative based on hydrologic and hydraulic analysis and summarize the alternative's ability to manage for present-day and 2070 climate conditions, and
  Select an inflow design flood for the improved dams based on accepted guidance.

3.2 Existing Vulnerabilities

Updated topographic survey and rainfall-runoff calculations applied to a new hydraulic model informed the following conclusions regarding the existing infrastructure in the project area:

- The present-day 50-year inland precipitation event could exceed the capacity of both dams and overtop existing low points in their embankments. Under predicted 2070 climate conditions, the SEPD capacity may be exceeded by the 10-year inland flood, potentially resulting in overtopping and failure for what is a substantially smaller storm frequency. Overtopping and resultant erosion is a common mechanism for dam failure.
- Modeling demonstrated a breach of the NEPD embankment during the present-day 50-year inland precipitation event could result in a "domino" breach scenario in which SEPD subsequently overtops and fails, exacerbating flooding at downstream locations.
- SEPD limits the overall system's resilience to saltwater intrusion. Estimates indicate that saltwater intrusion through the SEPD primary spillway could occur during the present-day 20-year coastal surge event and during the 2070 predicted 1-year coastal surge event (i.e., by 2070, saltwater intrusion through the spillway could occur on an annual basis).
- The SEPD primary spillway requires modification to increase its hydraulic capacity for the inflow design flood (IDF).
- Overtopping of the existing dam embankments due to coastal surge could occur during the present-day 100-year (SEP Dam) and 200-year (NEP Dam) events. Overtopping due to coastal surge is predicted during the 5-year (SEP Dam) and 50-year (NEP Dam) events by 2070.

The above information is summarized in Figure 3, which displays key infrastructure elevations as they relate to inland flood elevations calculated by the Fuss & O'Neill hydraulic model and coastal surge elevations as reported by the US Army Corps of Engineers and adjusted by Woods Hole Group in the 2019 Climate Resiliency Memorandum.

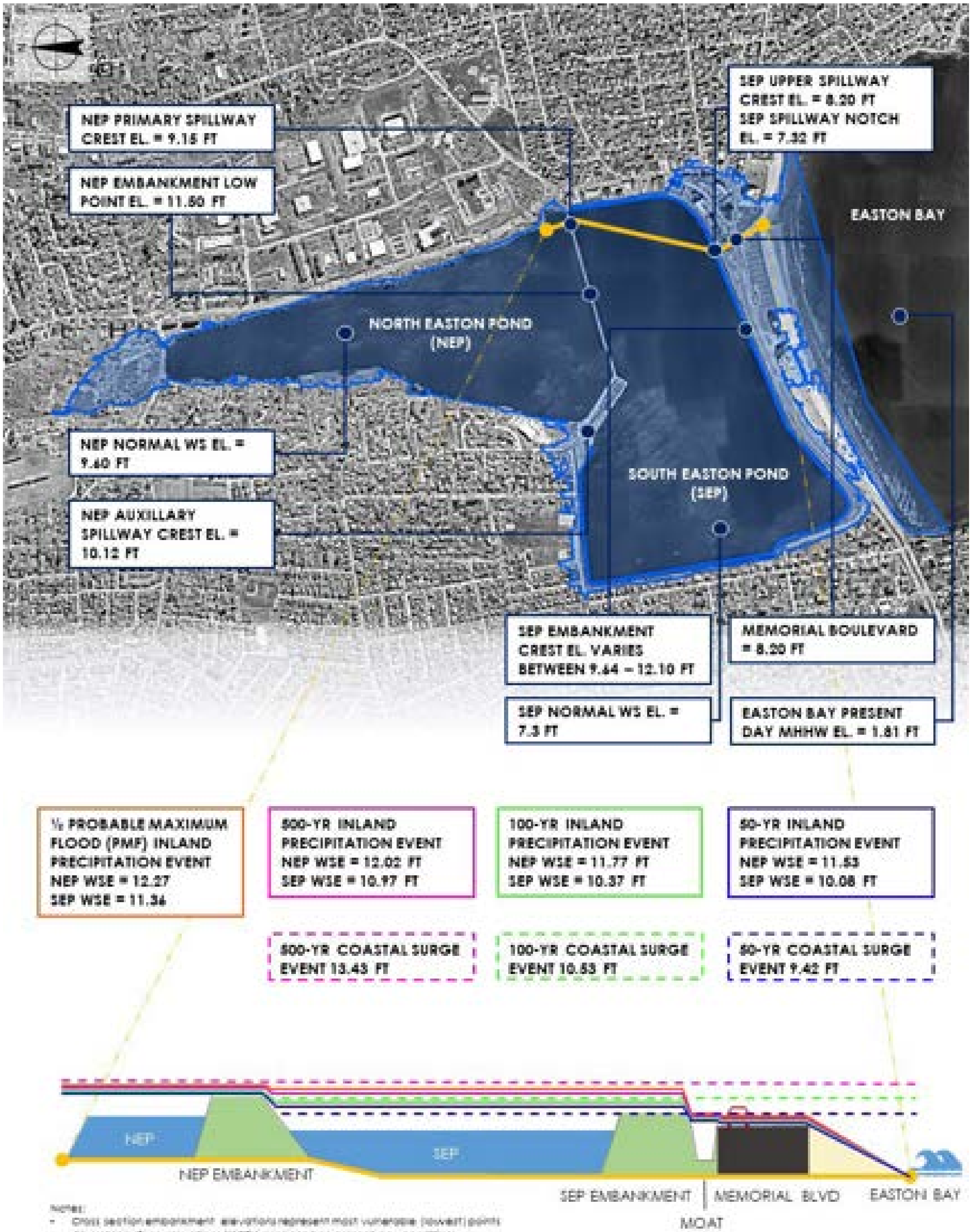


Figure 3: Peak Water Surface Elevation Plan & Profile View for Existing Conditions (Present-Day)

3.3 Proposed Alternatives

Fuss & O'Neill studied two alternatives for potential improvements to the dams. These alternatives, Alternative 2 and Alternative 4, were recommended for further evaluation as part of the 2019 Climate Resiliency Memorandum.

Alternative 2 included:

- Raising the NEP south and west embankments to elevation 13.4 feet to limit overtopping due to inland flooding,
- Raising the SEP south, east, a portion of the north (south of the sediment basin), and a portion of the west (that was not previously raised) embankments to elevation 12.1 feet to limit overtopping due to inland and coastal flooding,
- Reconstructing and armoring dam embankments with articulated concrete block mats to reduce the risk of erosion caused by wave attack, Moat flows, and unlikely overtopping events,
- Retrofitting the NEP auxiliary spillway with a gate structure to provide full closure to elevation 13.4 feet to prevent saltwater intrusion backflowing up the Moat channel,
- Removing and reconstructing the SEP primary spillway with a hydraulic barrier to provide closure to elevation 12.1 feet to prevent saltwater intrusion.

Alternative 4 included:

- Raising the NEP south and west embankments to elevation 13.4 feet to limit overtopping due to inland flooding,
- Raising the SEP south, east, a portion of the north (south of the sediment basin), and a portion of the west (that was not previously raised) embankments to elevation 12.1 feet to limit overtopping due to inland and coastal flooding,
- Reconstructing and armoring dam embankments with articulated concrete block mats to reduce the risk of erosion caused by wave attack, Moat flows, and unlikely overtopping events,
- Retrofitting the NEP auxiliary spillway with a gate structure to provide full closure to elevation 13.4 feet to prevent saltwater intrusion backflowing up the Moat channel,
- Removing the SEP primary spillway, constructing a spillway with a higher hydraulic capacity and installing a gate structure to provide closure to elevation 12.1 feet to prevent saltwater intrusion.

To account for vulnerabilities at the existing dams and to provide resilience for 2070 predicted climate conditions, Fuss & O'Neill recommends proceeding with Alternative 4 which includes several modifications that are recommended as amended by this study. A conceptual drawing of the recommended alternative can be seen in Figure 4. The recommended alternative proposes:

- Raising the NEP south and west embankments to elevation 13.4 feet to limit overtopping due to inland flooding,
- Raising the SEP south, east, a portion of the north (south of the sediment basin), and a portion of the west (that was not previously raised) embankments to elevation 12.1 feet to limit overtopping due to inland and coastal flooding,
- Reconstructing and armoring dam embankments with articulated concrete block mats to reduce the risk of erosion caused by wave attack, Moat flows, and overtopping events,
- Reconstructing the SEP spillway to a width of 120 feet and installing a hydraulic crest gate to range from elevations 5.1 to 12.1, allowing for varied pool elevations and preventing saltwater intrusion through the SEP spillway,

- Constructing a tidal/flap gate in the Moat near J Paul Braga Jr Memorial Field to prevent saltwater intrusion through the NEP auxiliary spillway. The SEP embankment east of the gate will remain at existing conditions to allow stormwater from surrounding neighborhoods into SEP and prevent increased water surface elevations in the moat and surrounding area.

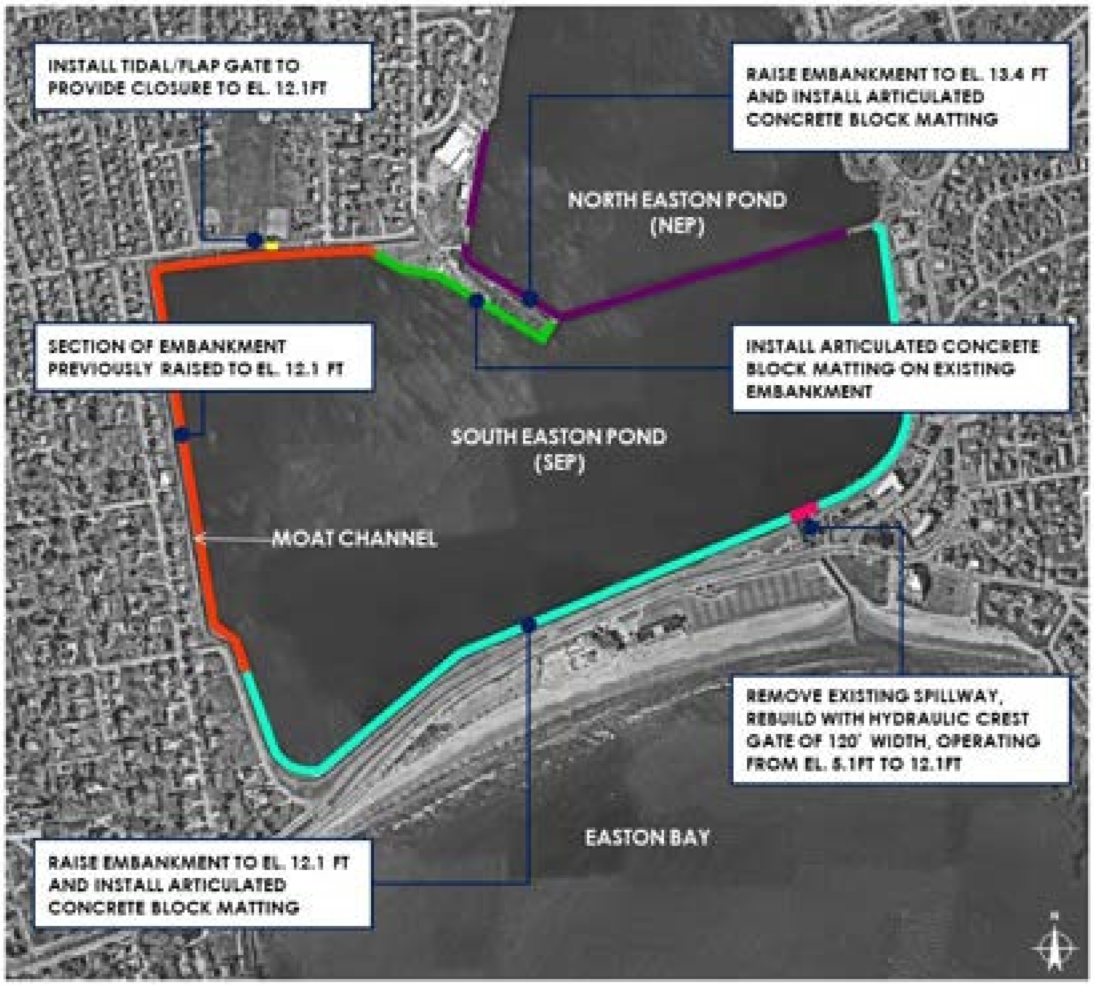


Figure 4: Recommended improvements to NEPD and SEPD.

Table 2 summarizes present-day and 2070 flood protection levels under existing conditions and under the recommended alternative. Figure 5 displays these results at the project site.

Table 2: Comparison of Flood Protection for Existing Conditions and Recommended Alternative

Climate Conditions	Scenario	Overtopping via Inland Flooding	Saltwater Intrusion
Present Day	**Existing Conditions**	10-year storm	10-year coastal surge
	Recommended Alternative	500-year storm	200-year coastal surge
2070	**Existing Conditions**	Lower than 10-year [1]	MHHW, no surge [2]
	Recommended Alternative	500-year storm	20-year coastal surge

[1] The smallest inland flood modeled was that of the 10-year precipitation. Modeling predicted this storm would overtop the existing SEP Dam embankments under predicted 2070 climate conditions.
[2] Modeling suggests the 2070 1-year coastal surge would overtop the SEP Dam primary spillway under existing conditions. Therefore, existing conditions protect only through mean higher high water (high tide) for predicted 2070 climate conditions.

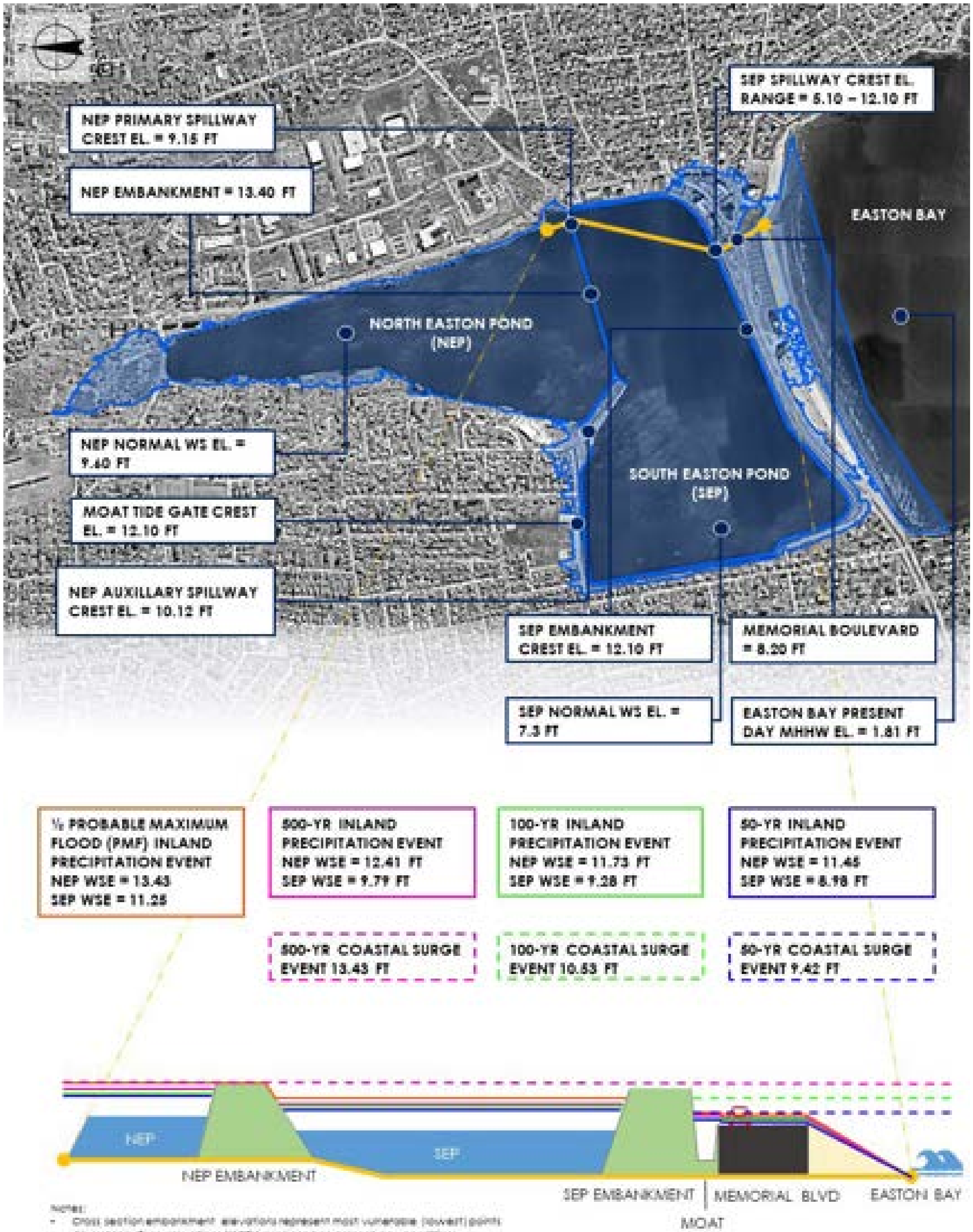


Figure 5: Peak Water Surface Elevation Plan & Profile View for Recommended Alternative (Present-Day)

3.4 Inflow Design Flood

The inflow design flood (IDF) is the storm event for which the dam spillways, embankments, and other components are designed. Fuss & O'Neill determine the IDF at both dams to be the present-day ½ Probable Maximum Flood (PMF) magnitude based on an incremental consequence analysis of dam breach scenarios and their resultant effect on downstream hazard. The PMF is defined as the most severe precipitation and resultant flows that could be expected to occur in a given location. The incremental consequence analysis employed multiple hazard criteria that were measured and compared at a range of locations downstream of the dams. A 120-foot wide spillway and crest gate appear to provide the hydraulic capacity necessary to prepare for (by lowering pre-storm storage in SEP Dam) and accommodate the ½ PMF as the IDF.

4 Recommended Plan

The recommended plan is Alternative 4 with some modifications from the 2019 Climate Resiliency Memorandum. These design changes were initiated after reviewing the updated topographic survey and H&H modeling.

4.1 Embankments

In this updated alternative a total of 7,900 feet of embankments surrounding the NEP and SEP would be raised and armored, and 1,150 feet would just be armored.

The embankments would be:
- Raised to elevation 13.4 feet for the NEP embankments and elevation 12.1 feet for the SEP embankments,
- Armored with Articulated Concrete Block (ACB) matting, similar to the repairs done on the SEP western embankment, to protect against wave action and overtopping, and
- Able to be modified to provide a stable walking path.

4.2 Spillways

The North Pond auxiliary spillway has recently been removed and replaced in kind in the Summer of 2023. No hydraulic gate is proposed for this spillway, however, the spillway replacement design included a wider weir wall footing and therefore the ability to retrofit a gate in the future.

Included in this recommended plan is:
- The removal and reconstruction of the SEP primary spillway and the installation of a hydraulically powered crest gate. The SEP primary spillway would be widened from its current hydraulic width of 100 feet and height of 4.5 feet to have a hydraulic width of 120 feet and height of 7 feet. The gate would connect to constructed concrete piers on either side of the gate.
- An example of crest gates can be seen in Figure 6.

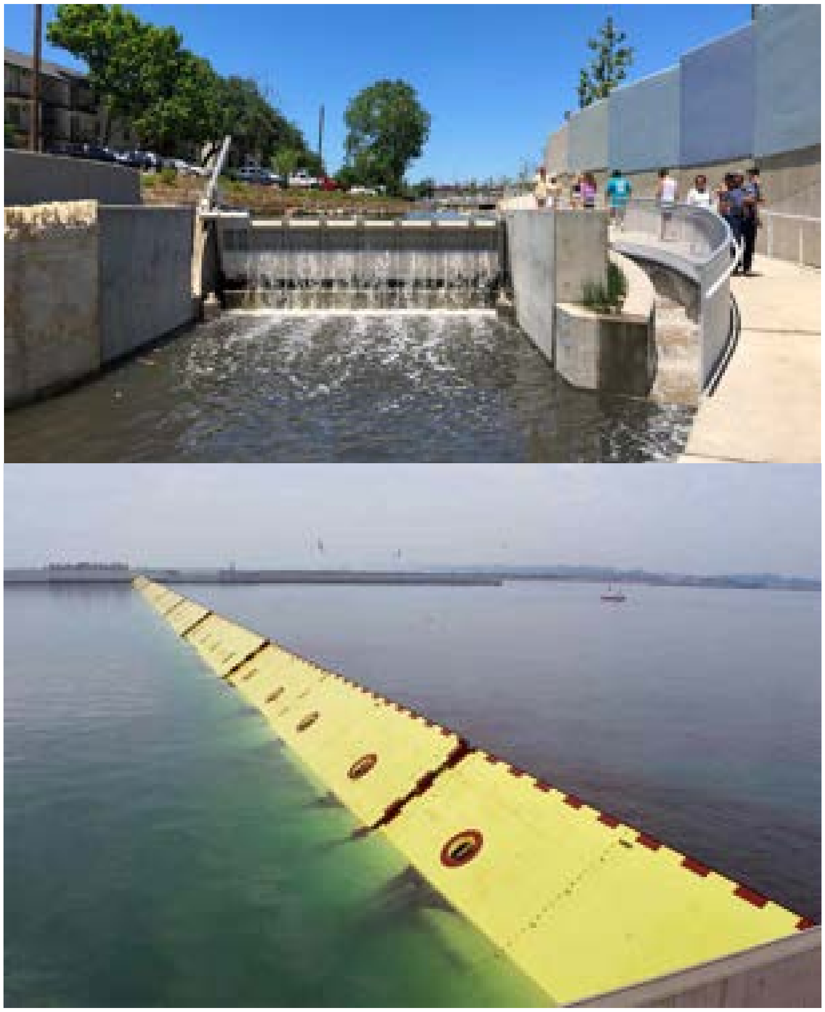


Figure 6: Crest Gate Examples (top http://steelfabinc.com/product/crest-gates/) (bottom: https://www.designboom.com/architecture/mose-flood-barrier-venice-storm-alex-10-05-2020/)

- A prefabricated building with a power connection would be constructed near the gate and would house the controls for the gate. The crest gate could be deployed manually from this building.
- This gate could also be deployed automatically with sensors both in SEP and in the Moat. When the water levels in the pond reach a predesignated (by the NWD) elevation, the gate could lower automatically to allow water to drain from the pond. When the water levels in the Moat increase due to coastal flooding, the gate could be programmed to close to prevent saltwater intrusion from coastal waters flowing into the pond through the spillway.
- This gate would stay in a "partially open" position during daily, non-event days and allow water to flow over it and act in a similar fashion to the existing spillway. During a storm, the gate could be closed to the elevation of the surrounding embankments to give the reservoir a higher capacity as well as prevent saltwater instruction until the water reaches the elevation of the embankments.
- A generator with a gas hook-up would be required to supply power and piers on either side of the gate would be constructed to house the hydraulic components of the gate.

4.3 Tidal/Flap Gate

The gates at J Paul Braga Jr. Memorial Field would span across the Moat and perpendicular to the SEP north embankment.

- This gate would be a tidal gate, a flap gate, or a combination of both.
- The top of the gate would be at elevation 12.1 feet and would tie into the Field and the SEP north embankment.
- This gate would allow one-way flow to allow water to flow from the NEP auxiliary spillway through the Moat and discharge to Easton's Bay, however, during storm surge conditions the gate in conjunction with the SEP embankment would prevent saltwater intrusion into SEP.
- This gate is automatic, they do not require human intervention outside of maintenance.

Whether the gate is a tidal or flap gate depends on how high the flows in the diversion channel are during normal day conditions. A combination of these gates could be constructed and would operate in the sense that the flap gate would be built into the tidal gate. How easily the flap gate opens to allow for flow through it can be adjusted. Figure 7 shows an example of a tidal gate.

Figure 7: Tidal gate example (https://watermanusa.com/products/large-custom-gates/self-regulating-tide-gates/)

5 Opinion of Costs

The budgetary opinion of construction cost associated with embankment raising and armoring alternatives and hydraulic barriers are summarized in Table 3. These costs include a 25 percent contingency and are typically expected to be accurate within -15% to +30% (depending on market conditions and other factors at the time of construction), resulting in a stated construction cost range.

It should also be noted that the costs only include construction costs and do not include long-term operation and maintenance costs. Detailed opinions of cost are provided in Attachment D, based on assessments of material quantities corresponding to conceptual plan.

Table 3: Order-of-Magnitude Opinions of Probable Construction Costs for Conceptual Alternatives

Budgetary Opinion of Cost	-15%	+30%
$43.1M	$37.9M	$53.4

6 Benefit Cost Analysis

Fuss & O'Neill prepared a Benefit-Cost Analysis (BCA) to evaluate the cost effectiveness of the recommended alternative based on the FEMA methodology that will be the basis of any future FEMA funding. The BCA Memorandum is included in Attachment E and includes a summary of the BCA, supporting references, and the preliminary output from the BCA Toolkit Version 6.0 Software. The FEMA BCA is a method that determines the future risk reduction benefits of a hazard mitigation project and compares those benefits to its costs. The result is a Benefit-Cost Ratio (BCR). A project is considered cost-effective when the BCR is 1.0 or greater.

The BCR is calculated by comparing the budgetary opinion of cost with the economic benefit associated with mitigating damages from the relevant hazard events. The hazard events evaluated as part of the BCA include inland flooding, coastal storm surge, and wind attack. Benefits are calculating using a combination of data from the H&H analyses, historical damaged experienced by the City of Newport at the dams, as well as coastal storm surge data from previous technical reports to professionally estimate damages per the FEMA BCA guidelines. Benefit items include but are not limited to the dam itself, utilities, structures, as well as the safety of the general public in the downstream area.

Based on the assumptions and methodology outlined in the BCA Analysis Memorandum, the BCR provided for the North Easton Dam project is 1.20, which indicates that the project is cost effective in accordance with FEMA BCA guidance. Detailed output from the FEMA Toolkit is included within the BCA Analysis Memorandum.

7 Next Steps

The following major steps are recommended to implement this project. This list is not intended to be all inclusive but to summarize the major next steps.

- Apply for FEMA's Building Resilient Infrastructure and Communities (BRIC) grant. The program would fund 75% of the final design and construction costs. A 25% match would need to be provided by the applicant which would be about $10.8 million for the recommended alternative.
- Meet with Rhode Island Emergency Management Agency (RIEMA) staff to review the hydraulic modeling and confirm the design criteria and recommendations. The hydraulic model developed for this project is complicated and unusual and buy-in from RIEMA is recommended.
- Meet with Rhode Island Coastal Resources Management Council (CRMC) to review the project and confirm permitting pathways for the improvements.
- Once funding is secured, final engineering design and permitting of the recommended alternative should be completed. As part of this process, the construction o[inions of cost should be updated and refined. This task should also define operation, maintenance and training requirements for this project.
- Right-of-way access to the allow construction of the proposed tidal/flap gate at J Paul Braga Jr. Memorial Field should be investigated. It is understood that this Field is currently City owned property.

Attachment A

Previous Reports and References

The following report was referenced during the completion of this report:

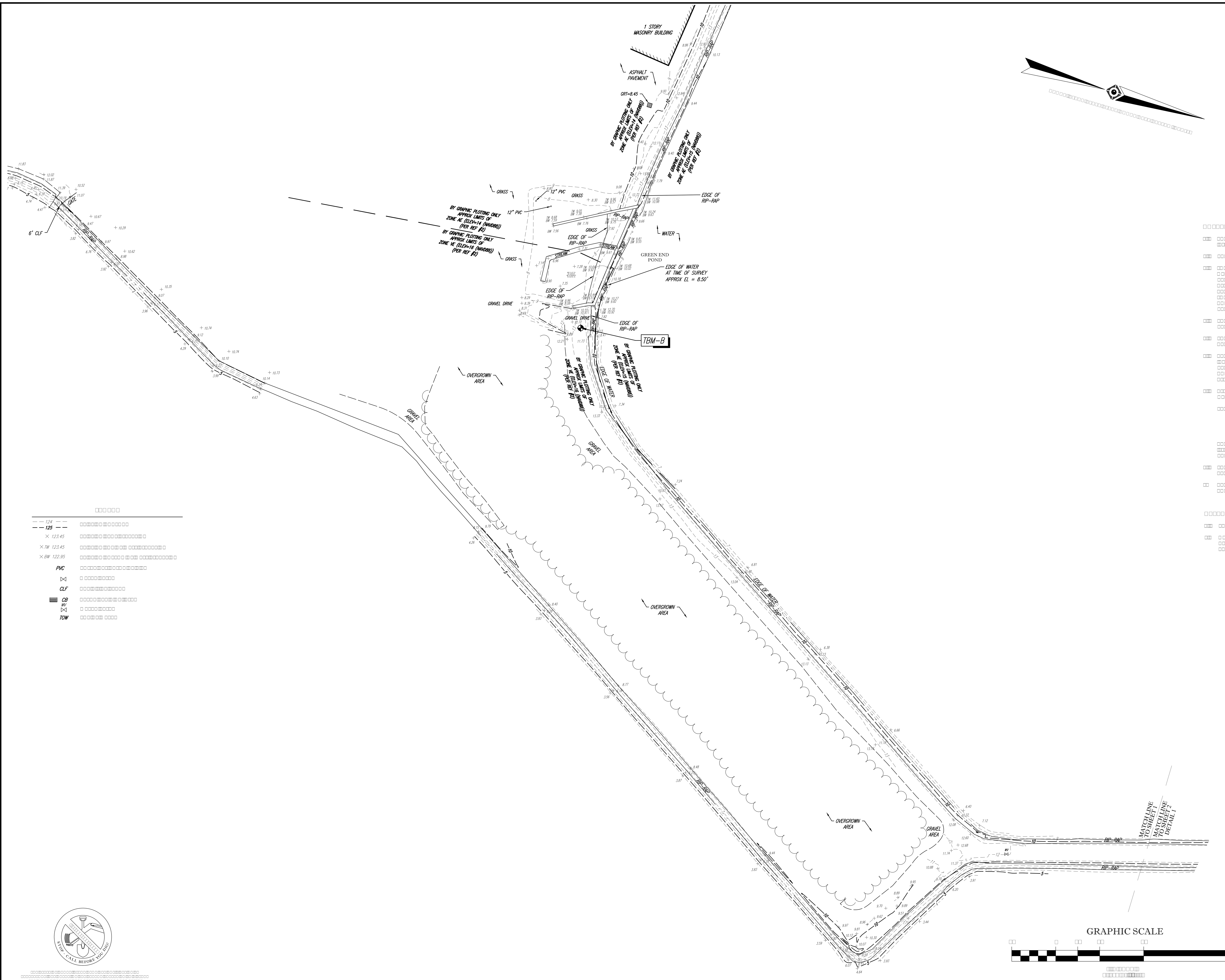
1. "Climate Resiliency Assessment Technical Memorandum North and South Easton Pond Reservoirs", Fuss & O'Neill and Woods Hole Group, April 2019.
2. Easton Pond North Dam Visual Inspection/Evaluation Report, Pare Corporations, August 22, 2013.
3. "Easton Pond North Dam Inspection Report Checklist", McMahon Associates, May 23, 2011.
4. "Final Report Easton Pond Dam and Moat Study", Fuss & O'Neill, September 2007.
5. "Plan of Waste-Way in North dam at Easton Pond", Newport, January 1898.
6. "Dam Inspection Report", Department of Environmental Management, October 18, 1985.
7. Site Photographs, 1980.
8. Site Photographs, October 1980, May 1978.

The following were referenced during the completion of the visual inspection and preparation of this report and the development of the recommendation presented herein:

1. "Guidelines for Reporting the Performance of Dams" National Performance of Dams Program, August 1994.
2. "ER 110-2-106-Recommended Guidelines for Safety Inspection of Dams", Department of the Army, September 26, 1979.
3. "Design of Small Dams", US Department of the Interior Bureau of Reclamation, 1987.

Attachment B

Topographic Survey



LOCUS MAP
© 2013 ESRI WORLD STREET MAPS
NOT TO SCALE

COMPREHENSIVE BOUNDARY SURVEY I

2. OTHER TYPE OF SURVEY: MEASUREMENT SPECIFICATION:
DATA ACCUMULATION SURVEY III
(PLANIMETRIC SURVEY, TOPOGRAPHIC SURVEY)
VERTICAL CONTROL STANDARD V-3
TOPOGRAPHIC SURVEY ACCURACY T-1

CHARLES E. LENT

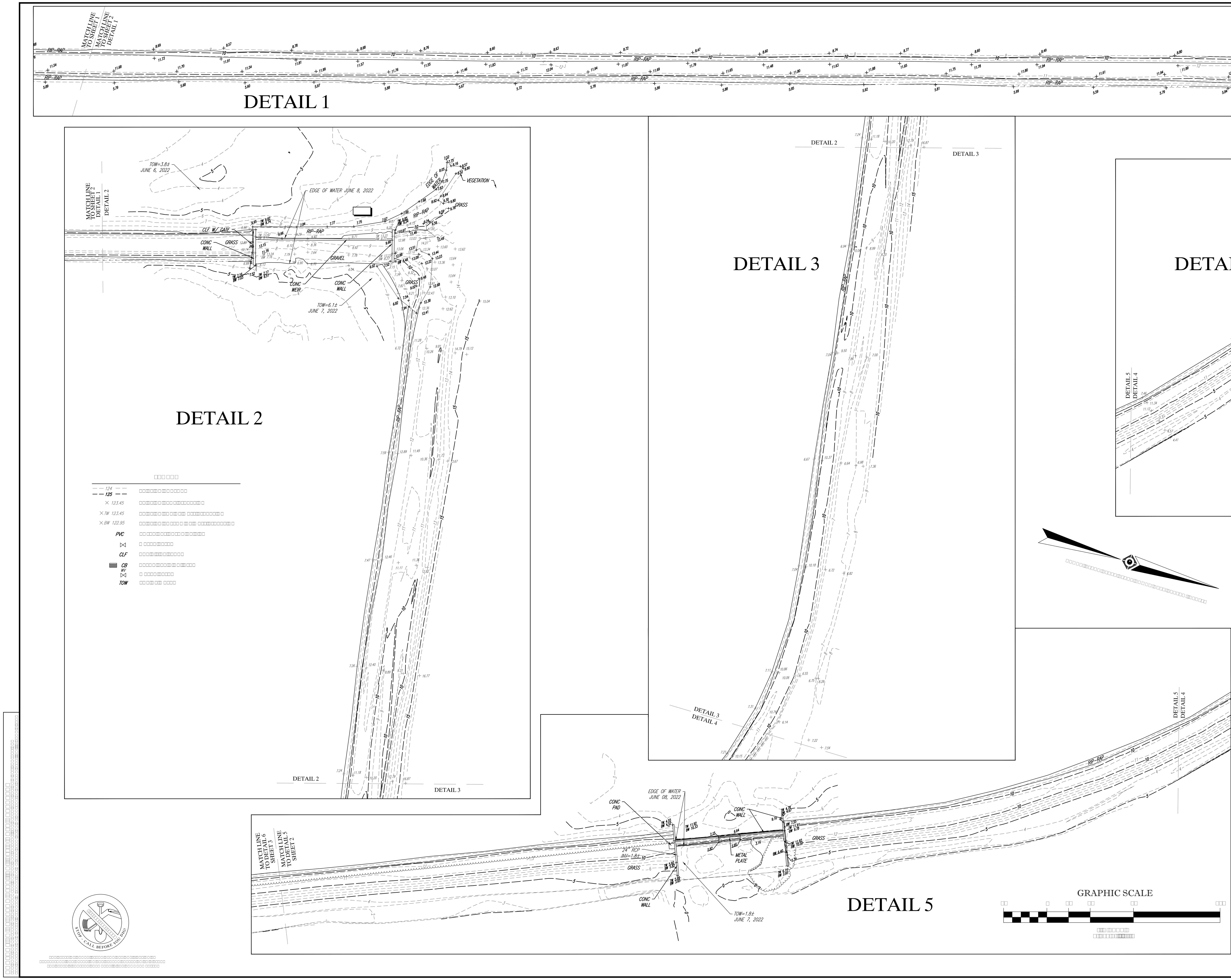
GRAPHIC SCALE

TOPOGRAPHIC SURVEY
FUSS & O'NEILL, INC.

CONTROL POINT ASSOCIATES, INC.
352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
508.948.3000 - 508.948.3003 FAX
WWW.CPASURVEY.COM

ALBANY, NY 518-217-5010
CHALFONT, PA 215-712-9800
HAUPPAUGE, NY 631-580-2645
MANHATTAN, NY 646-780-0411
MT LAUREL, NJ 609-857-2099
WARREN, NJ 908-668-0099

1 of 3



COMPREHENSIVE BOUNDARY SURVEY I

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(PLANIMETRIC SURVEY, TOPOGRAPHIC SURVEY)
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TOPOGRAPHIC SURVEY

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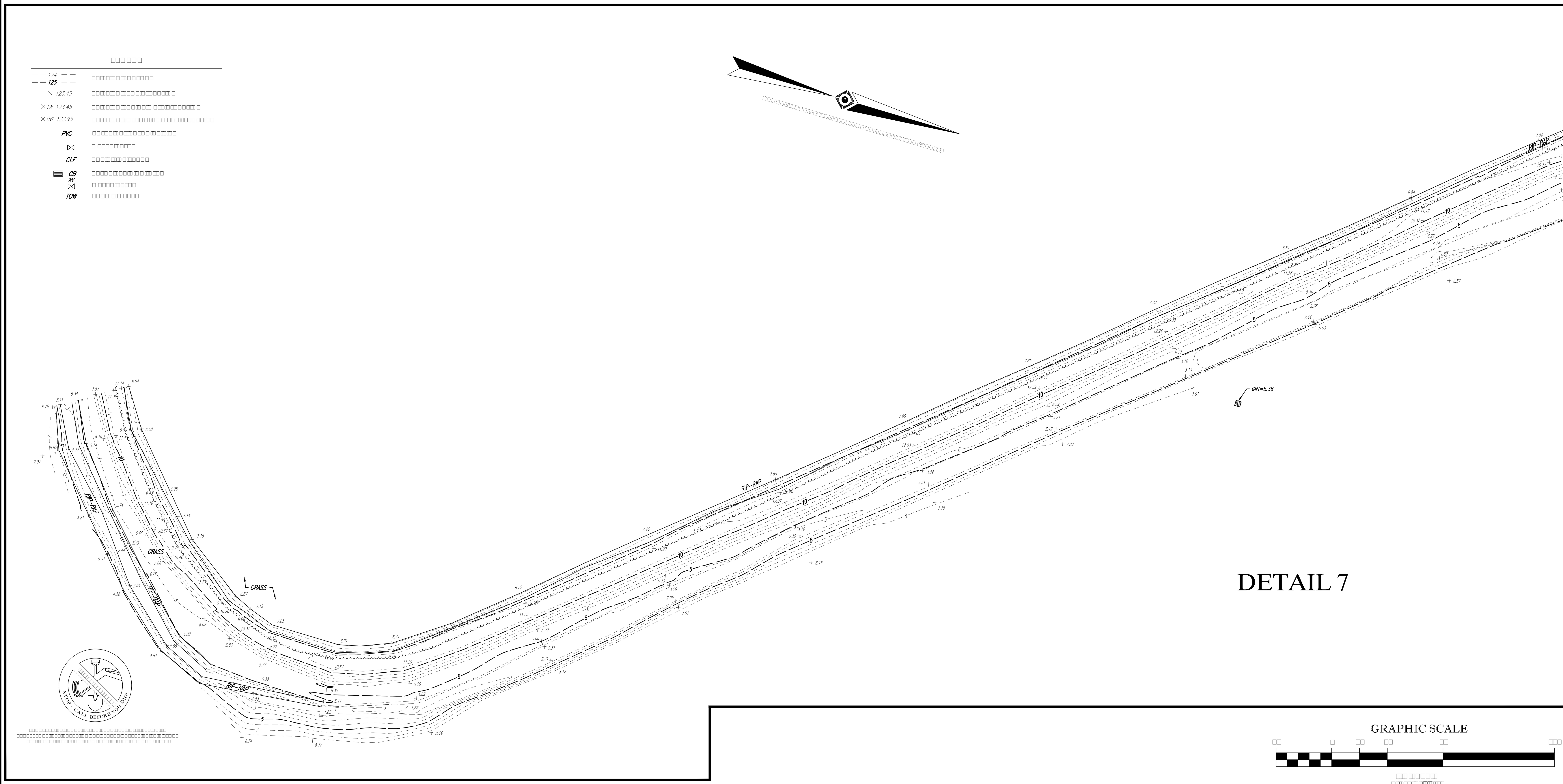
DETAIL 6

DETAIL 7



GRAPHIC SCALE

COMPREHENSIVE BOUNDARY SURVEY I

2. OTHER TYPE OF SURVEY: MEASUREMENT SPECIFICATION:

DATA ACCUMULATION SURVEY III

(PLANIMETRIC SURVEY, TOPOGRAPHIC SURVEY)

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3 3

Attachment C

Hydraulic and Hydrologic Technical Memorandum

North and South Easton Pond Dams
2023 Hydrologic & Hydraulic Analysis

City of Newport
Newport, Rhode Island

December 2023

FUSS & O'NEILL

317 Iron Horse Way
Suite 204
Providence, RI 02908

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North and South Easton Ponds
2023 Hydrologic and Hydraulic Analysis

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Figures | Page

Appendices | End of Report

1 Executive Summary

North Easton Pond Dam (NEP Dam) and South Easton Pond Dam (SEP Dam) are critical drinking water infrastructure for the City of Newport, Rhode Island and surrounding communities. The dams have been subject to inland and tidal flood events and associated damages. This technical memorandum summarizes a hydrologic and hydraulic analysis performed by Fuss & O'Neill to evaluate alternatives for improving the climate resilience of the dams and their appurtenances. The analyses presented in this memorandum builds upon and updates previous analyses carried out by Fuss & O'Neill.

The main goals of this 2023 Hydrologic and Hydraulic Analysis are as follows:

- Provide a refined understanding of the existing infrastructure and its ability to accommodate relevant inland and tidal flooding events
- Analyze the system's vulnerability to present-day and future flood scenarios (as informed by 2070 climate projections)
- Evaluate two alternatives for improvement of the dams as identified in a previous report prepared by Fuss & O'Neill
- Recommend an alternative based on hydrologic and hydraulic analyses and summarize the alternative's ability to accommodate present-day and 2070 climate conditions
- Select an inflow design flood for the dams based on accepted design standards and guidance

Methodology, model inputs, assumptions, and results are described in the following pages. The conclusions most relevant to the goals of the analysis can be summarized as follows:

1. **<u>Existing Vulnerabilities</u>**

- Modeling indicated the present-day 50-year inland precipitation event could exceed the capacity of both dams by overtopping existing low points in their embankments, and cause subsequent dam failures. Modeling indicated the predicted 2070 10-year inland precipitation event could exceed the SEP Dam capacity, potentially resulting in overtopping and failure.
- Modeling demonstrated a breach of the NEP Dam embankment during the present-day 50-year inland precipitation event could result in a "domino" breach scenario in which the SEP Dam subsequently overtops and fails, exacerbating flooding at downstream locations.
- SEP Dam limits the overall system's resilience to saltwater intrusion. Estimates indicate that saltwater intrusion through the SEP Dam primary spillway could occur during the present-day 20-year coastal surge event and during the 2070 predicted 1-year coastal surge event (i.e., by 2070, saltwater intrusion through the spillway could occur on an annual basis).
- Overtopping of the existing dam embankments due to coastal surge could occur during the present-day 100-year (SEP Dam) and 200-year (NEP Dam) events. Overtopping due to coastal surge is predicted during the 5-year (SEP Dam) and 50-year (NEP Dam) events by 2070.

2. **<u>Recommended Alternative (Alternative 4)</u>**

Fuss & O'Neill studied two alternatives for potential improvements to the dams. These alternatives, Alternative 2 and Alternative 4, were recommended for further evaluation as part of a previous assessment of the dams' resilience to the effects of climate change. To account for vulnerabilities at the existing dams and to provide resilience for 2070 predicted climate conditions, Fuss & O'Neill recommends proceeding with Alternative 4 (as amended by this study). The recommended alternative proposes:

- Raising NEP Dam embankment crest to elevation 13.4 to limit overtopping due to inland flooding
- Raising the SEP Dam embankment crest to elevation 12.1 to limit overtopping due to inland and coastal flooding
- Reconstructing the SEP Dam spillway to a width of 120 feet and installing a hydraulic crest gate to range from elevations 5.1 to 12.1, allowing for varied pool elevations and preventing saltwater intrusion through the SEP Dam spillway
- Constructing a tidal/flap gate in the moat near J Paul Braga Jr Memorial Field to prevent saltwater intrusion through the NEP Dam auxiliary spillway. The SEP Dam embankment east of the gate will remain at existing elevations to allow stormwater from surrounding neighborhoods into SEP and prevent increased water surface elevations in the moat and surrounding area
- Reconstructing and armoring dam embankments with articulated concrete block mats to reduce the risk of erosion caused by wave attack, moat flows, and unlikely overtopping events

Table 1 summarizes present-day and 2070 flood protection levels under existing conditions and under the recommended alternative. Figure 1 and Figure 2 display selected results at the project site.

Table 1: Comparison of Flood Protection for Existing Conditions and Recommended Alternative

Climate Conditions	Scenario	Overtopping via Inland Flooding	Saltwater Intrusion
Present-Day	Existing Conditions	10-year storm	10-year coastal surge
	Recommended Alternative	500-year storm	200-year coastal surge
2070	Existing Conditions	Lower than 10-year [1]	MHHW, no surge [2]
	Recommended Alternative	500-year storm	20-year coastal surge

[1] The smallest inland flood modeled was that of the 10-year precipitation. Modeling predicted this storm would overtop the existing SEP Dam embankments under predicted 2070 climate conditions.
[2] Modeling suggests the 2070 1-year coastal surge would overtop the SEP Dam primary spillway under existing conditions. Therefore, existing conditions protect only through mean higher high water (high tide) for predicted 2070 climate conditions.

3. Inflow Design Flood

The inflow design flood (IDF) is the storm event for which the dam spillways, embankments, and other components are designed. Fuss & O'Neill determined the IDF at both dams to be the present-day ½ probable maximum flood (PMF) magnitude based on an incremental consequence analysis of dam breach scenarios and their resultant effect on downstream hazard. The PMF is defined as the most severe precipitation and resultant flows that could be expected to occur in a given location. The incremental consequence analysis employed multiple hazard criteria that were measured and compared at a range of locations downstream of the dams. A 120-foot wide spillway and crest gate appear to provide the hydraulic capacity necessary to prepare for (by lowering pre-storm storage in SEP Dam) and accommodate the ½ PMF as the IDF.

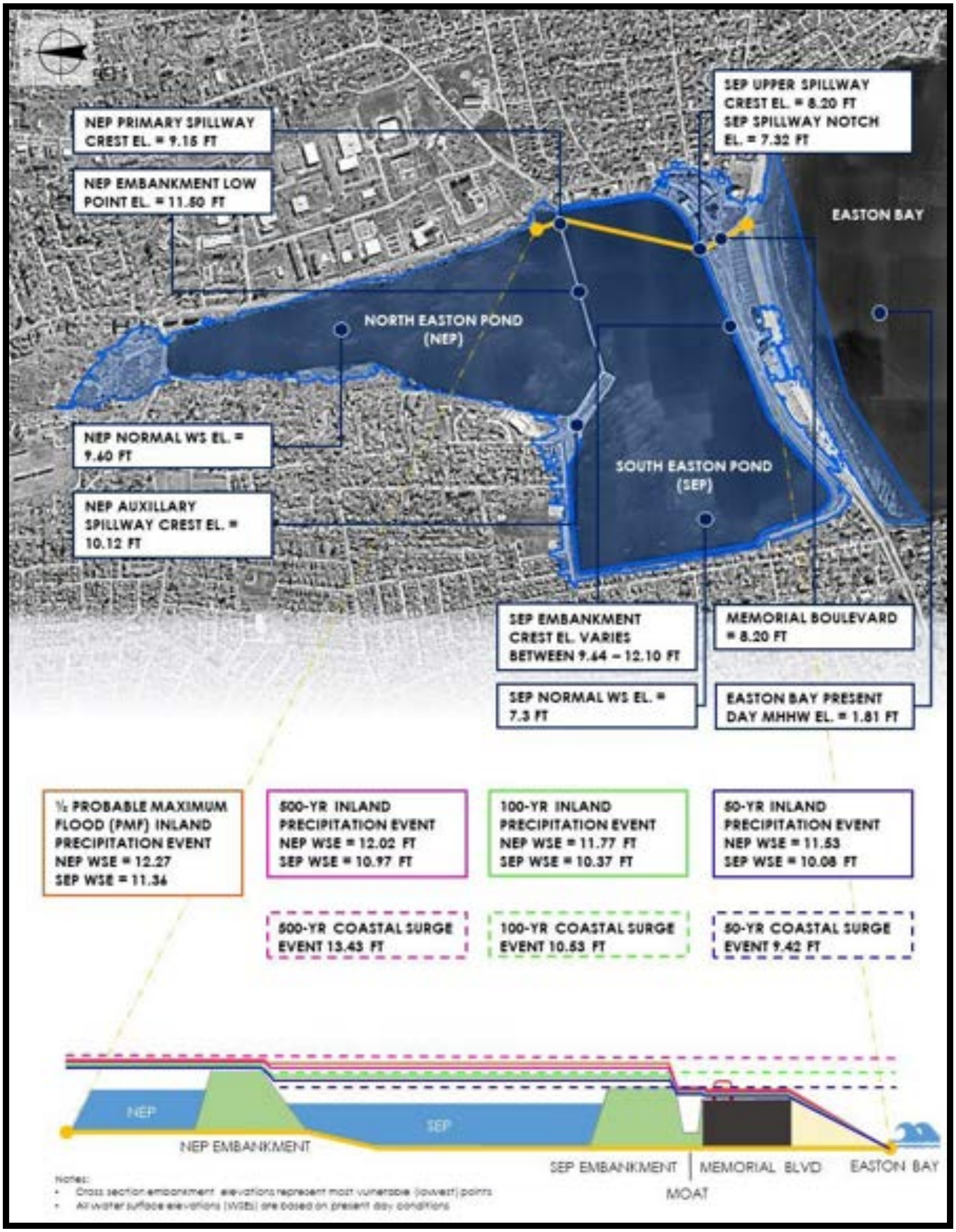


Figure 1: Peak Water Surface Elevations Plan & Profile View for Existing Conditions (Present-Day)

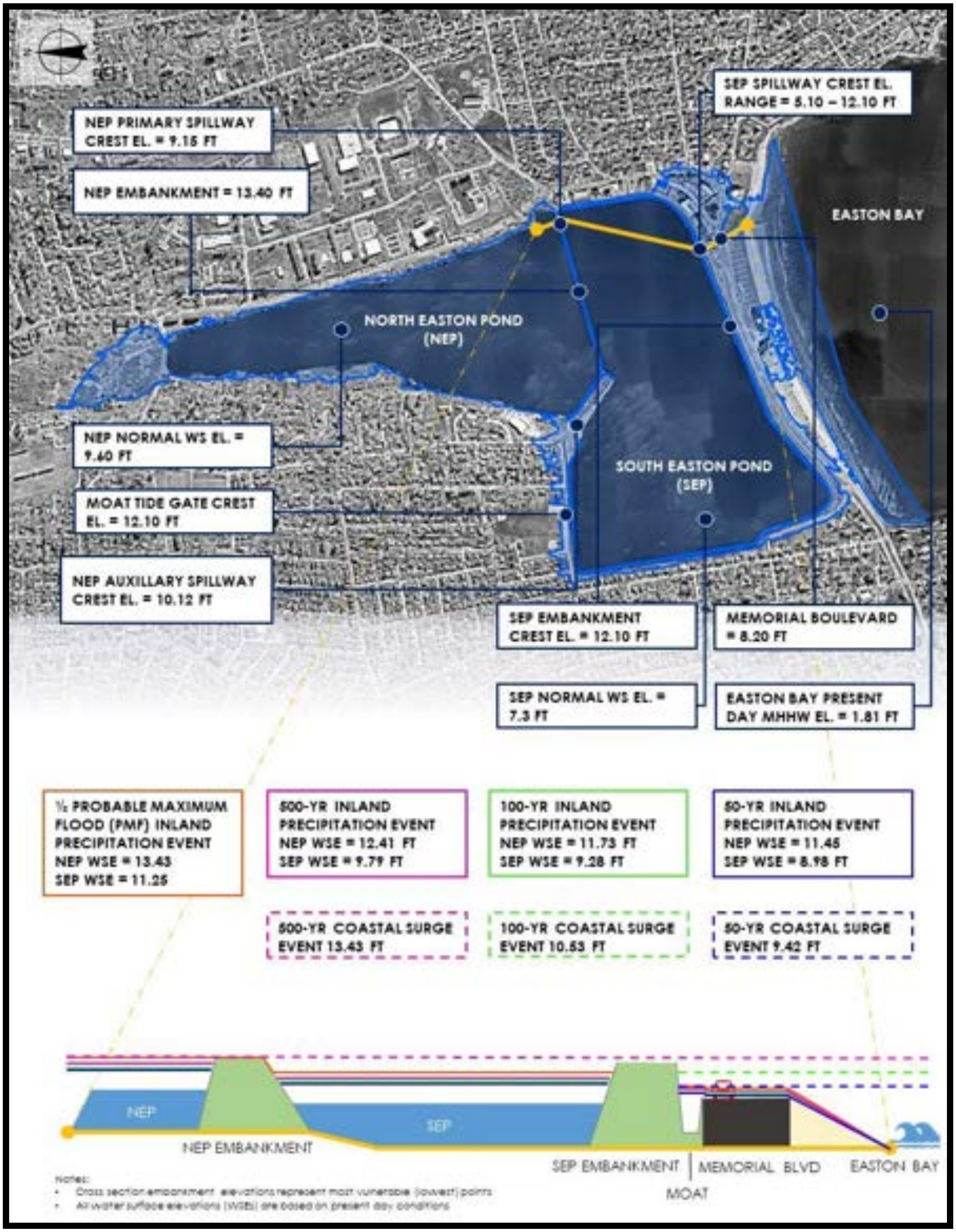


Figure 2: Peak Water Surface Elevations Plan & Profile View for Recommended Alternative (Present-Day)

2 Introduction

The hydrologic and hydraulic analyses discussed in this report evaluated vulnerabilities and studied proposed improvements at North Easton Pond Dam (NEP Dam) and South Easton Pond Dam (SEP Dam). Together, the dams, their appurtenances, and their reservoirs represent critical drinking water infrastructure for the City of Newport, Rhode Island, and neighboring communities. The City of Newport engaged Fuss & O'Neill to analyze and provide recommendations to mitigate present-day and future flood hazard vulnerabilities in the project area. Ultimately, the data presented in this report will inform future design in addition to benefit-cost analysis calculations in support of funding applications.

2.1 Existing Conditions

The City of Newport Department of Utilities Water Division (NWD) operates and maintains the raw water supply reservoirs, embankments, withdrawal/pumping systems, and treatment/distribution systems for residents and businesses in the City of Newport, the Town of Middletown, and the Town of Portsmouth. NEP Dam and SEP Dam are major components of this system. Their reservoirs contain a substantial portion of the NWD's drinking water supply: NEP Dam (Rhode Island State ID 584) and SEP Dam (Rhode Island State ID 585) each impound approximately 1,000 acre-feet of water at their respective normal pool elevations. Figure 3 displays the dams and the surrounding project area.

2.1.1 North Easton Pond Dam

NEP Dam is located immediately upstream of SEP Dam. Its embankment is approximately 2,800 feet long, including a portion running west to east that divides the two ponds. This portion could be considered an embankment of either dam but is viewed as the embankment for the NEP Dam under this analysis. A system of water mains and intake pipes reportedly runs below the NEP Dam embankment to the NWD Station 1 treatment facility. NEP Dam's primary spillway, a 130-foot-long concrete weir lined with riprap, is located at the southeastern corner of the reservoir. A 100-foot-wide auxiliary spillway and its discharge channel are situated at the southwestern corner of the reservoir, directly to the south of the NWD treatment plant. A vegetated sediment basin lies to the south of the NEP Dam auxiliary spillway between the two impoundments.

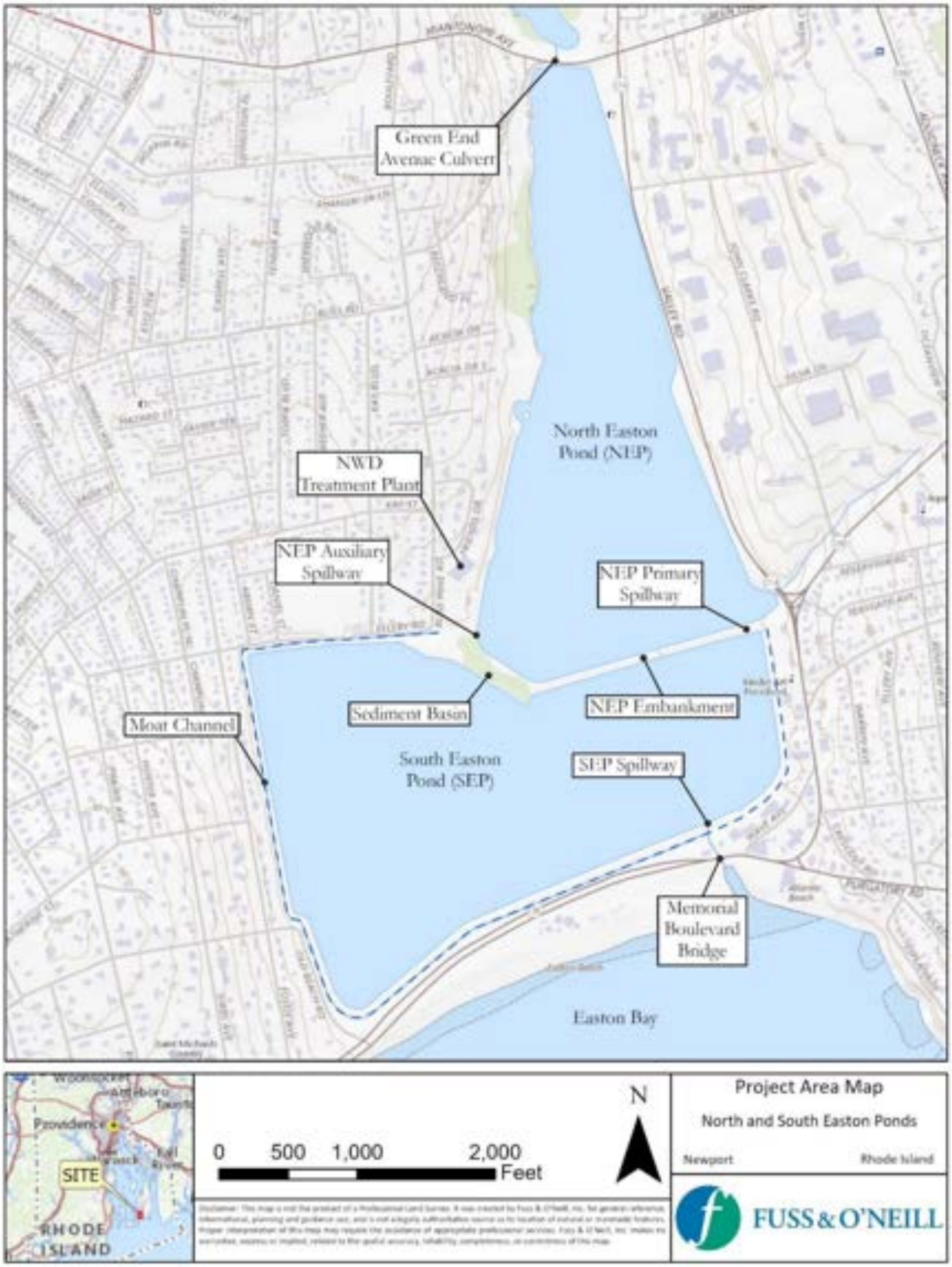


Figure 3: Overall Project Area Map for North and South Easton Ponds

2.1.2 South Easton Pond Dam

SEP Dam is directly downstream and south of NEP Dam. SEP Dam is surrounded by critical infrastructure including a state highway (Memorial Boulevard, Route 138A), an ultraviolet stormwater disinfection system, a sewage pumping station, and a public beach (Easton Beach). There are numerous residential and commercial properties in the direct vicinity of the dam, in addition to the roads and utilities that connect them. South Easton Pond was constructed in portions of what was previously a low-lying marsh area, necessitating a ringed embankment and moat around the impoundment.

The crest of the earthen embankment is generally narrow with steep side slopes. Recent reconstruction widened and armored the embankment with articulated concrete block (ACB) mats to mitigate erosion damage from frequent reservoir wave attack and flood flows in the moat channel.

The moat conveys discharge from the NEP Dam auxiliary spillway, as well as several stormwater outfalls from adjacent neighborhoods. These flows ultimately merge with discharge from the SEP Dam primary spillway, travel under the Memorial Boulevard Bridge, and outlet to Easton Bay. The moat channel has limited hydraulic capacity resulting in flow velocities that can damage SEP Dam's earthen embankments. These velocities are particularly concerning at the southwestern corner of SEP Dam, adjacent to Old Beach Road, and along the SEP Dam's southern embankment.

2.2 Previous Hydrologic and Hydraulic Analyses

Where appropriate, the current analyses made use of data from previous hydrologic and hydraulic reports produced by the City of Newport and Fuss & O'Neill. In some cases, previous reporting and data were updated or modified to reflect current conditions at the site and/or to incorporate new methodology and modeling techniques.

2.2.1 Easton Pond Dam and Moat Study, September 2007

This report was completed by Fuss & O'Neill to develop a flood hazard mitigation strategy at the dams and their associated moat system. A hydraulic model of the moat was created using the Hydraulic Engineering Center's River Analysis System (HEC-RAS). The model incorporated surveyed cross-section geometry and visual field assessments of Manning's roughness coefficient. Flood hydrographs from a TR-20 hydrologic model informed steady-state flow rates. This model and the associated reporting served as the basis for further analysis conducted in 2019.

2.2.2 Climate Resiliency Assessment Technical Memorandum North and South Easton Pond Reservoirs, April 2019

This technical memorandum, referred to as the "2019 Climate Resiliency Memorandum" throughout the following pages, was produced by Fuss and O'Neill and Woods Hole Group to summarize threats posed by climate change and to identify means of promoting climate resiliency at the dams. Fuss & O'Neill updated the 2007 Easton Pond Dam and Moat Study as a part of the 2019 Climate Resiliency

Memorandum. Rainfall depths used for hydrologic modeling were updated to incorporate precipitation values from the Rhode Island Department of Environmental Management (RIDEM) Stormwater Design and Installation Standards Manual. The project included modeling of the ½ probable maximum flood (½ PMF) as the presumed inflow design flood (IDF) for the dams. Ultimately, this report provided a high-level review of flood- and climate-related hazards at the dams and suggested further study of two alternatives for improvements, referred to as Alternative 2 and Alternative 4. Both alternatives included raising the dam embankments, stabilizing currently unarmored embankments with ACB matting, and installation of crest gates at the dam spillways to reduce the risk of saltwater intrusion from coastal flooding. Alternative 4 differed from Alternative 2 in that it included a modified primary spillway at SEP Dam to provide additional hydraulic capacity and flexibility in reservoir water levels.

3 2023 Hydrologic Analysis

Hydrologic modeling for the current analysis built upon that completed for the 2019 Climate Resiliency Memorandum. Previous data were updated and incorporated within the Hydraulic Engineering Center's Hydrologic Modeling System (HEC-HMS). The HEC-HMS model employed Soil Conservation Service (SCS) Curve Number and TR-55 Time of Concentration methodologies to develop rainfall-runoff estimates for individual subbasins under a range of storm events.

The delineated watershed contributing to the project area was adapted from the 2019 Climate Resiliency Memorandum after a review of the Newport stormwater system and the incorporation of updated LiDAR topography. The total watershed area contributing to North and South Easton ponds was determined to be approximately 4.37 square miles. The total watershed area contributing to the moat and its eventual discharge to Easton Bay is approximately 5.31 square miles. Figure 4 displays the watershed and subbasins developed for the current analysis. Characteristics of the delineated watershed and individual subbasins are included in Appendix A.

3.1 Curve Number and Time of Concentration

Subbasin curve numbers developed for the 2019 Climate Resiliency Memorandum were reviewed and compared against current land use data (USGS, 2018), aerial imagery, and NRCS soil types (NRCS, 2019). This analysis indicated curve numbers from the 2019 Climate Resiliency Memorandum remain accurate for use in the current model.

Time of concentration values for modeled subbasins were adjusted from the 2019 analysis using updated survey and LiDAR data.

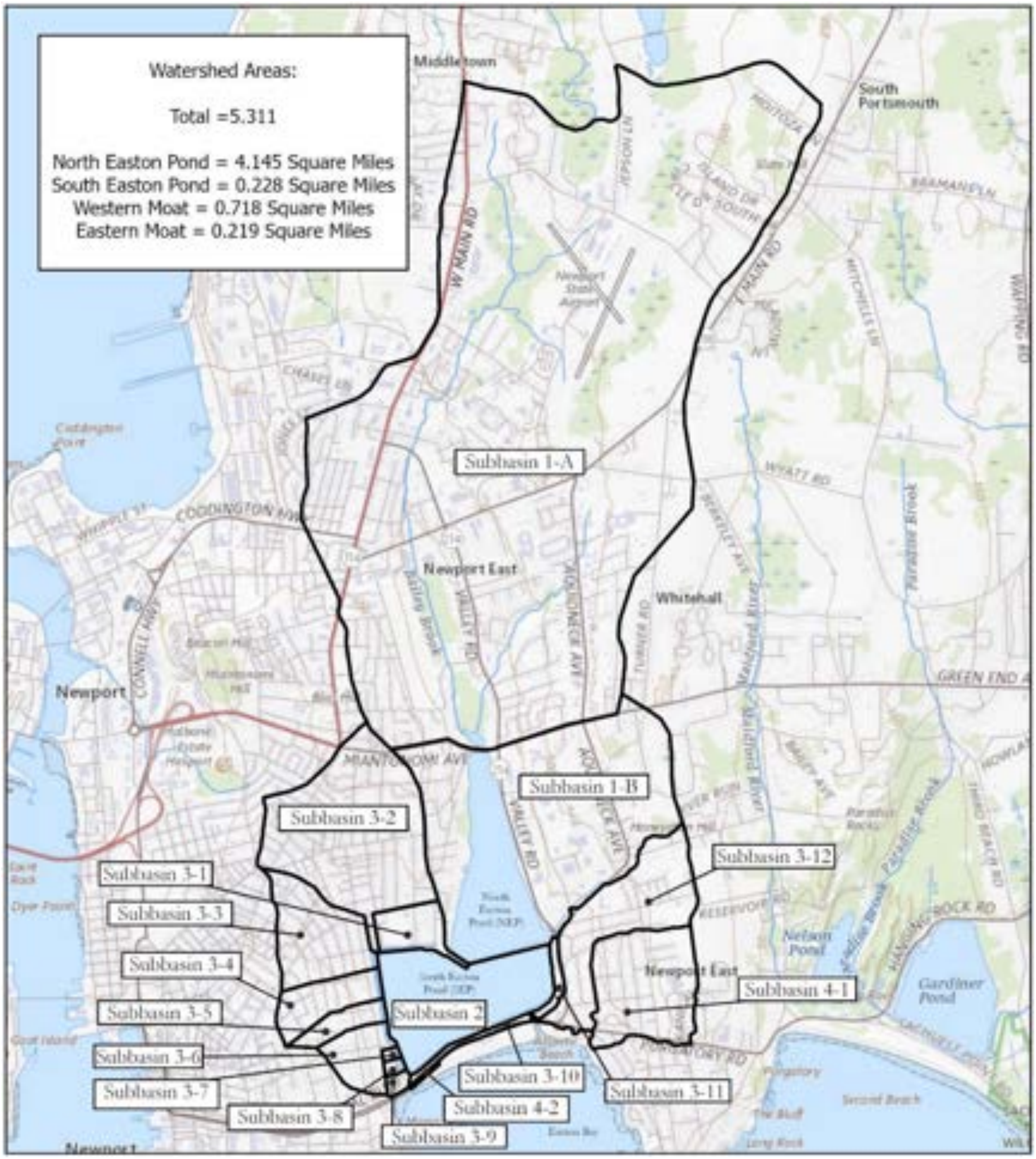


Figure 4: Watershed and Subbasin Delineation Map for North and South Easton Ponds

3.2 Storm Events

A range of precipitation events were simulated in the HEC-HMS model to produce corresponding flood hydrographs for each subbasin. These included:

- Present-day rainfall values for the 10-year, 50-year, 100-year, and 500-year storm events as reported by RIDEM and the Northeast Regional Climate Center (NRCC, 2022)
- Predicted rainfall values for the same events under 2070 climate conditions based on Resilient Massachusetts Action Team (RMAT) data
- Precipitation values for the probable maximum flood (PMF) as calculated via HMR-52 (see Section 3.2.2) within HEC-HMS
- Precipitation values for the 2070 PMF as predicted by applying a 7% increase recommended by the State of Colorado (Colorado, 2020)

3.2.1 Present-Day and 2070 Storm Events

Rainfall depths for present-day storm events are reported within the RIDEM Rhode Island Stormwater Design and Installation Standards Manual for Newport County. For the same storm events under 2070 climate conditions, rainfall depths were generated using the RMAT Climate Change Projections Dashboard at Site 7823, Fall River, Massachusetts. This location was chosen based on its proximity to the project site and the lack of comparable precipitation projections for the state of Rhode Island. Table 2 summarizes rainfall depths for storm events analyzed in the HEC-HMS model.

Table 2: Present-Day and Predicted 2070 Rainfall Depths for Analyzed Storm Events

Storm Event	Present-Day Rainfall Depth (in) [1]	Predicted 2070 Rainfall Depth (in) [2]
10-Year, 24-Hour	4.90	6.80
50-Year, 24-Hour	7.30	9.30
100-Year, 24-Hour	8.60	10.40
500-Year, 24-Hour	12.17	13.30

[1] RIDEM/NRCC, [2] RMAT

Within the HEC-HMS model, these rainfall depths were distributed across the subbasins to generate peak flows at subbasin discharge locations for each storm event. Results are summarized in Appendix A.

3.2.2 Probable Maximum Flood

The probable maximum flood (PMF) is commonly used in dam and spillway design. The flood hydrograph produced by the probable maximum precipitation (PMP) informs adequacy assessments of dam embankments and spillway hydraulic capacity. Due to their impoundment of community drinking water and their proximity to inhabited areas, NEP Dam and SEP Dam are classified as high-hazard dams. Under the Federal Emergency Management Agency's (FEMA) "prescriptive" design approach, the typical inflow design flood (IDF) for a high-hazard dam is the PMF (Federal Emergency Management Agency, 2013). Variance from the prescriptive approach is acceptable as outlined in Section

4. However, calculation of the PMF and relevant fractions of the PMF are still necessary for evaluation and design.

The PMP was determined in adherence with Hydrometeorological Report No. 51 (HMR-51) and Hydrometeorological Report No. 52 (HMR-52) prepared by the National Weather Service. The HMR-52 Probable Maximum Precipitation routine in HEC-HMS defined the distribution and depth of rainfall across the subbasins. The PMP was calculated at 38.5 inches over a period of 72 hours. The temporal distribution of rainfall for the PMF is included in Appendix A. The PMF flood hydrograph was produced by applying this rainfall event to the watershed. To generate fractions of the PMF, as necessary under incremental consequence analysis (see Section 4), reduction factors were applied to the PMF hydrograph. For example, a factor of 0.5 was applied to the PMF hydrograph to produce the ½ PMF hydrograph.

The 2070 PMF was simulated by applying a 7% precipitation increase as recommended by the State of Colorado (Colorado, 2020). While FEMA acknowledges there is not yet a standard approach for predicting future PMF magnitudes, the State of Colorado is one of a handful of states that has established such a magnification factor.

4 2023 Hydraulic Analyses

Fuss & O'Neill developed a 2-dimensional hydraulic model for the project area using HEC-RAS. Within the hydraulic model, flood hydrographs from the HEC-HMS model were routed through the NEP Dam, SEP Dam, and the moat channel for a variety of hypothetical storms and scenarios. Most relevant for the current project were the determination of the appropriate Inflow Design Flood (IDF) and the assessment of proposed improvements to the dams under a range of storm events, both for present-day and future precipitation and sea level rise conditions.

4.1 Hydraulic Model Development

A terrain raster (Figure 5) was developed for the project area to serve as the base for the larger hydraulic model. The terrain combines LiDAR topography publicly available through the National Oceanic and Atmospheric Administration (NOAA, 2016) with site-specific topographic survey data provided by Control Point Associates, Inc. (June 2021), R.P. Iannuccillo and Sons (July 2012), Waterman Engineering Co. (March 2008), and Apex Environmental, Inc. (October 2004). A table summarizing topographic data used to develop the terrain is included in Appendix B. The terrain was also modified to properly represent existing and proposed spillways in addition to potential dam breach locations.

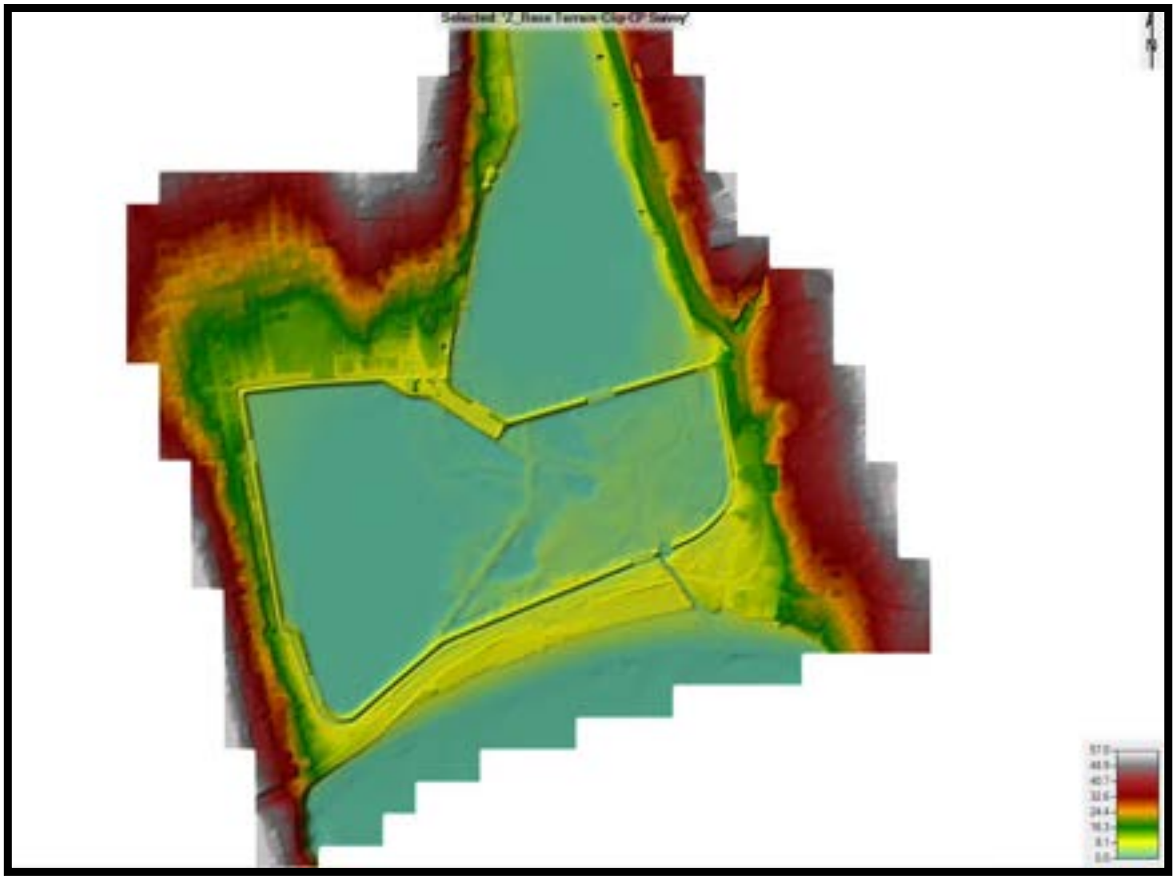


Figure 5: Terrain raster developed for the hydraulic model

A 2-dimensional mesh (Figure 6) was created for the project area to calculate precise topographic characteristics and hydraulic properties for individual cell areas across the relevant terrain and infrastructure. The cell mesh covers both dams, their embankments, the moat, and the surrounding neighborhoods. The mesh extends to the north and terminates shortly upstream of the Green End Avenue culvert. Cell orientations were modified such that faces aligned with pond embankments, spillways, and other terrain features.

Figure 6: A 2-dimensional cell mesh developed for hydraulic modeling

Internal 2-dimensional mesh connections were added to the model geometry to represent hydraulic structures including dam spillways, culverts, bridges, and potential dam breach locations. Surveyed elevations of each spillway were incorporated to ensure an accurate accounting of flow through and over the structures. Land cover data, survey data, aerial imagery, and knowledge of the site informed Manning's roughness coefficient (Manning's n) selections for the model area. The National Land Cover Dataset (NLCD) provided a valuable starting point for estimating Manning's n, but site-specific refinement was necessary. A map of Manning's n values applied to the project is included in Appendix B. Inflow boundary condition lines were established for each subbasin modeled in HEC-HMS. Boundary condition lines referenced the respective subbasin's flow hydrograph produced by the hydrologic model (see Appendix B).

4.2 Existing Vulnerabilities and Climate Resilience Alternatives

The hydraulic model assessed existing conditions and improvement alternatives at NEP and SEP dams to understand current vulnerabilities and demonstrate proposed resilience to impacts from flooding. The model incorporated resultant inflows from a range of present-day and predicted 2070 inland precipitation events. It also considered how rising sea levels and corresponding changes to tidal activity might affect existing infrastructure and proposed improvements. Two alternatives for modification of the dams were identified in the 2019 Climate Resiliency Memorandum: Alternative 2 and Alternative 4, as described in Section 4.2.2 and Section 4.2.3.

4.2.1 Existing Conditions

To fully understand improvements provided by the two proposed alternatives, Fuss & O'Neill completed an updated assessment of existing conditions for the NEP Dam and SEP Dam under a range of storm scenarios. Both present-day and predicted 2070 climate conditions were considered. Flood hydrographs for various inland flood events were produced through Fuss & O'Neill's hydrologic modeling, while sea level and coastal surge data were provided by the US Army Corps of Engineers (USACE) North Atlantic Coast Comprehensive Study (NACCS) as adjusted by Woods Hole Group (Table 3). Present-day and predicted 2070 storm events were modeled with corresponding mean higher high water (MHHW) values as the tailwater elevation in Easton Bay.

Table 3: Present Day and Adjusted (Future) NACCS Joint Probability Inundation Profiles

Return Period	Probability	Water Surface Elevation (ft.)			
		Present	2030	2050	2070
MHHW	Tides (no surge)	1.81	2.37	3.53	5.09
1	100.0%	4.55	5.11	6.27	7.83
2	50.0%	5.31	5.87	7.03	8.59
5	20.0%	6.37	6.93	8.09	9.65
10	10.0%	7.22	7.78	8.94	10.50
20	5.0%	8.13	8.69	9.85	11.41
50	2.0%	9.42	9.98	11.14	12.70
100	1.0%	10.53	11.09	12.25	13.81
200	0.5%	11.77	12.33	13.49	15.05
500	0.2%	13.43	13.99	15.15	16.71
1000	0.1%	14.62	15.18	16.34	17.90

(USACE, August 2015)

Overtopping of earthen embankments is a primary mechanism for dam failure. Overtopping could occur when inflow from inland precipitation events exceeds the storage capacity of either dam and resultant water surface elevations force flow over the embankment crest at one or more locations. Overtopping could also occur due to coastal surge events that raise sea level elevations over the crest of the SEP Dam and/or NEP Dam.

Saltwater intrusion at SEP Dam and/or NEP Dam could result in contamination of drinking water for the City of Newport and other dependent communities. Saltwater intrusion could occur due to sea levels rising and backwatering the dam spillway(s) or through overtopping of dam embankments during larger coastal surge events.

Elevations at several locations along dam embankments and spillways were used as benchmarks for determining the protection each dam provides against embankment overtopping and saltwater intrusion. The topographic survey completed for the current analysis documented embankment low points as summarized in Figure 13. Survey of the existing embankment separating the NEP Dam and SEP Dam reported elevations as low as 11.5 feet. The surveyed low point in the NEP Dam primary spillway is 9.15, while the surveyed low point in the NEP Dam auxiliary spillway is 10.12 feet. A large portion of the SEP Dam embankment was previously reconstructed to an elevation of approximately 12.1 feet following storm erosion and wave attacks. Still, topographic survey for the current analysis reported low points along the northern, eastern, southern, and western embankments of SEP Dam at approximately 9.15, 9.80 feet, 11.18 feet, and 10.57 feet, respectively. The surveyed low point in the SEP Dam primary spillway is 7.32 feet.

Existing conditions modeling results summarized in Table 4 indicate both NEP Dam and SEP Dam could overtop as a result of the present-day 50-year inland precipitation event. This recurrence interval is lowered to the 10-year inland event for SEP Dam under predicted 2070 climate conditions, indicating more frequent overtopping of the dam embankment in the future.

The limiting factor for resilience to tidal actions and/or coastal surge appears to be the potential for saltwater intrusion through the SEP Dam spillway. Saltwater intrusion through the SEP Dam spillway could occur during the present-day 20-year coastal surge event. Predicted 2070 conditions could result in saltwater intrusion through the SEP Dam spillway on an annual basis.

Overtopping of SEP Dam embankments due to coastal surge could occur during the present-day 100-year event. NEP Dam appears to be threatened by overtopping due to coastal surge during the present-day 200-year event. Under predicted 2070 conditions, the SEP Dam could be overtopped by the 5-year coastal surge event and the NEP Dam embankment could be overtopped by the 50-year coastal surge event. A complete table of results for all modeled scenarios is included in Appendix B.

Table 4: Present-Day and 2070 Inland Flooding Results for Existing Conditions [1]

Dam	Low Point in Primary Spillway	Low Point in Aux. Spillway	Low Point on Embankment	Recurrence Interval for Overtopping Due to Inland Flooding	Recurrence Interval for Saltwater Intrusion via Spillway	Recurrence Interval for Overtopping Due to Coastal Surge
NEP Dam	9.15	10.12	11.50	2023: 50-year (11.53) 2070: 50-year (11.85)	2023: 50-year (9.42) 2070: 5-year (9.65)	2023: 200-year (11.77) 2070: 50-year (12.70)
SEP Dam	7.32	N/A	9.64	2023: 50-year (10.08) 2070: 10-year (9.94)	2023: 20-year (8.13) 2070: 1-year (7.83)	2023: 100-year (10.53) 2070: 5-year (9.65)

[1] All elevations in feet (NAVD88)

Based on these results, the dams should be improved to protect against overtopping due to inland floods and coastal surge events, as well as to prevent saltwater intrusion through the dam spillways. Such modifications are necessary to account for vulnerabilities demonstrated under present-day climate conditions and to prepare for predicted increases in precipitation and exacerbated coastal surge in 2070.

4.2.2 Proposed Alternative 2

Alternative 2, as described in the 2019 Climate Resiliency Memorandum, proposed raising the embankments of NEP Dam and SEP Dam to uniform elevations of 13.4 and 12.1 feet, respectively. The proposed NEP Dam embankment elevation was chosen to restore what appears to be the original elevation of the embankment prior to settling and erosion. The proposed SEP Dam embankment elevation was selected to match previous improvements to a portion of the dam's western embankment in response to wave attack and erosion.

In addition to embankment raising, Alternative 2 proposed the installation of a crest gate at the SEP Dam primary spillway. Since the path for saltwater intrusion through the NEP Dam primary spillway is first through the SEP Dam spillway and reservoir, a crest gate at the SEP Dam spillway would provide protection from saltwater intrusion for both the SEP Dam spillway and NEP Dam primary spillway. As such the 2019 Climate Resiliency Memorandum proposed a crest gate at the NEP Dam auxiliary spillway to prevent saltwater intrusion via the moat. However, initial modeling of Alternative 2 revealed that raising the entirety of the SEP dam embankment to an elevation of 12.1 feet would restrict an existing transfer of flow from the moat and sediment basin near the NEP Dam auxiliary spillway into the SEP Dam (Figure 7). Restricting this flow by raising the SEP Dam embankment near the sediment basin appeared to increase water surface elevations in the moat and surrounding areas for the 50-year and 100-year storms.

As such, the current analysis evaluated the installation of a tidal/flap gate in the moat approximately 1000 feet downstream of the NEP Dam auxiliary spillway, near J Paul Braga Jr Memorial Field. This gate would allow the preservation of existing embankment elevations of the SEP Dam near the sediment basin while mitigating saltwater intrusion. Inland flows from the surrounding neighborhood and NEP Dam auxiliary spillway will enter SEP similar to existing conditions without increasing water surface elevations As amended, Alternative 2 would necessitate designing and constructing the SEP Dam embankment near the sediment basin to allow overtopping without a breach. While embankment armoring in the form of articulated concrete blocks (ACBs) is proposed for the entirety of both NEP and SEP dam embankments, design requirements to allow for overtopping go beyond ACB armoring to include embankment slope and flow velocity considerations.

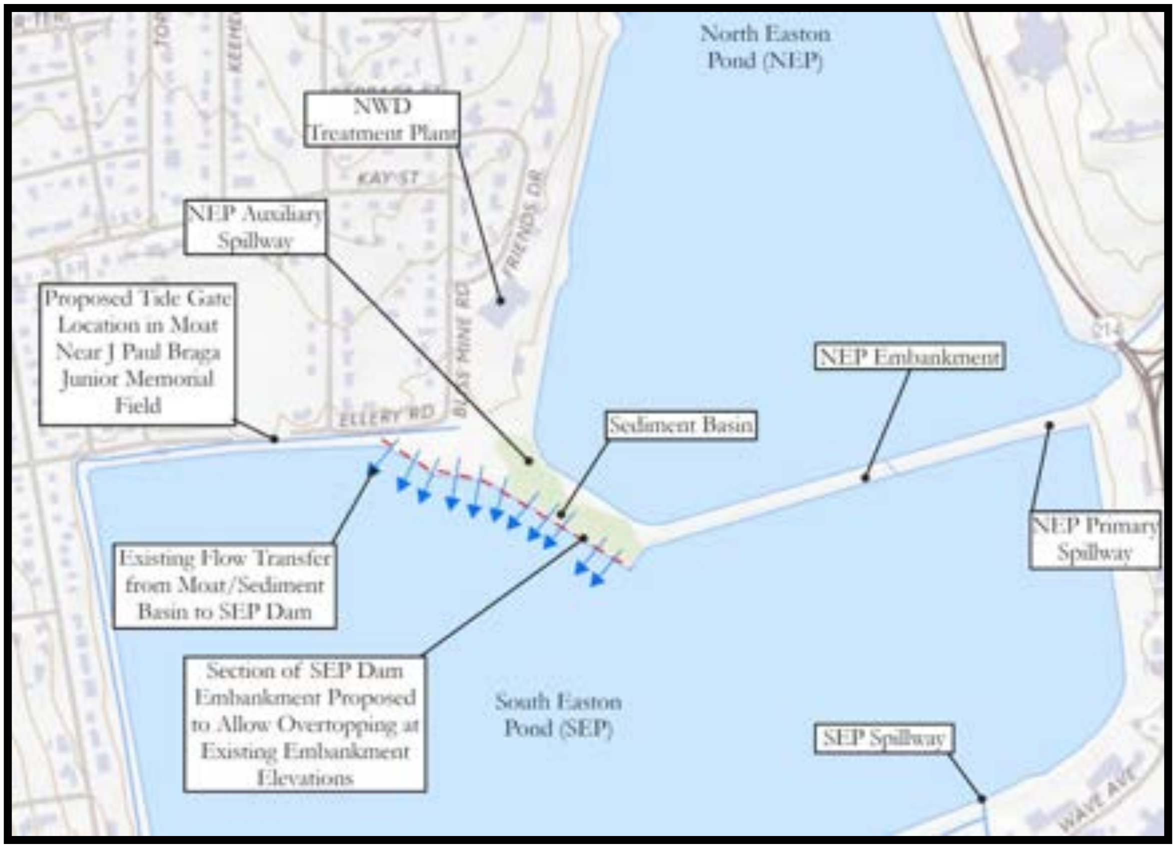


Figure 7: Existing flow transfer near sediment basin and proposed tidal/flap gate near J Paul Braga Memorial Field

To assess Alternative 2, a new terrain was developed within HEC-RAS that included the raised dam embankments. Modeled spillway elevations and dimensions matched those of existing conditions. Model results for Alternative 2 are summarized in Table 5.

Table 5: Present-Day and 2070 Inland Flooding Results for Alternative 2 [1]

Dam	Low Point in Primary Spillway	Low Point in Aux. Spillway	Proposed Low Point on Embankment	Recurrence Interval for Overtopping Due to Inland Flooding	Recurrence Interval for Saltwater Intrusion/Coastal Overtopping [2]
NEP Dam	9.15	10.12	13.4	2023: ½ PMF (13.46) 2070: ½ PMF (13.49)	2023: 500-year (13.43) 2070: 100-year (13.81)
SEP Dam	7.32	N/A	12.1	2023: ½ PMF (12.17) 2070: ½ PMF (12.18)	2023: 500-year (13.46) 2070: 50-year (12.70)

[1] All elevations in feet (NAVD88)
[2] Crest gate at SEP Dam spillway and tidal/flap gate in moat prevent saltwater intrusion up to 12.1 feet. As such, saltwater intrusion is expected to occur only during coastal surge events that overtop the dam embankments.

Table 6 compares protections provided by Alternative 2 with protections provided by existing conditions. Alternative 2 appears to increase protection against embankment overtopping during inland flood events and saltwater intrusion or embankment overtopping due to tidal activity and coastal surge events.

Table 6: Comparison of Protection Levels for Existing Conditions and Alternative 2

Climate Conditions	Scenario	Protects Against Overtopping via Inland Flooding Through Recurrence Interval:	Protects Saltwater Intrusion/Coastal Overtopping Through Recurrence Interval:
Present-Day	Existing Conditions	10-year storm	10-year coastal surge
	Alternative 2	500-year storm	200-year coastal surge
2070	Existing Conditions	Lower than 10-year [1]	MHHW, no surge [2]
	Alternative 2	500-year storm	20-year coastal surge

[1] The smallest inland flood modeled was that of the 10-year event, which was found to overtop the SEP Dam embankments in 2070 for the existing infrastructure.
[2] Modeling suggests the 2070 1-year coastal surge would overtop the SEP Dam spillway for existing conditions. Therefore, existing conditions protect only through normal high tides for 2070 climate conditions.

Despite the potential increase in protection provided by Alternative 2, the protection results largely from the impoundment of additional flow volume during extreme storm events. Because the embankments are raised and overtopping is prevented or reduced for relevant storms without a proportional increase in spillway flow capacity, peak water surface elevations for extreme storm events are higher under Alternative 2 than under existing conditions (Table 7). Further, modeling suggested both NEP Dam and SEP Dam would still overtop during the ½ PMF event. It is likely that the NEP Dam could be reconstructed to allow for overtopping without a breach. However, considering physical constraints and potential permitting implications, reconstructing the entirety of the SEP Dam embankment to allow for overtopping may be an impracticable solution.

Table 7: Peak Water Surface Elevations in NEP and SEP Dams Under Existing Conditions and Alternative 2

Dam	Scenario	100-Year Storm Peak WSE (ft)	500-Year Storm Peak WSE (ft)	½ Probable Maximum Flood Peak WSE (ft)
NEP	Existing Conditions	11.77	12.02	12.27
	Alternative 2	11.81	**12.50**	**13.46**
SEP	Existing Conditions	10.37	10.97	11.36
	Alternative 2	10.39	**11.33**	**12.17**

As discussed in Section 4.3, an increase in stored volume during extreme storm events could be expected to exacerbate hazards associated with a dam breach. Accordingly, Alternative 4 was modeled to determine if increased hydraulic capacity at the SEP Dam primary spillway could provide the same improvements as Alternative 2 while reducing peak water surface elevations and associated dam breach hazards.

4.2.3 Proposed Alternative 4

Alternative 4 proposed the same modifications as Alternative 2: raising the embankments to elevations 13.4 and 12.1 respectively for NEP and SEP dams, installing gates to protect the reservoirs from saltwater intrusion due to tidal activity and/or coastal surge, and armoring the pond embankments with ACB to mitigate erosion. The primary difference under Alternative 4 is the modification of the SEP spillway to provide additional hydraulic capacity. In the 2019 Climate Resiliency Memorandum, it was suggested that operable "crest gates at the SEP [Dam] …spillway [could] provide adaptive hydraulic capacity" to maintain freeboard between peak water surface elevations and embankment crests during relevant storm events. Further, a crest gate that operates over a range of elevations would allow for preemptive draining and additional storage capacity in SEP Dam leading up to and during extreme storm events.

Modeling for Alternative 4 followed an iterative approach in which the SEP Dam primary spillway crest elevation was lowered (thereby lowering the SEP Dam pool elevation) and widened as necessary to reduce peak water surface elevations during extreme storm events. Ultimately, a 120-foot-wide spillway lowered to an elevation of 5.1 feet was found to lower peak water surface elevations in SEP Dam below those reported for existing conditions during extreme storms (500-year and above) as summarized in Table 8. As such, Alternative 4 is expected to provide the same level of protection for inland storms, tidal activity, and coastal surge events as Alternative 2 while decreasing potential hazards associated with a dam breach. Elevation 5.1 was chosen as the minimum crest gate elevation in alignment with the predicted 2070 MHHW level (5.09 feet).

Table 8: Peak Water Surface Elevations in NEP and SEP Dam Under Existing Conditions and Alternatives

Dam	Scenario	100-Year Storm Peak WSE (ft)	500-Year Storm Peak WSE (ft)	½ Probable Maximum Flood Peak WSE (ft)
NEP	Existing Conditions	11.77	12.02	12.27
	Alternative 2	11.81	**12.50**	**13.46**
	Alternative 4	11.73	12.41	13.43
SEP	Existing Conditions	10.37	10.97	11.36
	Alternative 2	10.39	**11.33**	**12.17**
	Alternative 4	9.28	9.79	10.59

Because peak water surface elevations in NEP Dam still exceed that dam's proposed embankment elevations during the ½ PMF event, the embankment separating NEP and SEP Dam should be designed and constructed to overtop without forming a breach. Further, it was necessary to model Alternative 4 to determine the inflow design flood by evaluating dam breach hazards under proposed conditions. That process, in combination with modeling of more frequent large storm events without a breach to ensure downstream elevations are not increased, assisted in confirming Alternative 4 as the recommended alternative. Improvements Proposed under Alternative 4 are summarized in Figure 8.

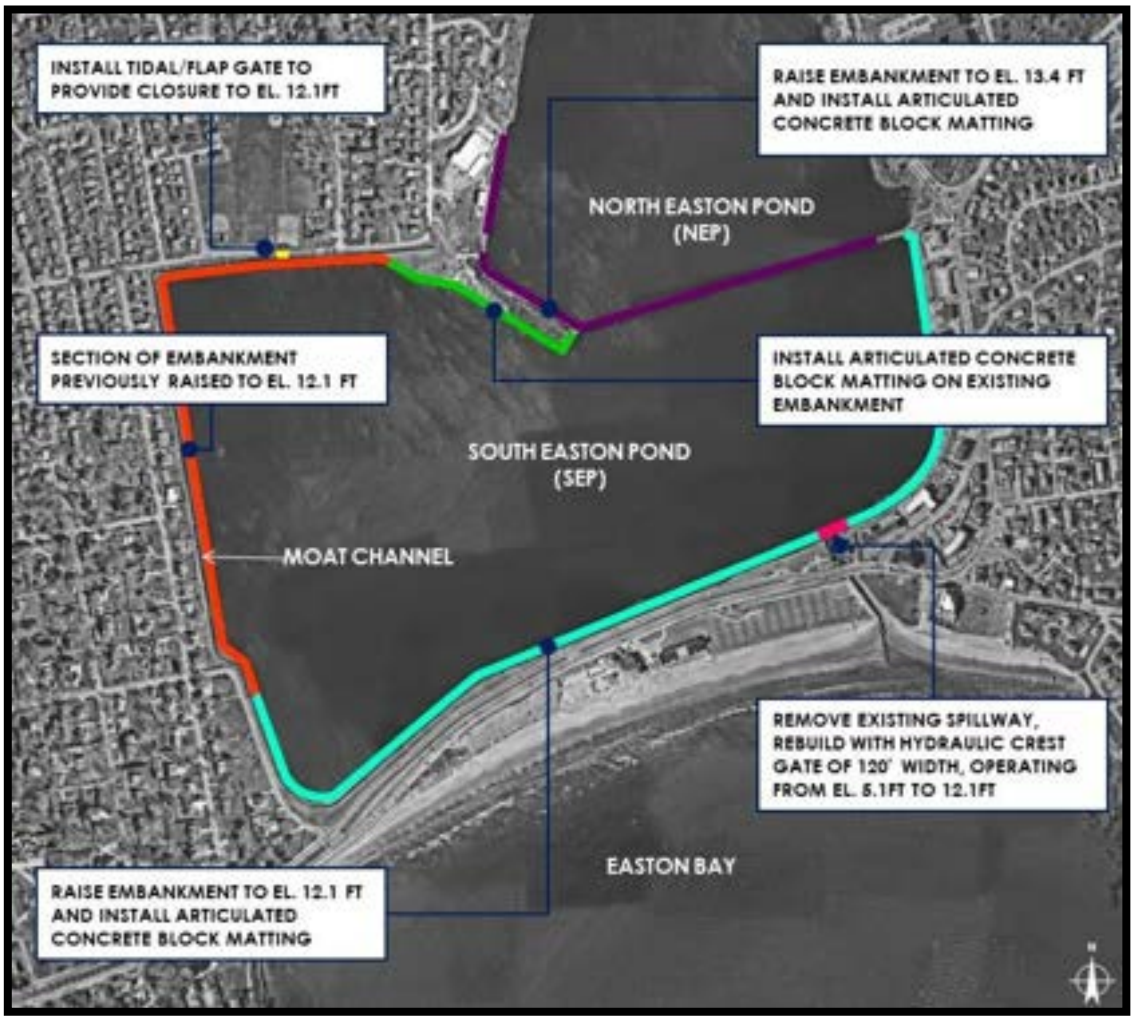


Figure 8: Summary of Improvements Proposed Under Amended Alternative 4

4.3 Inflow Design Flood Determination

The Inflow Design Flood (IDF) is critical in determining a dam's suitability under existing conditions and an important factor in the design of potential modifications. The IDF resulting from the corresponding inland precipitation event informs the design of spillways, embankment elevations, and other dam components. FEMA states "If significant modifications are…required to the dam and appurtenant structures, the IDF should be updated to reflect the new guidelines and/or hydrologic data." and that "modifications, like raising the dam…can increase the downstream consequences should the dam fail during an extreme flood event…" (Federal Emergency Management Agency, 2013) As such, and because modifications were deemed necessary based on vulnerabilities under existing conditions, Alternative 4 was modeled to determine the applicable IDF at the NEP Dam and SEP Dam.

Under a "prescriptive" approach, the IDF is based solely on the dam's "hazard potential classification" as defined by FEMA (Table 9). Both the NEP Dam and SEP Dam meet FEMA criteria for a high-hazard dam. Accordingly, the IDF for each pond under a prescriptive approach would be the probable maximum flood (PMF). However, FEMA (Federal Emergency Management Agency, 2013) outlines a process for an incremental consequence analysis to provide for a more refined and site-specific IDF selection. An incremental consequence analysis compares flood hazards during scenarios in which a dam does not fail (pre-breach) and scenarios in which the dam fails (post-breach) during the same storm event. Under this analysis, a storm of smaller magnitude than that dictated by a prescriptive approach may be selected as the IDF if the modeling of that storm demonstrates an insignificant increase in hazard from pre-breach to post-breach conditions. Site-specific IDF selection may result in cost-savings associated with design and construction while adhering to FEMA, Federal Energy Regulatory Commission (FERC), and state agency best practices and requirements.

Table 9: FEMA IDF Requirements for Dams Using a Prescriptive Approach

Hazard Potential Classification	Definition of Hazard Potential Classification	Inflow Design Flood
High	Probable loss of life due to dam failure or misoperation (economic loss, environmental damage, or disruption of lifeline facilities may also be probable, but are not necessary for this classification)	PMF[1]
Significant	No probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities due to dam failure or misoperation	0.1% Annual Chance Exceedance Flood (1,000-year Flood)[2]
Low	No probable loss of human life and low economic and/or environmental losses due to dam failure or misoperation	1% Annual Chance Exceedance Flood (100-year Flood) or a smaller flood justified by rationale

(1) Incremental consequence analysis or risk-informed decision making may be used to evaluate the potential for selecting an IDF lower than the prescribed standard. An IDF less than the 0.2% annual chance exceedance flood (500-year flood) is not recommended.

(2) Incremental consequence analysis or risk-informed decision making studies may be used to evaluate the potential for selecting an IDF lower than the prescribed standard. An IDF less than the 1% annual chance exceedance flood (100-year flood) is not recommended.

(Federal Emergency Management Agency, 2013)

FEMA and FERC both outline a process for incremental consequence analysis under which increases in flood hazards due to a dam breach are evaluated for varying storm magnitudes. The process begins with modeling the recommended low-end IDF storm. Progressively larger storm events, such as fractions of the PMF through the full PMF are then applied to the model until it can be demonstrated that the dam's failure does not significantly increase flood hazards in the surrounding area (Figure 9). Note 1 under Table 9, dictates the minimum potential IDF for evaluation at a high-hazard dam is the 500-year storm.

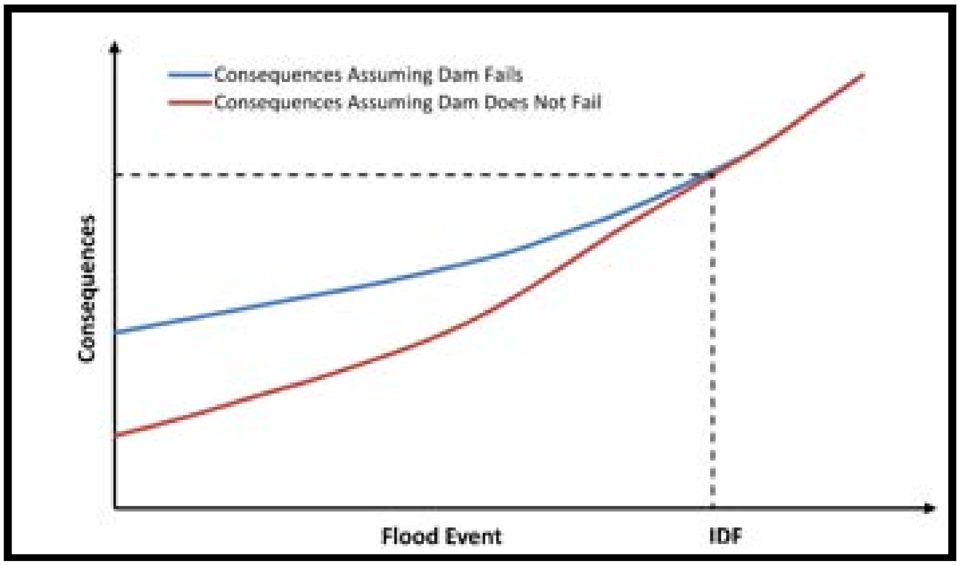


Figure 9: Conceptual Comparison of Incremental Consequence (Federal Emergency Management Agency, 2013)

As stated by FEMA, "There is much debate regarding what qualifies as a 'significant incremental consequence.' Methods of assessing the incremental increase in consequences vary from examining individual structures in the inundation zone to applying general criteria along the entire downstream inundation reach…Such criteria should not be viewed as absolute decision-making thresholds. Rather sensitivity analyses and engineering judgement must be applied. Since dam failure analyses and flood routing studies do not provide certain results, evaluation of the consequences of failure should be reasonably conservative. The application of more detailed methods such as two-dimensional flow modeling may justify a less conservative conclusion." (Federal Emergency Management Agency, 2013)

To provide metrics for an incremental consequence analysis, Fuss & O'Neill assessed pre- and post-breach flood depth and velocity results under multiple hazard criteria at numerous locations in the vicinity of NEP Dam and SEP Dam. Point locations, as shown in Figure 10, were established at houses and otherwise inhabited structures (e.g. hotels), along potential access and egress routes, and at other key infrastructure near the dams.

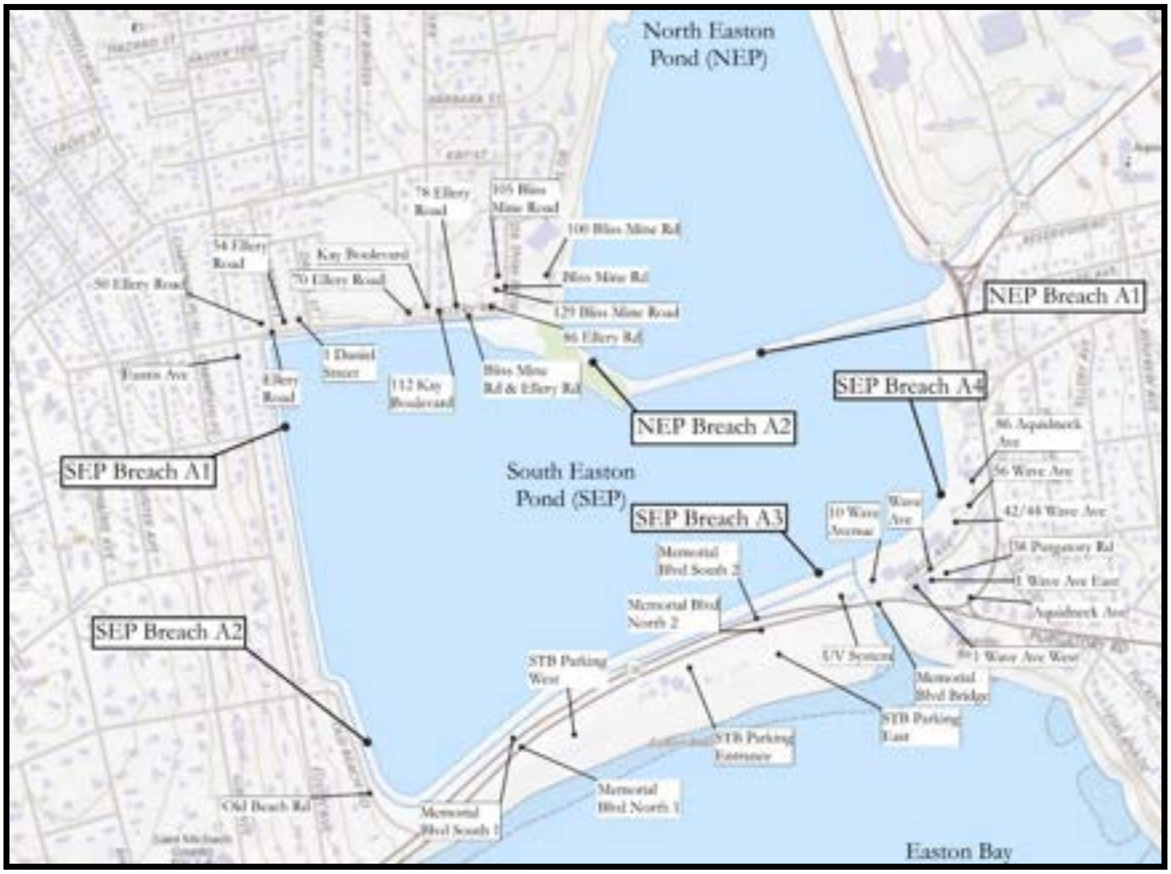


Figure 10: Point locations used for incremental consequence analysis near NEP and SEP dams

4.3.1 Flood Hazard Increase Criteria

Fuss & O'Neill utilized multiple criteria to determine the significance of increases in flood hazard for pre- and post-breach scenarios at the established point locations. It is important to note that some level of increase is generally to be expected under dam breach conditions. However, during extreme storm events, flood hazards typically exist downstream of the dam separate from a potential failure. For that reason, the goal of an incremental consequence analysis is to determine the storm magnitude under which increases in hazard due to a dam breach can be considered insignificant and acceptable (i.e. they do not increase pre-breach flood hazards beyond an established threshold and/or as informed by engineering judgement).

FERC 2-Foot Difference

The first and simplest criterion for evaluating increases in hazard was drawn from *Engineering Guidelines for the Evaluation of Hydropower Projects: Chapter 2- Selecting and Accommodating Inflow Design Floods for Dams* (Federal Energy Regulatory Commission, 2015). This guidance states "When a dam break analysis shows downstream incremental effects of approximately two feet or more in an inhabited area, engineering judgment and further analysis may be necessary to evaluate the need for modification to the dam." Therefore, Fuss & O'Neill considered any increase in flood depth of 2 feet or more between pre-breach and post-breach scenarios unacceptable.

USBR Flood Danger Charts

Criteria established by the United States Bureau of Reclamation (USBR) within *Downstream Hazard Classification Guidelines* (Bureau of Reclamation, 1988) were applied to the chosen point locations. USBR charts display depth-velocity thresholds for low danger, a mid-range zone in which engineering judgement is necessary to determine danger, and high danger. Separate charts and corresponding depth-velocity dangers are available based on the specific at-risk infrastructure or hazard type being evaluated.

Both with and without a breach, flooding near NEP Dam and SEP Dam has the potential to impact houses, roads, and areas that are generally inhabited by people of all ages. As such, relevant pre- and post-breach results were plotted on applicable USBR charts. An example chart, as adapted and published by the State of Maryland (State of Maryland, May 2018) is shown in Figure 11. A slight increase in pre- to post-breach depth and/or velocity alone was not automatically considered significant. If flood dangers for pre-breach and post-breach scenarios both fell within either the low danger zone or the high danger zone for a given location, increases were considered insignificant. For example, if the depth-velocity danger was classified as high prior to the dam breach, significant hazard exists whether the dam fails or not. Therefore, a slight increase in depth or velocity due to a dam breach would not significantly change the hazard. However, if pre-breach depth-velocity danger fell within the low danger zone and post-breach depth-velocity danger plotted above the high danger threshold, the increase could be considered significant. The process became more complicated when pre-breach danger fell within the low danger zone and was increased to the judgement zone under post-breach conditions, or pre-breach danger fell within the judgement zone and was increased above the high danger threshold under post-breach conditions. Fuss & O'Neill applied additional criteria to determine whether hazard increases were acceptable when they required engineering judgement.

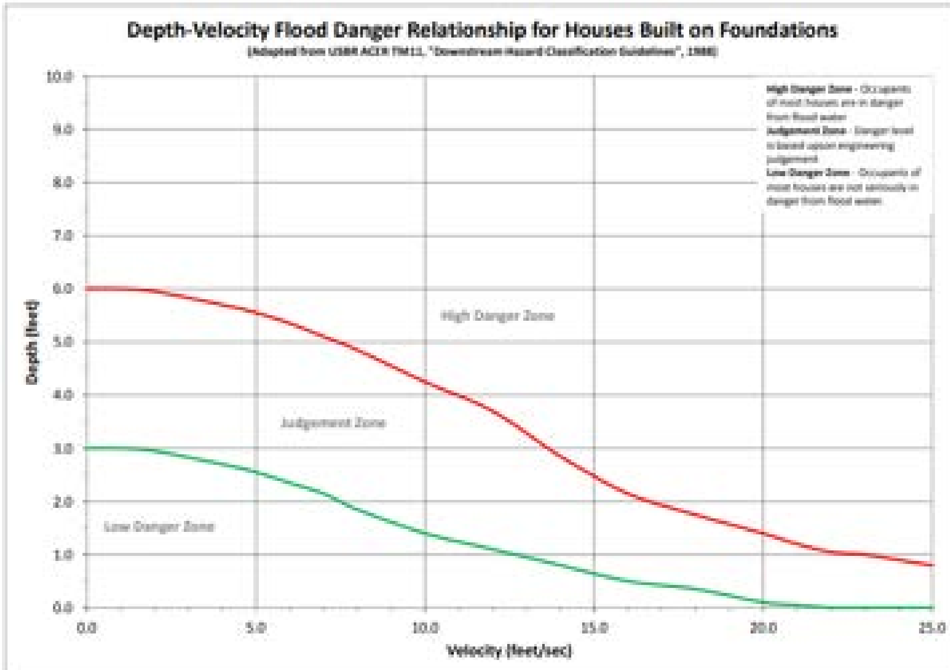


Figure 11: Depth-Velocity Flood Danger Relationship for Houses Built on Foundations (State of Maryland, 2018)

<u>**Engineering Judgement Criteria**</u>

As indicated by FEMA and the USBR flood danger charts, engineering judgement is necessary not only to establish an incremental consequence analysis at each unique site but also to determine what constitutes a "significant" increase in flood hazard from pre-breach to post-breach scenarios. The FERC and USBR criteria provide a basic framework for determining flood hazard increases. Fuss & O'Neill employed the following additional criteria summarized by FEMA (Federal Emergency Management Agency, n.d.) to evaluate hazards within the USBR judgement zone. Results for flood danger as it relates to houses generally fell at or below the low danger threshold on the relevant USBR chart. Therefore, no judgement zone criteria were applied to this hazard type.

- **Judgement Zone Criteria for Vehicles:** The National Weather Service indicates 2-feet of water could be sufficient to float a vehicle (National Weather Service, 1999). In addition, a depth of 1.5 feet flowing at a velocity of 6 feet per second "is sufficient to move a vehicle downstream." (Federal Emergency Management Agency, n.d.)
- **Judgement Zone Criteria for Adults:** FEMA summarizes various flood depth-velocity considerations for adults and children (Federal Emergency Management Agency, n.d.) as follows:
    - "An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second."

  - Jonkman and Penning-Roswell indicate human instability in flood waters can occur at any velocity greater than 5.5 feet per second (Jonkman, S. and Penning-Roswell, E., 2008)
- **Judgement Zone Criteria for Children:** While there do not appear to be sufficient data for how flood depth and velocity relate to a child's instability while wading, the CDC reports the minimum average height of a 5-year-old child in the United States to be 3.33 feet (40 inches, CDC 2000). Fuss & O'Neill applied a ratio of 3.33/5 to the criteria summarized by FEMA (for a 5-foot-tall adult) to establish a depth of 2 feet as a judgement zone criterion for children.

Judgement zone criteria were applied as additional layers on the USBR charts. If pre-beach danger fell within the low danger zone and was increased to the judgement zone under post-breach conditions, the increase would be considered significant if the post-breach danger clearly exceeded the judgement zone criteria. Similarly, if pre-breach conditions fell below the USBR high danger threshold, but above the judgement zone criteria threshold, the pre-breach danger was classified as high, and an increase was not considered significant unless it exceeded the FERC 2-foot difference criteria. Examples are shown in Figure 12, where lower values on each graphed line represent pre-breach depth-velocity values, and larger values represent post-breach depth-velocity values. In this example, green lines represent increases that could be considered acceptable, while dark red lines represent potentially unacceptable hazard increases.

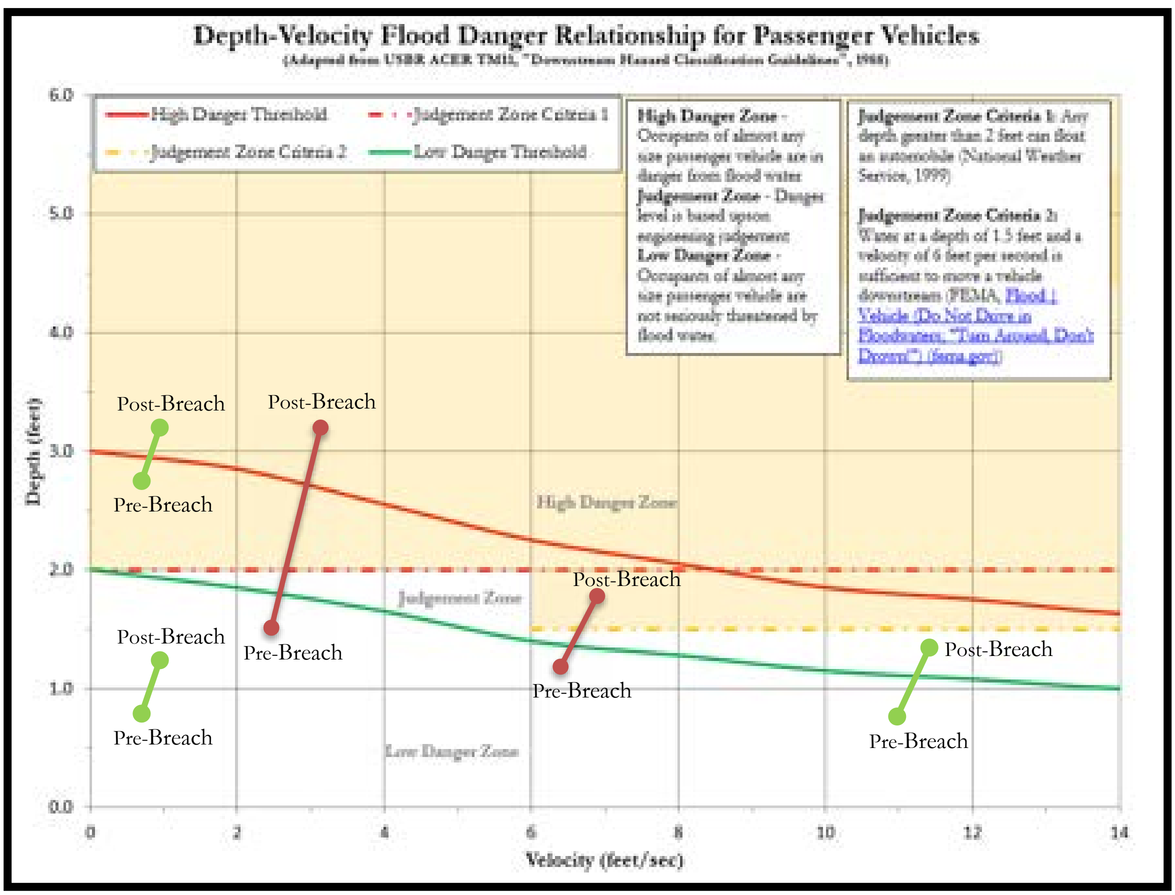
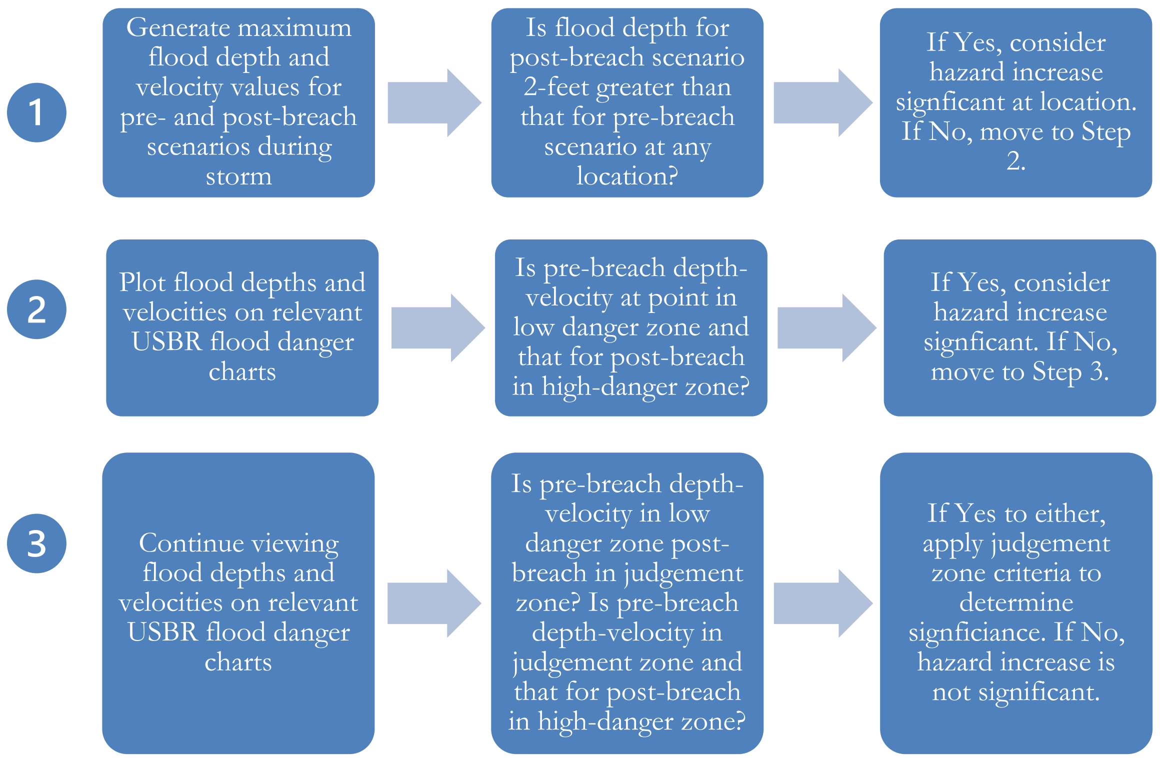


Figure 12: USBR Flood Danger Chart for Vehicles with Judgement Zone Criteria Applied

In summary, Fuss & O'Neill developed the following process for determining the significance of flood hazard increases at each location and applying engineering judgement as necessary.



4.3.2 Breach Model Inputs

Modeling of flood hazards posed by dam breach scenarios required a range of initial conditions data and input parameters as described, in part, below.

- **Initial Conditions:**
  - Initial water surface elevations in the reservoirs were set to the surveyed normal pool elevations for NEP and SEP dams within models for existing conditions and Alternative 2. Alternative 4 was modeled assuming the pool elevation for SEP Dam is lowered to elevation 5.1 prior to extreme storm events (500-year and above) as discussed in Section 4.2.3. This elevation could be refined to determine the ideal configuration for specific extreme storm events through additional modeling.
  - Normal flows were established as initial conditions prior to routing the potential IDF storm through the system
  - The downstream boundary condition for the model was set to approximate mean higher high water for the present-day climate conditions. This boundary condition was used to isolate and evaluate the potential hazard increase resulting

from a dam failure alone, which may have otherwise been dampened or obscured by the incorporation of coastal surge events during the IDF analysis. This assumption provides more conservative hazard increase results, as probabilistic modeling demonstrates inland precipitation events are often coupled with coastal surge.

- **Dam Breach Locations and Parameters**
  - Theoretical dam breach locations were chosen to assess the localized effects of dam failure at multiple points in the NEP and SEP dam embankments. Dam breach locations and the corresponding present-day storm during which the localized existing crest elevation would be exceeded are displayed in Figure 13. These locations correspond with surveyed low points in the existing dam embankments that may be prone to overtopping and subsequent failure, and/or were chosen based on their proximity to downstream development and infrastructure.
  - Dam breach scenarios were modeled for sensitivity under breach geometry and timing parameters from two commonly accepted breach parameter estimation methods: Froehlich 2008 (Froehlich, 2008) and Von Thun & Gillette (Von Thun & Gillette, 1990) This sensitivity analysis demonstrated that the Von Thun & Gillette methodology produced more conservative results. For this reason, results from dam breach scenarios using Von Thun & Gillette methodology were compared with pre-breach conditions.
  - Dam breaches were set to occur at the respective peak water surface elevation within each pond during the modeled storm event as dictated by FERC (Federal Energy Regulatory Commission, 2015).
  - For storm events that did not overtop the dam embankments, dam breaches were modeled as a piping failure in the same location.

Figure 13: Modeled dam breach locations and existing embankment low points at NEP Dam and SEP Dam

4.3.3 Incremental Consequence Analysis Results

While preliminary incremental consequence analysis was performed for existing conditions and Alternative 2, results for those scenarios were ultimately relevant only for comparison with results of Alternative 4. The incremental consequence analysis results for existing conditions and Alternative 2 demonstrated significant increases in hazards associated with dam breaches during the 500-year storm and ½ PMF events (see Appendix B). In addition, vulnerabilities of the existing dam infrastructure to present-day and future inland and coastal flooding, as discussed in Section 4.2.1, demonstrated the need for modifications at the NEP Dam and SEP Dam. Initial modeling of Alternative 2 indicated peak water surface elevations in both ponds would be substantially higher during extreme storm events (those that are often selected as the IDF) due to raised embankments lacking a proportional increase in spillway discharge capacity. Alternative 4 included a modified SEP Dam primary spillway to address this rise in peak water surface elevations and reduce potential hazards associated with a dam breach. Accordingly, results presented in this report focus primarily on conditions associated with Alternative 4 and the ½ PMF to ensure the proposed modifications can accommodate that event without significantly increasing hazards during a breach.

The controlling results among data from all breach locations (i.e. those resulting in the largest increase in flood depths) were plotted on the USBR Charts. In viewing the results, it is important to recall that the goal of an incremental consequence analysis is not to determine the storm for which there is no increase in depth or velocity due to a dam breach. Instead, an incremental consequence analysis acknowledges some level of hazard exists downstream of the dam prior to a breach and seeks to determine the storm during which a dam breach does not significantly increase that existing hazard.

Alternative 4: 500-Year Storm

It is possible that future modeling could determine a configuration of the SEP Dam spillway under which the 500-year storm could be considered the IDF. However, as discussed above, the preliminary incremental consequence analysis for existing conditions and Alternative 2 demonstrated significant increases in hazards during the 500-year storm and ½ PMF events. Based on these results and as a conservative measure, the incremental consequence analysis for Alternative 4 focused on the ½ PMF as the low-end IDF.

Alternative 4: ½ PMF

Following the determination that the 500-year storm was not suitable for selection as the IDF, breach scenarios were modeled for the ½ PMF event. Incremental consequence analysis for Alternative 4 under the ½ PMF demonstrated largely insignificant increases in hazard from pre-breach to post-breach conditions. Results for each hazard type are discussed under the respective USBR charts on the following pages. Ultimately, the increases in hazard shown for the ½ PMF were determined to be acceptable. As such, the ½ PMF was selected as the IDF for both NEP Dam and SEP Dam.

Alternative 4: ½ PMF Domino

FEMA recommends that "the flood wave that…from failure of [a] dam should be routed to evaluate if any…downstream dams would potentially breach in domino-like action." (Federal Emergency Management Agency, 2013). As such, a breach at NEP Dam was evaluated to determine if it would result in overtopping of the SEP Dam embankments during the ½ PMF event. Results indicated that the peak water surface elevation in SEP Dam after a breach of NEP Dam would rise to 11.24, lower than the proposed SEP embankment elevation (12.1) and, therefore, not expected to result in a breach.

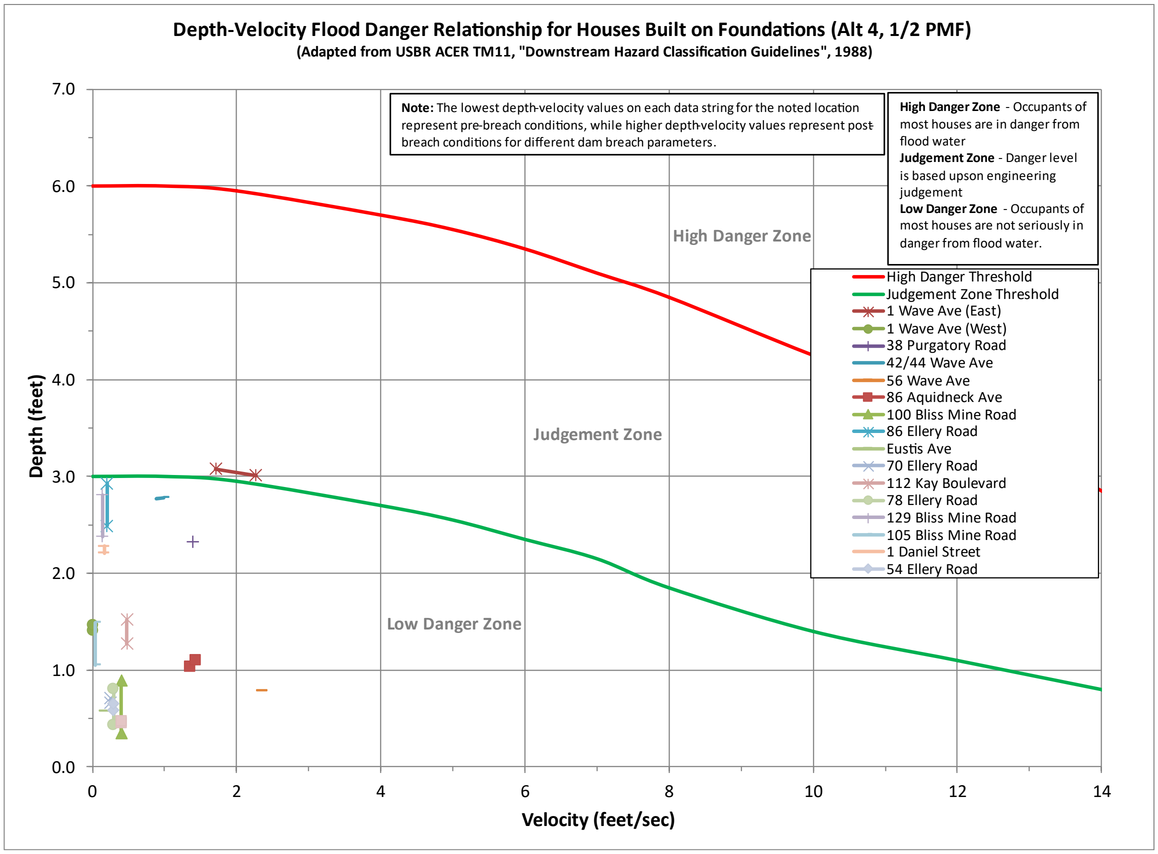


Figure 14: Depth-Velocity Flood Danger Relationship for Houses Built on Foundations Under Alternative 4 During ½ PMF

½ PMF Depth-velocity flood dangers for houses built on foundations during pre- and post-breach scenarios for Alternative 4 are shown in Figure 14. Only those locations that correspond with houses, or other structures assumed to be inhabited (e.g. hotels), are displayed. As shown, post-breach conditions result in some increase in depth and/or velocity for most locations. However, all results are within the low danger zone or the minimum range of the judgement zone. Accordingly, the increases for this hazard type were deemed acceptable.

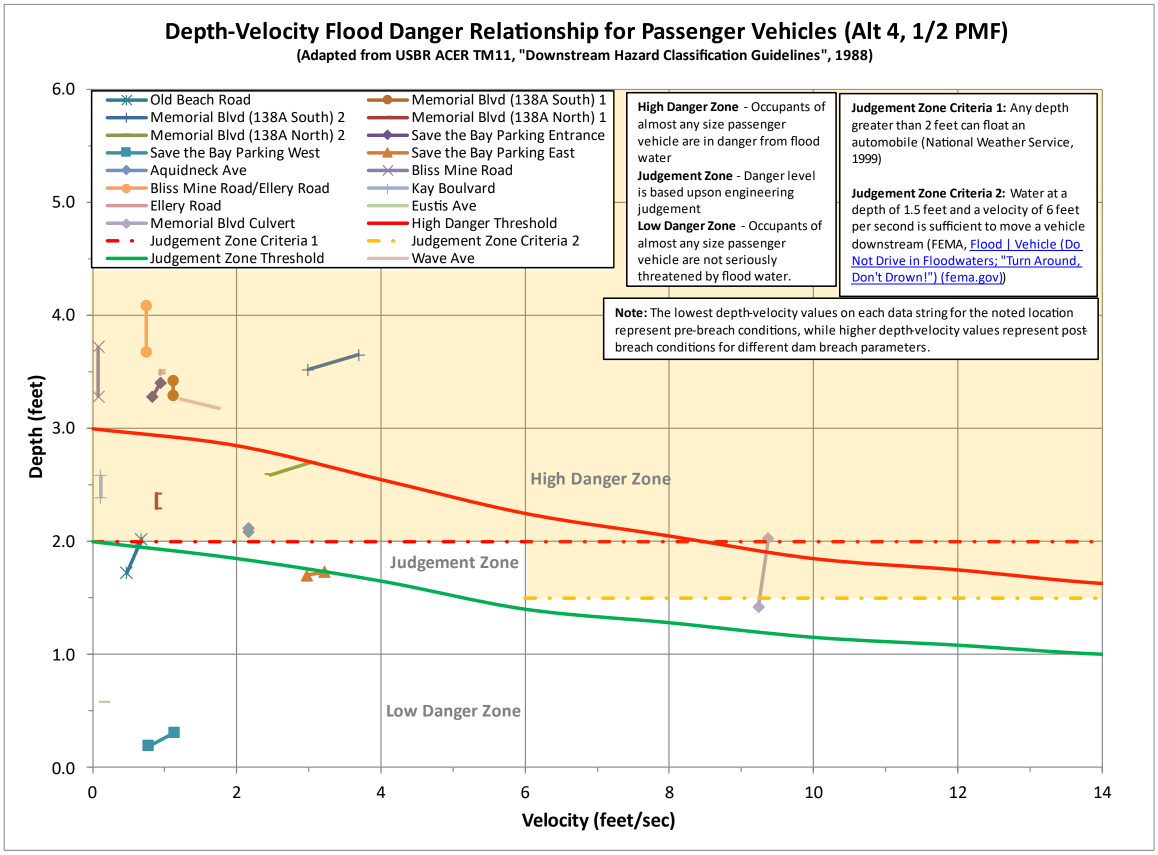


Figure 15: Depth-Velocity Flood Danger Relationship for Passenger Vehicles Under Alternative 4 During ½ PMF

½ PMF depth-velocity flood dangers as they relate to passenger vehicles during pre- and post-breach scenarios for Alternative 4 are shown in Figure 15. Only locations that correspond with a potential access/egress route are displayed. Post-breach conditions result in a slight increase in depth and/or velocity for most locations. However, many locations report depth-velocity values within the high danger zone (as defined either by USBR or judgement zone criteria) prior to a breach. At Old Beach Road and Memorial Boulevard Culvert, the increase in danger ratings shown are partially due to a reduction in pre-breach depth and velocity at these locations from existing conditions to Alternative 4. Without these reductions, the pre-breach danger would already be high. It is worth considering that Alternative 4 would both reduce pre-breach danger at these locations during extreme storms and would reduce the risk of a dam breach caused by overtopping or erosion. These potential failure mechanisms would be mitigated by embankment raising and armoring. While Old Beach Road may not be a viable access/egress route during a breach scenario under Alternative 4, it appears the three homes that would utilize Old Beach Road have viable and direct emergency egress routes by foot to the west. The possibility of closing Memorial Boulevard will be assessed during development of operations and maintenance plans for SEP Dam. Considering these additional points of context, the increases at these locations were deemed acceptable.

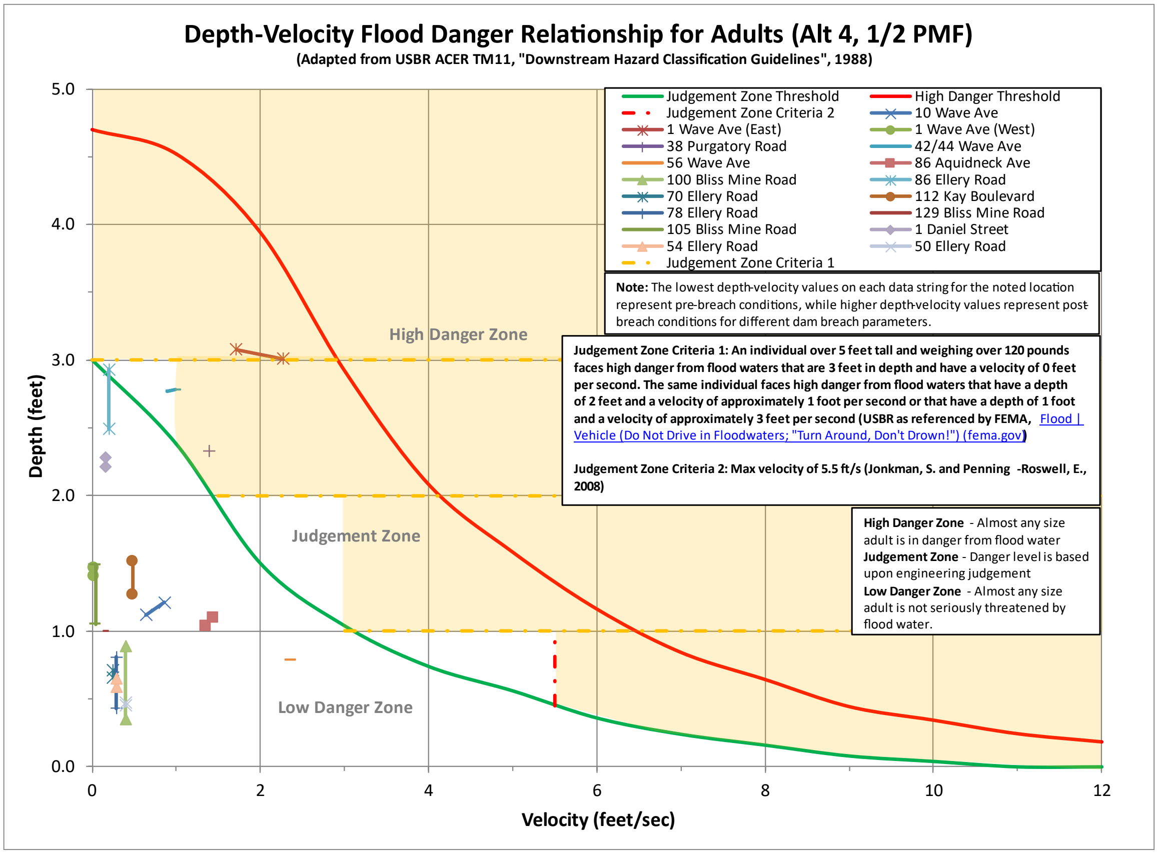


Figure 16: Depth-Velocity Flood Danger Relationship for Adults Under Alternative 4 During 1/2 PMF

Depth-velocity flood dangers as they relate to wading adults during pre- and post-breach scenarios for Alternative 4 are shown in Figure 16. Only locations that are likely to be inhabited are displayed. Post-breach conditions result in a slight increase in depth and/or velocity for most locations. However, all increases for post-breach conditions appear to fall within the same danger zone (as defined either by USBR or judgement zone criteria) as for pre-breach conditions at the same location. As such, increases shown for this flood hazard type were considered acceptable.

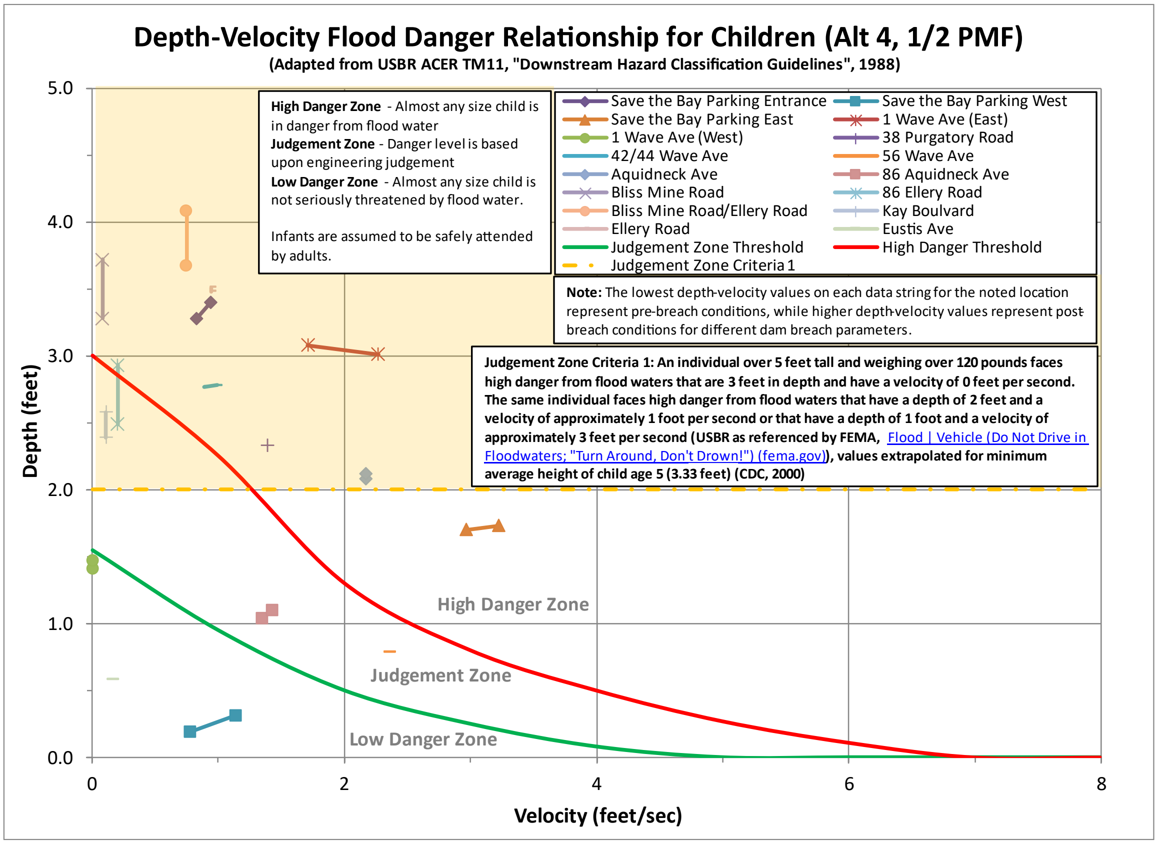


Figure 17: Depth-Velocity Flood Danger Relationship for Children Under Alternative 4 During 1/2 PMF

Depth-velocity flood dangers as they relate to wading children during pre- and post-breach scenarios for Alternative 4 are shown in Figure 17. Only locations that are likely to be inhabited are displayed. Post-breach conditions result in a slight increase in depth and/or velocity for most locations. However, all increases for post-breach conditions appear to fall within the same danger zone (as defined either by USBR or judgement zone criteria) as those for pre-breach conditions at the same location. As such, increases shown for this flood hazard type were considered acceptable.

5 Discussion and Conclusion

Hydrologic and hydraulic analyses summarized in this report sought to provide recommendations for mitigation of flood vulnerabilities at the NEP Dam and SEP Dam under both present-day and future climate conditions. Evidenced by historical flooding and damage, in addition to modeling performed as part of the current analysis, both dams are at risk of damage or failure resulting from inland flooding and tidal/coastal surge activity. Inland flood model results and sea level rise projections were analyzed to identify the following vulnerabilities for the existing dams:

- Modeling indicated the present-day 50-year inland precipitation event could exceed the capacity of both dams, overtop existing low points in their embankments, and cause subsequent dam failures. Under predicted 2070 climate conditions, the SEP Dam capacity may be exceeded by the 10-year inland flood.
- Modeling demonstrated a breach of the NEP Dam embankment during the present-day 50-year inland precipitation event could result in a "domino" breach scenario in which the SEP Dam subsequently overtops and fails, exacerbating flooding at downstream locations.
- SEP Dam limits the overall system's resilience to saltwater intrusion. Estimates indicate that saltwater intrusion through the SEP Dam primary spillway could occur during the present-day 20-year coastal surge event and during the 2070 predicted 1-year coastal surge event (i.e., by 2070, saltwater intrusion through the spillway could occur on an annual basis).
- Overtopping of the existing dam embankments due to coastal surge could occur during the present-day 100-year (SEP Dam) and 200-year (NEP Dam) events. Overtopping due to coastal surge is predicted during the 5-year (SEP Dam) and 50-year (NEP Dam) events by 2070.

The above vulnerabilities were determined primarily by isolating inland flooding and coastal surge events to evaluate the separate effects of each. 2070 inland flood scenarios were modeled with expected increases in mean higher high water – a readily available approximation of future tide conditions -- as the downstream boundary condition.

Alternative 2

Fuss & O'Neill evaluated two potential alternatives for modification of the dams to mitigate overtopping and erosion and to provide climate resilience. Modeling demonstrated that Alternative 2 would increase storage capacity, prevent saltwater intrusion through the spillways, and reduce the frequency of overtopping due to inland and/or coastal flooding. However, peak water surface elevations during extreme storms within NEP Dam and SEP Dam were reported as substantially higher than those for existing conditions. Higher peak water surface elevations during these storms would result in an increase in downstream flood hazards associated with a potential dam breach. For this reason, Alternative 2 was not selected as the recommended alternative.

Alternative 4 (Recommended Alternative)

Based on modeling, Alternative 4 would provide the same improvements as Alternative 2: enacting significant protections against inland and coastal flooding for present-day and predicted 2070 climate conditions. In addition, Alternative 4 appears to reduce peak water surface elevations in the SEP Dam by providing a crest gate that can operate over a range of elevations from 5.1 feet to 12.1 feet for an enlarged 120-foot-wide spillway.

As part of final design of the recommended alternative, additional hydraulic modeling should be carried out to develop an operations plan for the proposed gated SEP spillway. The proposed crest gate would likely require multiple sections and could necessitate varied elevations or timing considerations for different storm and tide combinations. This configuration will also be informed by gate manufacturer specifications.

Under normal conditions, the crest gate should be designed to retain a normal pool elevation of 7.3, similar to existing conditions. The gate configuration will also maintain discharge rates at the SEP Spillway that prevent increases in water surface elevations downstream of the dam.

Ahead of storms projected to be equal to or larger than the 500-year inland event, the gate would be dropped to a low elevation of 5.1 to provide additional storage capacity in SEP Dam. The current analysis determined that lowering the SEP spillway crest, thereby providing additional storage and flow capacity, would accommodate the IDF (1/2 PMF). The gate can also be raised up to elevation 12.1 (matching proposed embankment elevations) to prevent saltwater intrusion through the spillway.

A key component of Alternative 4 is the stabilization and armoring of dam embankments and, in specific areas, reconstructing and armoring dam embankments to allow for overtopping without a breach. Modeling and design may be necessary to understand and meet design criteria for periodic overtopping.

In conclusion, to account for vulnerabilities at the existing dams and to provide resilience for future climate conditions, Fuss & O'Neill recommend proceeding with proposed Alternative 4, which includes:

- Raising NEP Dam embankment crest to elevation 13.4 to limit overtopping due to inland flooding
- Raising the SEP Dam embankment crest to elevation 12.1 to limit overtopping due to inland and coastal flooding
- Reconstructing the SEP Dam spillway to a width of 120 feet and installing a hydraulic crest gate to range from elevations 5.1 to 12.1, allowing for varied pool elevations and preventing saltwater intrusion through the SEP Dam spillway
- Constructing a tidal/flap gate in the moat near J Paul Braga Jr Memorial Field to prevent saltwater intrusion through the NEP Dam auxiliary spillway. The SEP Dam embankment east of the gate will remain at existing elevations to allow stormwater from surrounding neighborhoods into SEP and prevent increased water surface elevations in the moat and surrounding area

- Reconstructing and armoring dam embankments with articulated concrete block mats to reduce the risk of erosion caused by wave attacks, moat flows, and unlikely overtopping events

Table 10 summarizes present-day and 2070 flood protection levels offered under existing conditions and under proposed Alternative 4. Figure 1 and Figure 2 display selected results at the project site.

Table 10: Comparison of Flood Protection Levels for Existing Conditions and Proposed Alternative 4

Climate Conditions	Scenario	Overtopping via Inland Flooding	Saltwater Intrusion
Present-Day	**Existing Conditions**	10-year storm	10-year coastal surge
	Recommended Alternative	500-year storm	200-year coastal surge
2070	**Existing Conditions**	Lower than 10-year [1]	MHHW, no surge [2]
	Recommended Alternative	500-year storm	20-year coastal surge

[1] The smallest inland flood modeled was that of the 10-year precipitation. Modeling predicted this storm would overtop the existing SEP Dam embankments under predicted 2070 climate conditions.
[2] Modeling suggests the 2070 1-year coastal surge would overtop the SEP Dam spillway under existing conditions. Therefore, existing conditions protect only through mean higher high water (high tide) for predicted 2070 climate conditions.

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Appendix A

Supporting Hydrologic Information

FUSS & O'NEILL

Subbasin Characteristics

Subbasin Name	Discharge Location	Area (Acres)	Composite Curve Number	Time of Concentration (Minutes)
Subbasin 1-A	North Easton Pond	2167.429	83.6	277.1
Subbasin 1-B	North Easton Pond	485.571	87.5	61.45
Subbasin 2	South Easton Pond	146.17	97	7.04
Subbasin 3-1	West Moat	32.937	82.4	24.64
Subbasin 3-2	West Moat	232.097	88	51.77
Subbasin 3-3	West Moat	84.639	90.2	32.93
Subbasin 3-4	West Moat	42.182	87.3	20.72
Subbasin 3-5	West Moat	21.241	81.6	24.92
Subbasin 3-6	West Moat	36.617	81.6	15.96
Subbasin 3-7	West Moat	2.16	79.6	6.11
Subbasin 3-8	West Moat	3.162	79.8	6
Subbasin 3-9	West Moat	4.7	80.6	6.7
Subbasin 3-10	East Moat	8.622	91	6
Subbasin 3-11	East Moat	8.193	94	6
Subbasin 3-12	East Moat	123.641	86.1	46.48
Subbasin 4-1	Away from Project	116.94	85.9	23.4
Subbasin 4-2	Away from Project	1.178	91	6

Present-Day Subbasin Peak Flow Summary

Subbasin Name	2-Year (cfs)	10-Year (cfs)	50-Year (cfs)	100-Year (cfs)	500-Year (cfs)	1/2 PMF (cfs)
Subbasin 1-A	447.6	817.4	1399.2	1718.9	2600	4313.1
Subbasin 1-B	349	596.6	970.5	1172	1720.9	2650.7
Subbasin 2	377.6	568.7	853.4	1007.1	1428.6	1407.5
Subbasin 3-1	32.3	59.5	101.8	124.8	187.6	268.1
Subbasin 3-2	190.3	322.5	521.5	628.6	920.1	1281.9
Subbasin 3-3	99.9	163.7	258.6	309.6	448.3	403.7
Subbasin 3-4	55.3	94.4	153.2	184.8	270.8	220.7
Subbasin 3-5	20	37.2	64.3	79	119.4	106.1
Subbasin 3-6	42	78.5	135.3	166.3	251	178.9
Subbasin 3-7	3.1	6	10.5	12.9	19.7	14.6
Subbasin 3-8	4.5	8.7	15.2	18.8	28.6	21.2
Subbasin 3-9	6.9	12.9	22.5	27.7	42	27.2
Subbasin 3-10	19.7	31.9	49.8	59.4	85.6	83.2
Subbasin 3-11	20.5	31.8	48.5	57.6	82.1	79.1
Subbasin 3-12	100.4	174.9	288.2	349.4	516.1	785.2
Subbasin 4-1	137	238.7	393	476.1	702.7	967.7
Subbasin 4-2	2.6	4.2	6.6	7.9	11.4	11.1

Predicted 2070 Subbasin Peak Flow Summary

Subbasin Name	2-Year (cfs)	10-Year (cfs)	50-Year (cfs)	100-Year (cfs)	500-Year (cfs)	1/2 PMF (cfs)
Subbasin 1-A	746.3	1276.7	1891.5	2163	2878.8	4615
Subbasin 1-B	549.9	892.8	1280.1	1449.4	1893.5	2836.2
Subbasin 2	533	794.2	1089.8	1219.7	1561.8	1506
Subbasin 3-1	54.3	92.9	137.1	156.5	207.4	286.9
Subbasin 3-2	297.6	480.2	686	776	1011.8	1371.6
Subbasin 3-3	151.8	238.9	336.9	379.7	492	431.9
Subbasin 3-4	87.1	141	201.7	228.2	297.8	236.2
Subbasin 3-5	33.9	58.6	86.9	99.4	132.1	113.6
Subbasin 3-6	71.5	123.4	183	209.1	277.7	191.4
Subbasin 3-7	5.4	9.5	14.3	16.4	21.8	15.6
Subbasin 3-8	7.9	13.8	20.7	23.7	31.7	22.7
Subbasin 3-9	11.8	20.5	30.5	34.9	46.5	29.1
Subbasin 3-10	29.6	46.1	64.6	72.7	93.9	89
Subbasin 3-11	29.7	45.1	62.4	70	89.9	84.6
Subbasin 3-12	160.8	264.6	382.2	433.7	568.5	840.2
Subbasin 4-1	219.5	360.9	520.7	590.6	773.9	1035.4
Subbasin 4-2	3.9	6.1	8.6	9.7	12.5	11.9

PMF Temporal Rainfall Distribution

The total precipitation depth was temporally distributed by dividing the rainfall into 6-hour increments, with the most intense 6-hour period of the storm further divided into 1-hour increments. The 72-hour rainfall distribution applied to the IDF analysis described in Section 4 is summarized below.

Cumulative Storm Time (hours)	Cumulative Rainfall Depth (in)	Cumulative Storm Time (hours)	Cumulative Rainfall Depth (in)
6	0.4	**42**	4.3
12	0.9	**48**	5.4
18	1.4	**54**	6.9
24	2.0	**60**	10.8
30	2.6	**66**	36.4
36	3.4	**72**	38.5

HEC-HMS Model Reports

Project: 20060901.d64.2023
Simulation Run: 10-Year
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:47

Global Parameter Summary - Subbasin

Area (MI2)

Element Name	Area (MI2)
SubWatershed 1 - A	3.39
SubWatershed 1 - B	0.76
SubWatershed 2	0.23
SubWatershed 3 - 3	0.13
SubWatershed 3 - 4	0.07
SubWatershed 3 - 6	0.06
SubWatershed 3 - 1	0.05
SubWatershed 3 - 2	0.36
SubWatershed 3 - 12	0.19
SubWatershed 4 - 1	0.18
SubWatershed 3 - 5	0.03
SubWatershed 3 - 8	0
SubWatershed 3 - 7	0
SubWatershed 3 - 9	0.01
SubWatershed 3 - 10	0.01
SubWatershed 3 - 11	0.01
SubWatershed 4 - 2	0

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number
SubWatershed 1 - A	0	83.6
SubWatershed 1 - B	0	87.5
SubWatershed 2	0	97
SubWatershed 3 - 3	0	90.2
SubWatershed 3 - 4	0	87.3
SubWatershed 3 - 6	0	81.6
SubWatershed 3 - 1	0	82.4
SubWatershed 3 - 2	0	88
SubWatershed 3 - 12	0	86.1
SubWatershed 4 - 1	0	85.9
SubWatershed 3 - 5	0	81.6
SubWatershed 3 - 8	0	79.8
SubWatershed 3 - 7	0	79.6
SubWatershed 3 - 9	0	80.6
SubWatershed 3 - 10	0	91
SubWatershed 3 - 11	0	94
SubWatershed 4 - 2	0	91

Transform: Scs

Element Name	Lag	Unitgraph Type
SubWatershed 1 - A	277.1	Standard
SubWatershed 1 - B	61.45	Standard
SubWatershed 2	7.04	Standard
SubWatershed 3 - 3	32.93	Standard
SubWatershed 3 - 4	20.72	Standard
SubWatershed 3 - 6	15.96	Standard
SubWatershed 3 - 1	24.64	Standard
SubWatershed 3 - 2	51.77	Standard
SubWatershed 3 - 12	46.48	Standard
SubWatershed 4 - 1	23.4	Standard
SubWatershed 3 - 5	24.92	Standard
SubWatershed 3 - 8	6	Standard
SubWatershed 3 - 7	6.11	Standard
SubWatershed 3 - 9	6.7	Standard
SubWatershed 3 - 10	6	Standard
SubWatershed 3 - 11	6	Standard
SubWatershed 4 - 2	6	Standard

Project: 20060901.d64.2023
Simulation Run: 10-Year
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:47

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	817.37	01Jan2022, 17:06	2.68
Sink - 1	3.39	817.37	01Jan2022, 17:06	2.68
SubWatershed 1 - B	0.76	596.61	01Jan2022, 13:06	3.47
SubWatershed 2	0.23	568.69	01Jan2022, 12:08	4.54
SubWatershed 3 - 3	0.13	163.71	01Jan2022, 12:36	3.77
SubWatershed 3 - 4	0.07	94.43	01Jan2022, 12:23	3.49
SubWatershed 3 - 6	0.06	78.46	01Jan2022, 12:18	2.94
SubWatershed 3 - 1	0.05	59.51	01Jan2022, 12:28	3.01
SubWatershed 3 - 2	0.36	322.51	01Jan2022, 12:56	3.53
SubWatershed 3 - 12	0.19	174.92	01Jan2022, 12:50	3.34
SubWatershed 4 - 1	0.18	238.73	01Jan2022, 12:26	3.34
SubWatershed 3 - 5	0.03	37.23	01Jan2022, 12:28	2.93
SubWatershed 3 - 8	0	8.68	01Jan2022, 12:08	2.78
SubWatershed 3 - 7	0	5.96	01Jan2022, 12:08	2.76
SubWatershed 3 - 9	0.01	12.93	01Jan2022, 12:08	2.85
SubWatershed 3 - 10	0.01	31.86	01Jan2022, 12:07	3.88
SubWatershed 3 - 11	0.01	31.8	01Jan2022, 12:07	4.2
SubWatershed 4 - 2	0	4.25	01Jan2022, 12:07	3.88

Project: 20060901.d64.2023
Simulation Run: 50-Year
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:44

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	1399.17	01Jan2022, 17:01	4.64
Sink - 1	3.39	1399.17	01Jan2022, 17:01	4.64
SubWatershed 1 - B	0.76	970.53	01Jan2022, 13:05	5.74
SubWatershed 2	0.23	853.38	01Jan2022, 12:08	6.93
SubWatershed 3 - 3	0.13	258.61	01Jan2022, 12:35	6.09
SubWatershed 3 - 4	0.07	153.18	01Jan2022, 12:23	5.78
SubWatershed 3 - 6	0.06	135.33	01Jan2022, 12:18	5.13
SubWatershed 3 - 1	0.05	101.75	01Jan2022, 12:27	5.21
SubWatershed 3 - 2	0.36	521.51	01Jan2022, 12:55	5.81
SubWatershed 3 - 12	0.19	288.23	01Jan2022, 12:50	5.6
SubWatershed 4 - 1	0.18	392.97	01Jan2022, 12:26	5.61
SubWatershed 3 - 5	0.03	64.26	01Jan2022, 12:28	5.12
SubWatershed 3 - 8	0	15.2	01Jan2022, 12:08	4.94
SubWatershed 3 - 7	0	10.48	01Jan2022, 12:08	4.92
SubWatershed 3 - 9	0.01	22.5	01Jan2022, 12:08	5.03
SubWatershed 3 - 10	0.01	49.8	01Jan2022, 12:07	6.23
SubWatershed 3 - 11	0.01	48.55	01Jan2022, 12:07	6.58
SubWatershed 4 - 2	0	6.64	01Jan2022, 12:07	6.23

Project: 20060901.d64.2023
Simulation Run: 100-Year
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:47

Global Parameter Summary - Subbasin

Area (MI2)

Element Name	Area (MI2)
SubWatershed 1 - A	3.39
SubWatershed 1 - B	0.76
SubWatershed 2	0.23
SubWatershed 3 - 3	0.13
SubWatershed 3 - 4	0.07
SubWatershed 3 - 6	0.06
SubWatershed 3 - 1	0.05
SubWatershed 3 - 2	0.36
SubWatershed 3 - 12	0.19
SubWatershed 4 - 1	0.18
SubWatershed 3 - 5	0.03
SubWatershed 3 - 8	0
SubWatershed 3 - 7	0
SubWatershed 3 - 9	0.01
SubWatershed 3 - 10	0.01
SubWatershed 3 - 11	0.01
SubWatershed 4 - 2	0

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number
SubWatershed 1 - A	0	83.6
SubWatershed 1 - B	0	87.5
SubWatershed 2	0	97
SubWatershed 3 - 3	0	90.2
SubWatershed 3 - 4	0	87.3
SubWatershed 3 - 6	0	81.6
SubWatershed 3 - 1	0	82.4
SubWatershed 3 - 2	0	88
SubWatershed 3 - 12	0	86.1
SubWatershed 4 - 1	0	85.9
SubWatershed 3 - 5	0	81.6
SubWatershed 3 - 8	0	79.8
SubWatershed 3 - 7	0	79.6
SubWatershed 3 - 9	0	80.6
SubWatershed 3 - 10	0	91
SubWatershed 3 - 11	0	94
SubWatershed 4 - 2	0	91

Transform: Scs

Element Name	Lag	Unitgraph Type
SubWatershed 1 - A	277.1	Standard
SubWatershed 1 - B	61.45	Standard
SubWatershed 2	7.04	Standard
SubWatershed 3 - 3	32.93	Standard
SubWatershed 3 - 4	20.72	Standard
SubWatershed 3 - 6	15.96	Standard
SubWatershed 3 - 1	24.64	Standard
SubWatershed 3 - 2	51.77	Standard
SubWatershed 3 - 12	46.48	Standard
SubWatershed 4 - 1	23.4	Standard
SubWatershed 3 - 5	24.92	Standard
SubWatershed 3 - 8	6	Standard
SubWatershed 3 - 7	6.11	Standard
SubWatershed 3 - 9	6.7	Standard
SubWatershed 3 - 10	6	Standard
SubWatershed 3 - 11	6	Standard
SubWatershed 4 - 2	6	Standard

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	1718.88	01Jan2022, 16:59	5.74
Sink - 1	3.39	1718.88	01Jan2022, 16:59	5.74
SubWatershed 1 - B	0.76	1172.01	01Jan2022, 13:05	6.99
SubWatershed 2	0.23	1007.12	01Jan2022, 12:08	8.23
SubWatershed 3 - 3	0.13	309.57	01Jan2022, 12:35	7.37
SubWatershed 3 - 4	0.07	184.77	01Jan2022, 12:23	7.04
SubWatershed 3 - 6	0.06	166.3	01Jan2022, 12:18	6.36
SubWatershed 3 - 1	0.05	124.77	01Jan2022, 12:27	6.44
SubWatershed 3 - 2	0.36	628.59	01Jan2022, 12:55	7.07
SubWatershed 3 - 12	0.19	349.38	01Jan2022, 12:49	6.85
SubWatershed 4 - 1	0.18	476.1	01Jan2022, 12:26	6.86
SubWatershed 3 - 5	0.03	79	01Jan2022, 12:28	6.34
SubWatershed 3 - 8	0	18.77	01Jan2022, 12:07	6.16
SubWatershed 3 - 7	0	12.94	01Jan2022, 12:08	6.13
SubWatershed 3 - 9	0.01	27.73	01Jan2022, 12:08	6.25
SubWatershed 3 - 10	0.01	59.42	01Jan2022, 12:07	7.51
SubWatershed 3 - 11	0.01	57.55	01Jan2022, 12:07	7.87
SubWatershed 4 - 2	0	7.92	01Jan2022, 12:07	7.51

Project: 20060901.d64.2023
Simulation Run: 500-Year
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:44

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	2600.04	01Jan2022, 16:56	8.81
Sink - 1	3.39	2600.04	01Jan2022, 16:56	8.81
SubWatershed 1 - B	0.76	1720.86	01Jan2022, 13:04	10.46
SubWatershed 2	0.23	1428.56	01Jan2022, 12:08	11.79
SubWatershed 3 - 3	0.13	448.31	01Jan2022, 12:35	10.88
SubWatershed 3 - 4	0.07	270.78	01Jan2022, 12:22	10.54
SubWatershed 3 - 6	0.06	250.99	01Jan2022, 12:17	9.79
SubWatershed 3 - 1	0.05	187.61	01Jan2022, 12:27	9.88
SubWatershed 3 - 2	0.36	920.14	01Jan2022, 12:54	10.55
SubWatershed 3 - 12	0.19	516.11	01Jan2022, 12:49	10.32
SubWatershed 4 - 1	0.18	702.66	01Jan2022, 12:25	10.35
SubWatershed 3 - 5	0.03	119.37	01Jan2022, 12:27	9.77
SubWatershed 3 - 8	0	28.58	01Jan2022, 12:07	9.57
SubWatershed 3 - 7	0	19.71	01Jan2022, 12:07	9.54
SubWatershed 3 - 9	0.01	42.01	01Jan2022, 12:08	9.68
SubWatershed 3 - 10	0.01	85.62	01Jan2022, 12:07	11.04
SubWatershed 3 - 11	0.01	82.15	01Jan2022, 12:07	11.42
SubWatershed 4 - 2	0	11.42	01Jan2022, 12:07	11.04

Project: 20060901.d64.2023
Simulation Run: 1/2 PMF
Simulation Start: 31 December 2021, 24:00
Simulation End: 3 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:44

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	4313.12	03Jan2022, 19:45	15.53
Sink - 1	3.39	4313.12	03Jan2022, 19:45	15.53
SubWatershed 1 - B	0.76	2650.7	03Jan2022, 16:06	18.49
SubWatershed 2	0.23	1407.48	03Jan2022, 15:12	19.32
SubWatershed 3 - 3	0.13	403.68	03Jan2022, 15:38	15.41
SubWatershed 3 - 4	0.07	220.7	03Jan2022, 15:26	15.2
SubWatershed 3 - 6	0.06	178.92	03Jan2022, 15:21	14.25
SubWatershed 3 - 1	0.05	268.13	03Jan2022, 15:30	18.22
SubWatershed 3 - 2	0.36	1281.87	03Jan2022, 15:56	17.76
SubWatershed 3 - 12	0.19	785.22	03Jan2022, 15:51	18.44
SubWatershed 4 - 1	0.18	967.7	03Jan2022, 15:29	18.5
SubWatershed 3 - 5	0.03	106.15	03Jan2022, 15:30	14.75
SubWatershed 3 - 8	0	21.22	03Jan2022, 15:11	15.57
SubWatershed 3 - 7	0	14.57	03Jan2022, 15:11	15.5
SubWatershed 3 - 9	0.01	27.2	03Jan2022, 15:12	14.8
SubWatershed 3 - 10	0.01	83.17	03Jan2022, 15:11	18.91
SubWatershed 3 - 11	0.01	79.08	03Jan2022, 15:11	19.13
SubWatershed 4 - 2	0	11.11	03Jan2022, 15:11	18.92

Project: 20060901.d64.2023
Simulation Run: 10-Year 2070
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:47

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	1276.74	01Jan2022, 17:02	4.23
Sink - 1	3.39	1276.74	01Jan2022, 17:02	4.23
SubWatershed 1 - B	0.76	892.78	01Jan2022, 13:05	5.26
SubWatershed 2	0.23	794.18	01Jan2022, 12:08	6.43
SubWatershed 3 - 3	0.13	238.93	01Jan2022, 12:35	5.61
SubWatershed 3 - 4	0.07	140.98	01Jan2022, 12:23	5.29
SubWatershed 3 - 6	0.06	123.42	01Jan2022, 12:18	4.67
SubWatershed 3 - 1	0.05	92.9	01Jan2022, 12:27	4.74
SubWatershed 3 - 2	0.36	480.18	01Jan2022, 12:55	5.33
SubWatershed 3 - 12	0.19	264.65	01Jan2022, 12:50	5.12
SubWatershed 4 - 1	0.18	360.89	01Jan2022, 12:26	5.13
SubWatershed 3 - 5	0.03	58.6	01Jan2022, 12:28	4.65
SubWatershed 3 - 8	0	13.83	01Jan2022, 12:08	4.48
SubWatershed 3 - 7	0	9.53	01Jan2022, 12:08	4.46
SubWatershed 3 - 9	0.01	20.5	01Jan2022, 12:08	4.57
SubWatershed 3 - 10	0.01	46.09	01Jan2022, 12:07	5.73
SubWatershed 3 - 11	0.01	45.08	01Jan2022, 12:07	6.08
SubWatershed 4 - 2	0	6.14	01Jan2022, 12:07	5.73

Project: 20060901.d64.2023
Simulation Run: 50-Year 2070
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:44

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	1891.49	01Jan2022, 16:58	6.34
Sink - 1	3.39	1891.49	01Jan2022, 16:58	6.34
SubWatershed 1 - B	0.76	1280.11	01Jan2022, 13:05	7.67
SubWatershed 2	0.23	1089.83	01Jan2022, 12:08	8.93
SubWatershed 3 - 3	0.13	336.9	01Jan2022, 12:35	8.05
SubWatershed 3 - 4	0.07	201.71	01Jan2022, 12:23	7.72
SubWatershed 3 - 6	0.06	182.96	01Jan2022, 12:18	7.03
SubWatershed 3 - 1	0.05	137.14	01Jan2022, 12:27	7.11
SubWatershed 3 - 2	0.36	686.02	01Jan2022, 12:55	7.75
SubWatershed 3 - 12	0.19	382.23	01Jan2022, 12:49	7.52
SubWatershed 4 - 1	0.18	520.7	01Jan2022, 12:26	7.54
SubWatershed 3 - 5	0.03	86.94	01Jan2022, 12:27	7.01
SubWatershed 3 - 8	0	20.7	01Jan2022, 12:07	6.82
SubWatershed 3 - 7	0	14.27	01Jan2022, 12:08	6.79
SubWatershed 3 - 9	0.01	30.54	01Jan2022, 12:08	6.92
SubWatershed 3 - 10	0.01	64.58	01Jan2022, 12:07	8.2
SubWatershed 3 - 11	0.01	62.39	01Jan2022, 12:07	8.56
SubWatershed 4 - 2	0	8.61	01Jan2022, 12:07	8.2

Project: 20060901.d64.2023
Simulation Run: 100-Year 2070
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:44

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	2163.03	01Jan2022, 16:57	7.28
Sink - 1	3.39	2163.03	01Jan2022, 16:57	7.28
SubWatershed 1 - B	0.76	1449.44	01Jan2022, 13:04	8.73
SubWatershed 2	0.23	1219.71	01Jan2022, 12:08	10.02
SubWatershed 3 - 3	0.13	379.71	01Jan2022, 12:35	9.13
SubWatershed 3 - 4	0.07	228.24	01Jan2022, 12:22	8.8
SubWatershed 3 - 6	0.06	209.07	01Jan2022, 12:18	8.08
SubWatershed 3 - 1	0.05	156.53	01Jan2022, 12:27	8.17
SubWatershed 3 - 2	0.36	775.98	01Jan2022, 12:55	8.82
SubWatershed 3 - 12	0.19	433.69	01Jan2022, 12:49	8.59
SubWatershed 4 - 1	0.18	590.63	01Jan2022, 12:25	8.61
SubWatershed 3 - 5	0.03	99.4	01Jan2022, 12:27	8.06
SubWatershed 3 - 8	0	23.73	01Jan2022, 12:07	7.87
SubWatershed 3 - 7	0	16.36	01Jan2022, 12:08	7.84
SubWatershed 3 - 9	0.01	34.94	01Jan2022, 12:08	7.97
SubWatershed 3 - 10	0.01	72.66	01Jan2022, 12:07	9.29
SubWatershed 3 - 11	0.01	69.97	01Jan2022, 12:07	9.66
SubWatershed 4 - 2	0	9.69	01Jan2022, 12:07	9.29

Project: 20060901.d64.2023
Simulation Run: 500-Year 2070
Simulation Start: 31 December 2021, 24:00
Simulation End: 1 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:44

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	2878.83	01Jan2022, 16:55	9.79
Sink - 1	3.39	2878.83	01Jan2022, 16:55	9.79
SubWatershed 1 - B	0.76	1893.45	01Jan2022, 13:04	11.56
SubWatershed 2	0.23	1561.81	01Jan2022, 12:08	12.92
SubWatershed 3 - 3	0.13	491.95	01Jan2022, 12:35	11.99
SubWatershed 3 - 4	0.07	297.82	01Jan2022, 12:22	11.65
SubWatershed 3 - 6	0.06	277.67	01Jan2022, 12:17	10.89
SubWatershed 3 - 1	0.05	207.38	01Jan2022, 12:27	10.98
SubWatershed 3 - 2	0.36	1011.84	01Jan2022, 12:54	11.66
SubWatershed 3 - 12	0.19	568.51	01Jan2022, 12:49	11.42
SubWatershed 4 - 1	0.18	773.87	01Jan2022, 12:25	11.46
SubWatershed 3 - 5	0.03	132.07	01Jan2022, 12:27	10.87
SubWatershed 3 - 8	0	31.67	01Jan2022, 12:07	10.67
SubWatershed 3 - 7	0	21.84	01Jan2022, 12:07	10.64
SubWatershed 3 - 9	0.01	46.5	01Jan2022, 12:08	10.78
SubWatershed 3 - 10	0.01	93.87	01Jan2022, 12:07	12.17
SubWatershed 3 - 11	0.01	89.91	01Jan2022, 12:07	12.55
SubWatershed 4 - 2	0	12.52	01Jan2022, 12:07	12.17

Project: 20060901.d64.2023
Simulation Run: Projected 0.5 PMF
Simulation Start: 31 December 2021, 24:00
Simulation End: 3 January 2022, 24:00

HMS Version: 4.10
Executed: 05 December 2023, 18:47

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
SubWatershed 1 - A	3.39	4615.04	03Jan2022, 19:45	16.62
Sink - 1	3.39	4615.04	03Jan2022, 19:45	16.62
SubWatershed 1 - B	0.76	2836.25	03Jan2022, 16:06	19.79
SubWatershed 2	0.23	1506.01	03Jan2022, 15:12	20.67
SubWatershed 3 - 3	0.13	431.94	03Jan2022, 15:38	16.49
SubWatershed 3 - 4	0.07	236.15	03Jan2022, 15:26	16.27
SubWatershed 3 - 6	0.06	191.44	03Jan2022, 15:21	15.25
SubWatershed 3 - 1	0.05	286.9	03Jan2022, 15:30	19.5
SubWatershed 3 - 2	0.36	1371.6	03Jan2022, 15:56	19
SubWatershed 3 - 12	0.19	840.18	03Jan2022, 15:51	19.73
SubWatershed 4 - 1	0.18	1035.44	03Jan2022, 15:29	19.79
SubWatershed 3 - 5	0.03	113.58	03Jan2022, 15:30	15.79
SubWatershed 3 - 8	0	22.71	03Jan2022, 15:11	16.66
SubWatershed 3 - 7	0	15.59	03Jan2022, 15:11	16.58
SubWatershed 3 - 9	0.01	29.1	03Jan2022, 15:12	15.84
SubWatershed 3 - 10	0.01	88.99	03Jan2022, 15:11	20.23
SubWatershed 3 - 11	0.01	84.62	03Jan2022, 15:11	20.47
SubWatershed 4 - 2	0	11.89	03Jan2022, 15:11	20.25

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Appendix B

Supporting Hydraulic Information

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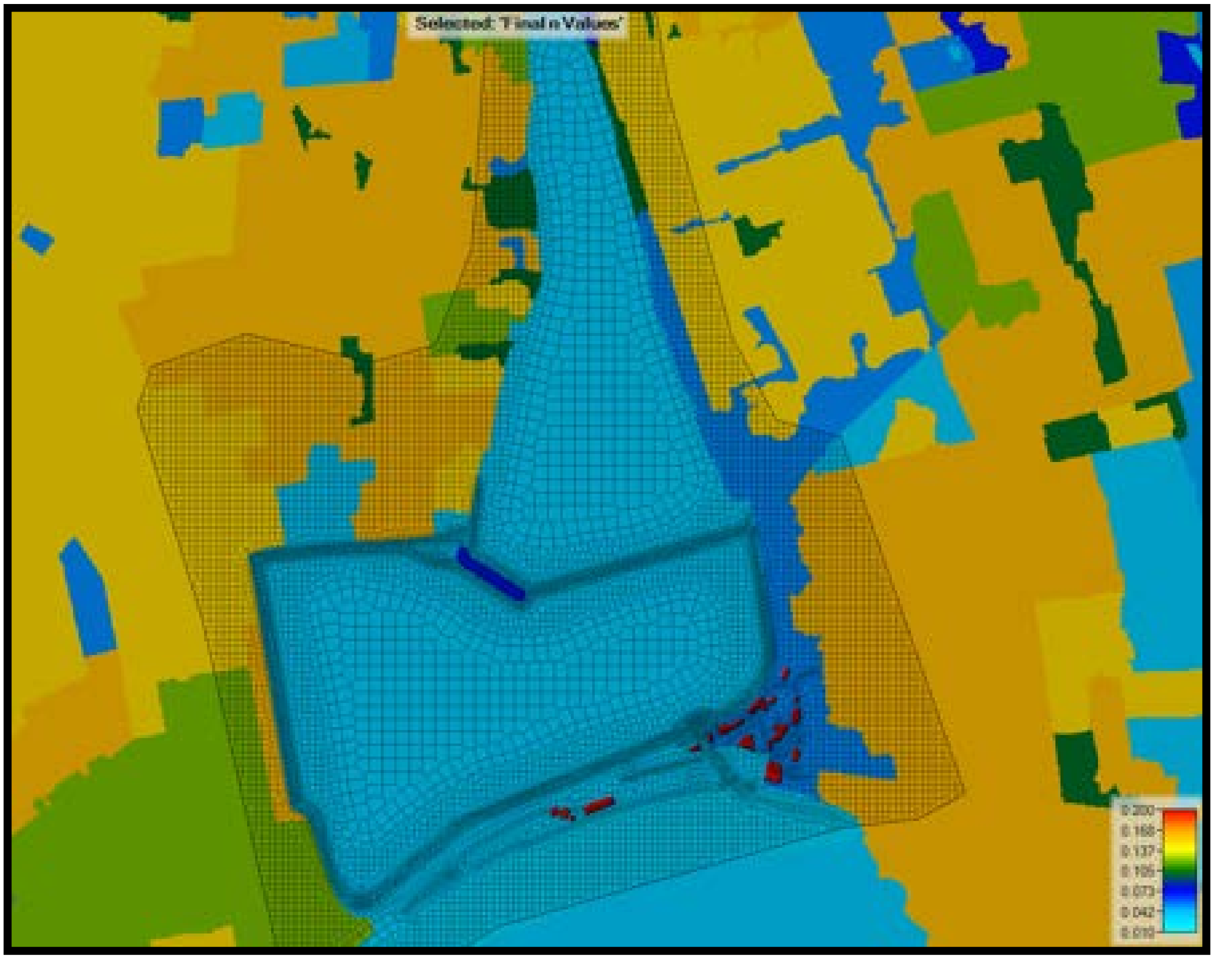
Topographic Data Summary Table

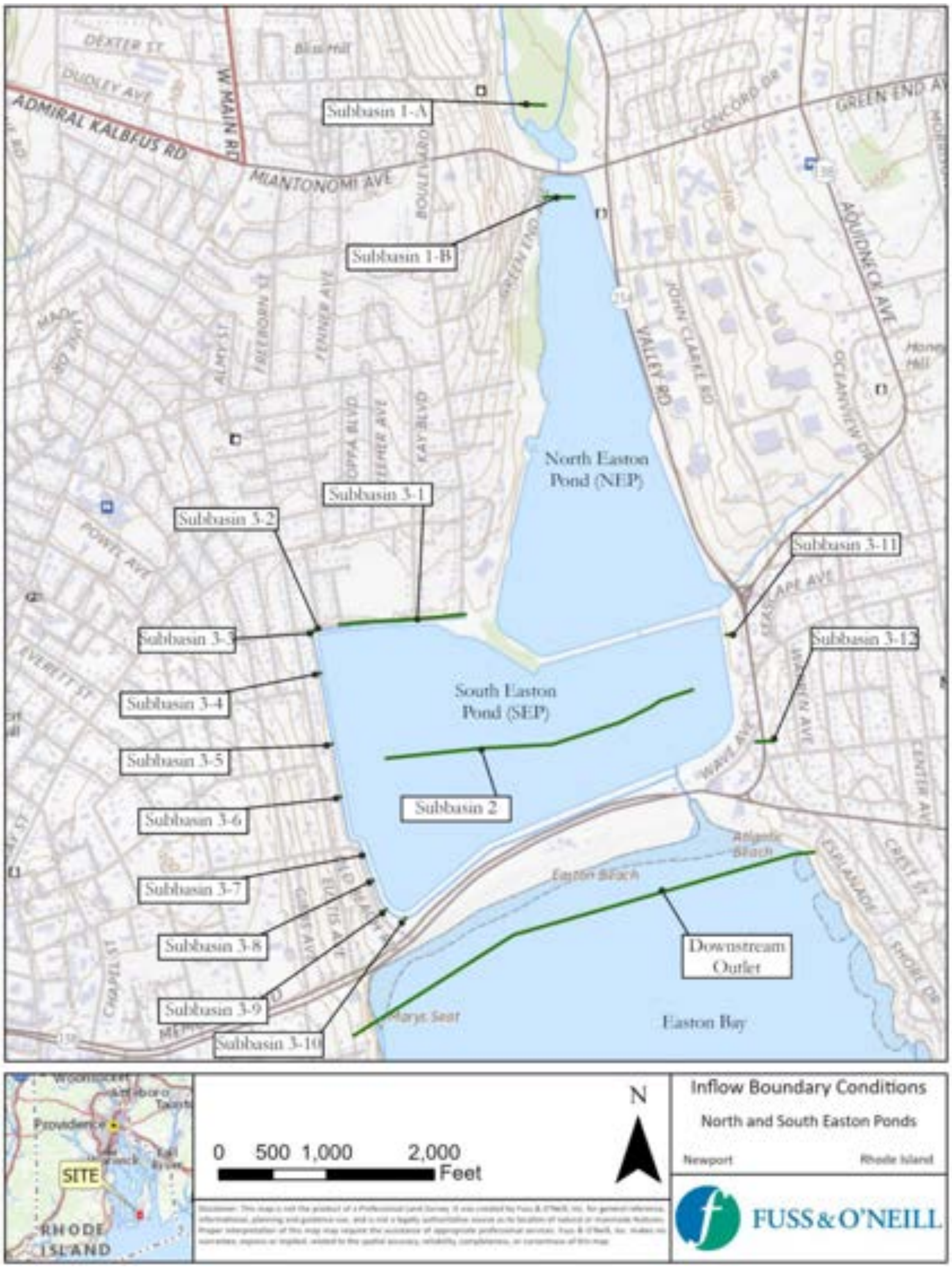
Plan Title	Source/Surveyor	Date Produced	Description
Lidar Topography	National Oceanic and Atmospheric Administration	2016	Lidar topography obtained through the NOAA Data Access Viewer used in any remaining project areas not covered by survey
Topographic Survey	Control Point Associates, Inc.	June 2021	Survey of the Eastern and Southern embankments of South Easton Pond and the embankment between North and South Easton Pond
As-Built Survey	R.P. Iannuccillo and Sons	July 2012	As-built survey used for the Western and Northern embankments of South Easton Pond
Topographic Survey Plan, Easton's Pond, Newport, Rhode Island	Waterman Engineering Co.	March 2008	Topographic survey used for the Western and Northern embankments of South Easton Pond
Bathymetric Survey Plan, South Easton Pond, Bottom Elevations	Apex Environmental, Inc.	October 2004	Bathymetric survey used for the bottom of South Easton Pond
Bathymetric Survey Plan, North Easton Pond, Bottom Elevations	Apex Environmental, Inc.	October 2005	Bathymetric survey used for the bottom of North Easton Pond

Manning's N Values Map



FUSS & O'NEILL

Inflow Boundary Conditions Map



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Peak Water Surface Elevations Summary

NEP Dam Present-Day Inland Flood Elevations Summary [1]

Alternative	Embankment Low Point Elevation	Spillway Elevation	10-Yr WSE	50-Yr WSE	50-Yr North Breach WSE [2]	100-Yr WSE	500-Yr WSE	500-Yr North Breach WSE [2]	½ PMF WSE	½ PMF North Breach WSE [2]
Existing Conditions	11.5	9.15	10.96	11.53	11.53	11.77	12.02	12.02	12.27	12.27
Alternative 2	13.4	9.15	10.97	11.54		11.81	12.50		13.46	13.46
Alternative 4	13.4	9.15	10.06	11.45		11.73	12.41		13.43	13.43

SEP Dam Present-Day Inland Flood Elevations Summary [1]

Alternative	Embankment Low Point Elevation	Spillway Elevation	10-Yr WSE	50-Yr WSE	50-Yr North Breach WSE [2]	100-Yr WSE	500-Yr WSE	500-Yr North Breach WSE [2]	½ PMF WSE	½ PMF North Breach WSE [2]
Existing Conditions	9.64	7.32	9.34	10.08	10.46	10.77	10.97	11.17	11.36	11.43
Alternative 2	12.1	7.32	9.27	10.02		10.39	11.33		12.17	12.26
Alternative 4	12.1	VARIES	8.09	8.98		9.28	9.79		10.39	11.25

NEP Dam 2070 Inland Flood Elevations Summary [1]

Alternative	Embankment Low Point Elevation	Spillway Elevation	10-Yr WSE	50-Yr WSE	100-Yr WSE	500-Yr WSE	½ PMF WSE
Existing Conditions	11.5	9.15	11.42	11.85	11.92	12.07	12.31
Alternative 2	13.4	9.15	11.43	11.95	12.16	12.68	13.49
Alternative 4	13.4	9.15	11.33	11.87	12.09	12.61	13.47

SEP Dam 2070 Inland Flood Elevations Summary [1]

Alternative	Embankment Low Point Elevation	Spillway Elevation	10-Yr WSE	50-Yr WSE	100-Yr WSE	500-Yr WSE	½ PMF WSE
Existing Conditions	9.64	7.32	9.94	10.51	10.72	11.08	11.42
Alternative 2	12.1	7.32	9.88	10.58	10.86	11.56	12.18
Alternative 4	12.1	VARIES	8.85	9.42	9.60	9.96	10.74

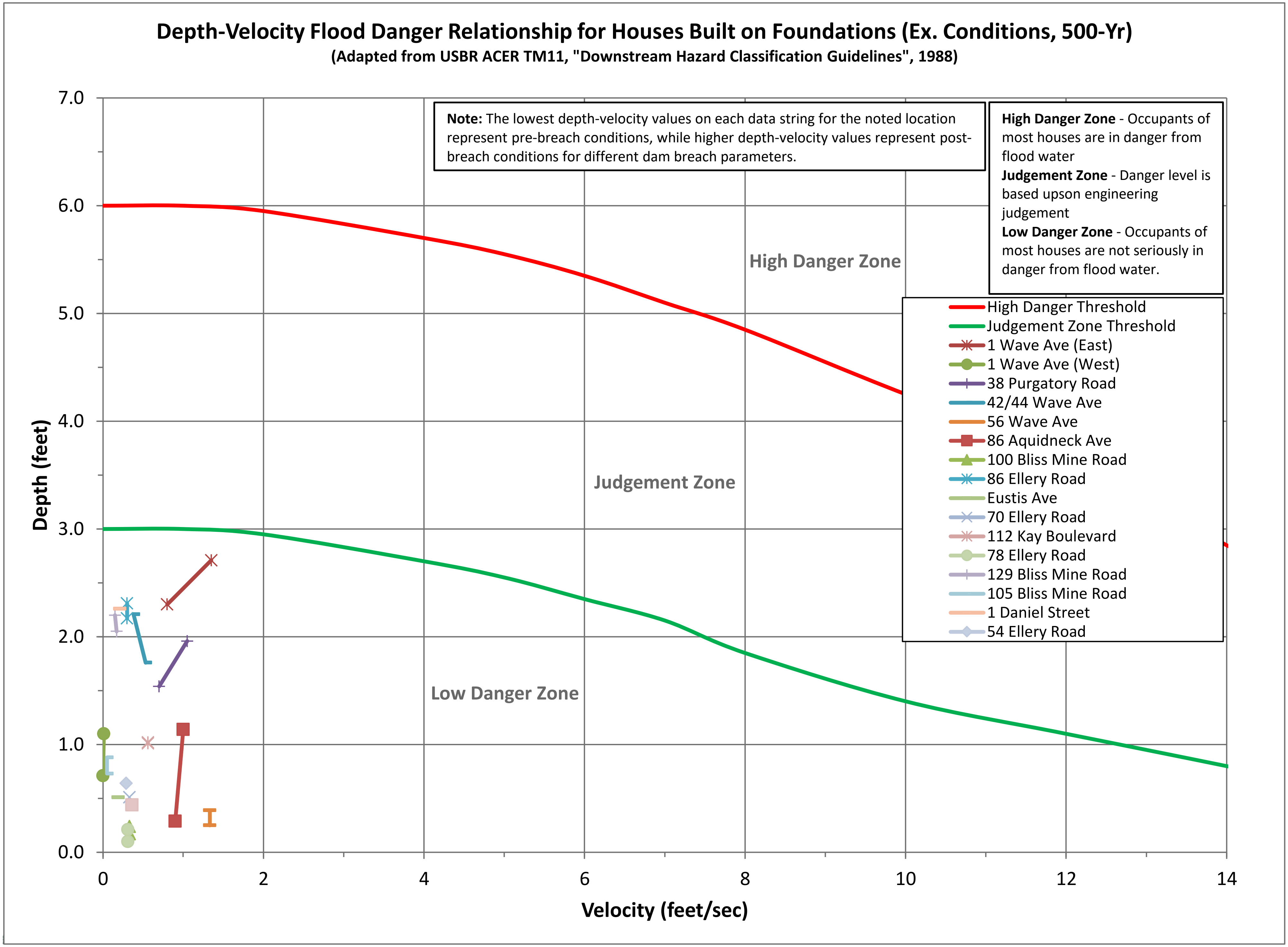
[1] Cells highlighted in red indicate embankments for that alternative will be overtopped by noted elevation.

[2] Breach scenarios for NEP Dam are reported in this table only in cases where NEP Dam is overtopped by the relevant storm event. Further, these scenarios were only necessary for present day climate conditions to inform inflow design flood.

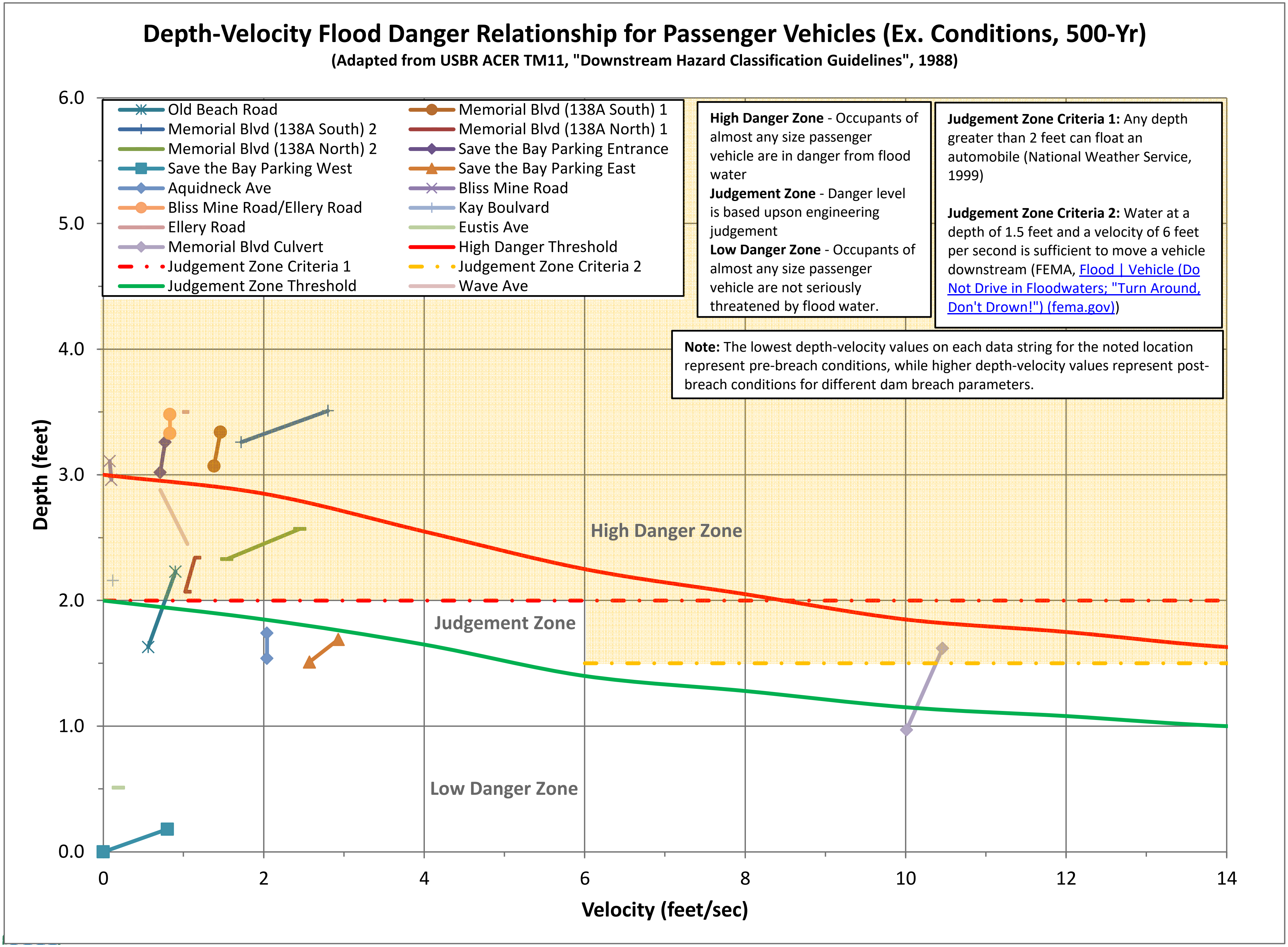
Incremental Consequence Analysis Results

FUSS & O'NEILL

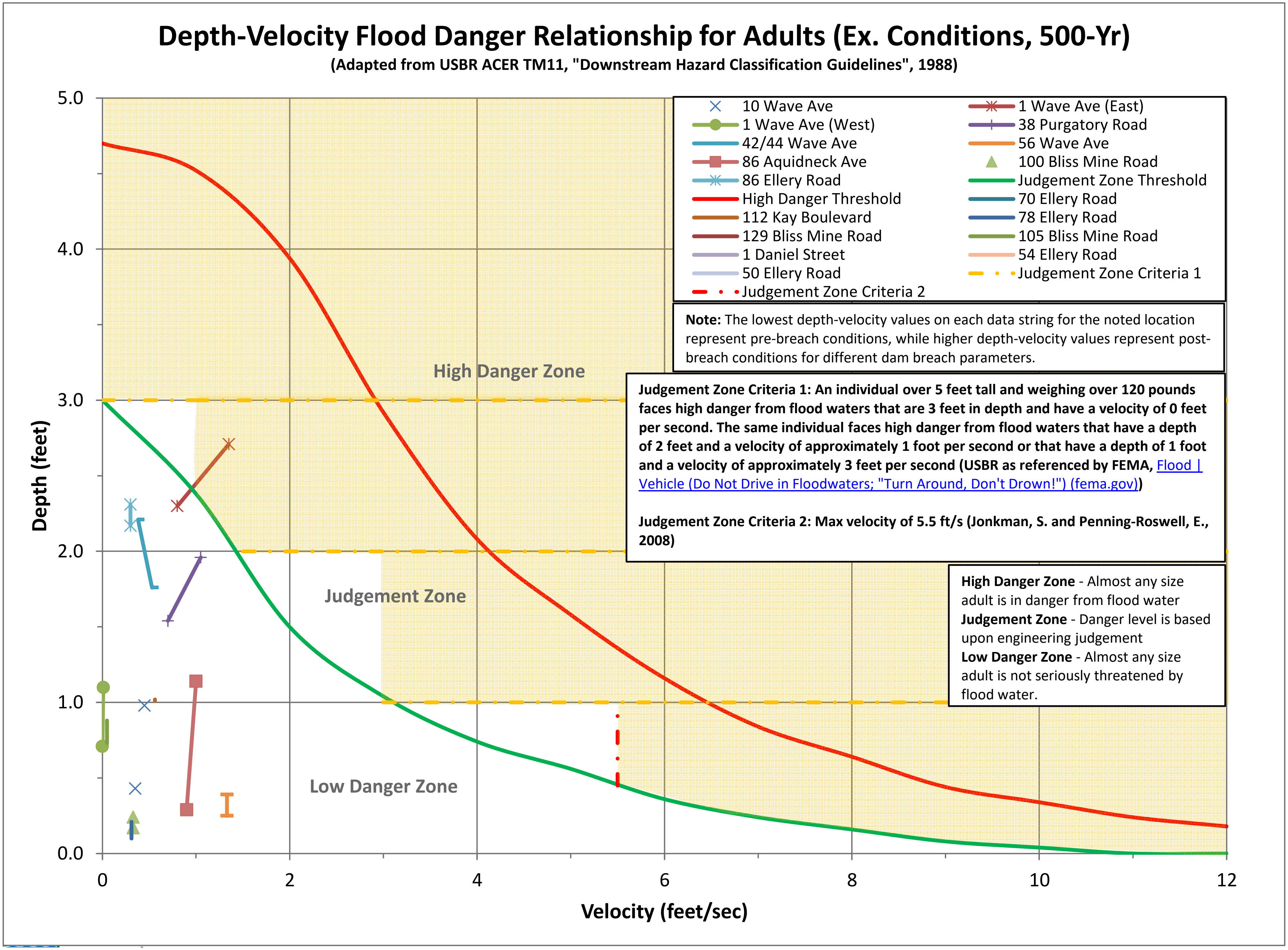
INFLOW DESIGN FLOOD INVESTIGATION SUMMARY OF INCREMENTAL CONSEQUENCE ANALYSIS RESULTS FOR EXISTING CONDITIONS 500-YEAR STORM				
Existing Conditions				
Location	No Breach Depth	No Breach Velocity	Breach Parameter Estimation Methodology	
			Von Thun & Gillette (VTG)	VTG Velocity
Old Beach Road	1.63	0.56	2.23	0.90
Memorial Blvd (138A South) 1	3.07	1.38	3.34	1.46
Memorial Blvd (138A South) 2	3.26	1.72	3.51	2.80
Memorial Blvd (138A North) 1	2.07	1.02	2.34	1.14
Memorial Blvd (138A North) 2	2.33	1.54	2.57	2.45
Save the Bay Parking Entrance	3.02	0.71	3.26	0.77
Save the Bay Parking West	0.00	0.00	0.18	0.80
Save the Bay Parking East	1.51	2.57	1.69	2.93
10 Wave Ave	0.43	0.35	0.98	0.45
1 Wave Ave (East)	2.30	0.80	2.71	1.35
1 Wave Ave (West)	0.71	0.00	1.10	0.01
38 Purgatory Road	1.54	0.70	1.96	1.05
42/44 Wave Ave	1.76	0.53	2.21	0.38
56 Wave Ave	0.25	1.33	0.39	1.33
Aquidneck Ave	1.54	2.04	1.74	2.04
86 Aquidneck Ave	0.29	0.90	1.14	1.00
100 Bliss Mine Road	0.17	0.33	0.24	0.33
Bliss Mine Road	2.96	0.10	3.11	0.08
86 Ellery Road	2.17	0.30	2.31	0.30
Bliss Mine Road/Ellery Road	3.33	0.83	3.48	0.83
Kay Boulvard	2.16	0.12	2.16	0.12
Ellery Road	3.50	0.99	3.50	0.99
Eustis Ave	0.51	0.19	0.51	0.19
Memorial Blvd Culvert	0.97	10.01	1.62	10.46
UV System	2.14	2.49	2.89	3.17
70 Ellery Road	0.51	0.33	0.51	0.33
112 Kay Boulevard	1.01	0.56	1.02	0.56
78 Ellery Road	0.10	0.31	0.21	0.31
129 Bliss Mine Road	2.05	0.17	2.20	0.15
105 Bliss Mine Road	0.73	0.05	0.88	0.05
1 Daniel Street	2.26	0.21	2.26	0.21
54 Ellery Road	0.64	0.29	0.64	0.29
50 Ellery Road	0.44	0.36	0.44	0.36
Wave Ave	2.45	1.05	2.88	0.71
South Easton Pond Dam				

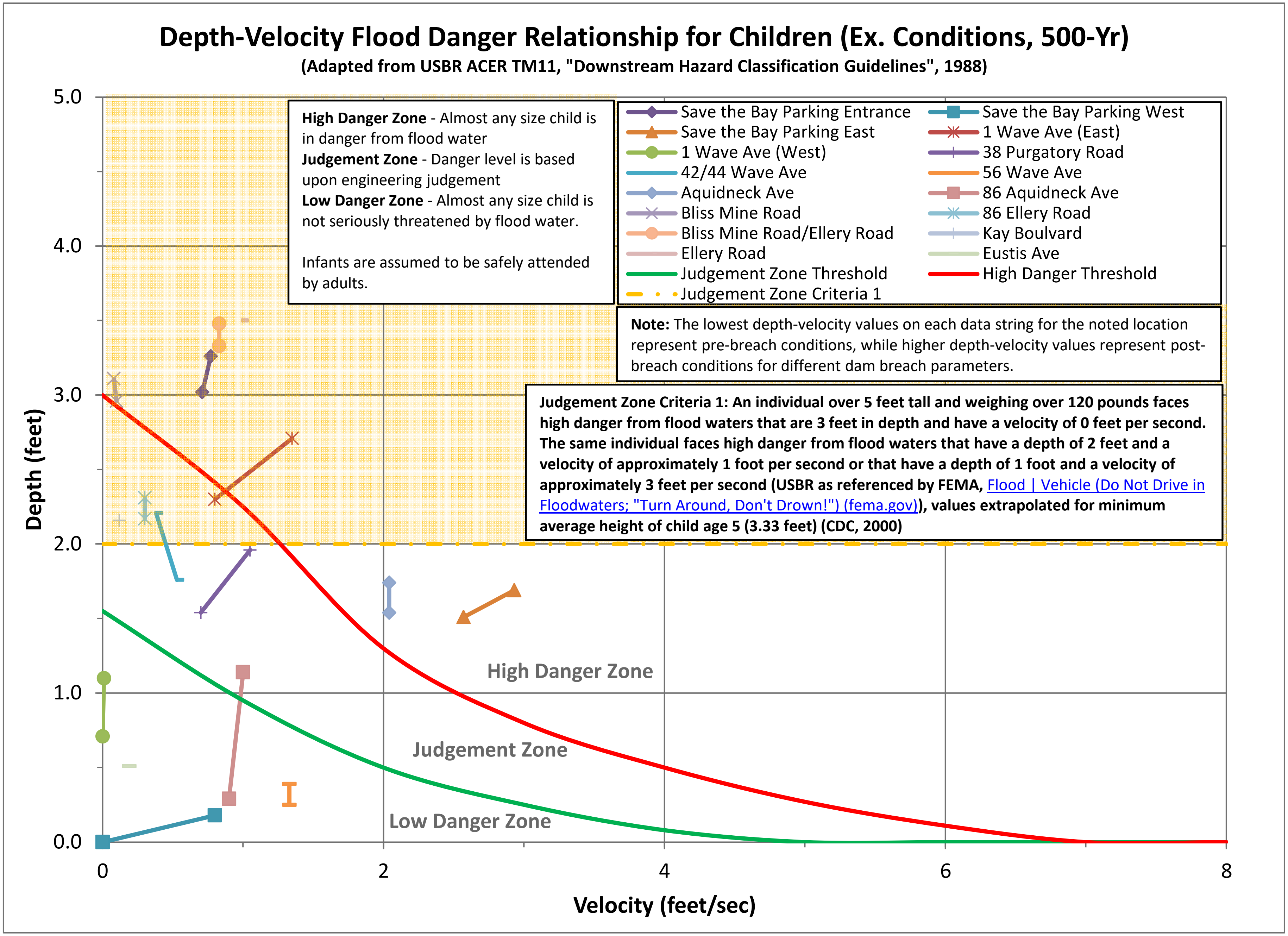


Depth-Velocity Flood Danger Relationship for Houses Built on Foundations (Ex. Conditions, 500-Yr)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone - Occupants of most houses are in danger from flood water
Judgement Zone - Danger level is based upson engineering judgement
Low Danger Zone - Occupants of most houses are not seriously in danger from flood water.
High Danger Zone
Judgement Zone
Low Danger Zone
High Danger Threshold
Judgement Zone Threshold
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
Eustis Ave
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
Depth (feet)
Velocity (feet/sec)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
0
2
4
6
8
10
12
14



Depth-Velocity Flood Danger Relationship for Passenger Vehicles (Ex. Conditions, 500-Yr)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Old Beach Road
Memorial Blvd (138A South) 2
Memorial Blvd (138A North) 2
Save the Bay Parking West
Aquidneck Ave
Bliss Mine Road/Ellery Road
Ellery Road
Memorial Blvd Culvert
Judgement Zone Criteria 1
Judgement Zone Threshold
Memorial Blvd (138A South) 1
Memorial Blvd (138A North) 1
Save the Bay Parking Entrance
Save the Bay Parking East
Bliss Mine Road
Kay Boulvard
Eustis Ave
High Danger Threshold
Judgement Zone Criteria 2
Wave Ave
High Danger Zone - Occupants of almost any size passenger vehicle are in danger from flood water
Judgement Zone - Danger level is based upson engineering judgement
Low Danger Zone - Occupants of almost any size passenger vehicle are not seriously threatened by flood water.
Judgement Zone Criteria 1: Any depth greater than 2 feet can float an automobile (National Weather Service, 1999)
Judgement Zone Criteria 2: Water at a depth of 1.5 feet and a velocity of 6 feet per second is sufficient to move a vehicle downstream (FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14
Velocity (feet/sec)


Depth-Velocity Flood Danger Relationship for Adults (Ex. Conditions, 500-Yr)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Depth (feet)
Velocity (feet/sec)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
High Danger Zone
Judgement Zone
Low Danger Zone
10 Wave Ave
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
Judgement Zone Threshold
High Danger Threshold
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
50 Ellery Road
Judgement Zone Criteria 1
Judgement Zone Criteria 2
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Judgement Zone Criteria 2: Max velocity of 5.5 ft/s (Jonkman, S. and Penning-Roswell, E., 2008)
High Danger Zone - Almost any size adult is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size adult is not seriously threatened by flood water.



Depth-Velocity Flood Danger Relationship for Children (Ex. Conditions, 500-Yr)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
High Danger Zone - Almost any size child is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size child is not seriously threatened by flood water.
Infants are assumed to be safely attended by adults.
Save the Bay Parking Entrance
Save the Bay Parking West
Save the Bay Parking East
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
Aquidneck Ave
86 Aquidneck Ave
Bliss Mine Road
86 Ellery Road
Bliss Mine Road/Ellery Road
Kay Boulvard
Ellery Road
Eustis Ave
Judgement Zone Threshold
High Danger Threshold
Judgement Zone Criteria 1
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov)), values extrapolated for minimum average height of child age 5 (3.33 feet) (CDC, 2000)
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
Velocity (feet/sec)

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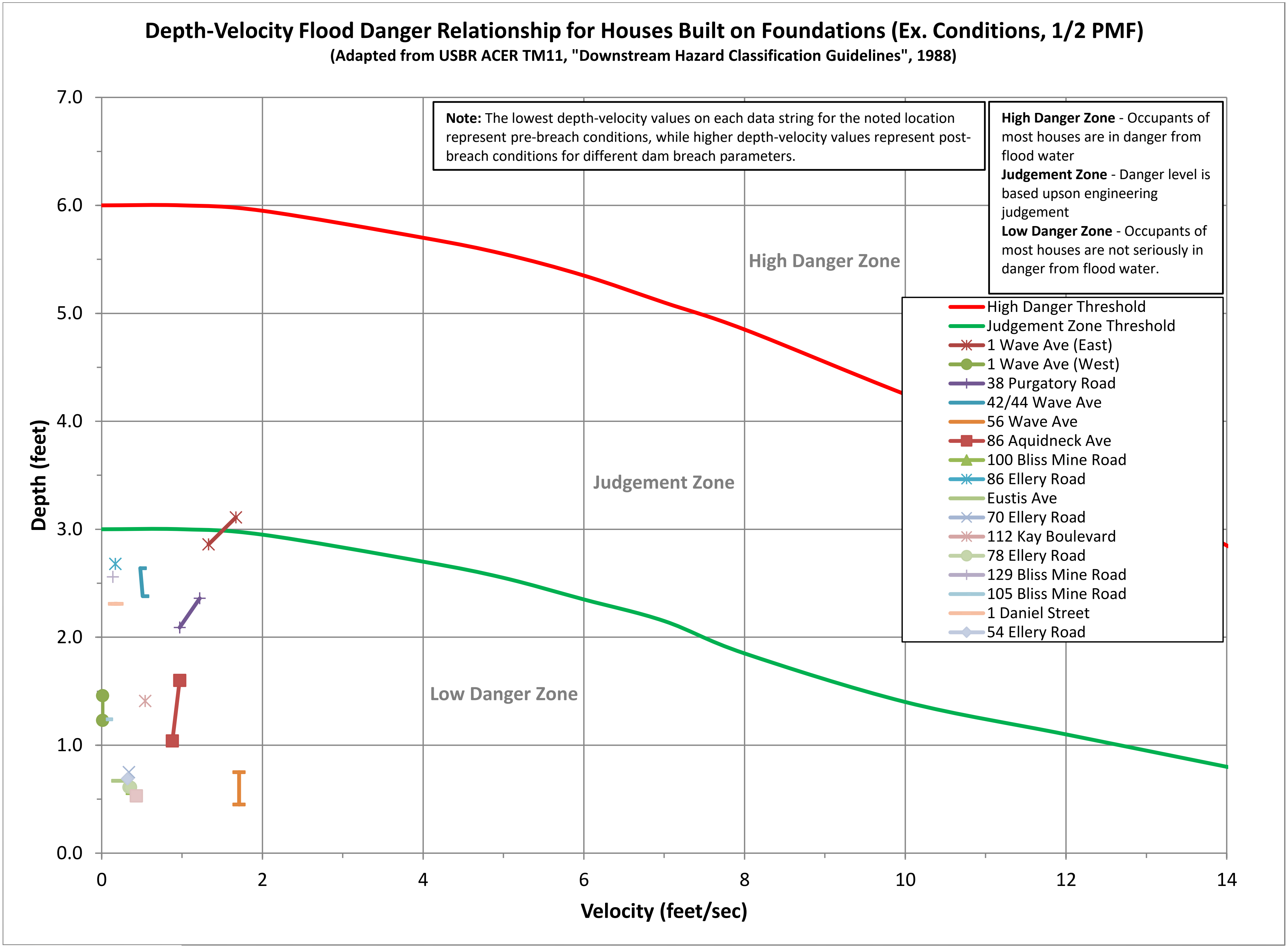
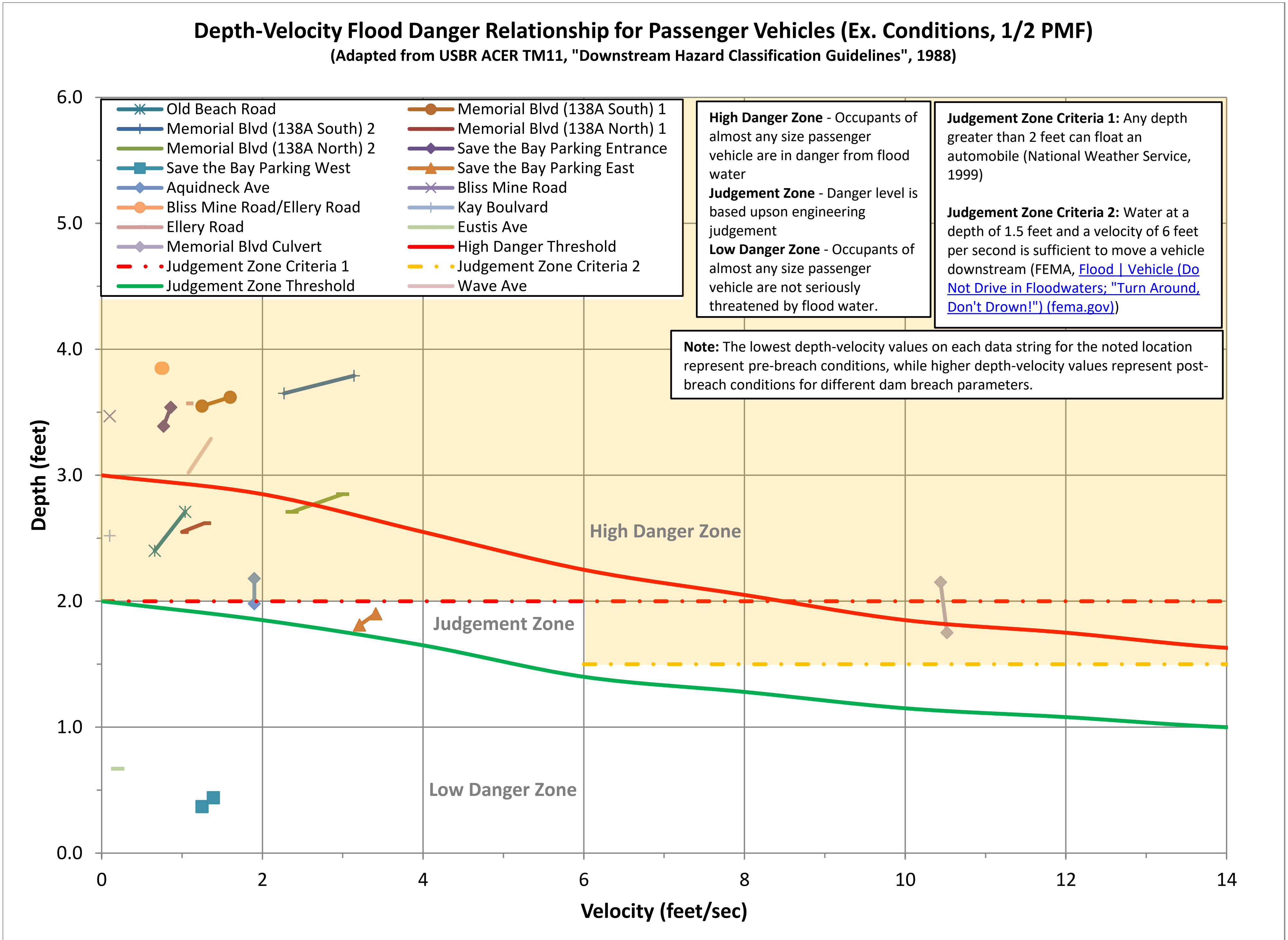
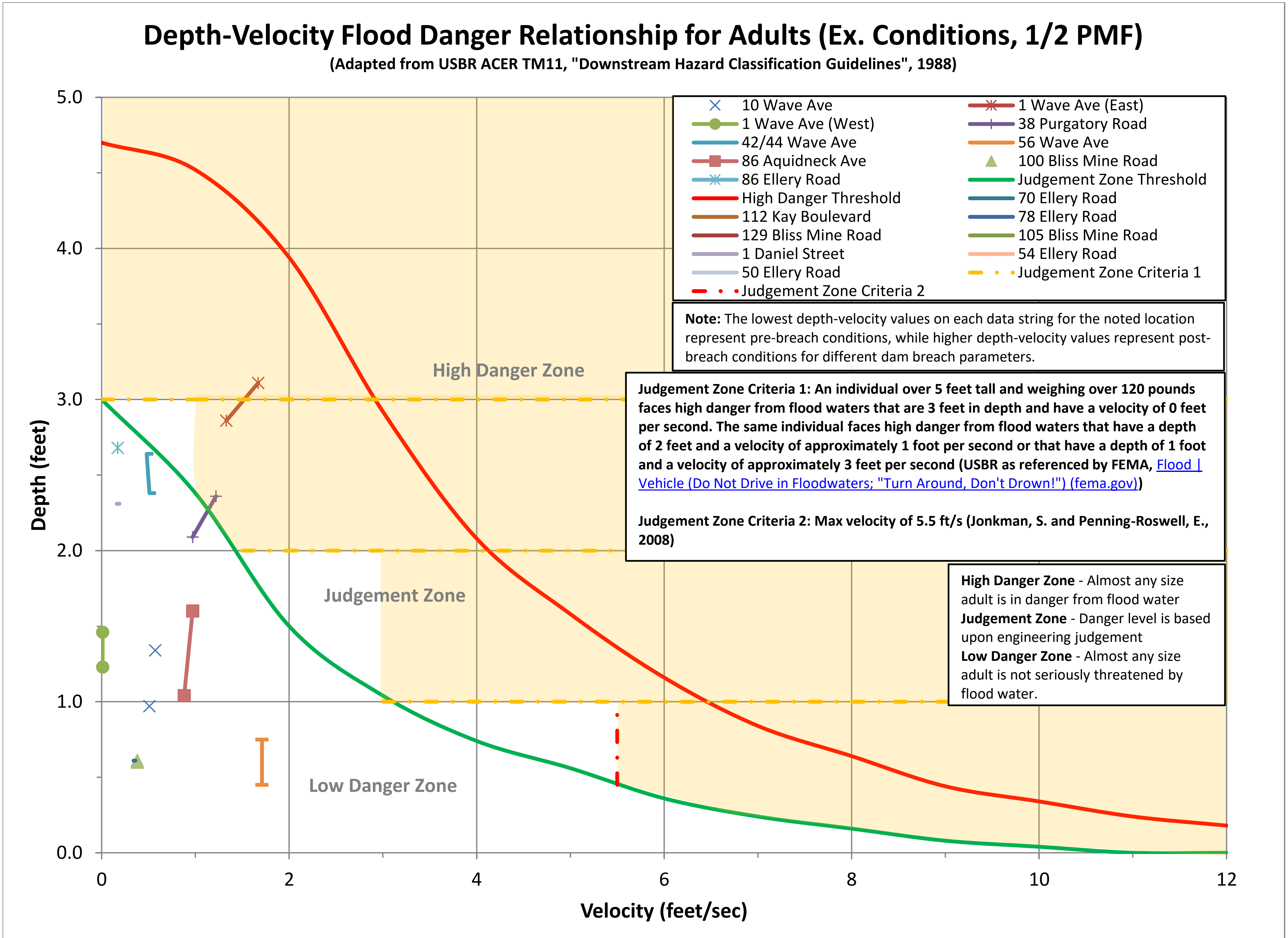
INFLOW DESIGN FLOOD INVESTIGATION				
SUMMARY OF INCREMENTAL CONSEQUENCE ANALYSIS RESULTS FOR EXISTING CONDITIONS 1/2 PMF EVENT				
Existing Conditions				
Location	No Breach Depth	No Breach Velocity	Breach Parameter Estimation Methodology	
			Von Thun & Gillette (VTG)	VTG Velocity
Old Beach Road	2.40	0.66	2.71	1.04
Memorial Blvd (138A South) 1	3.55	1.25	3.62	1.60
Memorial Blvd (138A South) 2	3.65	2.27	3.79	3.14
Memorial Blvd (138A North) 1	2.55	1.00	2.62	1.28
Memorial Blvd (138A North) 2	2.71	2.37	2.85	3.00
Save the Bay Parking Entrance	3.39	0.77	3.54	0.86
Save the Bay Parking West	0.37	1.25	0.44	1.39
Save the Bay Parking East	1.81	3.21	1.90	3.41
10 Wave Ave	0.97	0.51	1.34	0.57
1 Wave Ave (East)	2.86	1.33	3.11	1.67
1 Wave Ave (West)	1.23	0.01	1.46	0.01
38 Purgatory Road	2.09	0.97	2.36	1.22
42/44 Wave Ave	2.38	0.51	2.64	0.48
56 Wave Ave	0.45	1.71	0.75	1.71
Aquidneck Ave	1.98	1.90	2.18	1.90
86 Aquidneck Ave	1.04	0.88	1.60	0.97
100 Bliss Mine Road	0.61	0.38	0.60	0.38
Bliss Mine Road	3.47	0.10	3.47	0.10
86 Ellery Road	2.68	0.17	2.68	0.17
Bliss Mine Road/Ellery Road	3.85	0.74	3.85	0.76
Kay Boulvard	2.52	0.10	2.52	0.10
Ellery Road	3.57	1.06	3.57	1.06
Eustis Ave	0.67	0.20	0.67	0.20
Memorial Blvd Culvert	1.75	10.52	2.15	10.44
UV System	2.69	2.91	3.24	3.79
70 Ellery Road	0.75	0.34	0.75	0.34
112 Kay Boulevard	1.41	0.54	1.41	0.54
78 Ellery Road	0.61	0.34	0.61	0.36
129 Bliss Mine Road	2.56	0.14	2.56	0.14
105 Bliss Mine Road	1.24	0.06	1.24	0.06
1 Daniel Street	2.31	0.16	2.31	0.19
54 Ellery Road	0.69	0.32	0.69	0.32
50 Ellery Road	0.53	0.43	0.53	0.43
Wave Ave	3.02	1.08	3.29	1.36
South Easton Pond Dam [3]				

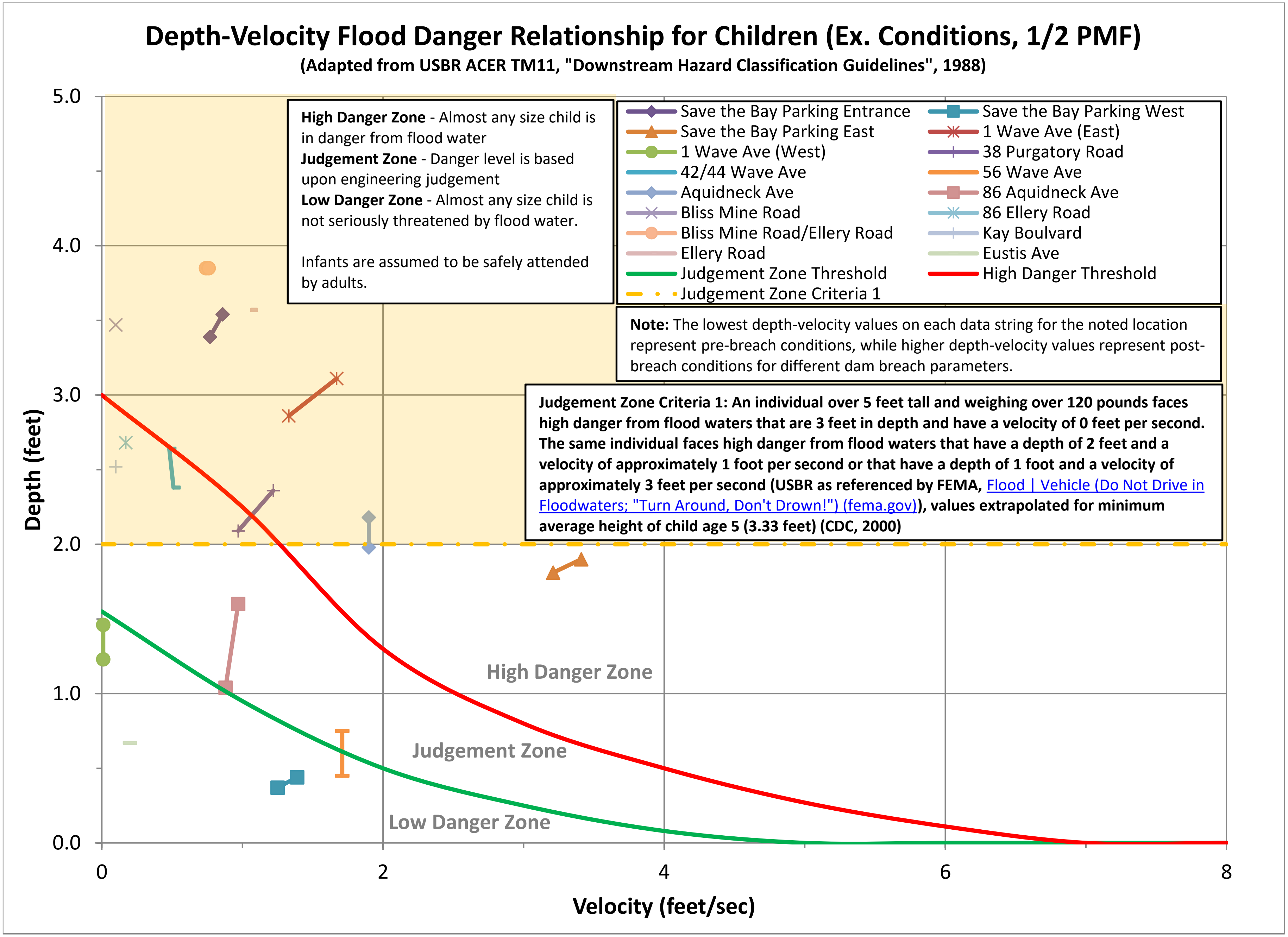


Depth-Velocity Flood Danger Relationship for Houses Built on Foundations (Ex. Conditions, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone - Occupants of most houses are in danger from flood water
Judgement Zone - Danger level is based upson engineering judgement
Low Danger Zone - Occupants of most houses are not seriously in danger from flood water.
High Danger Zone
Judgement Zone
Low Danger Zone
High Danger Threshold
Judgement Zone Threshold
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
Eustis Ave
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
Depth (feet)
Velocity (feet/sec)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14


Depth-Velocity Flood Danger Relationship for Passenger Vehicles (Ex. Conditions, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Old Beach Road
Memorial Blvd (138A South) 1
Memorial Blvd (138A South) 2
Memorial Blvd (138A North) 1
Memorial Blvd (138A North) 2
Save the Bay Parking Entrance
Save the Bay Parking West
Save the Bay Parking East
Aquidneck Ave
Bliss Mine Road
Bliss Mine Road/Ellery Road
Kay Boulvard
Ellery Road
Eustis Ave
Memorial Blvd Culvert
High Danger Threshold
Judgement Zone Criteria 1
Judgement Zone Criteria 2
Judgement Zone Threshold
Wave Ave
High Danger Zone - Occupants of almost any size passenger vehicle are in danger from flood water
Judgement Zone - Danger level is based upson engineering judgement
Low Danger Zone - Occupants of almost any size passenger vehicle are not seriously threatened by flood water.
Judgement Zone Criteria 1: Any depth greater than 2 feet can float an automobile (National Weather Service, 1999)
Judgement Zone Criteria 2: Water at a depth of 1.5 feet and a velocity of 6 feet per second is sufficient to move a vehicle downstream (FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14
Velocity (feet/sec)



Depth-Velocity Flood Danger Relationship for Adults (Ex. Conditions, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
10 Wave Ave
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
Judgement Zone Threshold
High Danger Threshold
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
50 Ellery Road
Judgement Zone Criteria 1
Judgement Zone Criteria 2
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Judgement Zone Criteria 2: Max velocity of 5.5 ft/s (Jonkman, S. and Penning-Roswell, E., 2008)
Judgement Zone
High Danger Zone - Almost any size adult is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size adult is not seriously threatened by flood water.
Low Danger Zone
Depth (feet)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Velocity (feet/sec)



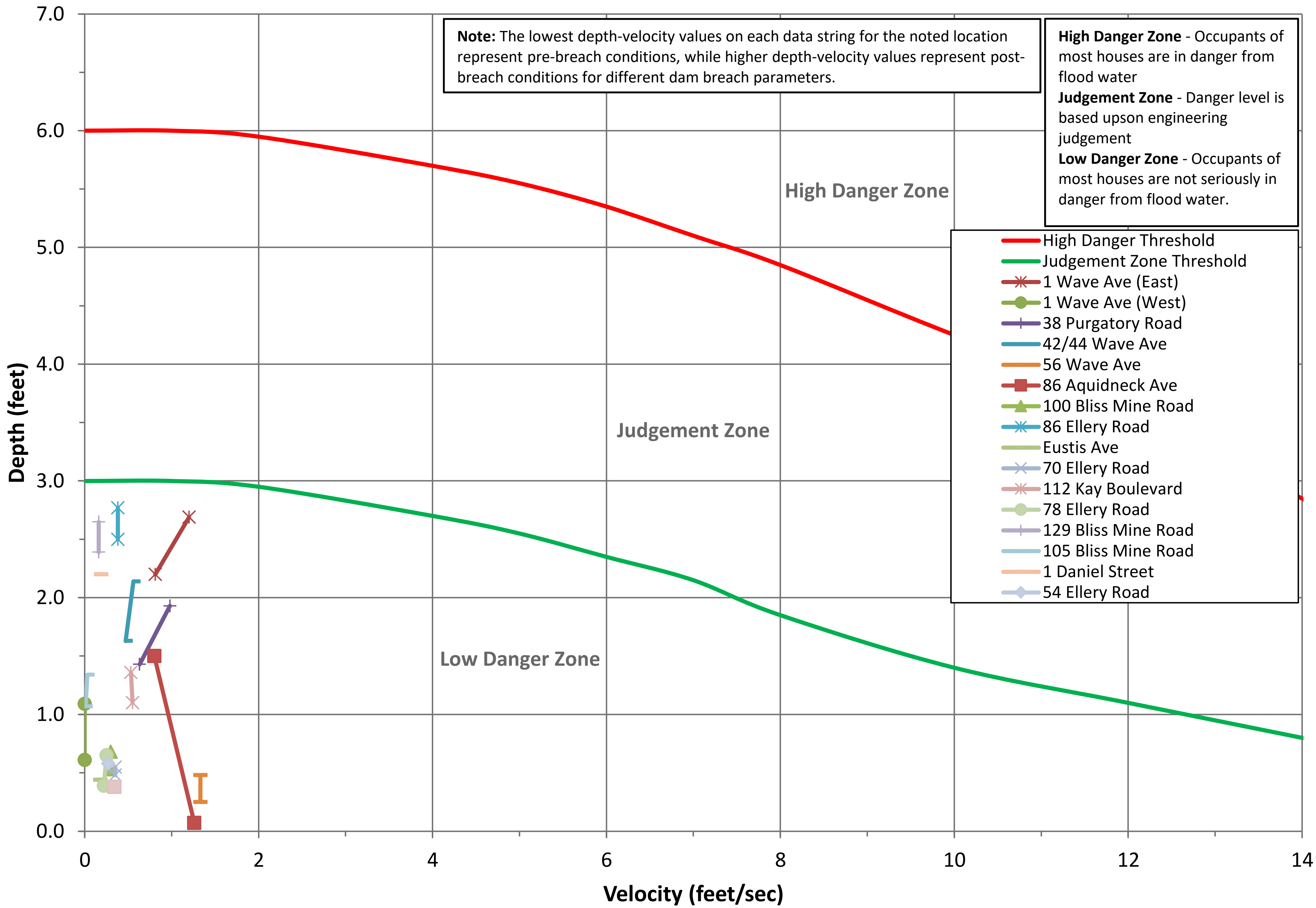
Depth-Velocity Flood Danger Relationship for Children (Ex. Conditions, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
High Danger Zone - Almost any size child is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size child is not seriously threatened by flood water.
Infants are assumed to be safely attended by adults.
Save the Bay Parking Entrance
Save the Bay Parking West
Save the Bay Parking East
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
Aquidneck Ave
86 Aquidneck Ave
Bliss Mine Road
86 Ellery Road
Bliss Mine Road/Ellery Road
Kay Boulvard
Ellery Road
Eustis Ave
Judgement Zone Threshold
High Danger Threshold
Judgement Zone Criteria 1
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov)), values extrapolated for minimum average height of child age 5 (3.33 feet) (CDC, 2000)
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
Velocity (feet/sec)

FUSS & O'NEILL

INFLOW DESIGN FLOOD INVESTIGATION SUMMARY OF INCREMENTAL CONSEQUENCE ANALYSIS RESULTS FOR ALTERNATIVE 2 500-YEAR STORM				
Alternative 2				
Location	No Breach Depth	No Breach Velocity	Breach Parameter Estimation Methodology	
			Von Thun & Gillette (VTG)	VTG Velocity
Old Beach Road	1.61	0.54	2.38	1.09
Memorial Blvd (138A South) 1	2.98	1.34	3.39	1.59
Memorial Blvd (138A South) 2	3.20	1.74	3.51	2.94
Memorial Blvd (138A North) 1	1.98	0.99	2.39	1.24
Memorial Blvd (138A North) 2	2.27	1.51	2.58	2.55
Save the Bay Parking Entrance	2.95	0.68	3.27	0.76
Save the Bay Parking West	0.00	0.00	0.21	0.89
Save the Bay Parking East	1.47	2.47	1.69	2.93
10 Wave Ave	0.33	0.27	0.94	0.30
1 Wave Ave (East)	2.20	0.81	2.69	1.20
1 Wave Ave (West)	0.61	0.00	1.09	0.00
38 Purgatory Road	1.43	0.63	1.93	0.98
42/44 Wave Ave	1.63	0.47	2.14	0.56
56 Wave Ave	0.25	1.33	0.48	1.33
Aquidneck Ave	1.54	2.04	1.72	2.04
86 Aquidneck Ave	0.07	1.26	1.50	0.80
100 Bliss Mine Road	0.53	0.29	0.68	0.30
Bliss Mine Road	3.29	0.13	3.56	0.11
86 Ellery Road	2.50	0.38	2.77	0.38
Bliss Mine Road/Ellery Road	3.66	0.86	3.92	0.86
Kay Boulvard	2.16	0.13	2.42	0.13
Ellery Road	3.45	0.99	3.45	0.99
Eustis Ave	0.44	0.18	0.44	0.18
Memorial Blvd Culvert	0.86	9.84	1.64	10.36
UV System	2.08	2.57	2.97	3.28
70 Ellery Road	0.48	0.35	0.55	0.35
112 Kay Boulevard	1.10	0.55	1.36	0.53
78 Ellery Road	0.39	0.22	0.65	0.25
129 Bliss Mine Road	2.39	0.16	2.65	0.16
105 Bliss Mine Road	1.07	0.01	1.34	0.03
1 Daniel Street	2.20	0.19	2.20	0.19
54 Ellery Road	0.58	0.27	0.58	0.27
50 Ellery Road	0.38	0.34	0.38	0.34
Wave Ave	2.34	1.05	2.84	0.90
South Easton Pond Dam [3]				

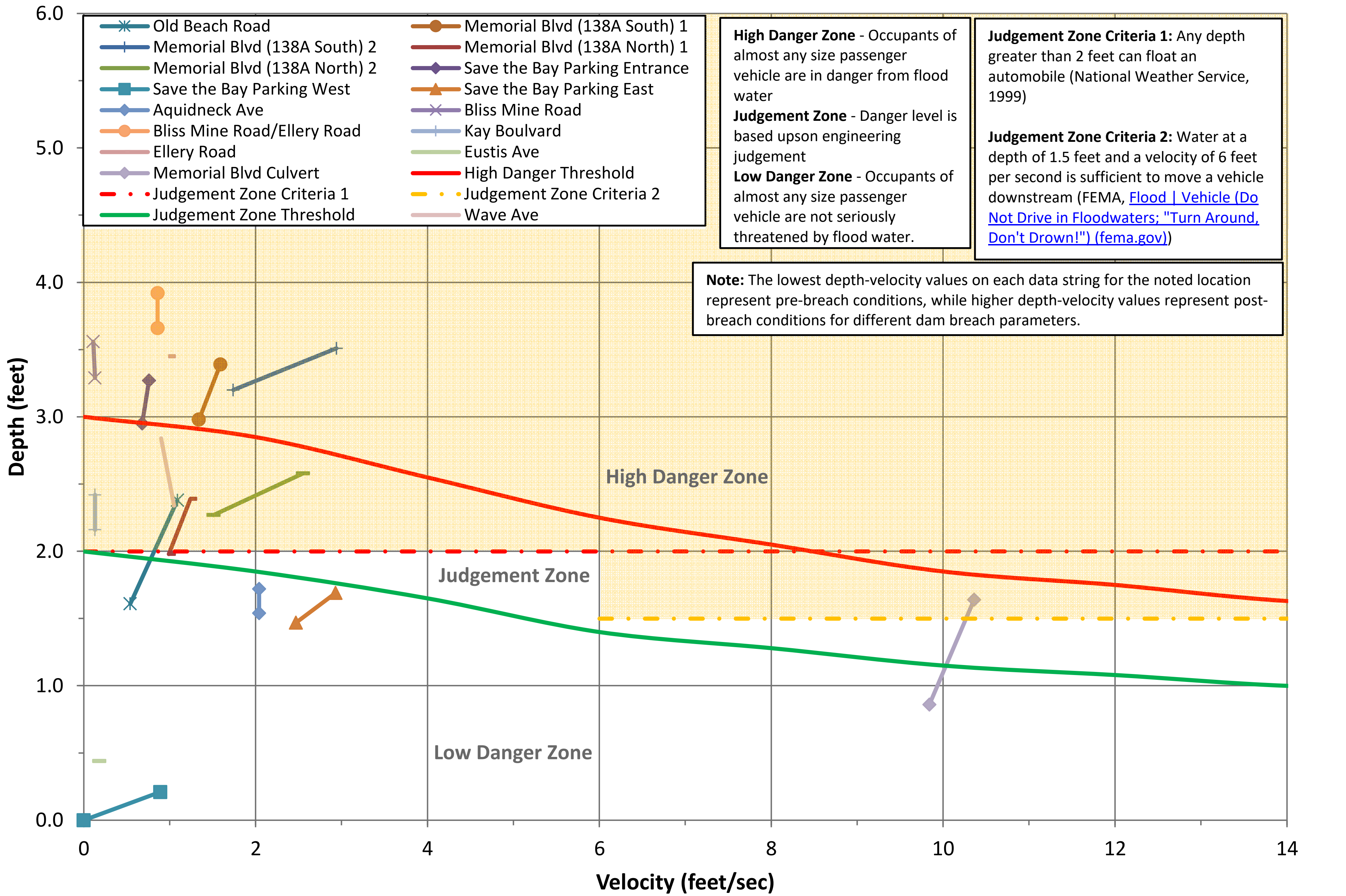
Depth-Velocity Flood Danger Relationship for Houses Built on Foundations (Alt 2, 500-Year)

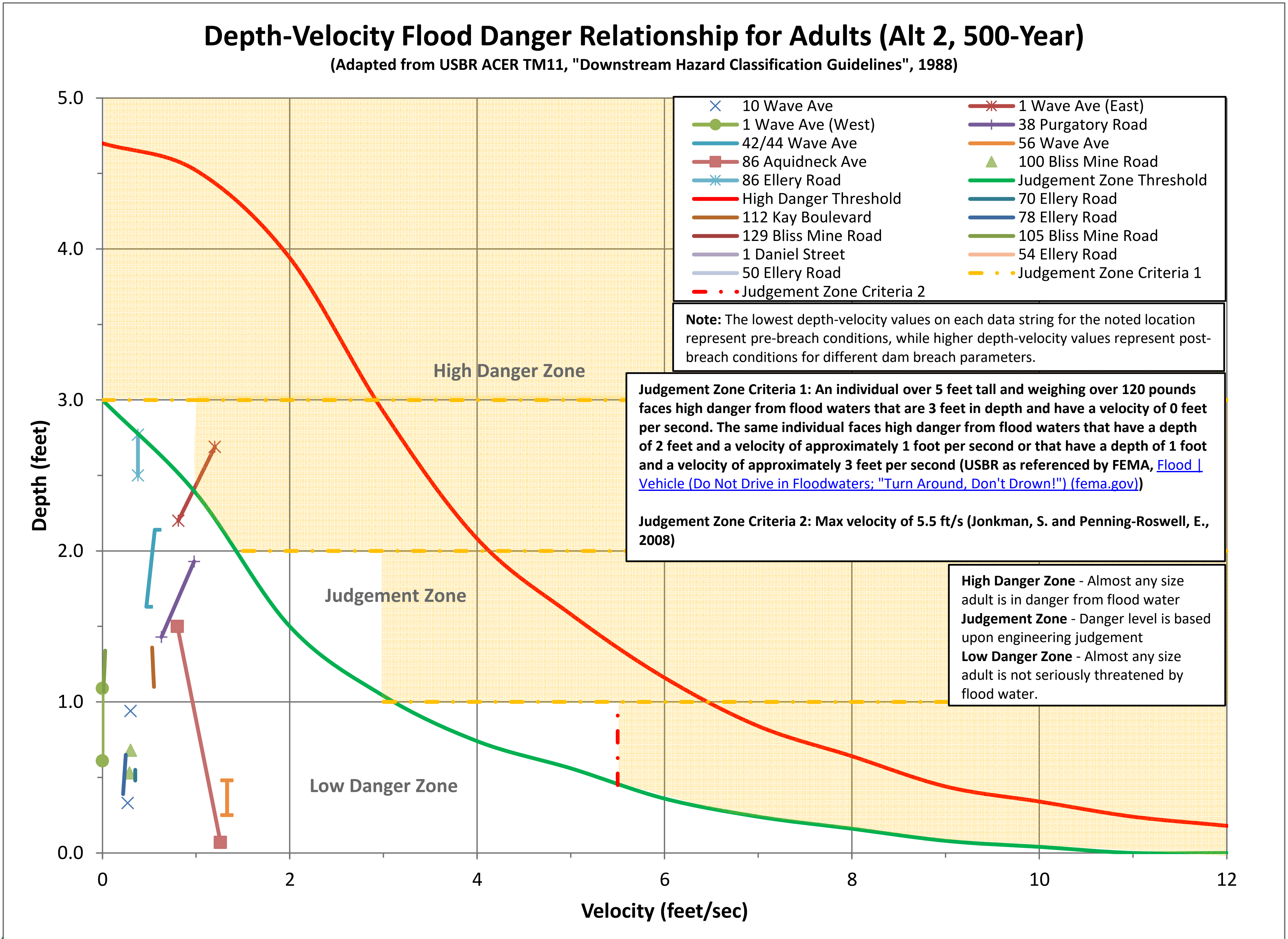
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)

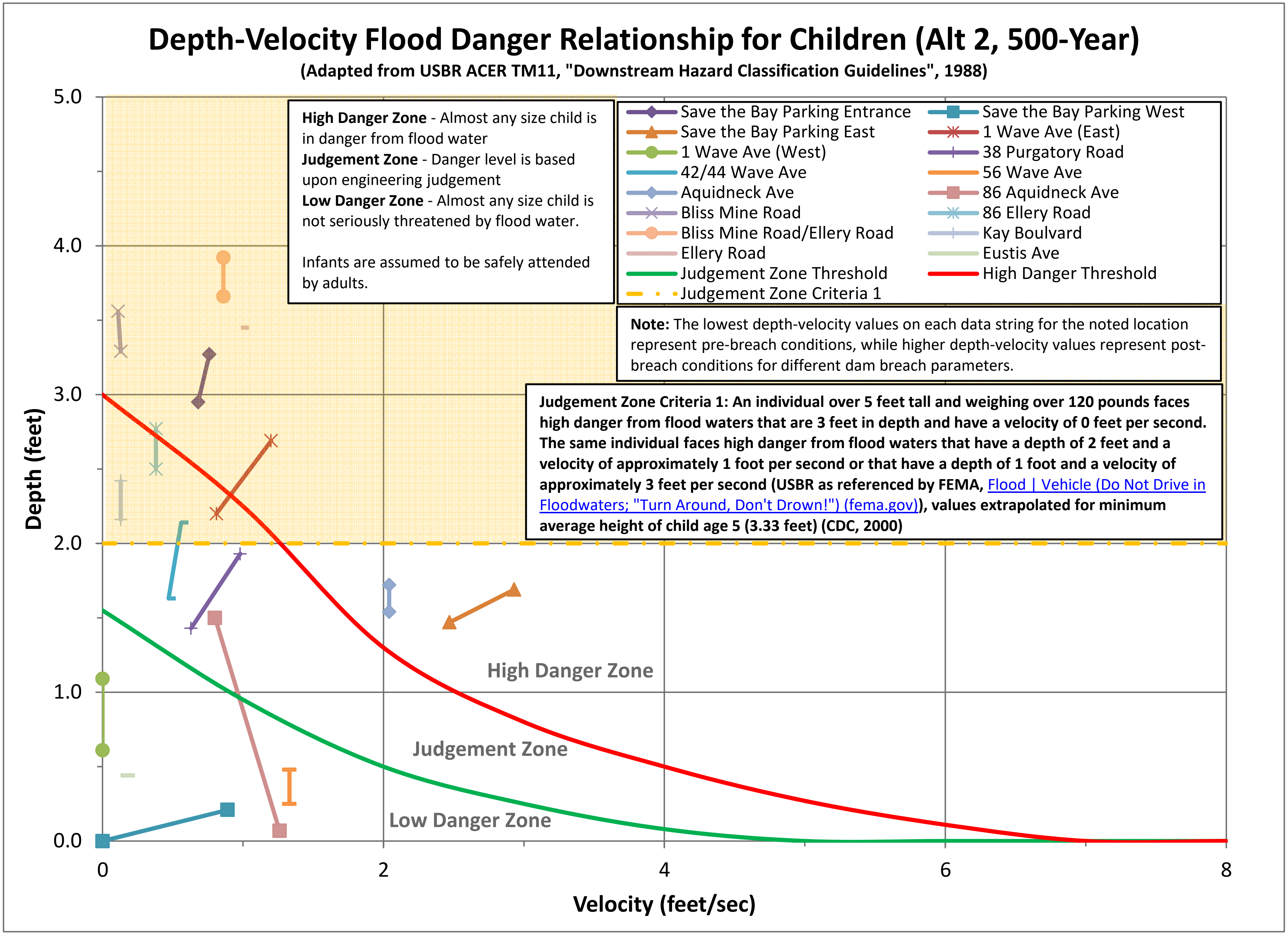


Depth-Velocity Flood Danger Relationship for Passenger Vehicles (Alt 2, 500-Year)

(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)



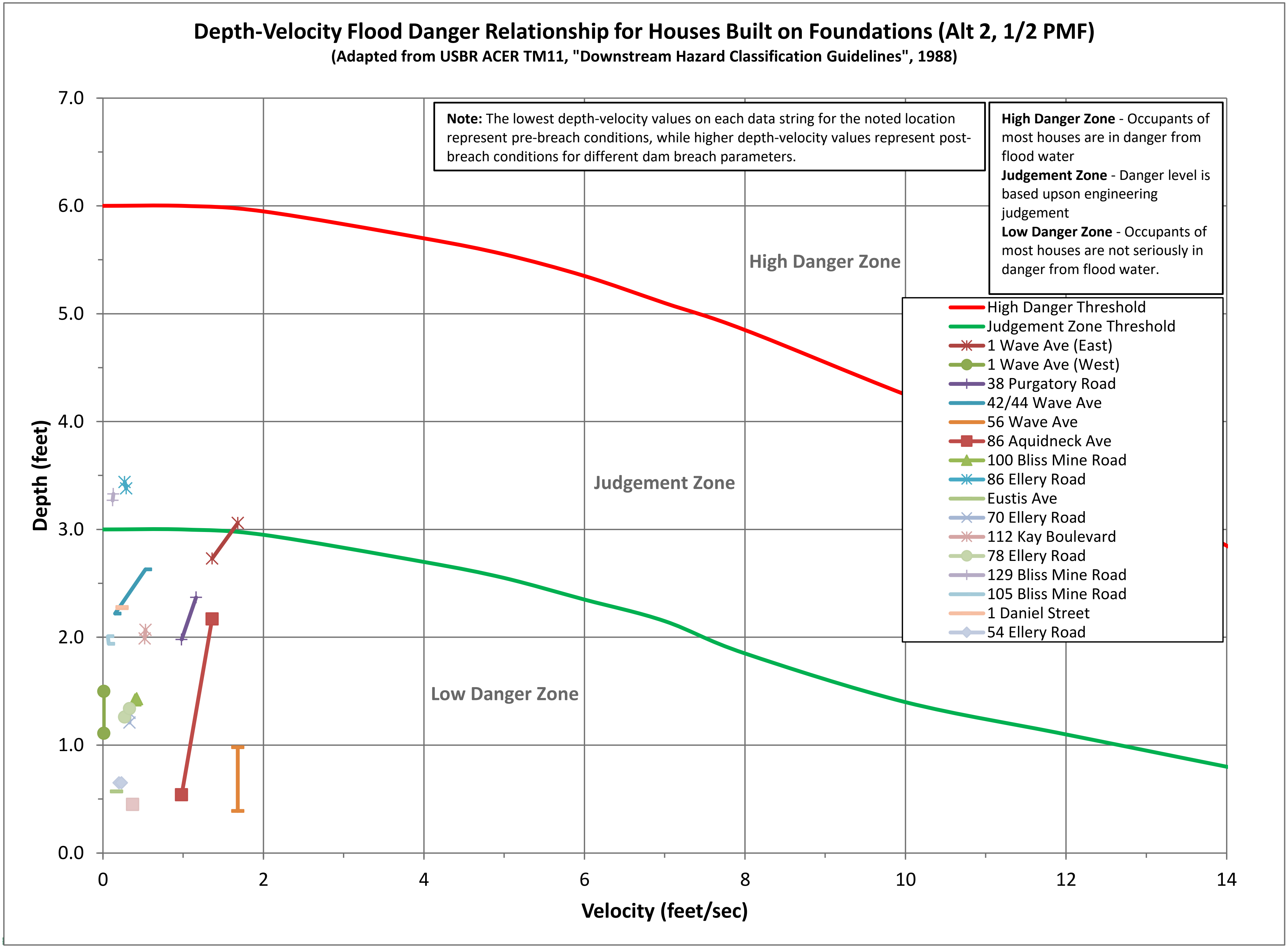

Depth-Velocity Flood Danger Relationship for Adults (Alt 2, 500-Year)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
10 Wave Ave
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
Judgement Zone Threshold
High Danger Threshold
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
50 Ellery Road
Judgement Zone Criteria 1
Judgement Zone Criteria 2
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Judgement Zone Criteria 2: Max velocity of 5.5 ft/s (Jonkman, S. and Penning-Roswell, E., 2008)
High Danger Zone - Almost any size adult is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size adult is not seriously threatened by flood water.
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Velocity (feet/sec)

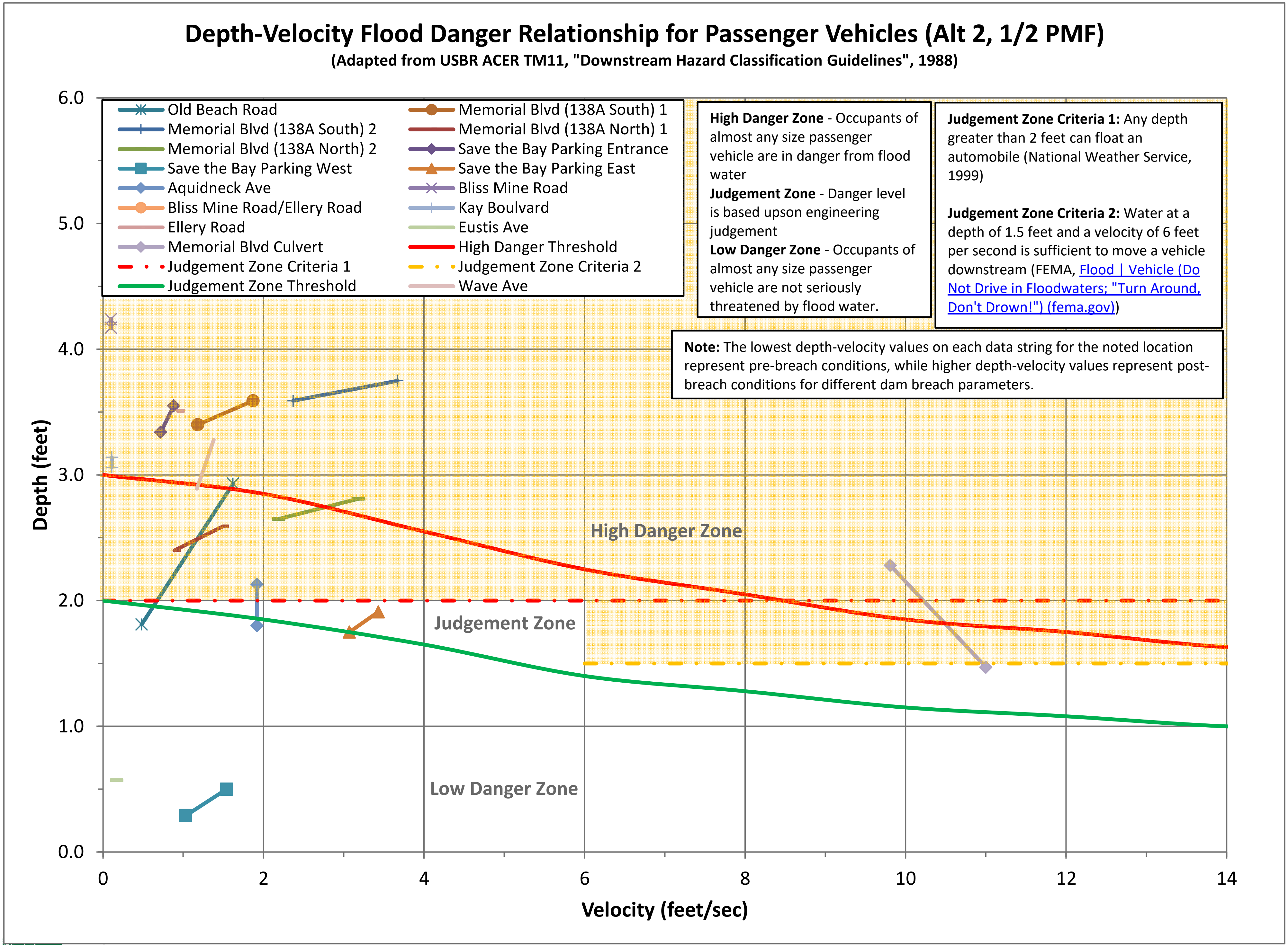


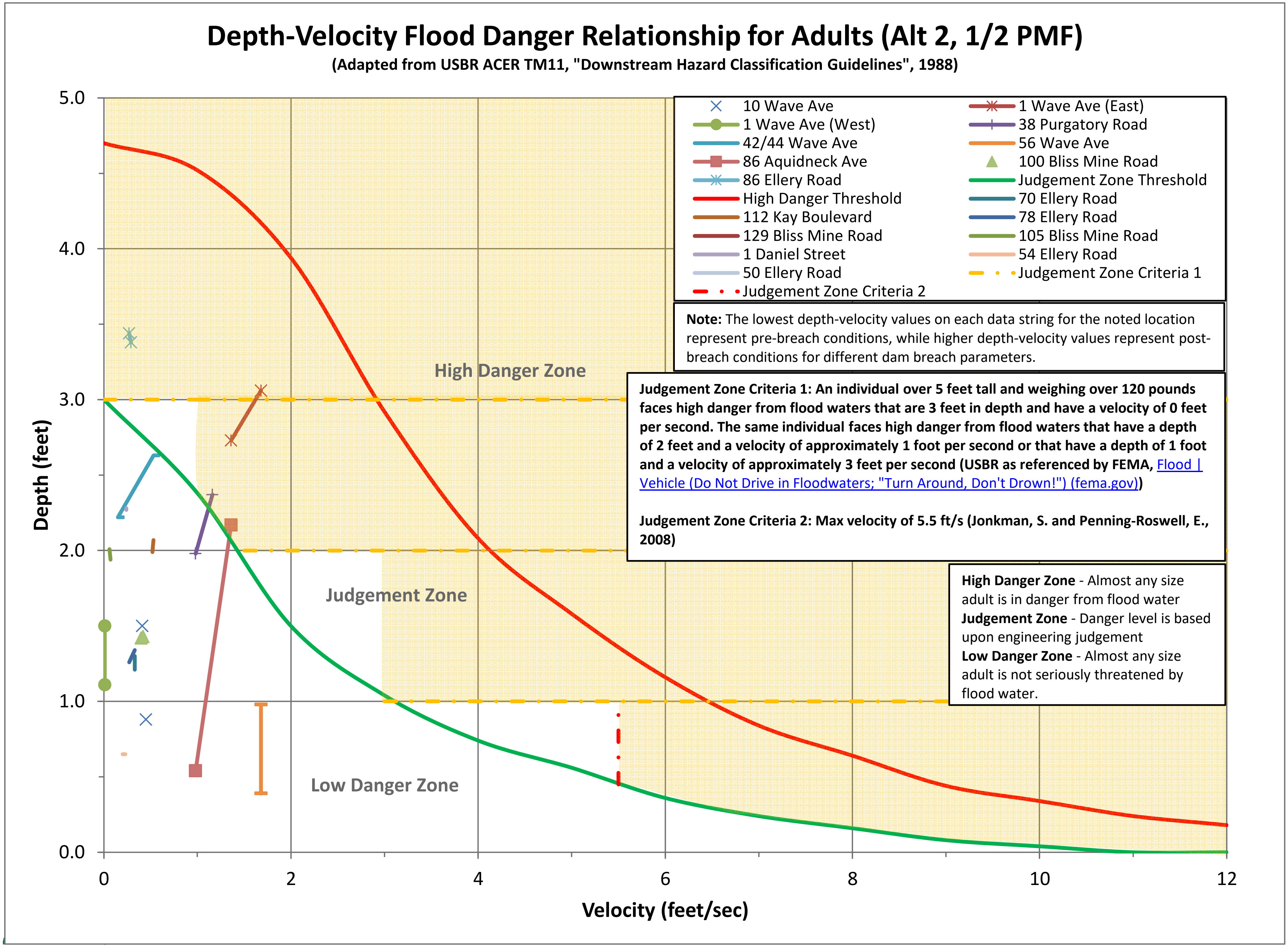
Maryland Department of the Environment

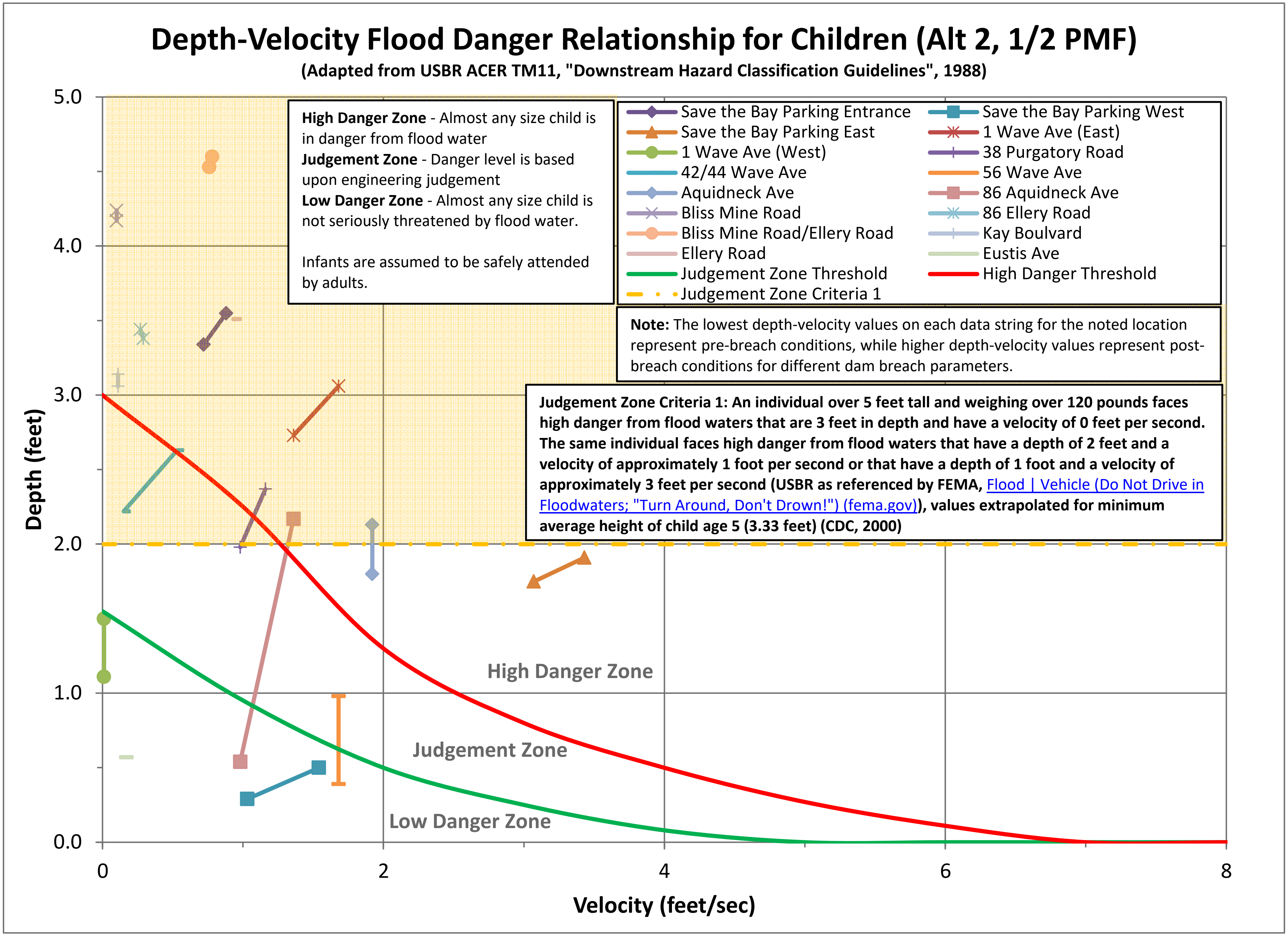
April 2018

INFLOW DESIGN FLOOD INVESTIGATION SUMMARY OF INCREMENTAL CONSEQUENCE ANALYSIS RESULTS FOR ALTERNATIVE 1/2 PMF EVENT				
Alternative 2				
Location	No Breach Depth	No Breach Velocity	Breach Parameter Estimation Methodology	
			Von Thun & Gillette (VTG)	VTG Velocity
Old Beach Road	1.81	0.48	2.93	1.62
Memorial Blvd (138A South) 1	3.40	1.18	3.59	1.87
Memorial Blvd (138A South) 2	3.59	2.37	3.75	3.67
Memorial Blvd (138A North) 1	2.40	0.89	2.59	1.49
Memorial Blvd (138A North) 2	2.65	2.19	2.81	3.18
Save the Bay Parking Entrance	3.34	0.72	3.55	0.88
Save the Bay Parking West	0.29	1.03	0.50	1.54
Save the Bay Parking East	1.75	3.07	1.91	3.43
10 Wave Ave	0.88	0.45	1.50	0.41
1 Wave Ave (East)	2.73	1.36	3.06	1.68
1 Wave Ave (West)	1.11	0.01	1.50	0.01
38 Purgatory Road	1.98	0.98	2.37	1.16
42/44 Wave Ave	2.22	0.15	2.63	0.53
56 Wave Ave	0.39	1.68	0.98	1.68
Aquidneck Ave	1.80	1.92	2.13	1.92
86 Aquidneck Ave	0.54	0.98	2.17	1.36
100 Bliss Mine Road	1.42	0.40	1.43	0.42
Bliss Mine Road	4.17	0.10	4.24	0.10
86 Ellery Road	3.38	0.29	3.44	0.27
Bliss Mine Road/Ellery Road	4.53	0.76	4.60	0.78
Kay Boulvard	3.06	0.11	3.14	0.11
Ellery Road	3.51	0.94	3.51	0.93
Eustis Ave	0.57	0.17	0.57	0.17
Memorial Blvd Culvert	1.47	11.00	2.28	9.81
UV System	2.57	3.58	3.51	4.36
70 Ellery Road	1.21	0.33	1.30	0.33
112 Kay Boulevard	1.99	0.52	2.07	0.53
78 Ellery Road	1.26	0.27	1.34	0.33
129 Bliss Mine Road	3.27	0.12	3.33	0.13
105 Bliss Mine Road	1.94	0.07	2.01	0.06
1 Daniel Street	2.27	0.24	2.28	0.24
54 Ellery Road	0.65	0.20	0.65	0.23
50 Ellery Road	0.45	0.37	0.45	0.37
Wave Ave	2.89	1.17	3.28	1.38
South Easton Pond Dam [3]				


Depth-Velocity Flood Danger Relationship for Houses Built on Foundations (Alt 2, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone - Occupants of most houses are in danger from flood water
Judgement Zone - Danger level is based upson engineering judgement
Low Danger Zone - Occupants of most houses are not seriously in danger from flood water.
High Danger Zone
Judgement Zone
Low Danger Zone
High Danger Threshold
Judgement Zone Threshold
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
Eustis Ave
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
Depth (feet)
Velocity (feet/sec)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14

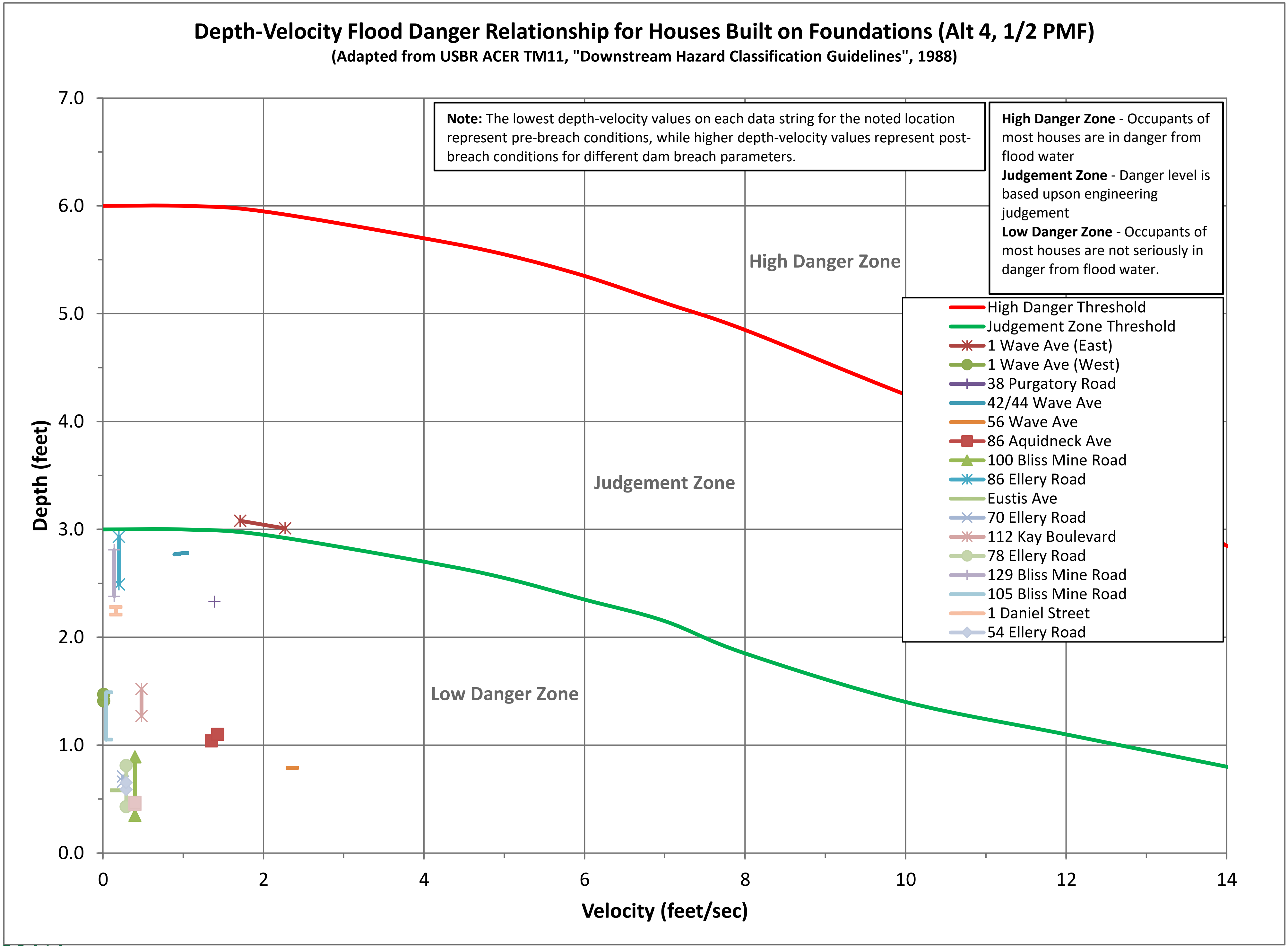

Depth-Velocity Flood Danger Relationship for Passenger Vehicles (Alt 2, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Old Beach Road
Memorial Blvd (138A South) 2
Memorial Blvd (138A North) 2
Save the Bay Parking West
Aquidneck Ave
Bliss Mine Road/Ellery Road
Ellery Road
Memorial Blvd Culvert
Judgement Zone Criteria 1
Judgement Zone Threshold
Memorial Blvd (138A South) 1
Memorial Blvd (138A North) 1
Save the Bay Parking Entrance
Save the Bay Parking East
Bliss Mine Road
Kay Boulvard
Eustis Ave
High Danger Threshold
Judgement Zone Criteria 2
Wave Ave
High Danger Zone - Occupants of almost any size passenger vehicle are in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Occupants of almost any size passenger vehicle are not seriously threatened by flood water.
Judgement Zone Criteria 1: Any depth greater than 2 feet can float an automobile (National Weather Service, 1999)
Judgement Zone Criteria 2: Water at a depth of 1.5 feet and a velocity of 6 feet per second is sufficient to move a vehicle downstream (FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14
Velocity (feet/sec)


Depth-Velocity Flood Danger Relationship for Adults (Alt 2, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
10 Wave Ave
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
Judgement Zone Threshold
High Danger Threshold
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
50 Ellery Road
Judgement Zone Criteria 1
Judgement Zone Criteria 2
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Judgement Zone Criteria 2: Max velocity of 5.5 ft/s (Jonkman, S. and Penning-Roswell, E., 2008)
High Danger Zone - Almost any size adult is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size adult is not seriously threatened by flood water.
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
Velocity (feet/sec)

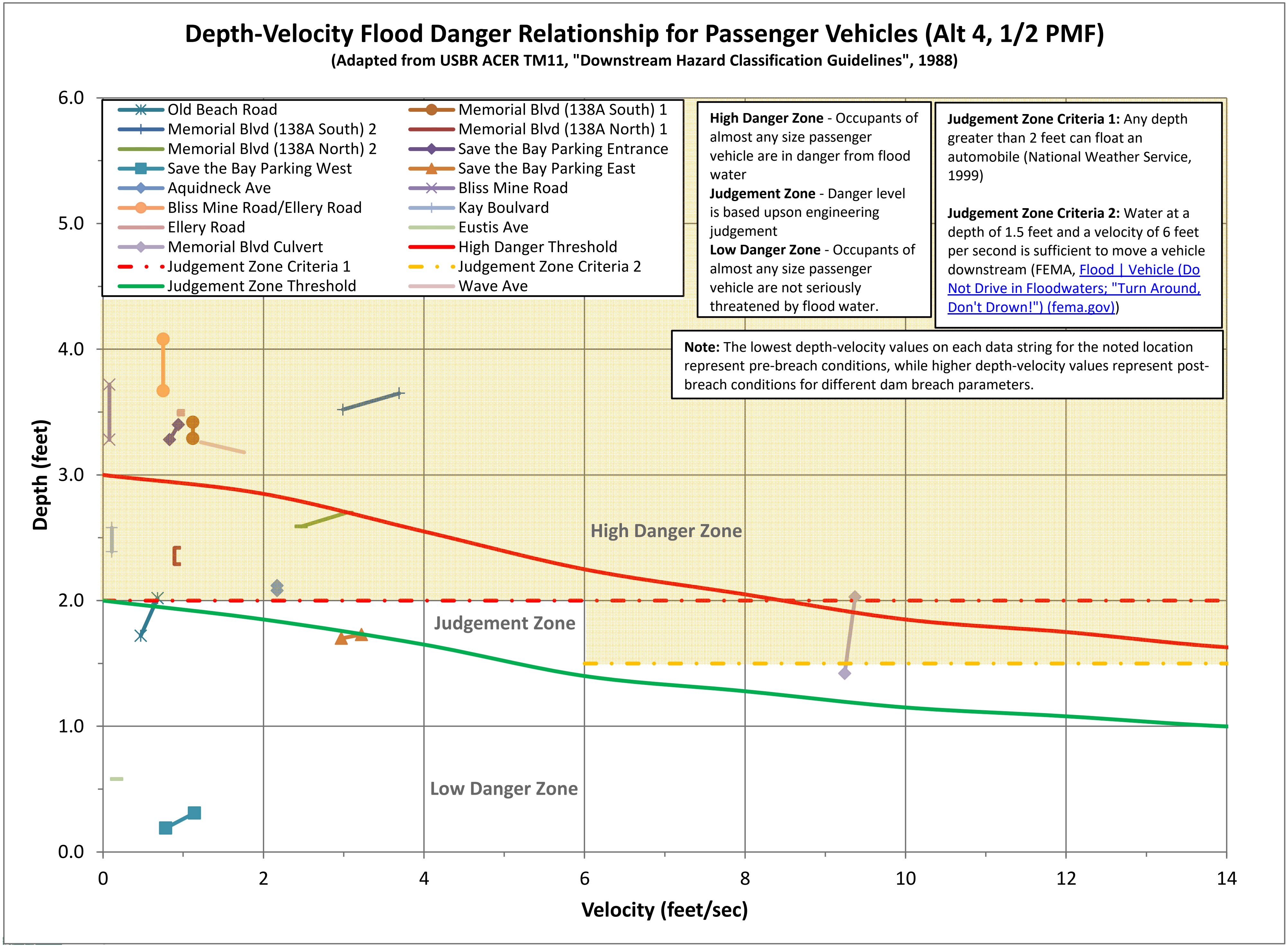

Depth-Velocity Flood Danger Relationship for Children (Alt 2, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
High Danger Zone - Almost any size child is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size child is not seriously threatened by flood water.
Infants are assumed to be safely attended by adults.
Save the Bay Parking Entrance
Save the Bay Parking West
Save the Bay Parking East
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
Aquidneck Ave
86 Aquidneck Ave
Bliss Mine Road
86 Ellery Road
Bliss Mine Road/Ellery Road
Kay Boulvard
Ellery Road
Eustis Ave
Judgement Zone Threshold
High Danger Threshold
Judgement Zone Criteria 1
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov)), values extrapolated for minimum average height of child age 5 (3.33 feet) (CDC, 2000)
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
Velocity (feet/sec)

FUSS & O'NEILL

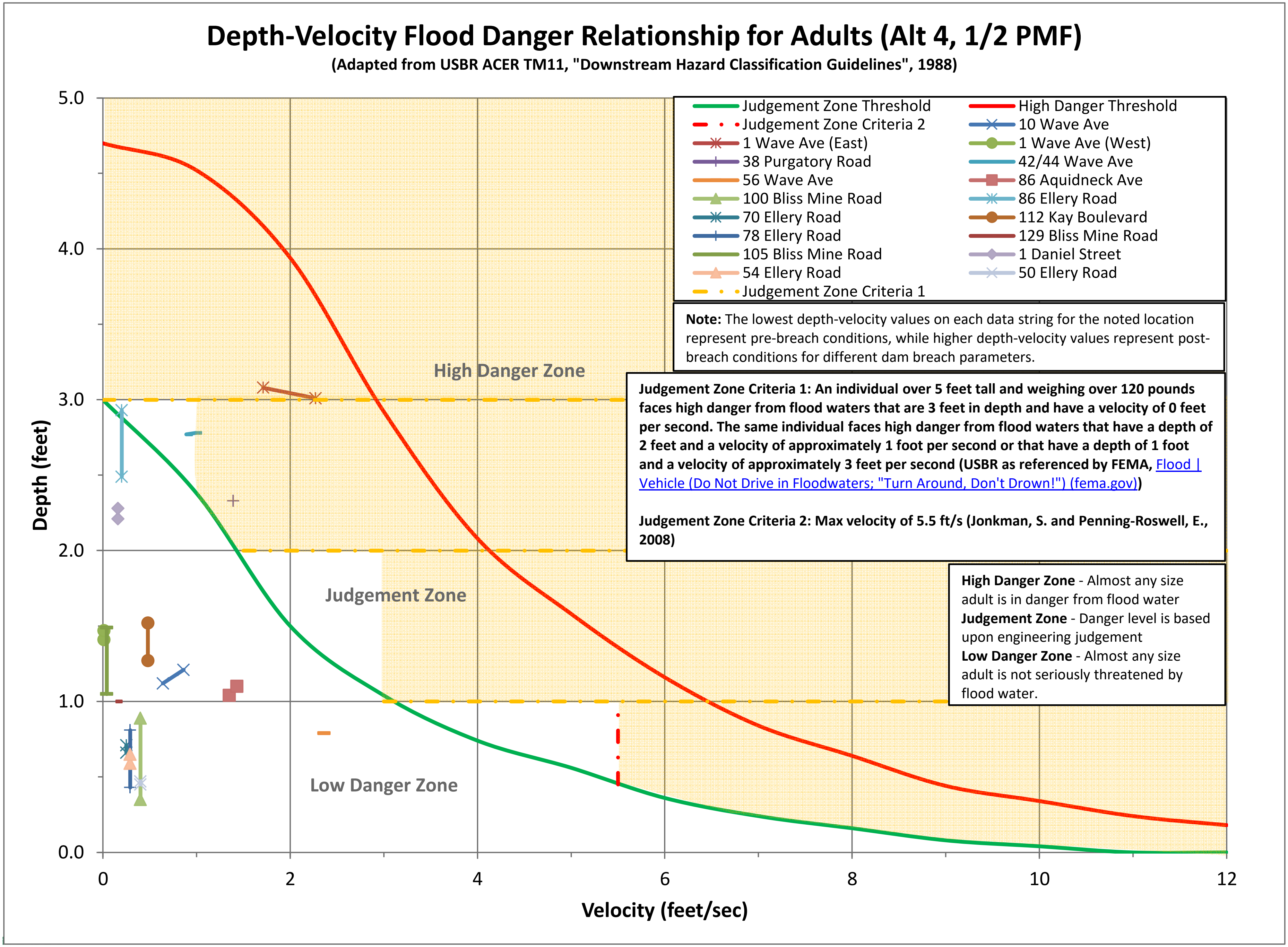
INFLOW DESIGN FLOOD INVESTIGATION SUMMARY OF INCREMENTAL CONSEQUENCE ANALYSIS RESULTS FOR ALTERNATIVE 4 1/2 PMF EVENT				
Alternative 4				
Location	No Breach Depth (Alternative 4)	No Breach Velocity (Alternative 4)	Breach Parameter Estimation Methodology	
			Von Thun & Gillette (VTG)	VTG Velocity
Old Beach Road	1.72	0.47	2.02	0.68
Memorial Blvd (138A South) 1	3.29	1.12	3.42	1.12
Memorial Blvd (138A South) 2	3.52	2.99	3.65	3.69
Memorial Blvd (138A North) 1	2.29	0.89	2.42	0.89
Memorial Blvd (138A North) 2	2.59	2.47	2.70	3.04
Save the Bay Parking Entrance	3.28	0.83	3.40	0.94
Save the Bay Parking West	0.19	0.78	0.31	1.14
Save the Bay Parking East	1.70	2.97	1.73	3.22
10 Wave Ave	1.12	0.64	1.21	0.86
1 Wave Ave (East)	3.08	1.71	3.01	2.27
1 Wave Ave (West)	1.41	0.01	1.47	0.01
38 Purgatory Road	2.33	1.39	2.33	1.39
42/44 Wave Ave	2.77	0.89	2.78	0.99
56 Wave Ave	0.79	2.36	0.79	2.36
Aquidneck Ave	2.08	2.17	2.12	2.17
86 Aquidneck Ave	1.04	1.35	1.10	1.43
100 Bliss Mine Road	0.35	0.40	0.89	0.40
Bliss Mine Road	3.28	0.08	3.72	0.08
86 Ellery Road	2.49	0.20	2.93	0.20
Bliss Mine Road/Ellery Road	3.67	0.75	4.08	0.75
Kay Boulvard	2.39	0.11	2.58	0.11
Ellery Road	3.48	0.94	3.51	0.94
Eustis Ave	0.58	0.17	0.58	0.17
Memorial Blvd Culvert	1.42	9.24	2.03	9.37
UV System	2.60	3.09	2.94	3.74
70 Ellery Road	0.66	0.25	0.71	0.25
112 Kay Boulevard	1.27	0.48	1.52	0.48
78 Ellery Road	0.43	0.29	0.81	0.29
129 Bliss Mine Road	2.38	0.14	2.81	0.14
105 Bliss Mine Road	1.05	0.04	1.49	0.04
1 Daniel Street	2.21	0.16	2.28	0.16
54 Ellery Road	0.59	0.29	0.65	0.29
50 Ellery Road	0.45	0.40	0.47	0.40
Wave Ave	3.26	1.22	3.18	1.76
South Easton Pond Dam [3]				



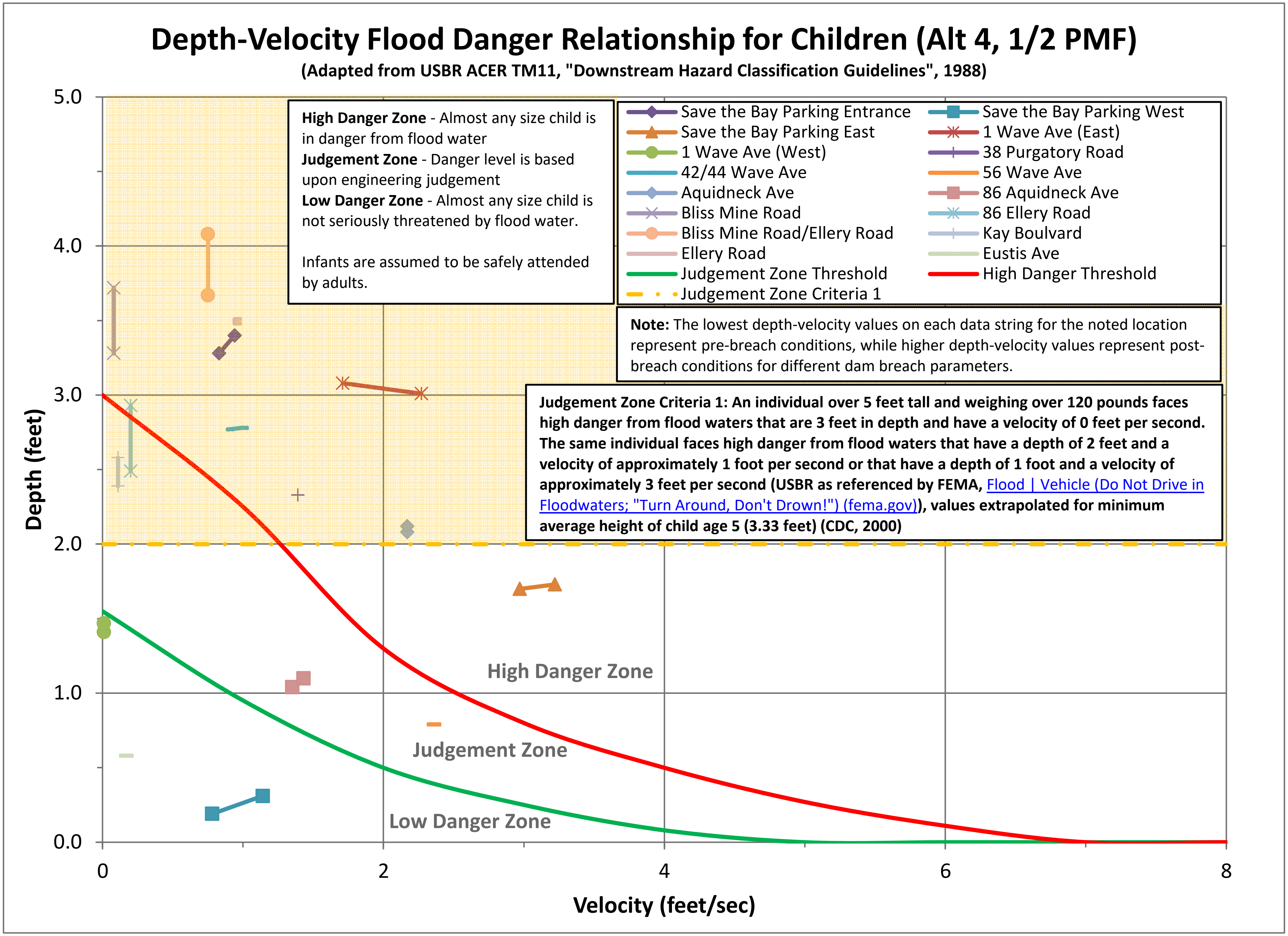
Depth-Velocity Flood Danger Relationship for Houses Built on Foundations (Alt 4, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone - Occupants of most houses are in danger from flood water
Judgement Zone - Danger level is based upson engineering judgement
Low Danger Zone - Occupants of most houses are not seriously in danger from flood water.
High Danger Zone
Judgement Zone
Low Danger Zone
High Danger Threshold
Judgement Zone Threshold
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
Eustis Ave
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
Depth (feet)
Velocity (feet/sec)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14



Depth-Velocity Flood Danger Relationship for Passenger Vehicles (Alt 4, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Old Beach Road
Memorial Blvd (138A South) 2
Memorial Blvd (138A North) 2
Save the Bay Parking West
Aquidneck Ave
Bliss Mine Road/Ellery Road
Ellery Road
Memorial Blvd Culvert
Judgement Zone Criteria 1
Judgement Zone Threshold
Memorial Blvd (138A South) 1
Memorial Blvd (138A North) 1
Save the Bay Parking Entrance
Save the Bay Parking East
Bliss Mine Road
Kay Boulvard
Eustis Ave
High Danger Threshold
Judgement Zone Criteria 2
Wave Ave
High Danger Zone - Occupants of almost any size passenger vehicle are in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Occupants of almost any size passenger vehicle are not seriously threatened by flood water.
Judgement Zone Criteria 1: Any depth greater than 2 feet can float an automobile (National Weather Service, 1999)
Judgement Zone Criteria 2: Water at a depth of 1.5 feet and a velocity of 6 feet per second is sufficient to move a vehicle downstream (FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
14
Velocity (feet/sec)



Depth-Velocity Flood Danger Relationship for Adults (Alt 4, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
Depth (feet)
Velocity (feet/sec)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8
10
12
High Danger Zone
Judgement Zone
Low Danger Zone
Judgement Zone Threshold
High Danger Threshold
Judgement Zone Criteria 2
10 Wave Ave
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
86 Aquidneck Ave
100 Bliss Mine Road
86 Ellery Road
70 Ellery Road
112 Kay Boulevard
78 Ellery Road
129 Bliss Mine Road
105 Bliss Mine Road
1 Daniel Street
54 Ellery Road
50 Ellery Road
Judgement Zone Criteria 1
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov))
Judgement Zone Criteria 2: Max velocity of 5.5 ft/s (Jonkman, S. and Penning-Roswell, E., 2008)
High Danger Zone - Almost any size adult is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size adult is not seriously threatened by flood water.



Depth-Velocity Flood Danger Relationship for Children (Alt 4, 1/2 PMF)
(Adapted from USBR ACER TM11, "Downstream Hazard Classification Guidelines", 1988)
High Danger Zone - Almost any size child is in danger from flood water
Judgement Zone - Danger level is based upon engineering judgement
Low Danger Zone - Almost any size child is not seriously threatened by flood water.
Infants are assumed to be safely attended by adults.
Save the Bay Parking Entrance
Save the Bay Parking West
Save the Bay Parking East
1 Wave Ave (East)
1 Wave Ave (West)
38 Purgatory Road
42/44 Wave Ave
56 Wave Ave
Aquidneck Ave
86 Aquidneck Ave
Bliss Mine Road
86 Ellery Road
Bliss Mine Road/Ellery Road
Kay Boulvard
Ellery Road
Eustis Ave
Judgement Zone Threshold
High Danger Threshold
Judgement Zone Criteria 1
Note: The lowest depth-velocity values on each data string for the noted location represent pre-breach conditions, while higher depth-velocity values represent post-breach conditions for different dam breach parameters.
Judgement Zone Criteria 1: An individual over 5 feet tall and weighing over 120 pounds faces high danger from flood waters that are 3 feet in depth and have a velocity of 0 feet per second. The same individual faces high danger from flood waters that have a depth of 2 feet and a velocity of approximately 1 foot per second or that have a depth of 1 foot and a velocity of approximately 3 feet per second (USBR as referenced by FEMA, Flood | Vehicle (Do Not Drive in Floodwaters; "Turn Around, Don't Drown!") (fema.gov)), values extrapolated for minimum average height of child age 5 (3.33 feet) (CDC, 2000)
High Danger Zone
Judgement Zone
Low Danger Zone
Depth (feet)
Velocity (feet/sec)
5.0
4.0
3.0
2.0
1.0
0.0
0
2
4
6
8

Attachment D

Opinion of Cost

FUSS & O'NEILL, INC.
317 Iron Horse Way, Suite 204
Providence, RI 02908

OPINION OF COST - Budgetary		DATE PREPARED : 10/3/2022	SHEET 1 OF 1
PROJECT :	North and South Easton Pond Embankment Resiliency Project	BASIS : RS Cost Means	
LOCATION :	Newport, RI	2021-2022 RIDOT and MassDOT WAUP	
DESCRIPTION:	Gate installation and embankment raising north and south embankments	Previous Experience	
DRAWING NO. :	20060901.D64 - South Easton Pond Dam Repairs and Improvements	ESTIMATOR : RKM	CHECKED BY : CLB

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 does 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.

ITEM NO.	ITEM DESCRIPTION	UNIT MEAS.	NO. UNITS	PER UNIT	TOTAL COST
North Pond Embankment					
1	**EROSION AND SEDIMENT CONTROLS**				
	Turbidity Curtain	LF	7,846	$50	$392,300
	Straw Wattles	LF	7,846	$10	$78,500
	Construction Entrance (crushed stone)	CY	30	$90	$2,700
	Construction Entrance (geotextile)	SY	30	$10	$300
	EROSION AND SEDIMENT CONTROLS SUBTOTAL				**$473,800**
2	**SITE ACCESS**				
	Construction Access Over Moat Channel - temporary bridge	LS	1	$150,000	$150,000
	SITE ACCESS SUBTOTAL				**$150,000**
3	**EMBANKMENT REPAIRS**				
	Remove Vegetation/Grubbing	SY	22,500	$15	$337,500
	Earth Excavation	CY	9,754	$50	$487,700
	Fine Grading	SY	11,576	$10	$115,800
	Embankment Soil Excavation and Replacement	CY	21,775	$45	$979,900
	Articulating Concrete Slope Protection	SF	324,000	$30	$9,720,000
	Geotextile Fabric	SY	41,580	$10	$415,800
	Geogrid Reinforcement	SY	19,800	$15	$297,000
	Compacted Washed Gravel	CY	30,382	$40	$1,215,300
	6" R-1 Riprap	CY	3,000	$90	$270,000
	R-7 Riprap Buttress	CY	1,500	$150	$225,000
	Riprap Relocation	CY	750	$86	$64,500
	EMBANKMENT REPAIRS SUBTOTAL				**$14,128,500**
4	**SOUTH POND SPILLWAY REPLACEMENT**				
	Removal of Existing Spillway	CY	370	$1,800	$666,700
	Removal of Existing Wingwalls	CY	15	$1,800	$27,000
	Over Excavation (earth)	CY	112	$50	$5,600
	Mud Mat	CY	37	$1,500	$55,600
	Spillway Base Reconstruction (Cast-in-Place Concrete)	CY	370	$2,500	$925,900
	SPILLWAY REPLACEMENT SUBTOTAL				**$1,680,800**
5	**SITE IMRPOVEMENTS AND RESTORATION**				
	4" Loam	SY	16,000	$6	$96,000
	Erosion Control Seed Mix	SY	16,000	$3	$48,000
	SITE IMRPOVEMENTS AND RESTORATION SUBTOTAL				**$144,000**
6	**GATE INSTALLATION**				
	Piers for gate support (reinforced concrete)	CY	450	$2,500	$1,125,000
	Gate Tie In	CY	2	$2,500	$5,000
	Crane and crew 40 ton (3 or 4 days)	Day	4	$2,151	$8,600
	Hauling to site	DAY	2	$1,200	$2,400
	Automatic Generator (gas) (10' away own cabinet, run natural gas to it)	EACH	1	$150,000	$150,000
	Housing (10x10x8) Pre-Fabricated Building	EACH	1	$80,000	$80,000
	Housing (10x10x8) Pre-Fabricated Building Installation	EACH	1	$35,000	$35,000
	Gas Hookup	LS	1	$40,000	$40,000
	Controls/ Communication Installed	LS	1	$75,000	$75,000
	Reservoir/Gate Controls Package (ie. tide gauges)	LS	1	$250,000	$250,000
	Power service	LS	1	$3,750	$3,750

	Gate Structure	LS	1	$3,350,000	$3,350,000
	Tidal/Flap Gate (APPROX. includes earthwork)	LS	1	$500,000	$500,000
	GATE INSTALLATION SUBTOTAL				**$5,624,750**
	EMBANKMENT SUBTOTAL				**$22,201,850**
	GENERAL				
	Mobilization & Demobilization	LS	1	10%	$2,220,200
	Construction Survey Layout and As-Built Mapping	LS	1	$20,000	$20,000
	Field and Laboratory Testing	LS	1	$50,000	$50,000
	Insurance and Bonds	LS	1	5%	$1,110,100
	Control of Water	LS	1	20%	$4,440,400
	Engineering	LS	1	20%	$4,440,400
	GENERALSUBTOTAL				**$12,281,100**
	OVERALL SUBTOTAL				**$34,482,950**
	CONTINGENCY (25%)				$8,620,800
	OVERALL TOTAL INCLUDING CONTINGENCY				**$43,104,000**
	SUBTOTAL -15% TO +30% (ROUNDED TO NEAREST $1,000)	**$37,932,000**		**TO**	**$53,449,000**

Notes:

Attachment E

Benefit Cost Analysis Report

M E M O R A N D U M

TO Rob Schultz, Director of Utilities, City of Newport

FROM Ken Berchielli, MS, EIT; Dean Audet, PE

DATE December 8, 2023

RE North and South Easton Pond Dams Resilience Project
BCA Analysis Memorandum

Fuss & O'Neill, Inc. (F&O) has completed a Benefit-Cost Analysis (BCA) as part of the North and South Easton Pond Dams Resilience Project. This memorandum provides a summary of the BCA along with supporting references to be used for inclusion with a future FEMA BRIC application to the US Federal Emergency Management Agency (FEMA) to secure funding for future phases of the project.

FEMA BCA Requirements

The FEMA BCA is a method that determines the future risk reduction benefits of a hazard mitigation project and compares those benefits to its costs. The result is a Benefit-Cost Ratio (BCR). A project is considered cost-effective when the BCR is 1.0 or greater. The FEMA BCA Toolkit Version 6.0 was used to complete the analysis. There are two categories for alternative cost effectiveness methodology to modify the threshold for mitigation projects that are considered cost effective under limited conditions. The categories include a 3% discount rate and 7% discount rate that weigh the total benefits to an adjusted net present value. Pursuant to the FY23 BRIC Notice of Funding Opportunities Overview, FEMA has established a set discount rate of 3% to be used in a BCA for hazard mitigation projects for the FY 2023 BRIC cycle. In previous grant application windows, FEMA has released a memorandum to the applicants summarizing the requirements for alternative cost-effectiveness methodology. It is assumed that the 3% discount rate is satisfactory due to the statement in the Notice of Funding Opportunities Overview, however Fuss & O'Neill will coordinate with FEMA staff to confirm if a formal letter will be released to confirm the appropriate discount rate. For the purpose of this memorandum, the 3% discount rate was used for all benefits.

Methodology

The North and South Easton Pond Dam Resilience Project involves evaluating alternatives to enhance the resilience of North and South Dams against coastal and inland storm events in Newport and Middletown, Rhode Island. The earthen embankments are susceptible to overtopping under more frequent and less severe storm conditions for both inland flooding and coastal flooding. In addition, the primary spillway of the South Easton Pond Dam is susceptible to saltwater intrusion from coastal flooding.

The recommended alternative includes select segments of the north pond and south pond embankments to protect against overtopping. The North Pond's southern and western embankments will be elevated to a constant crest elevation of 13.4 feet. The South Pond southern and eastern embankments to EL. 12.1 feet. Crest elevations are in reference to the NAVD88 datum. The embankment slopes will be armored and designed to be overtopped by fortifying the ground surface with articulated concrete block matting. In addition, the primary spillway of the south dam will be removed and replaced with provisions for a hydraulic crest gate. Additional detail regarding the design criteria of the recommended alternative is provided in the Conceptual Design Report developed by Fuss &O'Neill.

Elevating the embankment provides additional freeboard against inland flooding and coastal storm surge. Stone armor and articulating concrete block matting will provide enhanced protection against overtopping from wave action and wind attack. The combination of the mitigation items will make the dam resilient to inland flooding and dry weather wind events up to the 500-year recurrence interval. For coastal storm surges, the hydraulic crest gate will make the dam resilient up to the 200-year storm surge. The mitigation actions will work to protect utilities, structures, and the public from the effects of a dam failure.

The hazard events considered for the BCA include inland flooding and subsequent dam breaches, wind damage, and coastal flooding. The cost-benefit ratio was calculated by comparing the budgetary opinion of cost developed by Fuss & O'Neill with the economic benefits associated with mitigating the impacts of the hazard events. These benefits were determined using the FEMA BCA Calculator. Structures, utilities, as well as other ancillary benefit items were evaluated under the hazard conditions listed above. These line items (referred to as 'benefit items' herein) are tabulated in Attachment B of this Memorandum.

To evaluate inland flooding, HEC-RAS modeling was completed by Fuss & O'Neill to determine the increase in water surface elevations in both impoundments due to inland storm events. Once the recurrence interval was determined at which either dam could overtop, dam breach analyses were completed at various low points along both the North and South Dam Embankments. Tailwater depths in the moat channel around the south dam were compared directly with flood depths from breach inundation mapping to determine subsequent damages to structures, utilities, or personnel in the downstream area. Detailed H&H modeling results are included Conceptual Design Report.

Wind attack benefits were determined by evaluating historical damage from wind events experienced in the City of Newport at the North and South dams, specifically Hurricane Ida. Sustained wind speeds from the historical events were evaluated and assigned recurrence intervals, to determine a conservative recurrence interval where the dams would likely breach due to wave action from wind attack. This assumption is outlined in detail below.

Storm surge benefits were determined using the Climate Resilience Assessment Technical Memorandum for North and South Easton Pond Reservoir (prepared by Fuss & O'Neill, May 2019). The present-day 20-year storm surge elevations are above the crest elevation of the primary spillway, thus introducing saltwater intrusion into the south reservoir.

Assumptions used in BCA

- Overtopping as a result of inland storm events will cause dam failure (breach in embankment).
- Wind-related failures due to wave action against the embankment slopes are assumed to occur at the 50-year sustained wind speed provided in the 2009 Design Criteria Memorandum for South Easton Pond Dam (produced by F&O). This is based on historical damage experienced by the City of Newport at the North and South Easton Pond Dams.
- Sustained Wind speeds for historically expected damage events were obtained from the National Climatic Data Center (NCDC).
- The number of customers served for utility benefit items was provided by the City of Newport Water Department.
- Damages associated with potable water are included for each hazard mode. A breach in the embankment would require a boil water advisory for customers for a minimum of three days based on discussions with the City of Newport.
- Traffic counts were obtained from the RIGIS Environmental Data Center.

Summary of BCA Inputs

- Property Structure – Varies based on the type of structure. Structures selected as "other" include damages to the dam embankment or additional costs associated with items that are not available in the BCA standard structures (i.e. emergency response, loss of life, etc.).
- Hazard Type –Dam/Levee Break.
- Damage Frequency Relationship – Professional expected damages or historical expected damages.
- Mitigation Action Type – "Other" was selected due to the limited options available in the FEMA BCA Toolkit under the Dam/Levee Break Module.
- Project Useful Life – Assumed to be 50 years.
- Initial Project Costs – Order of magnitude cost estimates were completed by F&O as part of the overall project. The initial project costs are equal to $43,104,000.
- Annual Maintenance – Assumed to be $10,000.
- Professional/Historical Expected Damages Before Mitigation – Damages were estimated by reviewing water surface elevations and velocities due to a dam failure based on inland hydrologic and hydraulic modeling. Damages are limited to the dam itself and the downstream area (Memorial Boulevard). Methods to estimate costs vary based on the property structure type. Recurrence intervals were determined based on the hazard type.
- Professional/Historical Expected Damages After Mitigation – The proposed project is designed to protect the dam against a 500-year hazard event for inland flooding and wind attack, as well as a 200-year hazard event for storm surges.

Results

Based on the assumptions and methodology outlined in this memorandum, the BCR provided for the North Easton Dam project is 1.20 at the 3% indicating that the project is cost effective. Detailed output from the FEMA Toolkit is included in Attachment D.

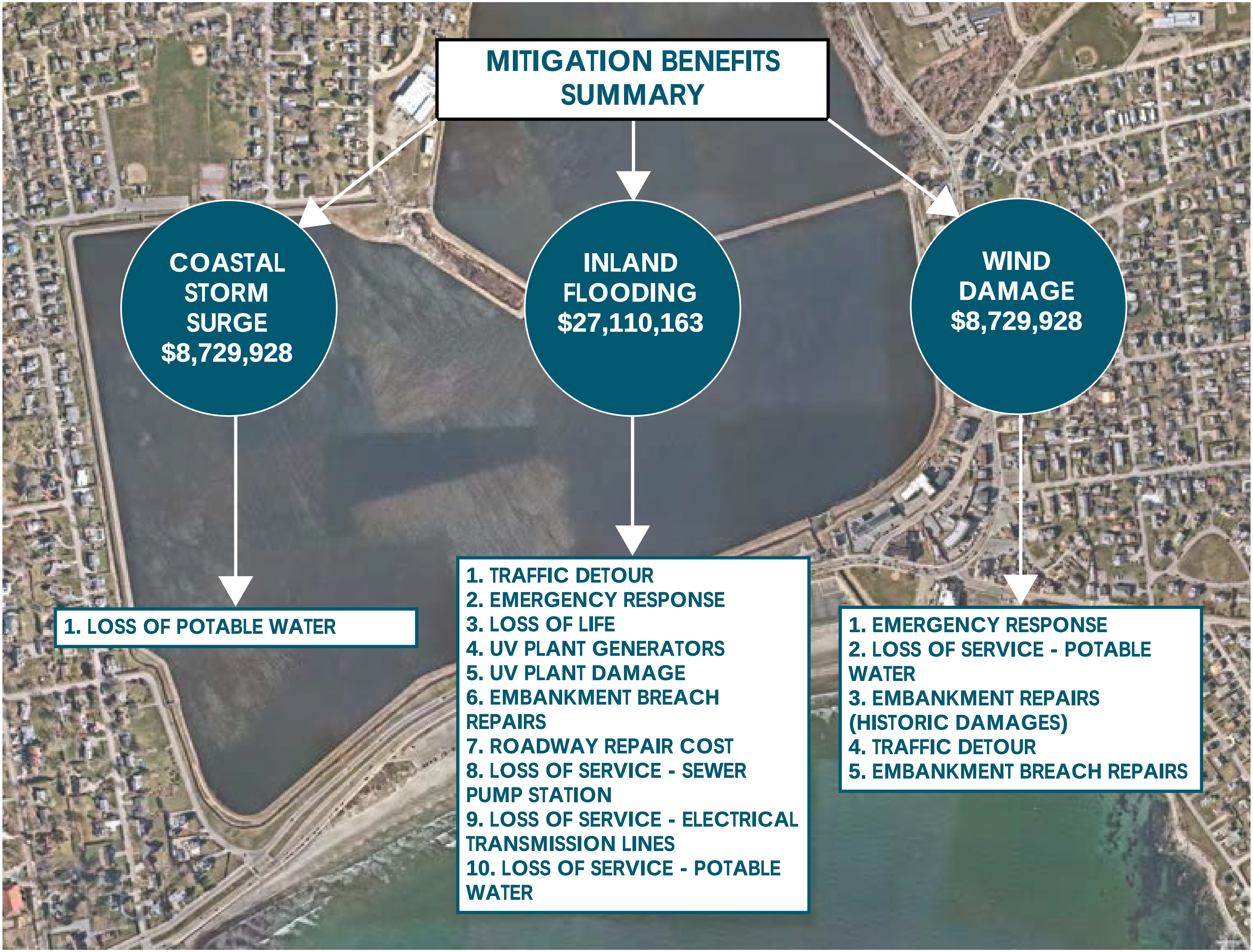
Attachments

A. Mitigation Benefits Summary
B. BCA Data Tabulation
C. References
D. FEMA BCA Toolkit Output

/sms

Appendix A

Mitigation Benefits Summary


MITIGATION BENEFITS SUMMARY
COASTAL STORM SURGE $8,729,928
INLAND FLOODING $27,110,163
WIND DAMAGE $8,729,928
1. LOSS OF POTABLE WATER
1. TRAFFIC DETOUR
2. EMERGENCY RESPONSE
3. LOSS OF LIFE
4. UV PLANT GENERATORS
5. UV PLANT DAMAGE
6. EMBANKMENT BREACH REPAIRS
7. ROADWAY REPAIR COST
8. LOSS OF SERVICE - SEWER PUMP STATION
9. LOSS OF SERVICE - ELECTRICAL TRANSMISSION LINES
10. LOSS OF SERVICE - POTABLE WATER
1. EMERGENCY RESPONSE
2. LOSS OF SERVICE - POTABLE WATER
3. EMBANKMENT REPAIRS (HISTORIC DAMAGES)
4. TRAFFIC DETOUR
5. EMBANKMENT BREACH REPAIRS

Appendix B

BCA Data Tabulation

FUSS & O'NEILL

EASTON POND NORTH DAM AND SOUTH DAM COASTAL RESILIENCE PROJECT BCA DATA TABULATION [1] NEWPORT, RI (UPDATED NOVEMBER 2023)								
FAILURE EVENT	MAP MARKER	BENEFIT ITEM	DAMAGE TYPE	LOCATION	DAMAGES BEFORE MITIGATION [2]	DAMAGE RECURRENCE INTERVAL	BENEFITS [3]	SUPPLEMENTAL INFORMATION [4]
INLAND FLOODING	1	Memorial Boulevard (RI-138A) Detour	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$8,069,610	50	$3,737,325	Damages before mitigation are based off detour timing and the shutdown time for Memorial Boulevard (RI 138-A).
	2	Emergency response	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$960,000	50	$444,610	Damages before mitigation are based available emergency response rates within the State of Rhode Island and estimating by F&O.
	3	Loss of Life	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$11,400,000	50	$5,279,747	Damages before mitigation are based on calculations completed by F&O using multiple dam safety manuals related to dam breach analysis.
	4	Pad mounted transformers for UV disinfectant structure	Professional Expected Damages	200 Memorial Blvd, Newport RI	$600,000	50	$277,881	Damages before mitigation are based on the updated 2023 HH Analysis and adjusted costs based off bid prices for the generators.
	5	UV Structure	Professional Expected Damages	200 Memorial Blvd, Newport RI	$3,000,000	50	$1,389,407	Damages before mitigation are based on the updated 2023 HH Analysis and adjusted costs based off bid prices for the UV Structure.
	6	Breached Embankment Repair Cost	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$3,000,000	50	$1,389,407	Estimated by F&O
	7	Roadway Repair Cost	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$700,000	50	$324,195	Estimated by F&O
	8	Loss of sewer pump station	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$8,095,800	50	$3,749,444	Utilizes FEMA standard values, Census data provided by The City of Newport Water Department; and a 10 day shutdown duration
	9	Loss of electrical transmission line	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$10,149,000	50	$4,103,151	Utilizes FEMA standard values, Census data provided by The City of Newport Water Department; and a 3 day shutdown duration
	10	Loss of potable water	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$13,851,198	50	$6,414,996	Utilizes FEMA standard values, Census data provided by The City of Newport Water Department; and a 3 day shutdown duration
WIND DAMAGE	11	Emergency response (sunny day breach occurs)	Professional expected damages - increased recurrence interval based off Hurricane Ida and increased to a 50-	Memorial Boulevard (RI 138-A)	$960,000	50	$444,610	Damages before mitigation are based available emergency response rates within the State of Rhode Island and estimating by F&O.
	12	Loss of potable water (sunny day breach occurs)	Professional expected damages - increased recurrence interval based off Hurricane Ida	Memorial Boulevard (RI 138-A)	$13,851,198	50	$6,414,996	Census data provided by The City of Newport Water Department; Assume 3 day shutdown
	13	Repair Embankment (sunny day breach occurs)	Professional expected damages - increased recurrence interval based off Hurricane Ida	Memorial Boulevard (RI 138-A)	$3,000,000	50	$1,518,056	Utilizes FEMA standard values, Census data provided by The City of Newport Water Department; and a 3 day shutdown duration
	14	Memorial Boulevard (RI-138A) Detour (sunny day breach occurs)	Professional expected damages - increased recurrence interval based off Hurricane Ida	Memorial Boulevard (RI 138-A)	$260,310	50	$254,493	Assume 2 day shutdown to repair damaged sections of the roadway
	15	Repair Embankment from wave action erosion	Historical Expected Damages (Hurricane Ida)	Memorial Boulevard (RI 138-A)	$100,000	25	$97,773	Historical damage costs provided by the City of Newport Water Department
COASTAL STORM SURGE	16	Loss of potable water (saltwater intrusion)	Professional Expected Damages	Memorial Boulevard (RI 138-A)	$13,851,198	20	$16,037,465	Census data provided by The City of Newport Water Department; Assume 3 day shutdown

1. This tables summarizes the results of the BCA and serves as a 'key' for mitigation items included in the BCA.
2. Total damages generally consist of professionally or historically estimated damages completed by F&O. Professionally estimated damages include FEMA standard values where applicable. Total damages include The total damages associated with the hazard, not including inflation.
3. The summation of the calculated annualized damages of all direct damage categories (building, contents, displacement, ecosystem services, and volunteer costs) and converted to net present value using the 3% discount rate.
4. This column is intended to provide basic background information on the benefit item and does not include all references or assumptions associated with each specific benefit item.

Appendix C

References

PREVIOUS REPORTS AND REFERENCES

The following is a list of reports that were utilized during the development of the benefit-cost analysis.

1. "Final BCA Reference Guide", Prepared by the Federal Emergency Management Agency, dated June 2009.
2. "Evaluating Scour at Bridges – Fifth Edition", Prepared by U.S. Department of Transportation Federal Highway Administration, Publication No. FHWA-HIF-12-003, April 2012.
3. "Final Sustainability Benefits Methodology Report", Prepared by the Federal Emergency Management Agency, dated August 23, 2012.
4. "A procedure for Estimating Loss of Life Caused by Dam Failure", Prepared by U.S. Department of the Interior, Dam Safety Office (DSO), September 1999.
5. "Guidance for Completing a Dam Breach Analysis for Small Ponds and Dams in Maryland", Prepared by Maryland Department of the Environment, May 2018.
6. "Introduction to FEMA's Benefit-Cost Analysis (BCA) Module", Prepared by the Federal Emergency Management Agency, dated June 2009.
7. "Spillway Design Flood Investigation North and South Easton Pond Dams", Prepared by Fuss & O'Neill, Inc., dated October 2022.
8. "Climate Resiliency Assessment Technical Memorandum North and south Easton Pond Reservoirs", Prepared by Fuss & O'Neill, Inc., dated May 2019.
9. "Design Criteria Memorandum South Easton Pond Dam Repairs and Improvements", Prepared by Fuss & O'Neill, Inc., dated April 2009.
10. "Emergency Action Plan Easton Pond Dam", Prepared by Fuss & O'Neill, Inc., dated October December 2007.
11. "National Hurricane Center Tropical Cyclone Report – Hurricane Ida, Prepared by John L. Beven II and Robbie Berg", National Hurricane Center, April 4, 2022.
12. "Economic Impact of Tourism in Newport, 2018", Prepared by Tourism Economics, dated August 2019.

Appendix D

FEMA BCA Toolkit Output

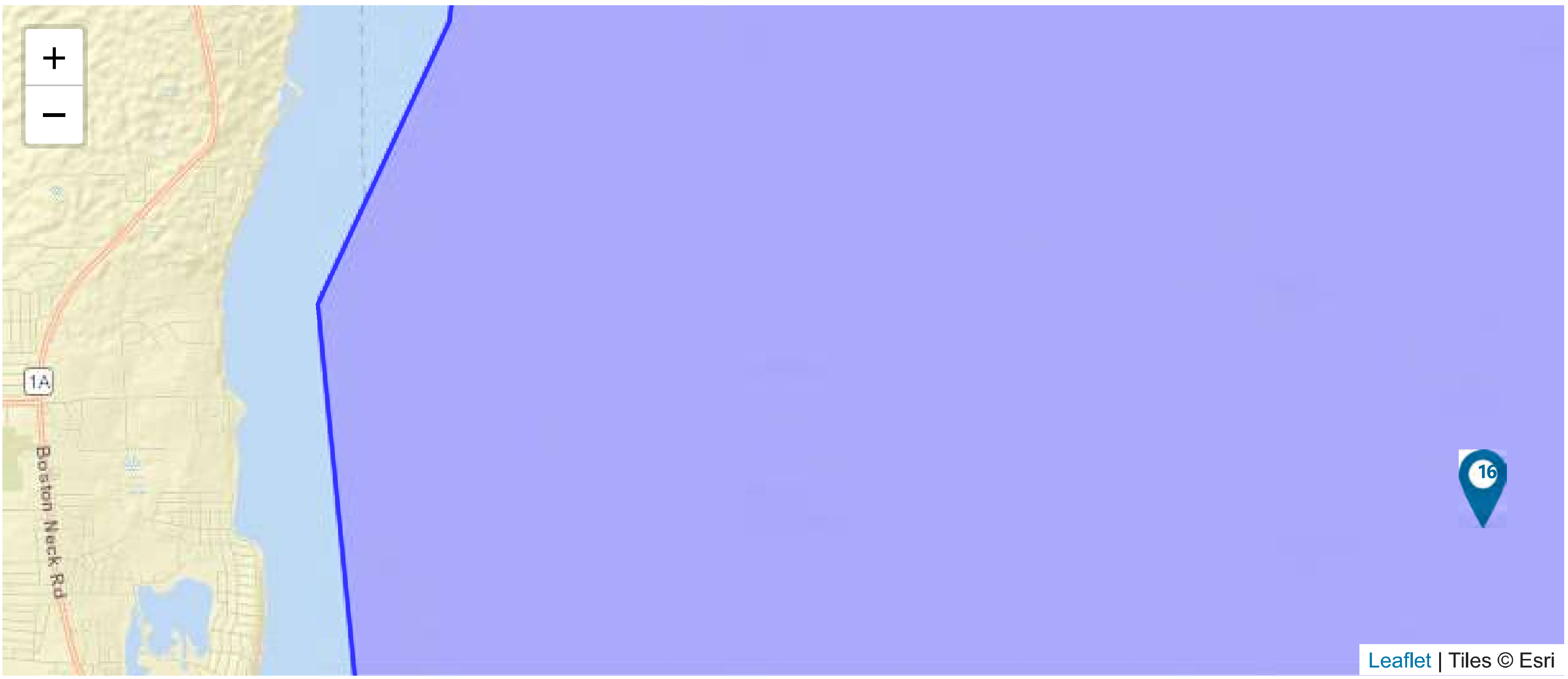
FEMA

Benefit-Cost Calculator

V.6.0 (Build 20231108.2102 | Release Notes)

Benefit-Cost Analysis

Project Name: North and South Easton Pond Dam Resiliency Alternatives



				Using 7% Discount Rate			Using 3% Discount Rate (For BRIC and FMA only)		
Map Marker	Mitigation Title	Property Type	Hazard	Benefits (B)	Costs (C)	BCR (B/C)	Benefits (B)	Costs (C)	BCR (B/C)
1	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 2,004,600	$ 43,242,007	0.05	$ 3,737,325	$ 43,361,298	0.09

				Using 7% Discount Rate			Using 3% Discount Rate (For BRIC and FMA only)		
Map Marker	Mitigation Title	Property Type	Hazard	Benefits (B)	Costs (C)	BCR (B/C)	Benefits (B)	Costs (C)	BCR (B/C)
2	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 238,477	$ 0	0.00	$ 444,610	$ 0	0.00
3	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 2,831,913	$ 0	0.00	$ 5,279,747	$ 0	0.00
4	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 149,048	$ 0	0.00	$ 277,881	$ 0	0.00
5	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 745,240	$ 0	0.00	$ 1,389,407	$ 0	0.00
6	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 745,240	$ 0	0.00	$ 1,389,407	$ 0	0.00
7	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 173,889	$ 0	0.00	$ 324,195	$ 0	0.00
8	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 2,011,100	$ 0	0.00	$ 3,749,444	$ 0	0.00
9	Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 2,200,819	$ 0	0.00	$ 4,103,151	$ 0	0.00
10	Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 3,440,830	$ 0	0.00	$ 6,414,996	$ 0	0.00
11	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 238,477	$ 0	0.00	$ 444,610	$ 0	0.00
12	Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 3,440,830	$ 0	0.00	$ 6,414,996	$ 0	0.00
13	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 814,244	$ 0	0.00	$ 1,518,056	$ 0	0.00

				Using 7% Discount Rate			Using 3% Discount Rate (For BRIC and FMA only)		
Map Marker	Mitigation Title	Property Type	Hazard	Benefits (B)	Costs (C)	BCR (B/C)	Benefits (B)	Costs (C)	BCR (B/C)
14	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 136,503	$ 0	0.00	$ 254,493	$ 0	0.00
15	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Dam/Levee Break	$ 52,443	$ 0	0.00	$ 97,773	$ 0	0.00
16	Other @ Memorial Blvd, Newport, Rhode Island, 02840		DFA - Coastal V Flood	$ 8,602,060	$ 0	0.00	$ 16,037,465	$ 0	0.00
TOTAL (SELECTED)				**$ 27,825,713**	**$ 43,242,007**	**0.64**	**$ 51,877,556**	**$ 43,361,298**	**1.20**
TOTAL				**$ 27,825,713**	**$ 43,242,007**	**0.64**	**$ 51,877,556**	**$ 43,361,298**	**1.20**

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Roads & Bridges
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$43,104,000
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$10,000

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2022
Year Property was Built:	1900
Analysis Duration:	123 Use Default:Yes

Roads and Bridges Properties

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Estimated Number of One-Way Traffic Detour Trips per Day:	18,000
Additional Time per One-Way Detour Trip (minutes):	20
Number of Additional Miles:	3
Federal Rate ($):	0.655 Use Default:Yes
Economic Loss Per Day of Loss of Function ($):	260,310

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	31	0	0	0	0	0	8,069,610

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	8,069,610	161,391
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	8,069,610	161,391

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	31	0	0	0	0	0	8,069,610

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	8,069,610	16,138
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	8,069,610	16,138

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$2,004,600
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$2,004,600
Total Mitigation Project Cost:	$43,242,007
Benefit Cost Ratio - Standard:	0.05
Benefit Cost Ratio - Standard + Social:	0.05

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	960,000	0	0	0	0	0	960,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	960,000	19,200
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	960,000	19,200

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	960,000	0	0	0	0	0	960,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	960,000	1,920
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	960,000	1,920

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$238,477
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$238,477
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	11,400,000	0	0	0	0	0	11,400,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	11,400,000	227,999
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	11,400,000	227,999

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	11,400,000	0	0	0	0	0	11,400,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	11,400,000	22,799
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	11,400,000	22,799

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$2,831,913
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$2,831,913
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	600,000	0	0	0	0	0	600,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	600,000	12,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	600,000	12,000

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	600,000	0	0	0	0	0	600,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	600,000	1,200
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	600,000	1,200

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$149,048
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$149,048
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	3,000,000	0	0	0	0	0	3,000,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	3,000,000	60,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	3,000,000	60,000

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	3,000,000	0	0	0	0	0	3,000,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	3,000,000	6,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	3,000,000	6,000

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$745,240
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$745,240
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	3,000,000	0	0	0	0	0	3,000,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	3,000,000	60,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	3,000,000	60,000

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	3,000,000	0	0	0	0	0	3,000,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	3,000,000	6,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	3,000,000	6,000

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$745,240
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$745,240
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	700,000	0	0	0	0	0	700,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	700,000	14,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	700,000	14,000

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	700,000	0	0	0	0	0	700,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	700,000	1,400
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	700,000	1,400

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$173,889
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$173,889
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48534396242718, -71.29740137850912
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Utilities
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	1950
Analysis Duration:	74 Use Default:Yes

Utilities Properties

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Type of Service:	Wastewater
Number of Customers Served:	11,130
Value of Unit of Service ($/person/day):	$66 Use Default:Yes
Total Value of Service Per Day ($/day):	$734,580

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	WASTEWATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	10	750,000	0	0	0	0	8,095,800

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	8,095,800	161,915
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	8,095,800	161,915

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	WASTEWATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	10	750,000	0	0	0	0	8,095,800

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	8,095,800	16,191
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	8,095,800	16,191

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$2,011,100
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$2,011,100
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.495714016023896, -71.29334103841956
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Utilities
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	1950
Analysis Duration:	74 Use Default:Yes

Utilities Properties

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Type of Service:	Electrical
Number of Customers Served:	11,130
Value of Unit of Service ($/person/day):	$199 Use Default:Yes
Total Value of Service Per Day ($/day):	$2,214,870

Professional Expected Damages Before Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

	ELECTRICAL	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	4	0	0	0	0	0	8,859,480

Annualized Damages Before Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	8,859,480	177,189
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	8,859,480	177,189

Professional Expected Damages After Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

	ELECTRICAL	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	4	0	0	0	0	0	8,859,480

Annualized Damages After Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	8,859,480	17,718
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	8,859,480	17,718

Benefits-Costs Summary

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$2,200,819
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$2,200,819
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.495714016023896, -71.29334103841956
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Utilities
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	1930
Analysis Duration:	94 Use Default:Yes

Utilities Properties

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Type of Service:	Potable Water
Number of Customers Served:	33,457
Value of Unit of Service ($/person/day):	$138 Use Default:Yes
Total Value of Service Per Day ($/day):	$4,617,066

Professional Expected Damages Before Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

	POTABLE WATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	3	0	0	0	0	0	13,851,198

Annualized Damages Before Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	13,851,198	277,023
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	13,851,198	277,023

Professional Expected Damages After Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

	POTABLE WATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	3	0	0	0	0	0	13,851,198

Annualized Damages After Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	13,851,198	27,701
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	13,851,198	27,701

Benefits-Costs Summary

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$3,440,830
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$3,440,830
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	1950
Analysis Duration:	74 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	960,000	0	0	0	0	0	960,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	960,000	19,200
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	960,000	19,200

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	960,000	0	0	0	0	0	960,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	960,000	1,920
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	960,000	1,920

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$238,477
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$238,477
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.495714016023896, -71.29334103841956
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Utilities
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Utilities Properties

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Type of Service:	Potable Water
Number of Customers Served:	33,457
Value of Unit of Service ($/person/day):	$138 Use Default:Yes
Total Value of Service Per Day ($/day):	$4,617,066

Professional Expected Damages Before Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

	POTABLE WATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	3	0	0	0	0	0	13,851,198

Annualized Damages Before Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	13,851,198	277,023
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	13,851,198	277,023

Professional Expected Damages After Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

	POTABLE WATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	3	0	0	0	0	0	13,851,198

Annualized Damages After Mitigation

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	13,851,198	27,701
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	13,851,198	27,701

Benefits-Costs Summary

Other @ 100 Bliss Mine Rd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$3,440,830
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$3,440,830
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	1930
Analysis Duration:	94 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	3,000,000	0	0	0	0	0	3,000,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	3,000,000	60,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	3,000,000	60,000

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	500,000	0	0	0	0	0	500,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	500,000	1,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	500,000	1,000

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$814,244
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$814,244
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Roads & Bridges
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	1950
Analysis Duration:	74 Use Default:Yes

Roads and Bridges Properties

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Estimated Number of One-Way Traffic Detour Trips per Day:	18,000
Additional Time per One-Way Detour Trip (minutes):	20
Number of Additional Miles:	3
Federal Rate ($):	0.655 Use Default:Yes
Economic Loss Per Day of Loss of Function ($):	260,310

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	2	0	0	0	0	0	520,620

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	520,620	10,412
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	520,620	10,412

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	1	0	0	0	0	0	260,310

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	260,310	521
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	260,310	521

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$136,503
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$136,503
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Dam/Levee Break
Mitigation Action Type:	Other
Property Type:	Other
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	1890
Analysis Duration:	134 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
25	100,000	0	0	0	0	0	100,000

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
25	100,000	4,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	100,000	4,000

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
500	100,000	0	0	0	0	0	100,000

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
500	100,000	200
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	100,000	200

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$52,443
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$52,443
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

Property Configuration

Property Title:	Other @ Memorial Blvd, Newport, Rhode Island, 02840
Property Location:	02840, Newport, Rhode Island
Property Coordinates:	41.48362500662152, -71.30830499870157
Hazard Type:	Coastal V Flood
Mitigation Action Type:	Other
Property Type:	Utilities
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Project Useful Life (years):	50
Project Cost:	$0
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Damage Analysis Parameters - Damage Frequency Assessment

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Year of Analysis was Conducted:	2023
Year Property was Built:	1890
Analysis Duration:	134 Use Default:Yes

Utilities Properties

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Type of Service:	Potable Water
Number of Customers Served:	33,457
Value of Unit of Service ($/person/day):	$138 Use Default:Yes
Total Value of Service Per Day ($/day):	$4,617,066

Professional Expected Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	POTABLE WATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
20	3	0	0	0	0	0	13,851,198

Annualized Damages Before Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
20	13,851,198	692,559
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	13,851,198	692,559

Professional Expected Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

	POTABLE WATER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
200	3	0	0	0	0	0	13,851,198

Annualized Damages After Mitigation

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
200	13,851,198	69,255
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	13,851,198	69,255

Standard Benefits - Ecosystem Services

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	$0

Benefits-Costs Summary

Other @ Memorial Blvd, Newport, Rhode Island, 02840

Total Standard Mitigation Benefits:	$8,602,060
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$8,602,060
Total Mitigation Project Cost:	$0
Benefit Cost Ratio - Standard:	0
Benefit Cost Ratio - Standard + Social:	0

APPENDIX F: CONSTRUCTION COMPLETION REPORT: EASTON POND NORTH DAM AUXILIARY SPILLWAY REPAIRS

Construction Completion Report
Easton Pond North Dam Auxiliary Spillway Repairs
Contract 23-004

City of Newport
Newport, RI

December 2023

FUSS & O'NEILL

317 Iron Horse Way
Suite 204
Providence, RI 02908

Fuss & O'Neill Project No. 20060901.D64

Table of Contents

Final Record Documents
City of Newport
Contract No. 23-004

Sections

FUSS & O'NEILL

Section A

Progress Meeting Notes

PRECONSTRUCTION MEETING AGENDA MINUTES
CITY OF NEWPORT
EASTON POND NORTH DAM SPILLWAY REPAIRS
Bid No. 23-004
1:00 P.M. – 2:30 P.M. – Wednesday, June 28, 2023
Utilities Department, 70 Halsey Street, Newport, RI

ATTENDEES:

Robert Schultz	City of Newport (NWD)
Josh Ponte	City of Newport (NWD)
Ron Ferraiuolo	SumCo Eco-Contracting (SumCo)
Andrea Judge	Fuss & O'Neill (F&O)
Rebecca Meyers	Fuss & O'Neill (F&O)

1. Introductions
    - Robert Schultz – City of Newport (NWD), Director of Utilities
    - Ron Ferraiuolo – SumCo Eco-Contracting, Team Lead
    - Andrea Judge – F&O, Project Manager
    - Rebecca Meyers – F&O, Project Engineer
    - Katie Cretella – F&O, Project Engineer (Not present)

    Josh Ponte will be the on-site foreman for the NWD. JP Ferreira will be the on-site foreman for SumCo and Adam Lundsted will be the project manager for SumCo.

    - Sign-In Sheet
    - Contact List/Emergency Phone Numbers

    See attachment. Contact list was updated to include Josh Ponte (NWD), JP Ferreira (SumCo), and Adam Lundsted (SumCo).

2. Construction Sequence

    Tentative construction start date is the week of July 24th. Construction is estimated to last 6 weeks.

    - Survey Control
    - Pond Drawdown – Current status of City drawdown

    City will drawdown pond to El. 7.1' (3' below the spillway crest). SumCo will provide a projected related drawdown to El. 5.5' (1.6' additional drawdown from El. 7.1').

    - Temporary Cofferdam / Control of Water – Submittal status

    Portadam will start setting up the week of July 24th, set up will take about 1 week.

PRECONSTRUCTION MEETING AGENDA MINUTES
CITY OF NEWPORT
EASTON POND NORTH DAM SPILLWAY REPAIRS
Bid No. 23-004
1:00 P.M. – 2:30 P.M. – Wednesday, June 28, 2023
Utilities Department, 70 Halsey Street, Newport, RI

- Erosion and Sedimentation Controls

Portadam will be used as the turbidity curtain on the upstream side. Bulk bags may be used as the turbidity curtain on the downstream side.

- Construction Staging Areas /Construction Access Routes

SumCo will work with NWD on staging areas and construction routes. SumCo will use the areas outlined in the plans.

- Vegetation Removal and Disposal
- Stone Masonry Wall Demolition/Disposal

SumCo shall track demolition quantities.

- Stone Masonry Weir Remove/Stockpile
- Stone Amor Weir Remove/Stockpile
- Auxiliary Spillway Construction

Concrete removal is estimated to take about 3 weeks. SumCo will excavate to El. 5.5 ft. F&O will inspect subgrade prior to placing the mud mat. Pockets of organics may be present which should be removed and replaced with suitable fill before placing the mud mat. Excavation should not be exposed for long periods of time before mud mat is placed. If a storm is projected before a weekend, SumCo will delay excavation until the following week to avoid long exposure times of the subgrade. SumCo is allowed to remove the rocks on the side of the dam as long as they are replaced at the end of construction.

- Repairs at Primary Spillway (ALT 1)
- Restore Pond
- Loam and Seed
- Substantial Completion

3. Site Issues
   - Digsafe/Utilities Notification

Utilities are present under the embankment and shall be protected. NWD will mark out utilities prior to July 21st. SumCo will call DigSafe and send permit to F&O.

- QA/QC

- Protection of Raw Water Quality
- Site Trailers / Sanitary Facilities

  Bathrooms will be present. One or two 14-16 foot trailers will be present for SumCo foreman(s).

- Equipment Storage / Material Stockpile Areas

  SumCo will use areas outlined on the plans and coordinate with NWD as needed.

- Site Security

  SumCo will use lower entrance gate on Ellery Road to avoid daycare. Gate will be locked by SumCo with gate code of 1225.

- Work hours
- Contractor HASP / Competent Person / First Aid

  SumCo will provide competent person on site.

- Permits / SWPPP Compliance
- Equipment Fueling

  Fueling of equipment will take place outside of the dewatered pond area.

4. Construction Administration

- Construction Contract
  - Insurance Certificates
  - Performance / Payment Bonds
- Preliminary Schedules/Submittals

  F&O will supply SumCo with a list of tasks where F&O field representatives should be present.

  - Construction Schedule
  - Schedule of Values
  - Schedule of Submittals – Identify time sensitive submittals

    F&O received most time sensitive submittals and is addressing them. Rob shall be copied on all submittals.

- Submittal Review and Distribution

  F&O set to return submittals to Ron (SumCo) copying Rob (NWD).

- Biweekly Progress Meetings
  - Determine time for progress meetings

    F&O will schedule an on-site meeting with CRMC for after July 15th. Bi-weekly meetings will start after this meeting on the same day and time as the meeting with CRMC.

  - Confirm attendance by NWD, SumCo, and F&O

    F&O – Andrea Judge, Rebecca Meyers, Katie Cretella
    NWD – Josh, Rob (when available), (Rob shall be copied on all emails)
    SumCo – Ron, Adam

  - F&O to conduct meetings, prepare agenda, and meeting notes
  - SumCo to provide look ahead schedule
- Requests for Information
- Payment Forms and Procedures

  Payments requests from SumCo will be made to NWD, not Town Hall.

  - Measurement and Documentation of Unit Price Quantities
  - City Tax Exemption
  - 5% Retainage
  - Prevailing Wage Forms

    SumCo will send prevailing wage forms with notarized pay requests monthly.

  - Release of Liens
- Contract Time: 120 Days / Notice to Proceed

  F&O will issue a Change Order for contract time increase and price increase.

- Request for Extension of Contract Times / Price
- Project Warrantees

  Copies of warranties to be sent to F&O prior to close out.

- Record Drawings

  SumCo to maintain redlines of project drawings. SumCo will confirm the top of wall elevations of the primary and auxiliary spillways at the end of construction. See attached for Control Point benchmarks.

5. Subcontractors
   - Identification of Subcontractors

     Portadam – Water Control
     Martin Bros. – Concrete

   - Licensing / Safety Certificate Documentation

     SumCo will have documentation of licensing/safety certificates for subcontractor.

6. Other Issues and Coordination Items
   - RIDEM/CRMC Permit Conditions

     F&O will notify RIDEM in writing estimated start and end date of construction.
     RIDEM requires seasonal base flow of zero to be maintained.
     F&O will set up an on-site meeting with CRMC, Ron, and Rob for after July 15th.
     NWD will post CRMC permit.

   - Protection of the embankment and walls

     SumCo will ensure to protect the remnants of the stone masonry wall that is outlined in the plans to remain.

   - Other Issues

7. Questions

   In case of a hurricane, SumCo will add 2 foot high bulk bags on the downstream side of the primary spillway and remove necessary equipment.

   The Portadam is acceptable to act as a turbidity curtain on the upstream side. If bulk bags are placed on the downstream side, they can be considered as a turbidity curtain.

FUSS & O'NEILL

CONSTRUCTION PROGRESS MEETING NO. 1 MINUTES
City of Newport Proj. No. 23-004
EASTON POND NORTH DAM SPILLWAY REPAIRS
10:00 A.M. – Monday, August 21, 2021
Easton Pond North Dam Auxiliary Spillway, Newport, RI

Attendees:
Rob Schultz (NWD)
Ron Ferraiuolo (SumCo)
Adam Lundsted (SumCo) – Not Present
Andrea Judge (F&O)
Katie Cretella (F&O)

1. Old Business
   - Pond Drawdown

     The 12" pumps were shut down over the weekend (8/19 – 8/20). During this time, the water level rose 0.2 feet to 6.7 feet. The 12" pumps will be shut down over night.

   - Change Order 1

     The City of Newport is waiting for an internal conflict. There will be no additional cost. It will be the original contract amount.

2. Status of Construction Items
   - Control of water

     The control of water is being maintained.

   - Mud mat installation

     As of 8/21/2023 the mud mat is just shy of the left training wall. The weir wall mud mat pour will happen today (8/21/23). This is the second of the three scheduled mud mat pours.

   - Spillway/Cast in place concrete

     The concrete pour for the right training wall will tentatively be Thursday (8/24/2023) and the concrete pour for weir footing will tentatively be Friday (8/25/2023).

3. Submittals
   - Review submittal log

     No new submittals. Will check with Rebecca with regards to primary spillway materials.

4. RFIs (None)

5. Payment Request

- Next pencil request date

  Pencil requests are limited to one per month. SumCo with send pencil request by the end of this week. The City of Newport to see status of city cheque run.

6. Construction Schedule

- Project schedule submittal

  SumCo will send an updated project schedule for the remainder of the project.

- 3 week look ahead schedule (SumCo)

  SumCo provided a 3 week look ahead schedule.

7. Other Issues

- Andrea on PTO 8/23-8/25, contact Rebecca and Katie. Alternately, contact Ken Berchielli (401) 533-5968 or Dean Audet (401) 578-1898.

  The bottom of the existing pipe is at the same elevation as the top of the weir footing. The City of Newport is anticipating no cost change. SumCo will send a sketch with the elevations and maintain any redlines.

8. Date of Next Progress Meeting: Confirm date with team

   The next Progress Meeting is scheduled for Tuesday September 5, 2023 at 10:00 (9/5/2023)

FUSS & O'NEILL

CONSTRUCTION PROGRESS MEETING NO. 2 MINUTES
City of Newport Proj. No. 23-004
EASTON POND NORTH DAM SPILLWAY REPAIRS
10:00 A.M. – Tuesday, September 5, 2023
Easton Pond North Dam Auxiliary Spillway, Newport, RI

Attendees:
Rob Schultz (NWD)
Ron Ferraiuolo (SumCo)
Adam Lundsted (SumCo) – Not Present
Andrea Judge (F&O)
Katie Cretella (F&O)
Rebecca Meyers (F&O)
Dean Audet (F&O)

1. Old Business

- Pond Drawdown

With both 12" pumps running, the pond can be drawn down 0.3 feet per day. Over the weekend the pond was at 5.8 feet. The pumps will be run 1 or 2 days this week to keep the water level around 6.0 feet. Otherwise the pumps will be kept off if no rain or storms are forecasted. SumCo is not anticipating any elevation in cost. The cofferdam is 12 feet tall. When the 25 year storm event occurred the water level rose 0.8-0.9 feet in one hour.

- Change Order 1

Rob will get pay requisitions in paper form resent.

2. Status of Construction Items

- Control of water

SumCo monitors the weather and utilizes the 12" pumps when needed. The 2" and 4" pumps run continuously to pump water from behind the cofferdam. If a major storm is forecasted SumCo will draw down the pond to 5.5 feet.

- Blow-off valve penetration and Field Order 1

The rebar at 45 degrees around the blow-off pipe is in place and in agreement with structural standards.

- Spillway/Cast in place concrete

The remaining formwork will be installed Tuesday (9/5) and Wednesday (9/6), with weir wall pours scheduled for Thursday (9/7) and Friday (9/8). The rebar for the left training wall will be installed this week, with a tentative pour of the left training wall scheduled for Tuesday (9/12). All cast-in-place concrete will be poured by mid-week of the following week (week of 9/10). Backfilling expected to begin this week. SumCo will give a days' notice when backfilling is scheduled. F&O will provide an answer on the right training wall – masonry connection. The City of Newport has no preference, and SumCo would prefer concrete. Measures of the gap between the right training wall and the existing masonry will be taken after the meeting.

- Material testing reports

  The material testing reports show that the embankment material is consistent.

- Primary Spillway Repairs, Wall Voids

  The line item for the crack repair will be exceeded. The line item for the surface repair will be under the expected cost. The net amount is expected to be about the same. The cost to repair the wall voids will be under budget. The greatest expense was renting the machine for the day.

3. Submittals
   - Review submittal log
   - Material testing reports

4. RFIs (None)

5. Payment Request
   - Pay estimate # 3

     No comments. SumCo will send a notarized copy.

6. Construction Schedule
   - Project schedule submittal
   - 3 week look ahead schedule (SumCo)

7. Other Issues

8. Date of Next Progress Meeting: Tuesday September 9, 2023

FUSS & O'NEILL

CONSTRUCTION PROGRESS MEETING NO. 3 MINUTES
City of Newport Proj. No. 23-004
EASTON POND NORTH DAM SPILLWAY REPAIRS
10:00 A.M. – Monday, September 19, 2023
Easton Pond North Dam Auxiliary Spillway, Newport, RI

Attendees:
Rob Schultz (NWD)
Ron Ferraiuolo (SumCo)
Adam Lundsted (SumCo) – Not Present
Dean Audet (F&O)
Katie Cretella (F&O)
Rebecca Meyers (F&O)

1. <u>Old Business</u>

- Pond Drawdown

  SumCo hopes to stop dewatering and start dismantling the pumps at the end of this week. SumCo is coordinating with cofferdam subcontractor of removal of the cofferdam which may begin next week.

- Change Order 1 (Time Extension Only)
  - Apply $5,704 of price increases to contingency

  Change Order 1 will be signed and resubmitted by Fuss & O'Neill.

- Change Order 2 (Balancing Change Order)

  SumCo hopes to have Change Order 2 prepared by the end of next week. This Change Order will include changes in the primary spillway repairs, stone, and unit prices.

2. <u>Status of Construction Items</u>

- Backfilling/Weir Wall Sections 1 and 3 Break Tests (below 70% required strength)

  SumCo hopes to backfill the left training wall on Wednesday (9/20), assuming the concrete is at 70% strength.

- Riprap Replacement, need for supplemental riprap?

  SumCo estimates that they have hauled to the site about 130 tons of supplemental riprap. The City is okay with hauling more riprap to site as needed to provide appropriate coverage of riprap.

- Primary Spillway Repairs, Filling Created Voids

  Repairs to the primary spillway are completed. The repairs were $29,000 under contract value. This will be accounted for in the balancing change order.

- Geotextile Under Secondary Spillway Riprap

  SumCo installed a geotextile under parts of the secondary spillway riprap to help support construction access to the spillway. While the plans did not call for geotextile under the riprap, SumCo could either remove it or leave it in place, whichever is easier for them as it will not impact the proper functioning of the completed work.

3. Additional Construction Items

- Outside work contained within contingency

  The City of Newport would like SumCo to install a 6-foot diameter catch basin on the 24" pipe that leads to the street. City will coordinate directly with SumCo on the installation.

4. Submittals (None)

5. RFIs (None)

6. Payment Request

- Payment Requests #2 and #3

  The City of Newport will have payment requests #2 and #3 in the next check run.

- Pay estimate #4

  Pay estimate #4 will be submitted next week.

7. Construction Schedule

- Project schedule submittal

  SumCo is scheduling the Portadam removal to be within the next two weeks. Next week, SumCo will have the pumps fully dismantled and will start cleaning up. SumCo will leave all materials (sand, stone) at the stockpile area. A dumpster will be onsite for plastic and trash disposal.

- Scheduling Substantial (95%) Completion

  The next progress meeting on Tuesday October 3, 2023, will include substantial completion.

8. Date of Next Progress Meeting: Tuesday, October 3, 2023

FUSS & O'NEILL

CONSTRUCTION COMPLETION MEETING MINUTES
City of Newport Proj. No. 23-004
EASTON POND NORTH DAM SPILLWAY REPAIRS
8:00 A.M. – Thursday, September 28, 2023
Easton Pond North Dam Auxiliary Spillway, Newport, RI

Attendees:
Rob Schultz (NWD)
Ron Ferraiuolo (SumCo)
Dean Audet (F&O)
Katie Cretella (F&O)
Rebecca Meyers (F&O)

1. **Old Business**
   - Change Order 1 (Time Extension Only)

     Change Order 1 has been submitted.

   - Change Order 2 (Balancing Change Order)

     SumCo will tentatively have Changer Order 2 prepared by next week.

2. **Status of Construction Items**
   - Removal of Portadam, 12" Pumps, and Sandbag Cofferdam

     The 12" pumps have been removed from the site. The sandbag cofferdam and portadam have been dismantled. The portadam materials are scheduled to be removed from the site today (9/28).

   - Backfilling Left Training Wall - Complete
   - Riprap Placement

     The riprap will extend farther on the downstream side of the weir wall than previously indicated on the plans to cover the exposed soil using the remaining riprap that the City has delivered to the site.

   - Construction Access

     The construction access path will remain for the City of Newport.

3. **Additional Construction Items**
   - Outside Work Contained within Contingency (Catch Basin Change Order)

     The City of Newport agreed to the catch basin change order. This work will be contained within the City of Newport Contingency. SumCo will tentatively start digging for the catch basin installation on Monday (10/2). The City of Newport will provide the catch basin tentatively on Monday (10/2).

4. **Submittals (None)**

5. **RFIs (None)**

CONSTRUCTION COMPLETION MEETING MINUTES
City of Newport Proj. No. 23-004
EASTON POND NORTH DAM SPILLWAY REPAIRS
8:00 A.M. – Thursday, September 28, 2023
Easton Pond North Dam Auxiliary Spillway, Newport, RI

6. **Payment Request**

- Payment Requests # 2 and #3
- Review Pay Estimate # 4

SumCo will revise and resubmit Pay Estimate #4, reducing the work completed on the auxiliary spillway reconstruction of both the weir walls and the training walls to each to 65% complete (Item No. 10.C & 10.D) and remove the total sum line item.

7. **Construction Schedule**

- Remainder of Work Schedule (SumCo)

This tentative list of items to be completed or corrected was generated during a completion inspection meeting conducted on September 28, 2023.

Temporary Erosion and Sedimentation Control

- ***Remove all filter socks except along the left side (looking downstream) of the temporary construction access route.***

Site Cleaning

- ***Remove and dispose offsite all construction debris and trash.***
- ***Leave any extra material in the staging area for the City of Newport.***
- ***Remove water level stick from North Easton Pond.***

Riprap Protection

- ***Blend the placed riprap with the existing riprap along the left and right embankments.***
- ***Place additional riprap on the disturbed areas downstream of the weir.***
- ***Place and level additional riprap on the excavated gap where the portadam tied into the embankment.***

Vegetative Restoration

- ***Rake, loam, and seed any disturbed areas, including the left and right embankments.***

8. **Other Issues**

- Concrete Below Required Strength (Weir Wall Sections 1 & 3, Left Training Wall, Portion of Right Training Wall)

Section B

Submittals

SUBMITTAL TRANSMITTAL

Date: 6/26/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03.30.00 - 1
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Concrete Mix Design and Additives, 4,500 psi, 3/4" stone

MANUFACTURER / SUPPLIER

Name: Cardi Materials, LLC

Address: 400 Lincoln Ave, Warwick, RI

Telephone No.: 401-739-8300 Facsimile No.: 401-736-2977

For Additional Information, Contact: Tim Farley

E-mail Address: tfarley@cardi.co

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

Title: Team Lead

CARDI MATERIALS, LLC

400 LINCOLN AVENUE WARWICK, RI 02888
TELEPHONE: 401-739-8300 FACSIMILE: 401-736-2977

READY MIX CONCRETE DIVISION

Mix Desi n: 4500psi 3 4” AE

Pro e t: Su Co E o-Contra tin , Easton Pond Da , Ne port, RI

Cardi Materials, LLC ere y ertifies t at e s all furnis 4500 PSI Con rete in 28 t enty-ei t days. T e e ent is Hol i Type I II. Fine and Coarse A re ates are fro Hopkins Hill Sand and Stone, LLC. Ad ixtures are fro GCP.

CLASS OF CONCRETE	**4500 PSI**
Mix ID#	**S454658AE**
Max. A re ate Si e	3 4
Ce ent, L s	526
Sla , L s	132
Fly As , L s	
Fine A re ate, L s	1120
Coarse A re ate, L s	1720
Water, L s Gals	275.2 33.0
W C Ratio	.42
Slu p Ran e	3”- 5”
Air Content	4.5 – 7.5%
Con era SA8080, O	26.5
Darex II, O	3.2

Fall River READY MIX CONCRETE

FRRM ACI 214 / 318 Strength Test Evaluation

Contra tor: Mo a k
Mix: 4500 psi AE
Spe d Str.: 4500 PSI
Mix ID S454658AE

Test No.	Date	Slu p in.	Air %	Con . Te p. F	7-Day Str. psi	28-Day Cyl. 1 psi	56 -Day Cyl. 2 psi	Ran e	Stren t psi	Mo in A of T ree	Mo in A of Ten
1	7 11 2022	6.00	6.0	86	4010	6630	7590	960	7110		
2	7 11 2022	6.00	6.4	86	3910	6310	6420	110	6365		
3	7 11 2022	6.00	6.4	86	3420	6130	6370	240	6250	6575	
4	7 13 2022	6.50	7.0	89	4020	5410	6200	790	5805	6140	
5	7 13 2022	6.00	7.5	89	3850	5280	5810	530	5545	5867	
6	7 13 2022	6.50	7.8	89	3580	5210	5640	430	5425	5592	
7	7 18 2022	7.00	6.5	87	5390	5920	7560	1640	6740	5903	
8	7 18 2022	7.00	6.5	87	5130	5910	7210	1300	6560	6242	
9	7 18 2022	7.50	7.5	87	4730	5910	7040	1130	6475	6592	
10	7 21 2022	8.00	7.2	84	3890	5250	5900	650	5575	6203	6185
11	7 21 2022	8.00	7.5	83	3630	5140	5890	750	5515	5855	6026
12	7 21 2022	7.50	7.0	83	4120	5500	5680	180	5590	5560	5948
13	7 22 2022	7.00	6.0	84	4030	6870	6990	120	6930	6012	6016
14	7 22 2022	7.50	7.5	84	3230	6050	6130	80	6090	6203	6045
15	7 22 2022	7.00	7.3	84	3840	6720	6330	390	6525	6515	6143
16	7 29 2022	6.50	6.6	82	3510	4490	5060	570	4775	5797	6078
17	7 29 2022	6.50	6.6	82	3890	5150	5590	440	5370	5557	5941
18	7 29 2022	7.00	6.5	82	3510	5040	5300	260	5170	5105	5802
19	8 3 2022	7.00	6.0	78	3910	5180	5650	470	5415	5318	5696
20	8 3 2022	6.50	6.0	78	4270	5530	6160	630	5845	5477	5723
21	8 3 2022	7.50	7.0	78	3710	5180	5740	560	5460	5573	5717
22	8 4 2022	6.00	6.0	88	4640	5780	6050	270	5915	5740	5750
23	8 4 2022	6.00	6.2	87	4530	5740	5920	180	5830	5735	5640
24	8 4 2022	6.00	6.2	87	4540	5250	5410	160	5330	5692	5564
AVG		6.77	6.7	85	4054			535	5900		

ACI 214 Stren t Analysis

A era e Stren t , X 5900 PSI
No. of Tests, n 24

A era e Ran e, R 535 PSI

Standard De iation, s 601 PSI
Coeffi ient of Variation, V 10.2 %

Wit in-Test Std De 474 PSI
Wit in-Test Coeff. of Var. 8.0 %

Bat -to-Bat Std De 370 PSI
Bat -to-Bat Coeff. of Var. 6.3 %

Min Stren t 4775 PSI
A Stren t 5900 PSI
Max Stren t 7110 PSI

Min Slu p 6.00 IN
A Slu p 6.77 IN
Max Slu p 8.00 IN

Min Air Content 6.0 %
A Air Content 6.7 %
Max Air Content 7.8 %

Min Con . Te p. 78 F
A Con . Te p. 85 F
Max Con . Te p. 89 F

ACI 318 Perfor an e Appro al

VALID, 15 TESTS

MODIFICATION FACTOR 1.040

s 625 PSI
f r f 1.33 s 4832 PSI
f r f 2.33 s - 500 4957 PSI

CONCLUSION: MIX APPROVED

Material Certification Report

Material: Portland Cement
Type: I-II

Test Period: 01-Apr-2023 to 30-Apr-2023
Date Issued: 10-May-2023

Certification

This cement meets the specifications of ASTM C150 and AASHTO M85 for Type I-II cement.

General Information

Supplier:	Holcim (US) Inc.	Source Location:	Ravena Plant Silo: C1-C16, B1-B6
Address:	8700 West Bryn Mawr Ave Chicago, IL 60631		P.O. Box 3 Ravena, NY 12143
Contact:		Contact:	Scott Derhammer / (518) 756-5000

The following is based on average test data during the test period. The data is typical of product shipped from this source; individual shipments may vary.

Test Data on ASTM Standard Requirements

Chemical

Item	Limit [1]	Result
SiO_2 (%)	-	20.1
Al_2O_3 (%)	6.0 max	4.7
Fe_2O_3 (%)	6.0 max	3.3
CaO (%)	-	62.8
MgO (%)	6.0 max	3.6
SO_3 (%) [2]	3.0 max	3.1
Loss on Ignition (%) [5]	3.5 max	1.1
Insoluble Residue (%)	1.50 max	0.22
CO_2 (%)	-	0.4
$CaCO_3$ in Limestone (%)	70 min	92
Potential Phase Compositions [3]:		
C_3S (%)	-	56
C_2S (%)	-	15
C_3A (%)	8 max	7
C_4AF (%)	-	10
$C_3S + 4.75C_3A$ (%)	-	89

Physical

Item	Limit [1]	Result
Air Content (%)	12 max	8
Blaine Fineness (m^2/kg)	260 min	385
Compressive Strength MPa (psi)		
3 day	10.0 (1450) min	26.3 (3810)
7 day	17.0 (2470) min	33.1 (4800)
28 day (previous month's data)	-	42.4 (6150)
Initial Vicat (minutes)	45-375	113
Mortar Bar Expansion (%) (C1038)	0.020 max	0.007

Test Data on ASTM Optional Requirements

Chemical

Item	Limit [1]	Result
Equivalent Alkalies (%)	-	0.65

Physical

Item	Limit [1]	Result

Notes (*1-9)

1 - Dashes in the Limit / Result columns mean Not Applicable.
2 - It is permissible to exceed the specification limit provided that ASTM C1038 Mortar Bar Expansion does not exceed 0.020% at 14 days.
3 - Adjusted per Annex A1.6 of ASTM C150 and AASHTO M85.
5 - Limit = 3.0 when limestone is not an ingredient in the final cement product

Additional Data

Item	Limestone	Inorganic Processing Addition
Amount (%)	0.9	-
SiO_2 (%)	5.5	-
Al_2O_3 (%)	1.3	-
Fe_2O_3 (%)	0.3	-
CaO (%)	50.3	-
SO_3 (%)	0.1	-

Base Cement Phase Composition	Result
C_3S (%)	57
C_2S (%)	15
C_3A (%)	7
C_4AF (%)	10

Printed: 5/10/2023 12:48:19 PM

Version: 180412

Scott Derhammer

Scott Derhammer,
Quality Manager

Material Certification Report

Brand: **NewCem®**
Material: **Slag Cement**
Type: **Grade 120**

Test Period: 01-Apr-2023 to 30-Apr-2023
Lot Number: Multiple Lots

Certification

This cement meets the specifications of ASTM C989 and AASHTO M 302 for Grade 120 slag cement.

General Information

Supplier:	Holcim (US) Inc.	Source Location:	**Sparrows Point Plant**
Address:	8700 West Bryn Mawr Ave Chicago, IL 60631		2001 Wharf Road Baltimore, MD 21219
		Contact:	Brian Borowski (630) 561-1198

The following is based on average test data during the test period. The data is typical of product shipped from this source; individual shipments may vary.

Test Data on ASTM Standard Requirements

Chemical

Item	Limit [1]	Result
Sulfide Sulfur (S) (%)	2.5 max	0.8
Sulfate Sulfur (as SO_3) [2] (%)	-	0.7
Aluminum Oxide (as Al_2O_3) (%)	-	11.9
Chloride (Cl) (%)	-	0.006
Equivalent Alkalies (%)	-	0.80

Physical

Item	Limit [1]	Result
45 µm (No. 325) Sieve (% retained)	20 max	1.4
Blaine Fineness (m²/kg)	-	685
Air Content (%)	12 max	3.9
Slag Activity Index (%)		
Avg 7 Day Index	-	109
Avg 28 Day Index(previous month's data)	115 min	133
Compressive Strength MPa (psi)		
Slag + Reference Cement		
7 Day	-	32.8 (4750)
28 Day (previous month's data)	-	50.5 (7330)

Test Data on Reference Cement

Chemical

Item	Limit [1]	Result
Equivalent Alkalies (%)	0.60 - 0.90	0.80

Physical

Item	Limit [1]	Result
7 Day	-	30 (4350)
28 Day (previous month's data)	5000 min	38 (5510)

Notes (*1-5)

1 - Dashes in the limits columns means Not Applicable
2 - If calcium sulfate is added to slag cement, measure in accordance with Test Method C1038/C1038M. Slag cement with added calcium sulfate will not develop expansion exceeding 0.020% at 14 days.
3 - Information on Reference Cement test data available upon request.
4 - Specific Gravity: 2.90
5 - This data may have been reported on previous Material Certification Reports. It is typical of the cement being currently shipped.

Date Issued: 5/19/2023

Brian Borowski
Quality Manager, US MPC

Cardi Materials
RIDOT QC Report

Rhode Island Concrete Aggregate Worksheet and Coarse Aggregate Blend Calculator

Date/Time:	6/6/2023	Lab/Location:	Cardi Corp.		
Weather:	50s Overcast	Date Rec'd #:		Random Sample:	Yes
Project:	Cardi Materials QC	Lab Login #:		Lot #:	N/A
Contract #:		Material ID:	RIDOT Blend	Sublot #:	N/A
Contractor:	Cardi Corp.	Material #:		Sample Location:	Warwick Plant
Pay Item #:		Sample #:	1	Station:	
Source:	Cardi Corporation	Sample Type:	QC	Offset:	
Plant Type:	Central Mix	Sampled By/Cert. #:	Tim Farley CT1059		

Material:	Sand	(T 255)	Wet Mass(W):	541.0
Sample #:	1		Original Dry Mass(D):	520.0
Source:	Hopkins Hill		Moisture Loss (W - D):	21.0
			% Moisture (100 x (W - D) / D):	4.0%

Sieve Analysis of Fine & Coarse Aggregates (T 27)

Sieve	Wt. Passing	% Ret	%Pass	Spec. %
1 1/2"				
1"				
3/4"				
5/8"				
1/2"				
3/8"	520.0	0.0	100.0	100
#4	510.0	1.9	98.1	95-100
#8	418.0	19.6	80.4	80-100
#16	317.4	39.0	61.0	50-85
#30	236.1	54.6	45.4	25-60
#50	148.9	71.4	28.6	10-30
#100	51.0	90.2	9.8	2-10
#200	12.1	97.7	2.3	
PAN	0.0	100.0	FM:	2.77
Total			Free Moisture:	3.6%

Material:	3/8"	(T 255)	Wet Mass(W):	1655.7
Sample #:	1		Original Dry Mass(D):	1635.9
Source:	Hopkins Hill		Moisture Loss (W - D):	19.8
			% Moisture (100 x (W - D) / D):	1.2%

Sieve Analysis of Fine & Coarse Aggregates (T 27)

Sieve	Wt. Passing	% Ret	%Pass	Spec. %
1 1/2"				
1"	1635.9	0.0	100.0	
3/4"	1635.9	0.0	100.0	
5/8"				
1/2"	1635.9	0.0	100.0	100
3/8"	1462.2	10.6	89.4	85-100
#4	329.1	79.9	20.1	20-55
#8	139.0	91.5	8.5	5-30
#16	96.0	94.1	5.9	0-10
#30				
#50				
#100				
#200				
PAN	3.8	99.8	Free Moisture:	0.6%
Total				

Material:	3/4"	(T 255)	Wet Mass(W):	5167.8
Sample #:	1		Original Dry Mass(D):	5140.3
Source:	Hopkins Hill		Moisture Loss (W - D):	27.5
			% Moisture (100 x (W - D) / D):	0.5%

Sieve	Wt. Passing	% Ret	%Pass	Spec. %
1 1/2"				
1"	5140.3	0.0	100.0	100
3/4"	4826.3	6.1	93.9	85-100
5/8"				
1/2"	1099.0	78.6	21.4	
3/8"	365.8	92.9	7.1	20-55
#4	137.6	97.3	2.7	0-10
#8	99.7	98.1	1.9	0-5
#16				
#30				
#50				
#100				
#200				
PAN	2.8	99.9	Free Moisture:	0.0%
Total				

BLEND Calculations

Size	Percent
3/4"	80.0%
3/8"	20.0%

Composite Blending Percent Passing

Sieve	3/4"	3/8"	BLENDED	Spec. %
1 1/2"				
1"	80.0	20.0	100.0	100
3/4"	75.1	20.0	95.1	85-100
5/8"				
1/2"	17.1	20.0	37.1	
3/8"	5.7	17.9	23.6	20-55
#4	2.2	4.0	6.2	0-10
#8	1.5	1.7	3.2	0-5
#16		1.2		
#30				
#50				
#100				
#200				
PAN				
Total				

]

CONCERA® SA8080

High range water-reducing admixture - ASTM C494 Type A and F and ASTM C1017 Type I

Product Description

CONCERA® SA8080 is a high efficiency polycarboxylate based linear dose water reducer and high range water reducing admixture. A unique formulation of polycarboxylate dispersants and rheology modifiers enables CONCERA® SA8080 to be successfully used in a wide variety of applications ranging from dry cast and zero slump mixes to highly flowable self-consolidating mixes. Throughout this diverse range of applications, CONCERA® SA8080 provides superior overall workability, rheology and finishability resulting in productivity improvements, excellent strength and durability properties.

CONCERA® SA8080 is supplied as a ready-to-use liquid that weighs approximately 8.65 lbs/gal (1.04kg/L). It does not contain intentionally added chlorides.

Product Advantages

- Linear dose capability 3” (75mm) slump concrete to SCC
- Enables very high flow segregation-resistant concrete
- Provides extended slump flow retention
- Consistent and predictable performance
- Improved strength and durability
- Improved pumpability and finishability with harsh aggregates
- Reduces required job-site QC support
- Faster cycle times and truck turnaround
- Easier and faster placement and finishing
- Sustainability benefits

Uses

Dry-Cast and Zero/Low Slump Mixes

CONCERA® SA8080 enables the discharge of dry-cast, zero slump and low slump fast and efficiently. This improves cycle times and feed rates of curbing, barrier wall, pipe machines and hollow-core. In addition, CONCERA® SA8080 results in improved strength and durability through better cement dispersion, compaction and hydration along with superior finishability and form finish.

3” to 8” Standard Slump Concrete

CONCERA® SA8080 performs consistently and linear as a water reducer, mid-range water reducer and high range water reducer. CONCERA® SA8080 improves movement of the concrete under energy thereby allowing concrete to be floated and finished faster and easier, even with mix designs containing manufactured sands. In many cases, cementitious contents can be reduced without negatively impacting finishability, strength or durability properties. Concrete slump retention and pumpability properties are superior with pump pressures reduced due to the slicker surface properties of the mix.

Control Flow Concrete

CONCERA® SA8080 is recommended for use in the production of Control Flow Concrete, a highly flowable conventionally proportioned concrete category with slump flows that reside between conventional and self-consolidating concrete. Typical water content of base mixture (without CONCERA® SA8080) should be sufficient to produce an untreated 2-5 inch (50-125 mm) slump.

- Produces concrete with extremely high levels of workability without segregation. Slump flows can vary from 16 to 25 inches (410 to 635 mm) with the types of materials used, but will typically range from 18 to 22 inches (460 to 560 mm)
- Provides superior water tolerance to the concrete, making it less susceptible to normal manufacturing moisture fluctuations
- Extends slump life to enable batch plant adjustments and predictable job site plastic properties

Self-Consolidating Concrete

CONCERA® SA8080 can be used to make self-consolidating concrete (SCC) with superior water tolerance and very high levels of workability without segregation. In addition, CONCERA® SA8080 produces SCC concrete that is less sticky and has improved finishability and form finish even when used in mix designs containing harsh aggregates. CONCERA® SA8080 can be used by itself or in conjunction with ADVA®products to achieve optimal properties.

Addition Rates

CONCERA® SA8080 is an easy-to-dispense liquid admixture. Dosage rates can be adjusted to meet a wide spectrum of concrete mix proportions and performance requirements and typically range from 2-24 oz/cwt (130-1560 ml/cwt kg). Please consult your GCP representative for further technical guidance.

Compatibility with Other Admixtures and Batch Sequencing

CONCERA® SA8080 is compatible with most GCP admixtures as long as they are added separately to the concrete mix, usually through the water holding tank discharge line. In general, it is recommended that the product be added to the concrete mix near the end of the batch sequence for optimum performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations.

For concrete that requires air entrainment, the use of an ASTM C260 air-entraining agent, such as DAREX® II AEA is recommended to provide suitable air void parameters for freeze-thaw resistance. Please consult your GCP representative for guidance.

APPLICATIONS	SLUMP/FLOW	TYPICAL DOSAGE	BENEFITS
Low slump (i.e. Curb, Barrier)/ Dry cast	0-3" (0-75mm)	2-4 oz/cwt (130-260 ml/cwt kg)	Better feed from truck, faster feed through extruding machine, better finish directly from machine, faster cycle times, improved strength and density.
Traditional slump ranges	3-8" (75-200mm)	3-8 oz/cwt (195-520 ml/cwt kg)	Linear dose performance, improved finishability and pumpability with manufactured sands. Excellent slump retention.
Control Flow Concrete	16-24" (405-610mm)	8-18 oz/cwt (520-1170 ml/cwt kg)	Faster placement with reduced labor and QC, segregation resistant, excellent slump retention.
SCC Concrete	20-28" (510-710mm)	10-24 oz/cwt (650-1560 ml/cwt kg)	Highly flowable and superior water tolerance, enhanced consistency, finishability with manufactured aggregates.

Packaging & Handling

CONCERA® SA8080 is available in bulk, delivered by metered tank trucks, in totes and drums.

CONCERA® SA8080 will begin to freeze at approximately 32°F(0°C) but will return to full strength after thawing and thorough agitation. In storage and for proper dispensing, the temperature should be maintained above 32°F (0°C).

Dispensing Equipment

A complete line of accurate, automatic dispensing equipment is available.

Specifications

Concrete shall be designed in accordance with *Standard Recommended Practice for Selecting Proportions for Concrete*, ACI 211.

The high-range water-reducing admixture shall be CONCERA® SA8080 high range water reducer as manufactured by GCP, or its equivalent. It shall be manufactured to meet all the requirements of Specification for Chemical Admixtures for Concrete, ASTM Designation C494 as a Type A and F and ASTM C1017 Type I admixture.

The admixture shall be delivered as a ready-to-use, liquid product and shall not contain added chlorides. It shall be used in strict accordance with manufacturers recommendations.

GCP Applied Technologies Inc., 2325 Lakeview Parkway, Alpharetta, GA 30009, USA

In Canada, 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

Last Updated: 2022-04-21
gcpat.com/solutions/products/concera/concera-sa8080

DAREX® II AEA

Air-entraining admixture ASTM C260

Product Description

DAREX® II AEA is an air-entraining admixture which generates a highly stable air void system for increased protection against damage from freezing and thawing, severe weathering, or de-icer chemicals. DAREX® II AEA is a complex mixture of organic acid salts in an aqueous solution specifically formulated for use as an air-entraining admixture for concrete and is manufactured under rigid control which provides uniform, predictable performance. It is supplied ready to- use and does not require pre-mixing with water. DAREX® II AEA is a dark brown liquid. One gallon weighs 8.7 lbs (1.04 kg/L). DAREX® II AEA complies to ASTM C260 *Standard Specifications for Air-Entraining Admixtures for Concrete*.

Product Advantages

- Air stability makes it particularly useful for longer transit times
- Produces excellent air void systems in concretes that are traditionally difficult to air entrain

Uses

DAREX® II AEA is used in ready-mix and concrete products plants to improve air entrainment stability. It is particularly effective in maintaining air content during longer haul times. DAREX® II AEA performs well in conventional concrete and is effective in plasticizing mixes and with slag, lightweight, or manufactured aggregates which tend to produce harsh concrete.

DAREX® II AEA entrains air effectively with microsilica concrete and with fly ash concrete.

Performance

DAREX® II AEA disperses and generates millions of discrete semimicroscopic bubbles throughout the concrete composite. Once thoroughly mixed, the concrete contains a stable network of bubbles which act much like ball bearings increasing mobility, or plasticity, of the concrete. This adds workability to the mix and permits a reduction of water with no loss of slump. Placeability is improved. Bleeding, segregation and green shrinkage are minimized.

Through the purposeful entrainment of air, DAREX ® II AEA markedly increases the durability of concrete to all exposures.

Compatibility with Other Admixtures and Batch Sequencing

DAREX® II AEA is compatible with most GCP admixtures as long as they are added separately to the concrete mix. In general, it is recommended that DAREX® II AEA be added to the concrete mix near the beginning of the batch sequence for optimum performance, preferably by "dribbling" on the sand. Different sequencing may be used if local testing shows better performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations. DAREX® II AEA should not be added directly to heated water.

Pretesting of the concrete mix should be performed before use, as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. Please consult your GCP Applied Technologies representative for guidance.

Addition Rates

There is no standard addition rate for DAREX® II AEA. The amount to be used will depend upon the amount of air required under job conditions, usually in the range of 4% to 7%. Typical factors which might influence the amount of air entrained are temperature, cement, sand gradation and use of extra fine materials such as fly ash. Typical DAREX® II AEA addition rates generally range from ½ to 5 fl oz/100 lbs (30 to 320 mL/100 kg) of cement.

The air-entraining efficiency of DAREX® II AEA becomes even greater when used with water-reducing and set-retarding agents. This may allow a reduction of up to ⅔ in the amount of DAREX® II AEA required for the specified air content.

Concrete Mix Adjustment

Entrained air results in increased yields with a consequent decrease in the cement content of the placed concrete. This condition calls for a mix adjustment, usually accomplished by reducing the fine aggregate content. This is in addition to the reduction in water content brought about by the increase in plasticity.

Packaging & Handling

DAREX® II AEA is available in bulk, delivered by metered tank trucks, totes and drums.

DAREX® II AEA will freeze at about 30 °F (-1 °C), but its air-entraining properties are completely restored by thawing and thorough mechanical agitation.

Dispensing Equipment

A complete line of accurate dispensing equipment is available. These dispensers can be located to discharge into the water line, the mixer, or on the sand.

Specifications

Concrete shall be air entrained concrete, containing 4% to 8% entrained air. The air contents in the concrete shall be determined by the pressure method (ASTM Designation C231), gravimetric method (ASTM Designation C138) or volumetric method (ASTM Designation C173). The air-entraining admixture shall be DAREX® II AEA as manufactured by GCP Applied Technologies, or equal. The air-entraining admixture shall be added at the concrete mixer or batching plant at approximately ½ to 5 fl oz/100 lbs (30 to 320 mL/100 kg) of cement, or in such quantities as to give the specified air contents.

gcpat.com | North America Customer Service: 1 877-4AD-MIX1 (1 877-423-6491)

GCP Applied Technologies Inc., 62 Whittemore Avenue, Cambridge, MA 02140 USA.

In Canada, 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

Last Updated: 2018-08-24
gcpat.com/solutions/products/darex-ii-aea

SUBMITTAL TRANSMITTAL

Date: 6/26/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03.30.00 - 2
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Concrete Mix Design, Lean Concrete, 1,500 psi, 3/4" stone

MANUFACTURER / SUPPLIER

Name: Cardi Materials, LLC

Address: 400 Lincoln Ave, Warwick, RI

Telephone No.: 401-739-8300 Facsimile No.: 401-736-2977

For Additional Information, Contact: Tim Farley

E-mail Address: tfarley@cardi.co

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

Title: Team Lead

CARDI MATERIALS, LLC

400 LINCOLN AVENUE WARWICK, RI 02888
TELEPHONE: 401-739-8300 FACSIMILE: 401-736-2977

READY MIX CONCRETE DIVISION

Mix Desi n: 1500 3 4” AE Lean Mix

Pro e t: Su Co E o-Contra tin , Easton Pond Da , Ne port, RI

Cardi Materials, LLC ere y ertifies t at e s all furnis 1500 PSI Con rete in 28 t enty-ei t days. T e e ent is Hol i Type I II. Fine and Coarse A re ates are fro Hopkins Hill Sand and Stone, LLC. Ad ixtures are fro GCP.

CLASS OF CONCRETE	**1500 PSI**
Mix ID#	**154300AE**
Max. A re ate Si e	3 4”
Ce ent, L s	300
Sla , L s	
Fly As , L s	
Fine A re ate, L s	1515
Coarse A re ate, L s	1700
Water, L s Gals	258.5 31.0
W C Ratio	.86
Slu p Ran e	3”- 5”
Air Content	4.5 – 7.5%
Con era SA8080, O	15.0
Darex, O	2.0

Material Certification Report

Material: Portland Cement
Type: I-II

Test Period: 01-Apr-2023 to 30-Apr-2023
Date Issued: 10-May-2023

Certification

This cement meets the specifications of ASTM C150 and AASHTO M85 for Type I-II cement.

General Information

Supplier:	Holcim (US) Inc.	Source Location:	Ravena Plant Silo: C1-C16, B1-B6
Address:	8700 West Bryn Mawr Ave Chicago, IL 60631		P.O. Box 3 Ravena, NY 12143
Contact:		Contact:	Scott Derhammer / (518) 756-5000

The following is based on average test data during the test period. The data is typical of product shipped from this source; individual shipments may vary.

Test Data on ASTM Standard Requirements

Chemical

Item	Limit [1]	Result
SiO_2 (%)	-	20.1
Al_2O_3 (%)	6.0 max	4.7
Fe_2O_3 (%)	6.0 max	3.3
CaO (%)	-	62.8
MgO (%)	6.0 max	3.6
SO_3 (%) [2]	3.0 max	3.1
Loss on Ignition (%) [5]	3.5 max	1.1
Insoluble Residue (%)	1.50 max	0.22
CO_2 (%)	-	0.4
$CaCO_3$ in Limestone (%)	70 min	92
Potential Phase Compositions [3]:		
C_3S (%)	-	56
C_2S (%)	-	15
C_3A (%)	8 max	7
C_4AF (%)	-	10
$C_3S + 4.75C_3A$ (%)	-	89

Physical

Item	Limit [1]	Result
Air Content (%)	12 max	8
Blaine Fineness (m^2/kg)	260 min	385
Compressive Strength MPa (psi)		
3 day	10.0 (1450) min	26.3 (3810)
7 day	17.0 (2470) min	33.1 (4800)
28 day (previous month's data)	-	42.4 (6150)
Initial Vicat (minutes)	45-375	113
Mortar Bar Expansion (%) (C1038)	0.020 max	0.007

Test Data on ASTM Optional Requirements

Chemical

Item	Limit [1]	Result
Equivalent Alkalies (%)	-	0.65

Physical

Item	Limit [1]	Result

Notes (*1-9)

1 - Dashes in the Limit / Result columns mean Not Applicable.
2 - It is permissible to exceed the specification limit provided that ASTM C1038 Mortar Bar Expansion does not exceed 0.020% at 14 days.
3 - Adjusted per Annex A1.6 of ASTM C150 and AASHTO M85.
5 - Limit = 3.0 when limestone is not an ingredient in the final cement product

Additional Data

Item	Limestone	Inorganic Processing Addition
Amount (%)	0.9	-
SiO_2 (%)	5.5	-
Al_2O_3 (%)	1.3	-
Fe_2O_3 (%)	0.3	-
CaO (%)	50.3	-
SO_3 (%)	0.1	-

Base Cement Phase Composition	Result
C_3S (%)	57
C_2S (%)	15
C_3A (%)	7
C_4AF (%)	10

Printed: 5/10/2023 12:48:19 PM

Version: 180412

Scott Derhammer

Scott Derhammer,
Quality Manager

HOLCIM

Brand:	**NewCem®**		
Material:	**Slag Cement**	**Test Period:**	01-Apr-2023 to 30-Apr-2023
Type:	**Grade 120**	**Lot Number:**	Multiple Lots

Material Certification Report

Certification

This cement meets the specifications of ASTM C989 and AASHTO M 302 for Grade 120 slag cement.

General Information

Supplier:	Holcim (US) Inc.	Source Location:	**Sparrows Point Plant**
Address:	8700 West Bryn Mawr Ave Chicago, IL 60631		2001 Wharf Road Baltimore, MD 21219
		Contact:	Brian Borowski (630) 561-1198

The following is based on average test data during the test period. The data is typical of product shipped from this source; individual shipments may vary.

Test Data on ASTM Standard Requirements

Chemical

Item	Limit [1]	Result
Sulfide Sulfur (S) (%)	2.5 max	0.8
Sulfate Sulfur (as SO_3) [2] (%)	-	0.7
Aluminum Oxide (as Al_2O_3) (%)	-	11.9
Chloride (Cl) (%)	-	0.006
Equivalent Alkalies (%)	-	0.80

Physical

Item	Limit [1]	Result
45 µm (No. 325) Sieve (% retained)	20 max	1.4
Blaine Fineness (m²/kg)	-	685
Air Content (%)	12 max	3.9
Slag Activity Index (%)		
Avg 7 Day Index	-	109
Avg 28 Day Index(previous month's data)	115 min	133
Compressive Strength MPa (psi)		
Slag + Reference Cement		
7 Day	-	32.8 (4750)
28 Day (previous month's data)	-	50.5 (7330)

Test Data on Reference Cement

Chemical

Item	Limit [1]	Result
Equivalent Alkalies (%)	0.60 - 0.90	0.80

Physical

Item	Limit [1]	Result
7 Day	-	30 (4350)
28 Day (previous month's data)	5000 min	38 (5510)

Notes (*1-5)

1 - Dashes in the limits columns means Not Applicable
2 - If calcium sulfate is added to slag cement, measure in accordance with Test Method C1038/C1038M. Slag cement with added calcium sulfate will not develop expansion exceeding 0.020% at 14 days.
3 - Information on Reference Cement test data available upon request.
4 - Specific Gravity: 2.90
5 - This data may have been reported on previous Material Certification Reports. It is typical of the cement being currently shipped.

Date Issued: 5/19/2023

Brian Borowski
Quality Manager, US MPC

Cardi Materials
RIDOT QC Report

Rhode Island Concrete Aggregate Worksheet and Coarse Aggregate Blend Calculator

Date/Time:	6/6/2023	Lab/Location:	Cardi Corp.		
Weather:	50s Overcast	Date Rec'd #:		Random Sample:	Yes
Project:	Cardi Materials QC	Lab Login #:		Lot #:	N/A
Contract #:		Material ID:	RIDOT Blend	Sublot #:	N/A
Contractor:	Cardi Corp.	Material #:		Sample Location:	Warwick Plant
Pay Item #:		Sample #:	1	Station:	
Source:	Cardi Corporation	Sample Type:	QC	Offset:	
Plant Type:	Central Mix	Sampled By/Cert. #:	Tim Farley CT1059		

Material:	Sand	(T 255)	Wet Mass(W):	541.0
Sample #:	1		Original Dry Mass(D):	520.0
Source:	Hopkins Hill		Moisture Loss (W - D):	21.0
			% Moisture (100 x (W - D) / D):	4.0%

Sieve Analysis of Fine & Coarse Aggregates (T 27)

Sieve	Wt. Passing	% Ret	%Pass	Spec. %
1 1/2"				
1"				
3/4"				
5/8"				
1/2"				
3/8"	520.0	0.0	100.0	100
#4	510.0	1.9	98.1	95-100
#8	418.0	19.6	80.4	80-100
#16	317.4	39.0	61.0	50-85
#30	236.1	54.6	45.4	25-60
#50	148.9	71.4	28.6	10-30
#100	51.0	90.2	9.8	2-10
#200	12.1	97.7	2.3	
PAN	0.0	100.0	FM:	2.77
Total			Free Moisture:	3.6%

Material:	3/8"	(T 255)	Wet Mass(W):	1655.7
Sample #:	1		Original Dry Mass(D):	1635.9
Source:	Hopkins Hill		Moisture Loss (W - D):	19.8
			% Moisture (100 x (W - D) / D):	1.2%

Sieve Analysis of Fine & Coarse Aggregates (T 27)

Sieve	Wt. Passing	% Ret	%Pass	Spec. %
1 1/2"				
1"	1635.9	0.0	100.0	
3/4"	1635.9	0.0	100.0	
5/8"				
1/2"	1635.9	0.0	100.0	100
3/8"	1462.2	10.6	89.4	85-100
#4	329.1	79.9	20.1	20-55
#8	139.0	91.5	8.5	5-30
#16	96.0	94.1	5.9	0-10
#30				
#50				
#100				
#200				
PAN	3.8	99.8	Free Moisture:	0.6%
Total				

Material:	3/4"	(T 255)	Wet Mass(W):	5167.8
Sample #:	1		Original Dry Mass(D):	5140.3
Source:	Hopkins Hill		Moisture Loss (W - D):	27.5
			% Moisture (100 x (W - D) / D):	0.5%

Sieve	Wt. Passing	% Ret	%Pass	Spec. %
1 1/2"				
1"	5140.3	0.0	100.0	100
3/4"	4826.3	6.1	93.9	85-100
5/8"				
1/2"	1099.0	78.6	21.4	
3/8"	365.8	92.9	7.1	20-55
#4	137.6	97.3	2.7	0-10
#8	99.7	98.1	1.9	0-5
#16				
#30				
#50				
#100				
#200				
PAN	2.8	99.9	Free Moisture:	0.0%
Total				

Size	Percent
3/4"	80.0%
3/8"	20.0%

BLEND Calculations

Composite Blending Percent Passing

Sieve	3/4"	3/8"	BLENDED	Spec. %
1 1/2"				
1"	80.0	20.0	100.0	100
3/4"	75.1	20.0	95.1	85-100
5/8"				
1/2"	17.1	20.0	37.1	
3/8"	5.7	17.9	23.6	20-55
#4	2.2	4.0	6.2	0-10
#8	1.5	1.7	3.2	0-5
#16		1.2		
#30				
#50				
#100				
#200				
PAN				
Total				

]

CONCERA® SA8080

High range water-reducing admixture - ASTM C494 Type A and F and ASTM C1017 Type I

Product Description

CONCERA® SA8080 is a high efficiency polycarboxylate based linear dose water reducer and high range water reducing admixture. A unique formulation of polycarboxylate dispersants and rheology modifiers enables CONCERA® SA8080 to be successfully used in a wide variety of applications ranging from dry cast and zero slump mixes to highly flowable self-consolidating mixes. Throughout this diverse range of applications, CONCERA® SA8080 provides superior overall workability, rheology and finishability resulting in productivity improvements, excellent strength and durability properties.

CONCERA® SA8080 is supplied as a ready-to-use liquid that weighs approximately 8.65 lbs/gal (1.04kg/L). It does not contain intentionally added chlorides.

Product Advantages

- Linear dose capability 3” (75mm) slump concrete to SCC
- Enables very high flow segregation-resistant concrete
- Provides extended slump flow retention
- Consistent and predictable performance
- Improved strength and durability
- Improved pumpability and finishability with harsh aggregates
- Reduces required job-site QC support
- Faster cycle times and truck turnaround
- Easier and faster placement and finishing
- Sustainability benefits

Uses

Dry-Cast and Zero/Low Slump Mixes

CONCERA® SA8080 enables the discharge of dry-cast, zero slump and low slump fast and efficiently. This improves cycle times and feed rates of curbing, barrier wall, pipe machines and hollow-core. In addition, CONCERA® SA8080 results in improved strength and durability through better cement dispersion, compaction and hydration along with superior finishability and form finish.

3” to 8” Standard Slump Concrete

CONCERA® SA8080 performs consistently and linear as a water reducer, mid-range water reducer and high range water reducer. CONCERA® SA8080 improves movement of the concrete under energy thereby allowing concrete to be floated and finished faster and easier, even with mix designs containing manufactured sands. In many cases, cementitious contents can be reduced without negatively impacting finishability, strength or durability properties. Concrete slump retention and pumpability properties are superior with pump pressures reduced due to the slicker surface properties of the mix.

Control Flow Concrete

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- Produces concrete with extremely high levels of workability without segregation. Slump flows can vary from 16 to 25 inches (410 to 635 mm) with the types of materials used, but will typically range from 18 to 22 inches (460 to 560 mm)
- Provides superior water tolerance to the concrete, making it less susceptible to normal manufacturing moisture fluctuations
- Extends slump life to enable batch plant adjustments and predictable job site plastic properties

Self-Consolidating Concrete

CONCERA® SA8080 can be used to make self-consolidating concrete (SCC) with superior water tolerance and very high levels of workability without segregation. In addition, CONCERA® SA8080 produces SCC concrete that is less sticky and has improved finishability and form finish even when used in mix designs containing harsh aggregates. CONCERA® SA8080 can be used by itself or in conjunction with ADVA®products to achieve optimal properties.

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CONCERA® SA8080 is compatible with most GCP admixtures as long as they are added separately to the concrete mix, usually through the water holding tank discharge line. In general, it is recommended that the product be added to the concrete mix near the end of the batch sequence for optimum performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations.

For concrete that requires air entrainment, the use of an ASTM C260 air-entraining agent, such as DAREX® II AEA is recommended to provide suitable air void parameters for freeze-thaw resistance. Please consult your GCP representative for guidance.

APPLICATIONS	SLUMP/FLOW	TYPICAL DOSAGE	BENEFITS
Low slump (i.e. Curb, Barrier)/ Dry cast	0-3" (0-75mm)	2-4 oz/cwt (130-260 ml/cwt kg)	Better feed from truck, faster feed through extruding machine, better finish directly from machine, faster cycle times, improved strength and density.
Traditional slump ranges	3-8" (75-200mm)	3-8 oz/cwt (195-520 ml/cwt kg)	Linear dose performance, improved finishability and pumpability with manufactured sands. Excellent slump retention.
Control Flow Concrete	16-24" (405-610mm)	8-18 oz/cwt (520-1170 ml/cwt kg)	Faster placement with reduced labor and QC, segregation resistant, excellent slump retention.
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Packaging & Handling

CONCERA® SA8080 is available in bulk, delivered by metered tank trucks, in totes and drums.

CONCERA® SA8080 will begin to freeze at approximately 32°F(0°C) but will return to full strength after thawing and thorough agitation. In storage and for proper dispensing, the temperature should be maintained above 32°F (0°C).

Dispensing Equipment

A complete line of accurate, automatic dispensing equipment is available.

Specifications

Concrete shall be designed in accordance with *Standard Recommended Practice for Selecting Proportions for Concrete*, ACI 211.

The high-range water-reducing admixture shall be CONCERA® SA8080 high range water reducer as manufactured by GCP, or its equivalent. It shall be manufactured to meet all the requirements of Specification for Chemical Admixtures for Concrete, ASTM Designation C494 as a Type A and F and ASTM C1017 Type I admixture.

The admixture shall be delivered as a ready-to-use, liquid product and shall not contain added chlorides. It shall be used in strict accordance with manufacturers recommendations.

GCP Applied Technologies Inc., 2325 Lakeview Parkway, Alpharetta, GA 30009, USA

In Canada, 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

Last Updated: 2022-04-21
gcpat.com/solutions/products/concera/concera-sa8080

DAREX® II AEA

Air-entraining admixture ASTM C260

Product Description

DAREX® II AEA is an air-entraining admixture which generates a highly stable air void system for increased protection against damage from freezing and thawing, severe weathering, or de-icer chemicals. DAREX® II AEA is a complex mixture of organic acid salts in an aqueous solution specifically formulated for use as an air-entraining admixture for concrete and is manufactured under rigid control which provides uniform, predictable performance. It is supplied ready to- use and does not require pre-mixing with water. DAREX® II AEA is a dark brown liquid. One gallon weighs 8.7 lbs (1.04 kg/L). DAREX® II AEA complies to ASTM C260 *Standard Specifications for Air-Entraining Admixtures for Concrete*.

Product Advantages

- Air stability makes it particularly useful for longer transit times
- Produces excellent air void systems in concretes that are traditionally difficult to air entrain

Uses

DAREX® II AEA is used in ready-mix and concrete products plants to improve air entrainment stability. It is particularly effective in maintaining air content during longer haul times. DAREX® II AEA performs well in conventional concrete and is effective in plasticizing mixes and with slag, lightweight, or manufactured aggregates which tend to produce harsh concrete.

DAREX® II AEA entrains air effectively with microsilica concrete and with fly ash concrete.

Performance

DAREX® II AEA disperses and generates millions of discrete semimicroscopic bubbles throughout the concrete composite. Once thoroughly mixed, the concrete contains a stable network of bubbles which act much like ball bearings increasing mobility, or plasticity, of the concrete. This adds workability to the mix and permits a reduction of water with no loss of slump. Placeability is improved. Bleeding, segregation and green shrinkage are minimized.

Through the purposeful entrainment of air, DAREX ® II AEA markedly increases the durability of concrete to all exposures.

Compatibility with Other Admixtures and Batch Sequencing

DAREX® II AEA is compatible with most GCP admixtures as long as they are added separately to the concrete mix. In general, it is recommended that DAREX® II AEA be added to the concrete mix near the beginning of the batch sequence for optimum performance, preferably by “dribbling” on the sand. Different sequencing may be used if local testing shows better performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations. DAREX® II AEA should not be added directly to heated water.

Pretesting of the concrete mix should be performed before use, as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. Please consult your GCP Applied Technologies representative for guidance.

Addition Rates

There is no standard addition rate for DAREX® II AEA. The amount to be used will depend upon the amount of air required under job conditions, usually in the range of 4% to 7%. Typical factors which might influence the amount of air entrained are temperature, cement, sand gradation and use of extra fine materials such as fly ash. Typical DAREX® II AEA addition rates generally range from ½ to 5 fl oz/100 lbs (30 to 320 mL/100 kg) of cement.

The air-entraining efficiency of DAREX® II AEA becomes even greater when used with water-reducing and set-retarding agents. This may allow a reduction of up to ⅔ in the amount of DAREX® II AEA required for the specified air content.

Concrete Mix Adjustment

Entrained air results in increased yields with a consequent decrease in the cement content of the placed concrete. This condition calls for a mix adjustment, usually accomplished by reducing the fine aggregate content. This is in addition to the reduction in water content brought about by the increase in plasticity.

Packaging & Handling

DAREX® II AEA is available in bulk, delivered by metered tank trucks, totes and drums.

DAREX® II AEA will freeze at about 30 °F (-1 °C), but its air-entraining properties are completely restored by thawing and thorough mechanical agitation.

Dispensing Equipment

A complete line of accurate dispensing equipment is available. These dispensers can be located to discharge into the water line, the mixer, or on the sand.

Specifications

Concrete shall be air entrained concrete, containing 4% to 8% entrained air. The air contents in the concrete shall be determined by the pressure method (ASTM Designation C231), gravimetric method (ASTM Designation C138) or volumetric method (ASTM Designation C173). The air-entraining admixture shall be DAREX® II AEA as manufactured by GCP Applied Technologies, or equal. The air-entraining admixture shall be added at the concrete mixer or batching plant at approximately ½ to 5 fl oz/100 lbs (30 to 320 mL/100 kg) of cement, or in such quantities as to give the specified air contents.

gcpat.com | North America Customer Service: 1 877-4AD-MIX1 (1 877-423-6491)

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate, and is offered for consideration, investigation and verification by the user, but we do not warrant the results to be obtained. Please read all statements, recommendations, and suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation, or suggestion is intended for any use that would infringe any patent, copyright, or other third party right.

GCP Applied Technologies Inc., 62 Whittemore Avenue, Cambridge, MA 02140 USA.

In Canada, 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

This document is only current as of the last updated date stated below and is valid only for use in the United States. It is important that you always refer to the currently available information at the URL below to provide the most current product information at the time of use. Additional literature such as Contractor Manuals, Technical Bulletins, Detail Drawings and detailing recommendations and other relevant documents are also available on www.gcpat.com. Information found on other websites must not be relied upon, as they may not be up-to-date or applicable to the conditions in your location and we do not accept any responsibility for their content. If there are any conflicts or if you need more information, please contact GCP Customer Service.

Last Updated: 2018-08-24

gcpat.com/solutions/products/darex-ii-aea

SUBMITTAL TRANSMITTAL

Date: 6/26/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03.30.00 - 3
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
	1		Rebar drawings for weir and training walls

MANUFACTURER / SUPPLIER

Name: Rebars & Mesh

Address: 111 Avco Road, Haverhill, MA

Telephone No.: 800-558-6713 Facsimile No.: 978-372-0831

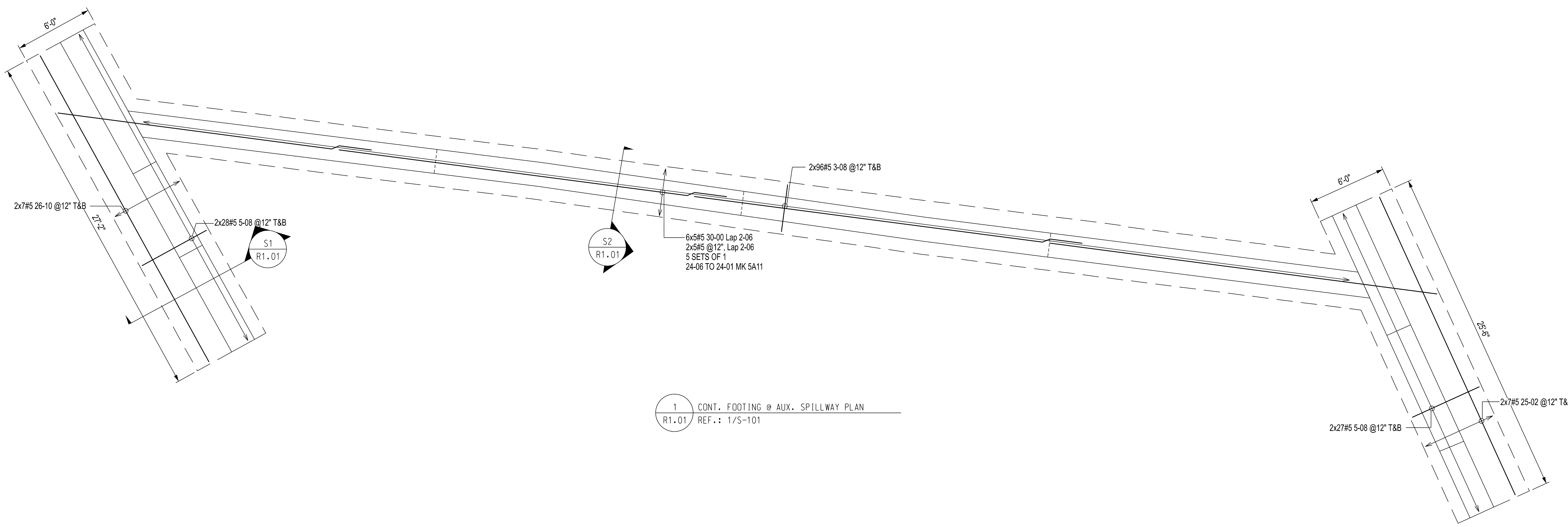
For Additional Information, Contact: Carl Martin, Martin Bros Contracting (Subcontractor)

E-mail Address: carl@martinbrosgc.com

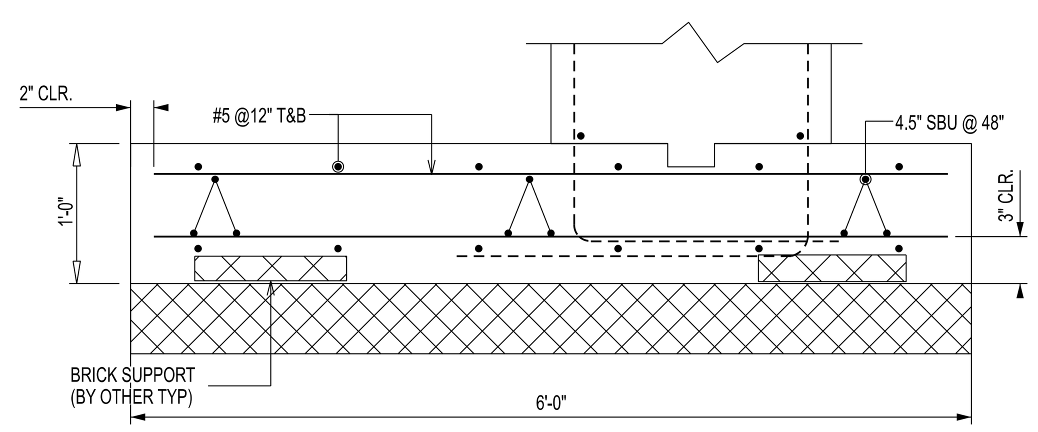
I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

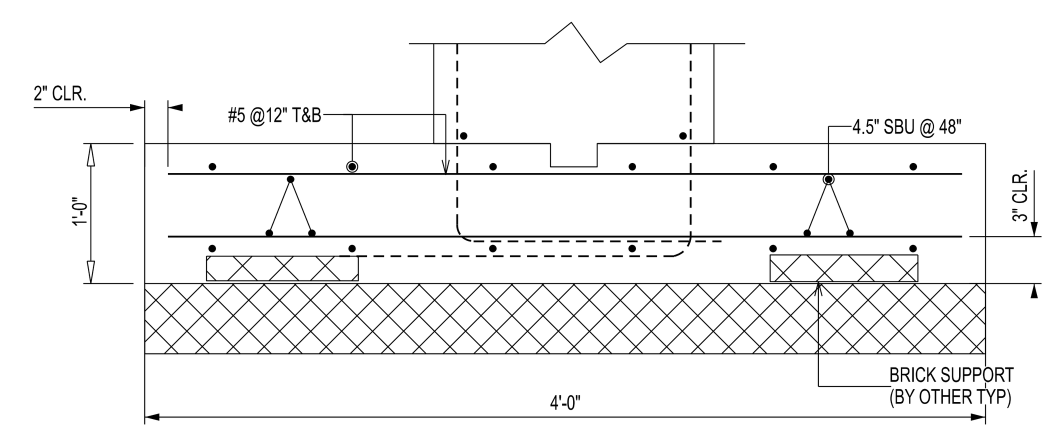
Title: Team Lead



1 CONT. FOOTING @ AUX. SPILLWAY PLAN
R1.01 REF.: 1/S-101



S1 CONT. FOOTING @ AUX. SPILLWAY SECTION
R1.01 REF.: 2/S-101



S2 CONT. FOOTING @ AUX. SPILLWAY SECTION
R1.01 REF.: 3/S-101

ACCESSORIES REQUIRED			
HEIGHT	TYPE	QTY	AREA
4.5"	SBU- EPOXY COATED	355 LF	12" AUX. SPILLWAY WALL FOOTING

REINFORCING BARS
ASTM A775 GRADE 60 (EPOXY COATED)
UNLESS NOTED OTHERWISE

Shortages, improper fabrication or claims for any other reason must be reported to Rebars & Mesh, Inc. within a period of 15 days from delivery.

Rebars & Mesh, Inc. reserves the right to field inspect prior to replacement or reconditioning of nonconforming material, and will not honor charges for work done in the field without specific authorization from Rebars & Mesh, Inc.

Reinforcing steel pacing drawing only use in conjunction with contract drawings & specifications. Elevations & dimensions shown on this drawing are for detailing purposes only and should not be used for construction unless verified by engineer or contractor.

Refer to architectural and structural drawings for all dimensions & setting out information.

The contractor shall verify all dimensions and elevations of new work and report any discrenpacies prior to fabrication and/or placement of reinforcement.

This drawing is not to be scaled.

ABBREVIATIONS:			
ALT	ALTERNATE	FF	FAR FACE
ADDL	ADDITIONAL	H / HOR	HORIZONTAL
B/BOT	BOTTOM	INTER	INTERSECTION
BB	BOND BEAM	LW	LONG WAY
BLL	BOTTOM LOWER LAYER	MID	MIDDLE
BUL	BOTTOM UPPER LAYER	NF	NEAR FACE
CB/COR	CORNER BAR	OC	ON CENTER
CJ	CONSTRUCTION JOINT	REF	REFERENCE
CLR	CLEARANCE	SIG	STAGGER
CONT	CONTINUOS	SW	SHORT WAY
D/V	DOWEL / VERTICAL	T	TOP
DIAG	DIAGONAL	T&B	TOP & BOTTOM
DWL	DOWEL	TLL	TOP & LOWER LAYER
EE	EACH END	TRANS	TRANSVERSAL
EJ	EXPANSION JOINT	TUL	TOP UPPER LAYER
ES	DOWEL / VERTICAL	TYP	TYPICAL
EW	EACH WAY	V/ VERT	VERTICAL

ARCHITECT / ENGINEER PLEASE CONFIRM

1.-
2.-
3.-
4.-
5.-
6.-
7.-

LAP SPLICE TABLE: (48D) (U.N.O ON THE DRAWING)					
CONC.: 4,500 PSI REBAR: A775/60			CONC.:	REBAR:	
BAR SIZE	TOP	OTHERS	BAR SIZE	TOP	OTHERS
#3			#3		
#4			#4		
#5		30"	#5		
#6			#6		
#7			#7		
#8			#8		

COVER TABLE: (U.N.O ON THE DRAWING)					
ITEM	LOCATION	CLR.	ITEM	LOCATION	CLR.
FOOTING	BOT	3"			
FOOTING	SIDES/TOP	2"			

CONTRACT DRAWING REFERENCE: (U.N.O ON THE DRAWING)		
DRAWING NUMBER	REV.	DATE
CIP PLANS -102622	-	07/20/22

SHOP DRAWING REFERENCE: (U.N.O ON THE DRAWING)	
ITEM	DRAWING NUMBER
TRAINING WALL FOUNDATION	R1.01
TRAINING WALL ELEV. E1-E3/WEIR&VOID REPAIR	R1.02

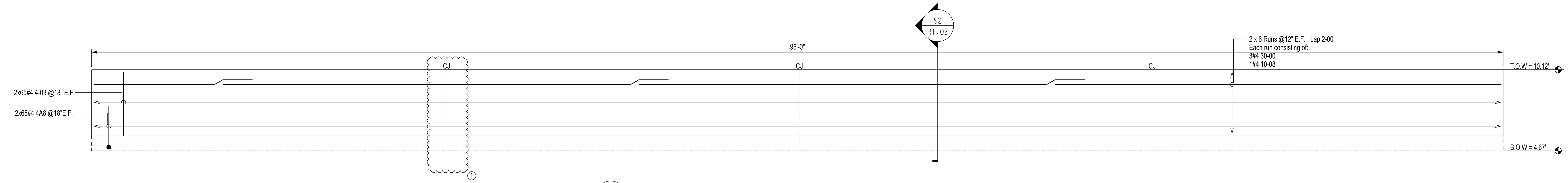
06/05/23 FOR APPROVAL

111 AVCO ROAD
HAVERHILL - MA
01835-6936

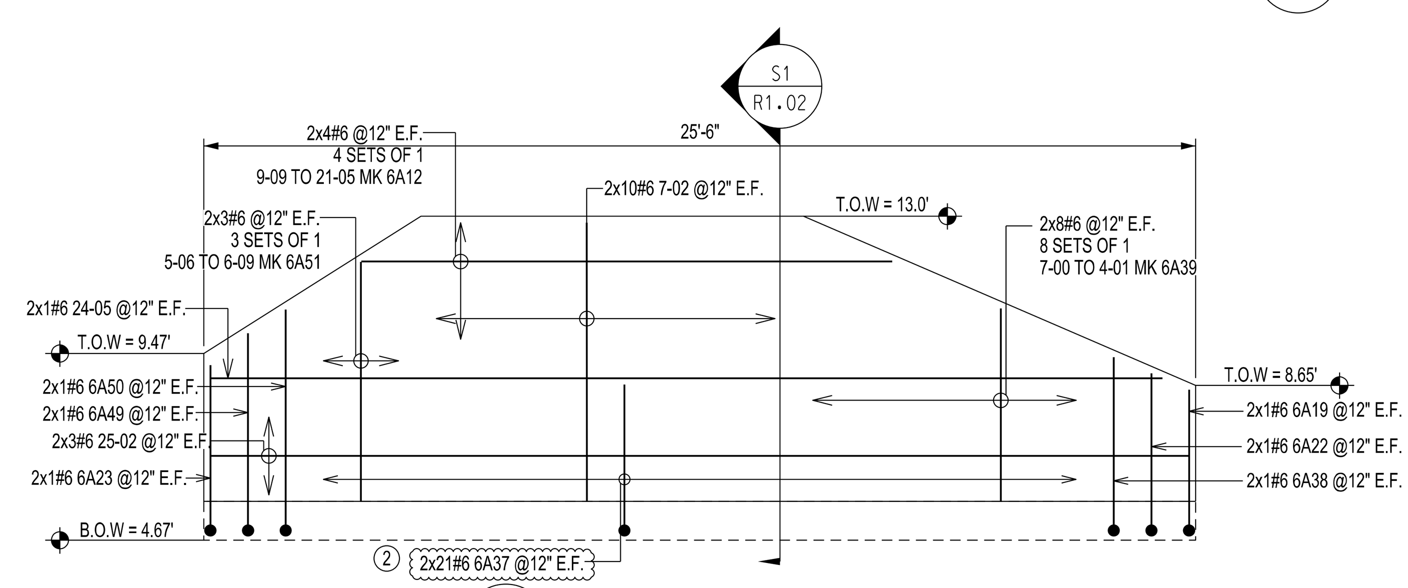
800-558-6713
978-372-0831 (FAX)

Project	EASTON POND DAM
Location	EASTON, MA
Architect	.
Engineer	.
Customer	MARTIN BROS CONSTRUCTION CO.

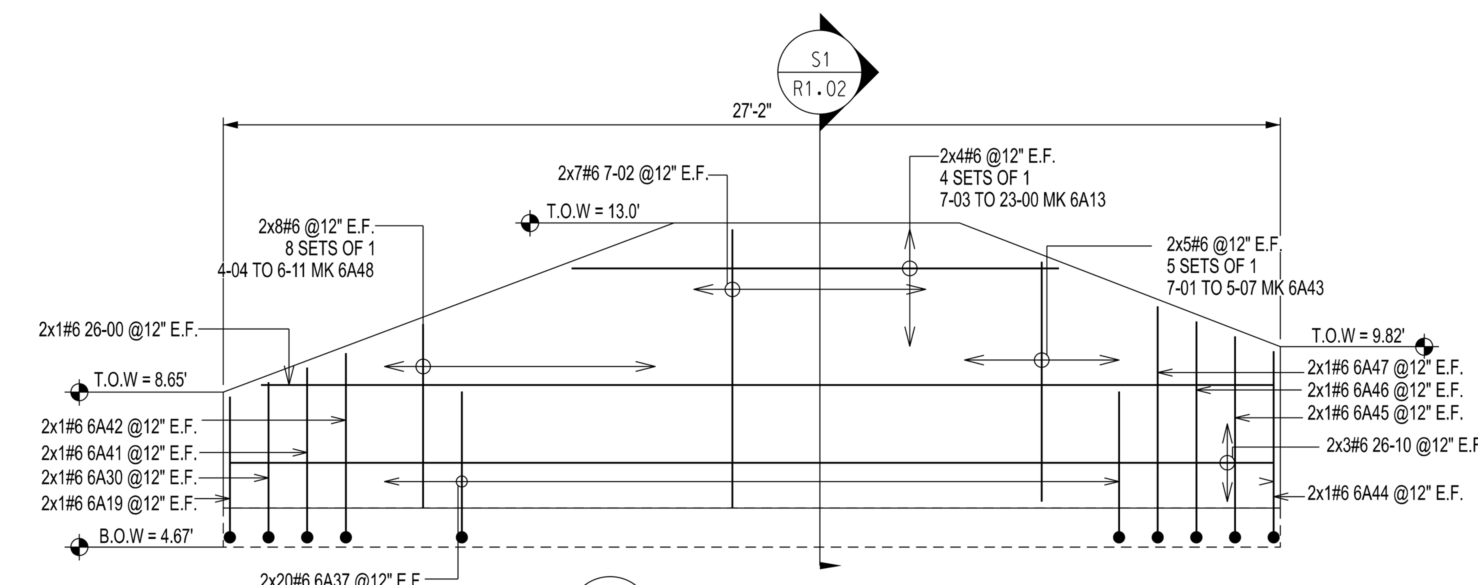
Drawn GCP	Date: 06/05/23	Reviewed EG	Job No.: RED2305242
Drawing TRAINING WALL FOUNDATION			Drawing No.: R1.01



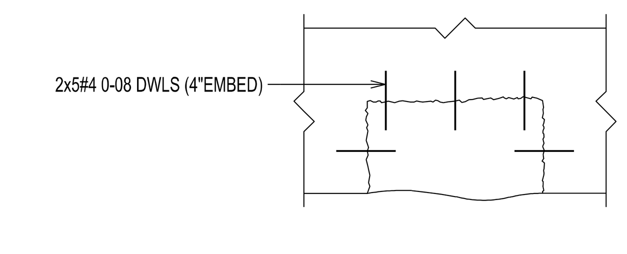
E1 / R1.02 TRAINING WALL ELEVATION (AUX. SPILLWAY)



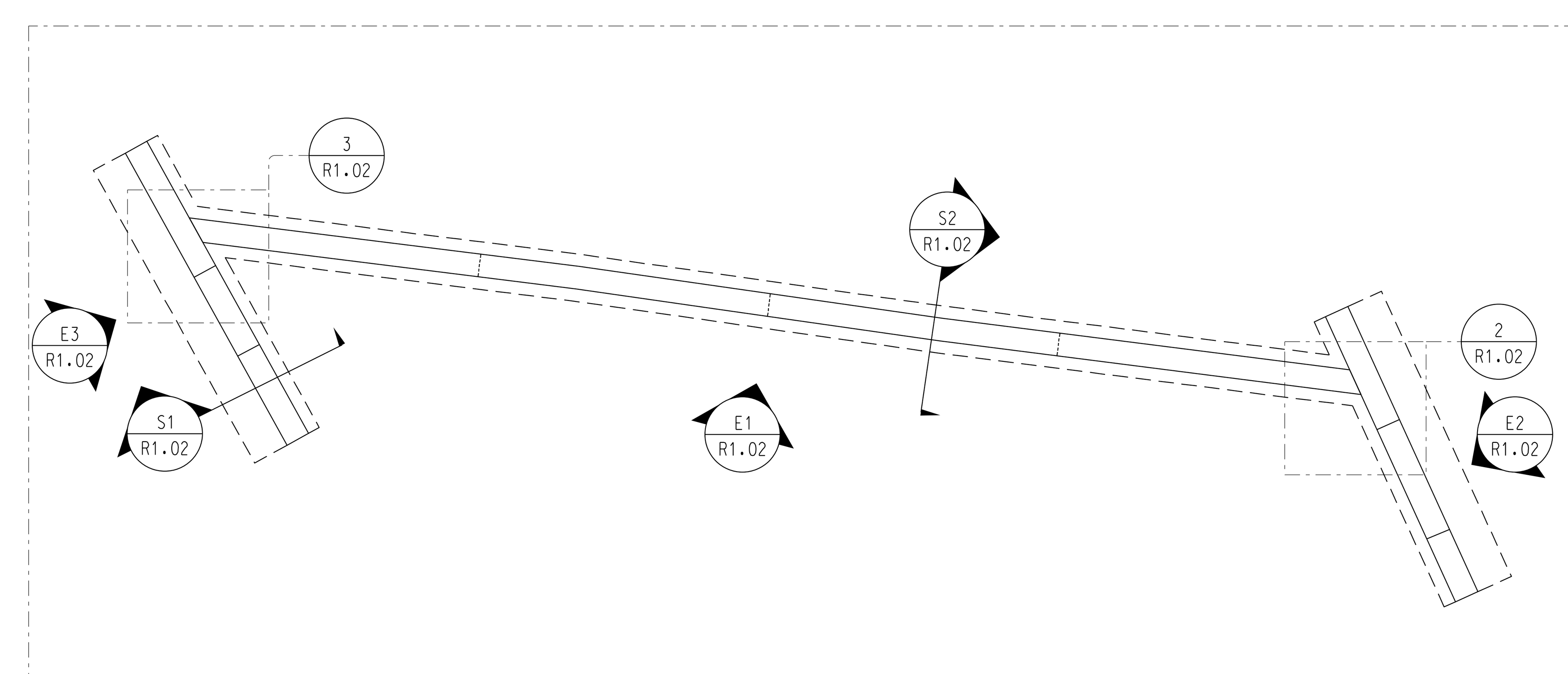
E2 / R1.02 TRAINING WALL ELEVATION (AUX. SPILLWAY)



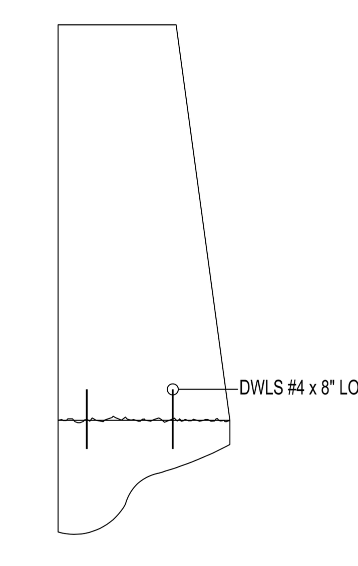
E3 / R1.02 TRAINING WALL ELEVATION (AUX. SPILLWAY)



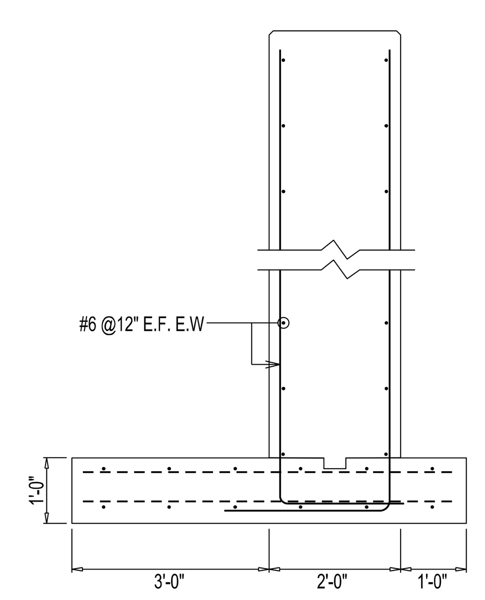
5 / R1.02 VOID REPAIR PLAN
REF.: B/CD-503



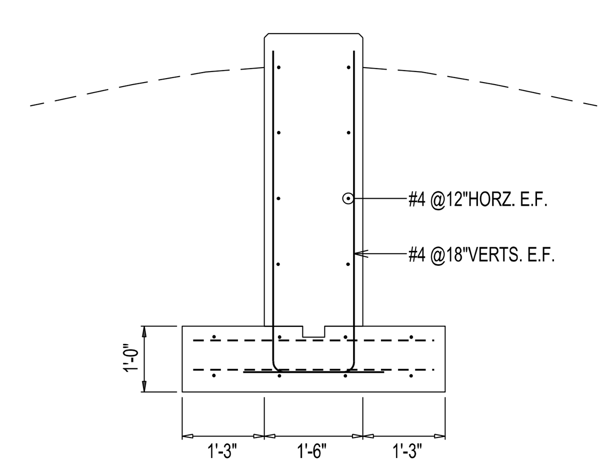
1 / R1.02 KEY PLAN: TRAINING WALL
REF.: 1/S-101



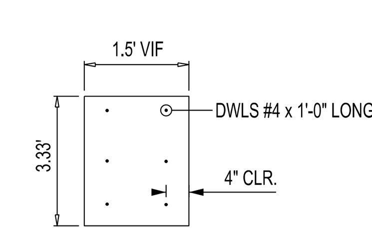
S4 / R1.02 VOID REPAIR SECTION
REF.: B/CD-503



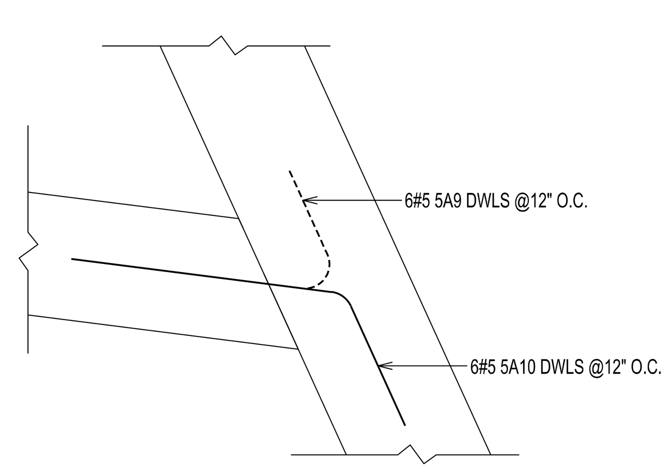
S1 / R1.02 TRAINING WALL SECTION
REF.: 2/S-101



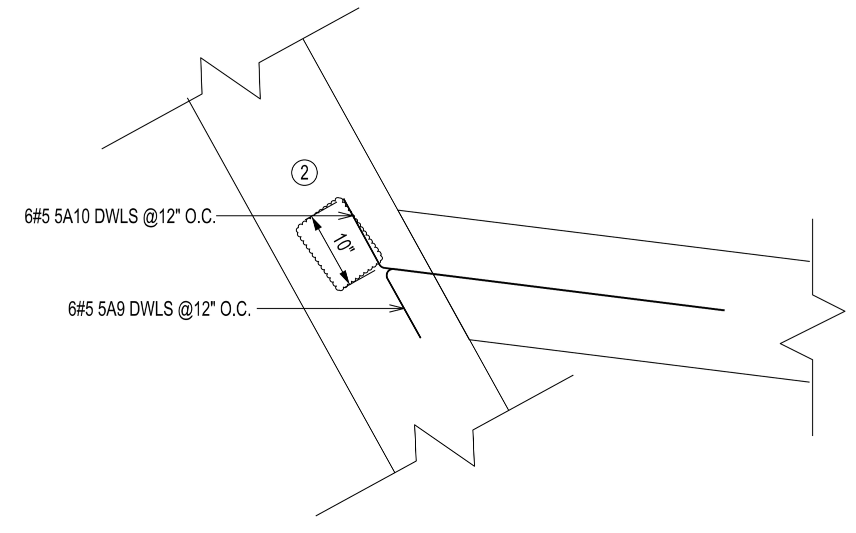
S2 / R1.02 TRAINING WALL SECTION
REF.: 3/S-101



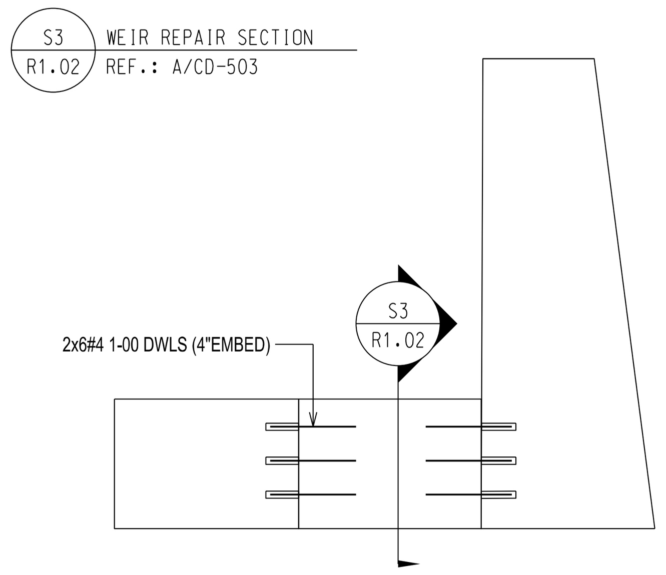
S3 / R1.02 WEIR REPAIR SECTION
REF.: A/CD-503



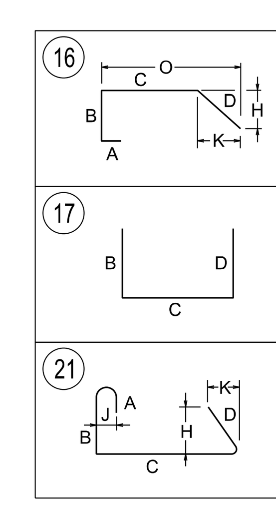
2 / R1.02 JOINT PLAN
REF.: 4/S-101



3 / R1.02 JOINT PLAN
REF.: 4/S-101



4 / R1.02 WEIR REPAIR PLAN
REF.: A/CD-503



QTY	SIZE	EP	BAR MARK	V	BND TYP	CD	A	B	C	D	E	F/R	G	H	J	K	O
4	6		6A19		17			2-00	3-072								
2	6		6A22		17			2-00	4-002								
2	6		6A23		17			2-00	4-03								
2	6		6A30		17			2-00	3-113								
82	6		6A37		17			2-00	3-09								
2	6		6A38		17			2-00	4-052								
2	6		6A41		17			2-00	4-041								
2	6		6A42		17			2-00	4-083								
2	6		6A44		17			2-00	4-092								
2	6		6A45		17			2-00	5-02								
2	6		6A46		17			2-00	5-062								
2	6		6A47		17			2-00	5-111								
2	6		6A49		17			2-00	5-003								
2	6		6A50		17			2-00	5-081								
12	5		5A9		21				2-06	0-10				0-10		0-06	
12	5		5A10		16				2-06	0-10				0-081		0-06	
130	4		4A8		17			1-06	2-09								

(BENDING DIMENSIONS: A–O)

REINFORCING BARS
ASTM A775 GRADE 60 (EPOXY COATED)
UNLESS NOTED OTHERWISE

Shortages, improper fabrication or claims for any other reason must be reported to Rebars & Mesh, Inc. within a period of 15 days from delivery.

Rebars & Mesh, Inc. reserves the right to field inspect prior to replacement or reconditioning of nonconforming material, and will not honor charges for work done in the field without specific authorization from Rebars & Mesh, Inc.

Reinforcing steel pacing drawing only use in conjunction with contract drawings & specifications. Elevations & dimensions shown on this drawing are for detailing purposes only and should not be used for construction unless verified by engineer or contractor.

Refer to architectural and structural drawings for all dimensions & setting out information.

The contractor shall verify all dimensions and elevations of new work and report any discrenpacies prior to fabrication and/or placement of reinforcement.

This drawing is not to be scaled.

ABBREVIATIONS:

ALT	ALTERNATE	FF	FAR FACE
ADDL	ADDITIONAL	H / HOR	HORIZONTAL
B/BOT	BOTTOM	INTER	INTERSECTION
BB	BOND BEAM	LW	LONG WAY
BLL	BOTTOM LOWER LAYER	MID	MIDDLE
BUL	BOTTOM UPPER LAYER	NF	NEAR FACE
CB/COR	CORNER BAR	OC	ON CENTER
CJ	CONSTRUCTION JOINT	REF	REFERENCE
CLR	CLEARANCE	SIG	STAGGER
CONT	CONTINUOS	SW	SHORT WAY
D/V	DOWEL / VERTICAL	T	TOP
DIAG	DIAGONAL	T&B	TOP & BOTTOM
DWL	DOWEL	TILL	TOP & LOWER LAYER
EE	EACH END	TRANS	TRANSVERSAL
EJ	EXPANSION JOINT	TUL	TOP UPPER LAYER
ES	DOWEL / VERTICAL	TYP	TYPICAL
EW	EACH WAY	V/ VERT	VERTICAL

ARCHITECT / ENGINEER PLEASE CONFIRM

1.- CLARIFY IF REBAR STOPPED AT CJs
2.- DWLS HOOK DIMENSIONS.
3.-
4.-
5.-
6.-
7.-

LAP SPLICE TABLE: (48D) (U.N.O ON THE DRAWING)

CONC.: 4,500 PSI REBAR: A775/60			CONC.: REBAR:		
BAR SIZE	TOP	OTHERS	BAR SIZE	TOP	OTHERS
#3			#3		
#4		24"	#4		
#5			#5		
#6		36"	#6		
#7			#7		
#8			#8		

COVER TABLE: (U.N.O ON THE DRAWING)

ITEM	LOCATION	CLR.	ITEM	LOCATION	CLR.
FOOTING	BOT	3"			
WALL	SIDES/TOP	2"			

CONTRACT DRAWING REFERENCE: (U.N.O ON THE DRAWING)

DRAWING NUMBER	REV.	DATE
CIP PLANS -102622	-	07/20/22

SHOP DRAWING REFERENCE: (U.N.O ON THE DRAWING)

ITEM	DRAWING NUMBER
TRAINING WALL FOUNDATION	R1.01
TRAINING WALL ELEV. E1-E3/WEIR&VOID REPAIR	R1.02

06/05/23 FOR APPROVAL

111 AVCO ROAD
HAVERHILL - MA
01835-6936
800-558-6713
978-372-0831 (FAX)

Project	EASTON POND DAM
Location	EASTON, MA
Architect	.
Engineer	.
Customer	MARTIN BROS CONSTRUCTION CO.

Drawn GCP | Date: 06/05/23 | Reviewed EG | Job No.: RED2305242

Drawing TRAINING WALL ELEV. E1-E3/WEIR& VOID REPAIR | Drawing No.: R1.02

SUBMITTAL TRANSMITTAL

Date: 7/6/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 31 25 00
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Straw wattle, 12" h, cotton mesh sock (biodegradable)

MANUFACTURER / SUPPLIER

Name: Western Green
Address: 4609E. Boonville-New Harmony Rd, Evansville, IN 47725
Telephone No.: 800-772-2040 Facsimile No.:
For Additional Information, Contact: Ian Yaple (EJ Prescott)
E-mail Address: ian.yaple@ejprescott.com

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

Title: Team Lead

MATERIAL PROPERTY DATA SHEET

WESTERN GREEN

Straw Bio Wattle

Temporary • Biodegradable • Straw Fiber • Sediment Control Device

DESCRIPTION

Western Green manufactures Biodegradable Straw Wattles which are all-natural sediment control logs designed for use in sediment control applications. The Straw Bio Wattles consist of 100% clean, weed free straw fiber matrix confined by a 100% biodegradable ring spun cotton mesh to form a log of specific length and diameter. Straw Bio Wattles are designed to reduce hydraulic energy and filter sediment laden flow in channels and on slopes. The wattles are flexible to conform to the soil surface and are secured by staking.

Each Straw Bio Wattle is made in the USA and manufactured under Western Green's Quality Assurance Program to ensure a continuous distribution of fibers and consistent dimensions.

Material Content	
Fiber Fill	100% clean, weed free straw fiber
Outer Mesh	100% Ring spun Cotton, with 1/8 in openings
Configuration	Cylindrical with Closed Ends
End Closure	Hog ring or Tied

Specified Expected Values		
Diameter	**12 in (0.31 m)**	**20 in (0.51 m)**
Length	**10 ft (3.0 m)** or 20 ft	**10 ft (3.0 m)**
Density	2.5 lbs/ft (3.7 kg/m) 3.3 lbs/ ft³ (53.0 kg/m³)	5.0 lbs/ft (7.4 kg/m) 2.4 lbs/ ft³ (39.0 kg/m³)
Weight	25 lbs (11.3 kg)	50 lbs (22.7 kg)

Disclaimer: The information contained herein may represent product index data, performance ratings, bench scale testing or other material utility quantifications. Each representation may have unique utility and limitations. Every effort has been made to ensure accuracy, however, no warranty is claimed and no liability shall be assumed by Western Green or its affiliates regarding the completeness, accuracy or fitness of these values for any particular application or interpretation. While testing methods are provided for reference, values shown may be derived from interpolation or adjustment to be representative of intended use. For further information, please feel free to contact Western Green.

Western Green • 4609 E. Boonville-New Harmony Rd.
Evansville, IN 47725 • (800) 772-2040

SUBMITTAL TRANSMITTAL

Date: 6/26/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03.30.00 - 4
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Screw on Coil Ties
1			Screw on Plastic Cones

MANUFACTURER / SUPPLIER

Name: Dayton Superior

Address: 1125 Byers Road, Miamisburg, OH

Telephone No.: 888-977-9600 Facsimile No.:

For Additional Information, Contact: Carl Martin, Martin Bros Contracting (Subcontractor)

E-mail Address: carl@martinbrosgc.com

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

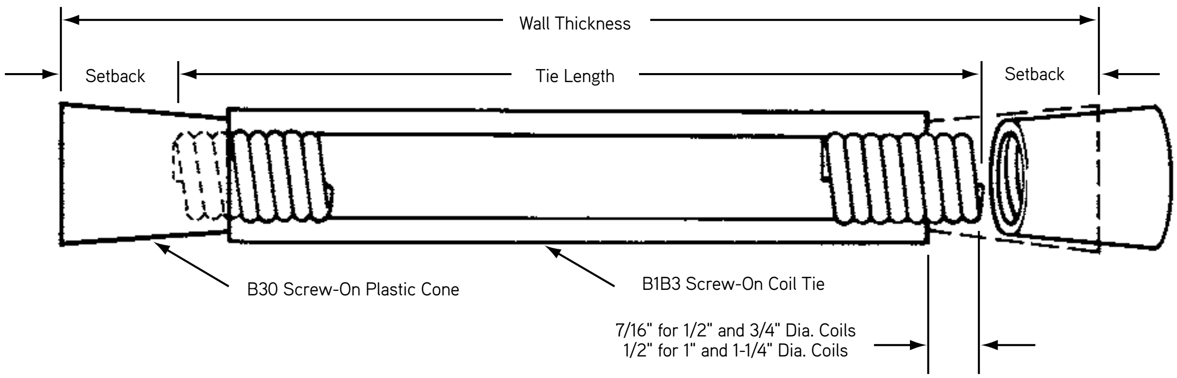
BY:
Signature:

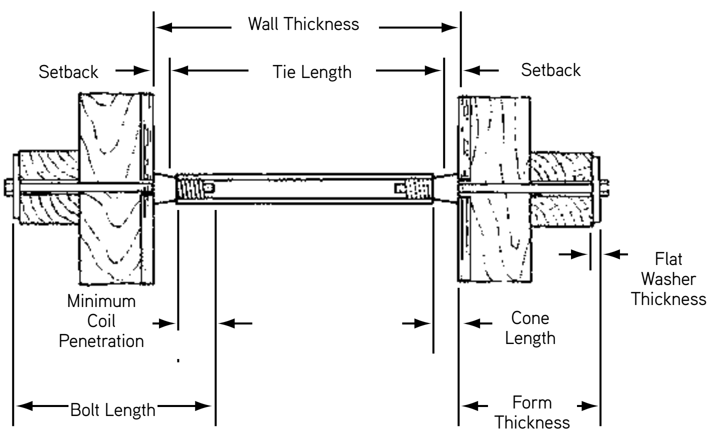
Title: Team Lead

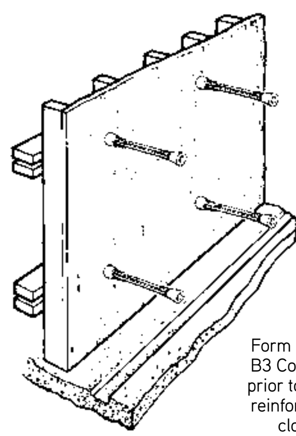
B1B3 and B2B3 Screw-On Coil Tie

Dayton Superior Screw-On Coil Tie is designed with longer coils that extend beyond the end of the struts. Plastic cones screw onto the projections to provide a positive setback and act as a fixed internal form spreader.

To determine proper screw-on coil tie length, subtract the required total setback (both sides) from the wall thickness.






Form panel showing B3 Coil Ties in place prior to installation of reinforcing steel and closure form.

B1B3 and B2B3 Screw-On Coil Tie Selection Chart

Type	Bolt Diameter	Number of Strut Wires	Safe Working Load Tension (lbs.)
B1B3 Standard	1/2"	2	4,500
B1B3 Heavy	1/2"	2	6,750
B1B3 Extra Heavy	1/2"	2	9,000
B1B3 Standard	3/4"	2	6,750
B1B3 Heavy	3/4"	2	9,000
B1B3 Standard	1"	2	13,500
B2B3 Standard	1/2"	4	9,000
B2B3 Standard	3/4"	4	13,500
B2B3 Heavy	3/4"	4	18,000
B2B3 Standard	1"	4	18,000
B2B3 Heavy	1"	4	27,000
B2B3 Heavy	1-1/4"	4	27,000
B2B3 36K	1-1/4"	4	37,000

SWL provides a factor of safety of approximately 2 to 1.

Warning: See minimum coil penetration information in General and Technical Information.

To Order:
Specify: (1) quantity, (2) name, (3) safe working load, (4) bolt diameter, (5) tie length, (6) wall thickness, (7) setback.

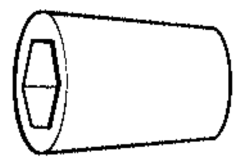
Example:
1,500 pcs. B1B3 Screw-On Coil Tie, 6,750 lbs. SWL, 1/2" diameter, 22 long for a 24" wall, 1" setback.

B30 Screw-On Plastic Cones

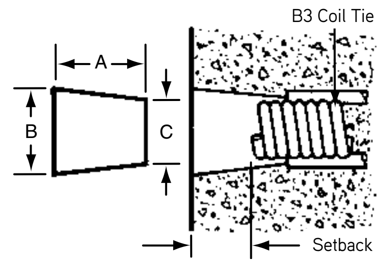
Dayton Superior Screw-On Plastic Cones are designed to thread onto the protruding coil of a B3 Screw-On Coil Tie. Use a B15 Cone Removal Wrench to back the cone off the tie and out of the concrete. B30 plastic cones are normally reusable.

B30 Screw-On Selection Chart

Bolt Dia.	Setback	A	B	C
1/2"	1"	1-3/8"	1-1/4"	1"
1/2"	1-1/2"	1-7/8"	1-1/4"	1"
1/2"	2"	2-3/8"	1-1/4"	1"
3/4"	1"	1-1/2"	1-5/8"	1-7/16"
3/4"	1-1/2"	2"	1-5/8"	1-7/16"
3/4"	2"	2-1/2"	1-3/4"	1-7/16"
3/4"	3"	3-1/2"	1-7/8"	1-7/16"
1"	1"	1-1/2"	2-1/8"	1-13/16"
1"	2"	2-1/2"	2-1/8"	1-13/16"
1-1/4"	2"	2-1/2"	2-3/8"	2-1/8"



B30 Screw-On Plastic Cone

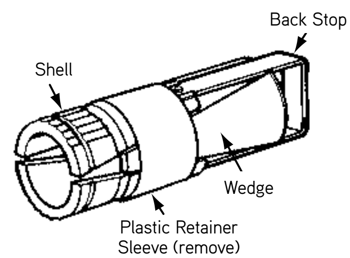


Warning: Cones are to be used for spreader action only and are not designed for scaffold bracket or other accessory loads.

B31 Rock Anchor

Dayton Superior B31 Rock Anchor is a preassembled unit tapped with 1/2", 3/4" or 1" diameter coil thread. NC thread is available on special order. Rock anchors used in sound rock or concrete allows one-sided forming of walls or similar applications to be completed quickly and economically.

The rock anchor is threaded onto the coil rod until the rod hits the backstop of the anchor. The plastic retaining sleeve is removed and the rock anchor/coil rod assembly is placed into the bore hole. The assembly is installed so that the anchor backstop "bottoms" in the bore hole. Tightening the coil rod will draw the anchor wedges forward to expand the anchor's shell. Care should be taken to not overtighten the anchor.

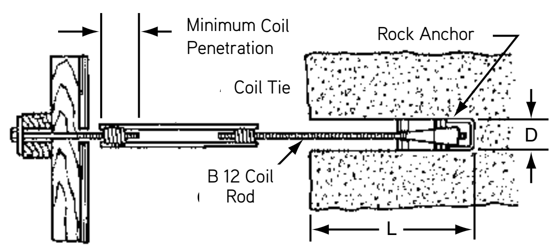


B31 Rock Anchor

B31 Rock Anchor Selection Chart

Coil Rod Diameter	Minimum Hole Depth "L" *	Required Hole Diameter "D"	Safe Working Load Tension (lbs.) **
1/2"	6"	1-3/8"	4,500
3/4"	8"	1-5/8"	9,000
1"	10"	1-3/4"	18,000

SWL provides a factor of safety of approximately 2 to 1 in 3,500 psi concrete.



***NOTE:** It is extremely important to drill the proper size bore hole for the appropriate rock anchor. Avoid "dog leg" or "rifled" holes, they will hinder anchor installation. It is also important to avoid letting the drill dwell at the bottom of the hole. This can cause an enlargement at the bottom of the hole and result in a loss of anchorage strength.

The bore hole for the rock anchor must be drilled perpendicular to the exposed bearing surface. The load carrying capacity of the rock anchor is greatly reduced when there is an angle between the nut on the coil rod and the bearing surface.

To Order:
Specify: (1) quantity, (2) name, (3) coil rod diameter.

Example:
600 pcs. B31 Rock Anchor, 1/2" coil thread.

The B31 Rock Anchor is not a reusable device. After the rock anchor has been set and the forming completed, do not attempt to reuse the rock anchor.

****WARNING:** For safe construction practice, the most critical factor to consider is the actual anchorage capacity provided by the rock strata or concrete in which the rock anchor is to be installed. Correct hole depth and actual rock anchor capacity must always be determined by field tests before placing rock anchors into general use on a project.

SUBMITTAL TRANSMITTAL

Date: 6/26/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03.30.00 - 6
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Wet Curing Blanket

MANUFACTURER / SUPPLIER

Name: McTech Group

Address: P.O. Box 626, Hartford, NC

Telephone No.: 866-913-8363 Facsimile No.: 770-913-8307

For Additional Information, Contact: Carl Martin, Martin Bros Contracting (Subcontractor)

E-mail Address: carl@martinbrosgc.com

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

Title: Team Lead

UltraCure NCF™

McTech Group

Single Use Wet Curing Blanket

UltraCure NCF™
Disposable Wet Cure Blanket

Material Specification:
UltraCure NCF™ moisture-retaining covering by McTech Group, Inc. is a natural colored cellulose fabrics with a 3 mil white reflective impervious coating applied to one side designed to help provide protection against UV degradation. The non-staining fabric has a tensile strength meeting ASTM D- 882 and a minimum retention capacity of 6.5(g). Material shall meet or exceed ASTM C171-03, ASTM C171-97a and AASHTO M171-00, standard specifications for sheet material for curing concrete slabs or pavement.

Application:
Place wet, UltraCure NCF™ wet cure covering in widest practical width as soon as concrete has hardened sufficiently to prevent surface damage. Sides and end shall be lapped at least 3". Immediately repair any holes or tears during curing period using wet cure material and water. Cover entire surface area including edges of paving and sidewalks. Install UltraCure NCF™ moisture containing wet cure covering material as per manufacturer's written instructions. Wet surface of slab on-grade with 1/8" to 1/4" inch of water to cover entire surface area of slab, then slowly unroll the UltraCure NCF™ product onto slab using the roller squeegee applicator. No portion of this product shall be reused once it has been put into use on a slab on grade or other concrete application. Maintain UltraCure NCF™ in place on concrete for a period of not less than seven (7) days after placement. Continuous inspection for the purpose of maintaining 100 % curing blanket contact with surface to be cured is recommended.

Physical Properties: UltraCure NCF™

Property		Value	ASTM Test Method
Caliper		1.4 mm	ASTM D - 5199
Tensile	TD	4783 psi	ASTM D - 882
	MD	4900 psi	
Elongation	TD	721%	ASTM D - 882
	MD	622%	
Elmendorf	TD	1500 g	ASTM D - 1922
	MD	350 g	
Dart		300 g	ASTM D - 1709
Reflectance		> 70%	ASTM E - 1447

TD= Transverse Direction MD= Machine Direction

Technical Assistance Contact:
McTech Group, Inc.
3502 Diversified Drive
Loganville, Ga. 30052
Toll Free: 1-866-913-8363
Fax: 770-913-8307
Web: **www.McTechGroup.com**

SUBMITTAL TRANSMITTAL

Date: 6/26/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03.30.00 - 5
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Farm Fresh XL, Form Release

MANUFACTURER / SUPPLIER

Name: Dayton Superior

Address: 1125 Byers Road, Miamisburg, OH

Telephone No.: 888-977-9600 Facsimile No.:

For Additional Information, Contact: Carl Martin, Martin Bros Contracting (Subcontractor)

E-mail Address: carl@martinbrosgc.com

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BY:
Signature:

Title: Team Lead

UNITEX By Dayton Superior

Farm Fresh XL™
Form Release

TECHNICAL DATA SHEET

DESCRIPTION
Farm Fresh XL™ is a water-based, economical, V.O.C. compliant, concrete form release agent. Farm Fresh XL™ works to ensure clean, positive release on plywood, fiberglass, aluminum, steel, urethane and other concrete forming materials and form liners. This product acts as a barrier to the adhesion of concrete while minimizing surface dusting. Properly applied,Farm Fresh XL™ will not stain concrete or interfere with the adhesion of coatings.

USE

Farm Fresh XL™ works to ensure clean, positive release on plywood, fiberglass, aluminum, steel, urethane and other concrete forming materials and form liners.

FEATURES
- Economical
- V.O.C. compliant
- Clean, positive release
- Minimizes surface dusting
- Reduced surface defects
- Non-staining
- Water clean up
- Biodegradable
- Tested and compliant per CDPH V1.2
- Certified to conform to NSF/ANSI/CAN 61 by WQA
- May contribute to LEED credits
- Excellent sprayability

VOC
Contains 0 g/L. Compliant with all Canadian and U.S. VOC regulations for Concrete Form Release agents including Federal EPA, OTC, LADCO, SCAQMD & CARB.

Estimating Guide

	SQ. FEET/GALLON	SQ. METERS/LITER
Steel	1000 - 1500	24.6 - 36.9
Aluminum	1000 - 1500	24.6 - 36.9
Medium Density Plywood	1000-1250	24.6 - 30.7
High Density Plywood	1000 - 1500	24.6 - 36.9
Rough Sawn Lumber 1st coat	500 - 1000	12.3 - 24.6
2nd coat	500 - 1000	12.3 - 24.6
Texture and absorption of forming material will dictate final coverage rate. Prior to coating plywood forms, apply one or two heavy brush coats to edges to ensure ease of form removal.		

Packaging

PRODUCT CODE	PACKAGE	SIZE	
		Gallon	Liter
143495	Pail	5	18.9
143496	Drum	55	208.2
143497	Tote	275	1041

STORAGE
Keep from freezing. Store in original containers, keeping container lids, spouts and/or bungs tightly sealed. Shelf life of 12 months in properly stored sealed containers.

Surface Preparation:
Surfaces to be treated should be clean and free of all water, dust and dirt or residues, which might transfer to the final concrete surface.

Mixing
Stir well prior to use

Placement:
Apply during dry weather with low-pressure spray, roller or brush. Apply uniformly to assure proper coverage. Use of a fine fan tip, 0.1-0.2 gpm allows for more even coverage and avoidance of excess material. For improved application consistency and reduction in labor utilize the Dayton Spray-Pro (Item # 309233 or 309232) power spray system. Wipe excess material from forms prior to form construction and concrete placement. FOR BEST RESULTS APPLY TO FORMS BEFORE EACH USE.

CLEAN UP
Use clean water for clean up.

TECHNICAL DATA SHEET

LIMITATIONS

FOR PROFESSIONAL USE ONLY

This product is certified to conform to NSF/ANSI Standard 61 at a maximum surface area to volume ratio of 0.18 sq. in./L (1.1 sq. cm./L). Forms and equipment must be clean and dry prior to use. Excessive rain after application prior to concrete placement may require re-application. When properly treated forms should have a uniform thin film, with a slight waxy feel. After use, a white residue may be visible on forms. This is normal for water based form release agents and should not be confused with concrete build up.

PRECAUTIONS

READ SDS PRIOR TO USING PRODUCT

- Use with adequate ventilation
- Wear protective clothing, gloves and eye protection (goggles, safety glasses and/or face shield)
- Keep out of the reach of children
- Do not take internally
- In case of ingestion, seek medical help immediately
- May cause skin irritation upon contact, especially prolonged or repeated. If skin contact occurs, wash immediately with soap and water and seek medical help as needed.
- If eye contact occurs, flush immediately with clean water and seek medical help as needed
- Dispose of waste material in accordance with federal, state and local requirements

MANUFACTURER

Dayton Superior Corporation
1125 Byers Road
Miamisburg, OH 45342
Customer Service: 888-977-9600
Technical Services: 877-266-7732
Website: www.daytonsuperior.com

WARRANTY

Dayton Superior Corporation ("Dayton") warrants for 12 months from the date of manufacture or for the duration of the published product shelf life, whichever is less, that at the time of shipment by Dayton, the product is free of manufacturing defects and conforms to Dayton's product properties in force on the date of acceptance by Dayton of the order. Dayton shall only be liable under this warranty if the product has been applied, used, and stored in accordance with Dayton's instructions, especially surface preparation and installation, in force on the date of acceptance by Dayton of the order. The purchaser must examine the product when received and promptly notify Dayton in writing of any non-conformity before the product is used and no later than 30 days after such non-conformity is first discovered. If Dayton, in its sole discretion, determines that the product breached the above warranty, it will, in its sole discretion, replace the non-conforming product, refund the purchase price or issue a credit in the amount of the purchase price. This is the sole and exclusive remedy for breach of this warranty. Only a Dayton officer is authorized to modify this warranty. The information in this data sheet supersedes all other sales information received by the customer during the sales process. THE FOREGOING WARRANTY SHALL BE EXCLUSIVE AND IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER WARRANTIES OTHERWISE ARISING BY OPERATION OF LAW, COURSE OF DEALING, CUSTOM, TRADE OR OTHERWISE.

Dayton shall not be liable in contract or in tort (including, without limitation, negligence, strict liability or otherwise) for loss of sales, revenues or profits; cost of capital or funds; business interruption or cost of downtime, loss of use, damage to or loss of use of other property (real or personal); failure to realize expected savings; frustration of economic or business expectations; claims by third parties (other than for bodily injury), or economic losses of any kind; or for any special, incidental, indirect, consequential, punitive or exemplary damages arising in any way out of the performance of, or failure to perform, its obligations under any contract for sale of product, even if Dayton could foresee or has been advised of the possibility of such damages. The Parties expressly agree that these limitations on damages are allocations of risk constituting, in part, the consideration for this contract, and also that such limitations shall survive the determination of any court of competent jurisdiction that any remedy provided in these terms or available at law fails of its essential purpose.

SUBMITTAL TRANSMITTAL

Date: 6/26/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03.30.00 - 7
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Neoprene Waterstop Washer for Coil Ties

MANUFACTURER / SUPPLIER

Name: Williams Form Engineering Corp

Address: 8165 Graphic Dr, Belmont, MI

Telephone No.: 616-866-0815 Facsimile No.: 616-866-1890

For Additional Information, Contact: Carl Martin, Martin Bros Contracting (Subcontractor)

E-mail Address: carl@martinbrosgc.com

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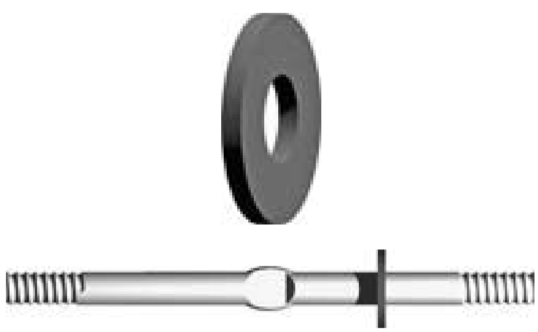
BY:
Signature:

Title: Team Lead

Coil Tie Water Seal

All Two Strut and Four Strut Coil Ties are available with a neoprene rubber washer installed on each wire strut. Thte neoprene washers help prevent the seepage of water along the wire sturts. In damp or wet conditions this is a beneficial addition to the form tie system.

Waterstop Washer - Inside Rod



A Waterstop Washer made from enoprene rubber is available for field installation on the She Bolt Inner Rods. The neoprene washers help prevent the seepage of water along the rod. In damp or wet conditions thisis a beneficial addition to the She Bolt System.

SUBMITTAL TRANSMITTAL

Date: 6/26/23

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317 Iron Horse Way, Suite 204
Providence, RI 02908
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From: SumCo Eco-Contracting, LLC
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Attn: Ron Ferraiuolo, Team Lead

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Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03.30.00 - 8
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			PVC Waterstop, 701 ribbed with center bulb

MANUFACTURER / SUPPLIER

Name: Greenstreak Group

Address: 3400 Tree Court Industrial Blvd, St Louis, Mo

Telephone No.: 800-325-9504 Facsimile No.: 800-551-5145

For Additional Information, Contact: Carl Martin, Martin Bros Contracting (Subcontractor)

E-mail Address: carl@martinbrosgc.com

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

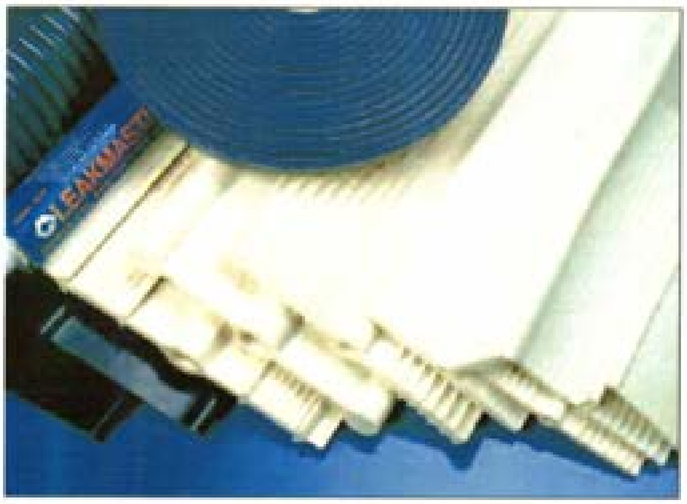
BY:
Signature:

Title: Team Lead

GREENSTREAK®

The Recognized Leader for

WATERSTOPS FOR CONCRETE



Concrete structures are only as watertight as the waterstops that join them. Greenstreak waterstops stop leaks before they start... in the joints of concrete structures.

Since 1950, Greenstreak has served the general and architectural concrete construction industry. Innovation, engineering and quality craftsmanship are combined to produce products of choice for the industry's owners, designers and contractors.

Greenstreak maintains its position of industry leadership by responding to the unique needs of our customers. Greenstreak's dedicated technical and customer service staffs are active participants in the concrete industry to take advantage of the latest technological advances, communicate with our market and analyze trends.

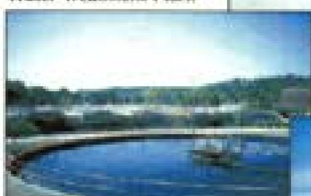
Centrally located, Greenstreak products are readily available through a dedicated network of Concrete Forming and Accessory Distributors both nationally and internationally.

Typical Structures Requiring Waterstops Include:

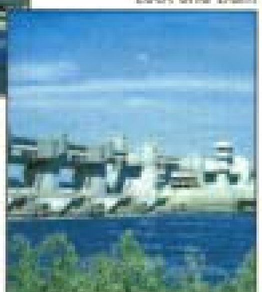
- Dams, locks, canals, water reservoirs and aqueducts
- Water and waste water treatment facilities
- Primary and secondary containment structures
- Culverts and tunnels
- Storage Tanks
- Retaining walls
- Bridge and deck abutments
- Foundations
- Slabs-on-grade
- Parking garages

Flood Wall

Water Treatment Plant



Lock and Dam



GREENSTREAK GROUP INC
A Family of Construction Companies

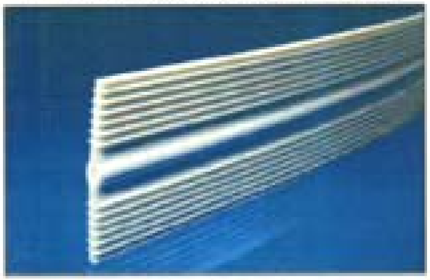
3400 Tree Court Industrial Boulevard, St. Louis, Missouri 63122
Phone: 800-325-9504 or 636-225-9400
Fax: 800-551-5145 or 636-225-2049
Greenstreak.com

WATERSTOP BASIC USE

Embedded in concrete, across and/or along the joint, waterstops form a watertight diaphragm that prevents the passage of fluid through the joint.

SUGGESTED WATERSTOP DESIGN CHECKLIST

- Determine structure type
- Verify chemical containment requirements (if any)
- Verify hydrostatic head pressure requirements
- Determine joint type and joint movement requirements
- Verify joinery details of dissimilar or non-symmetrical waterstop profiles (consider using one profile throughout to simplify intersections)
- Specify ribbed profile for best water sealing performance
- Specify type and size (by product number, if possible)
- Specify factory fabrications of intersections and heat welded field butt joints
- Specify method for securing waterstop in position (hog rings, grommets, etc.)



PVC WATERSTOP

- The industry standard
- Broadest design selection
- Formulated and compounded by Greenstreak
- Manufactured by Greenstreak from only prime resins and all virgin raw materials
- Great inherent elasticity
- Resistant to many waterborne chemicals
- Heat weldable
- Will not discolor concrete or produce electrolytic action
- Suitable for above or below grade applications

Physical properties

All Greenstreak PVC waterstops are specially formulated and manufactured to meet or exceed the industry's standard specifications.

Greenstreak PVC Waterstop Physical Properties

PROPERTY	TEST 'ASTM	NOMINAL VALUE
Water absorption	'D570	0.02%
Tear resistance	'D624	225 lb/in.
Ultimate Elongation	'D638	300% min
Tensile strength	'D638	2000 psi min
Low temperature brittleness	'D746	Passed @ -35°F / -37°C
Stiffness in flexure	'D747	700 psi
Specific gravity	'D792	1.40
Hardness Shore A15	'D2240	79±3
Accelerated extraction - Tensile strength - Elongation	CRD-C 572	 1850 psi 350%
Effect of Alkali - weight change - hardness change		 +0.10% +1 point

Note: Greenstreak conducts regular testing of materials. Refer to Suggested Master Specification for current values.

Independent laboratory tests are available for the following applicable standards:

- Corps of Engineers CRD-C572-74
- Bureau of Reclamation C902
- CH2M Hill
- Montgomery Watson, Inc.
- Various State Highway and/or Public Works Department Standards

Installation aids for PVC waterstops

Greenstreak offers various features to economically assist and promote proper installation of PVC waterstops. Waterstops must be securely positioned in the forms to prevent deflection or misalignment during concrete placement. This is achieved by tethering the outer flanges of the waterstop to the adjacent reinforcing steel.

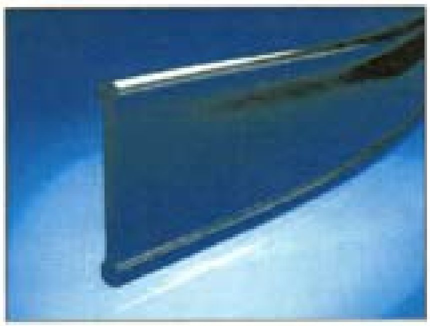
Tie-Right, Grommeted, Punched Flanges

The following features are offered to assist this method of installation:

- Tie-Right - most PVC shapes are available with factory applied hog rings
- Punched Flanges - most ribbed shapes are available with punched flanges
- Grommets - selected shapes are available with brass grommets

PVC Waterstop fabrications

PVC waterstop splices, directional changes and intersections are critical components of a quality installation. Specifications requiring factory made fabrications are strongly recommended. Greenstreak can provide homogeneous directional changes and intersections, leaving only the less difficult straight splices to be welded in the field.



SBR AND NEOPRENE RUBBER WATERSTOPS

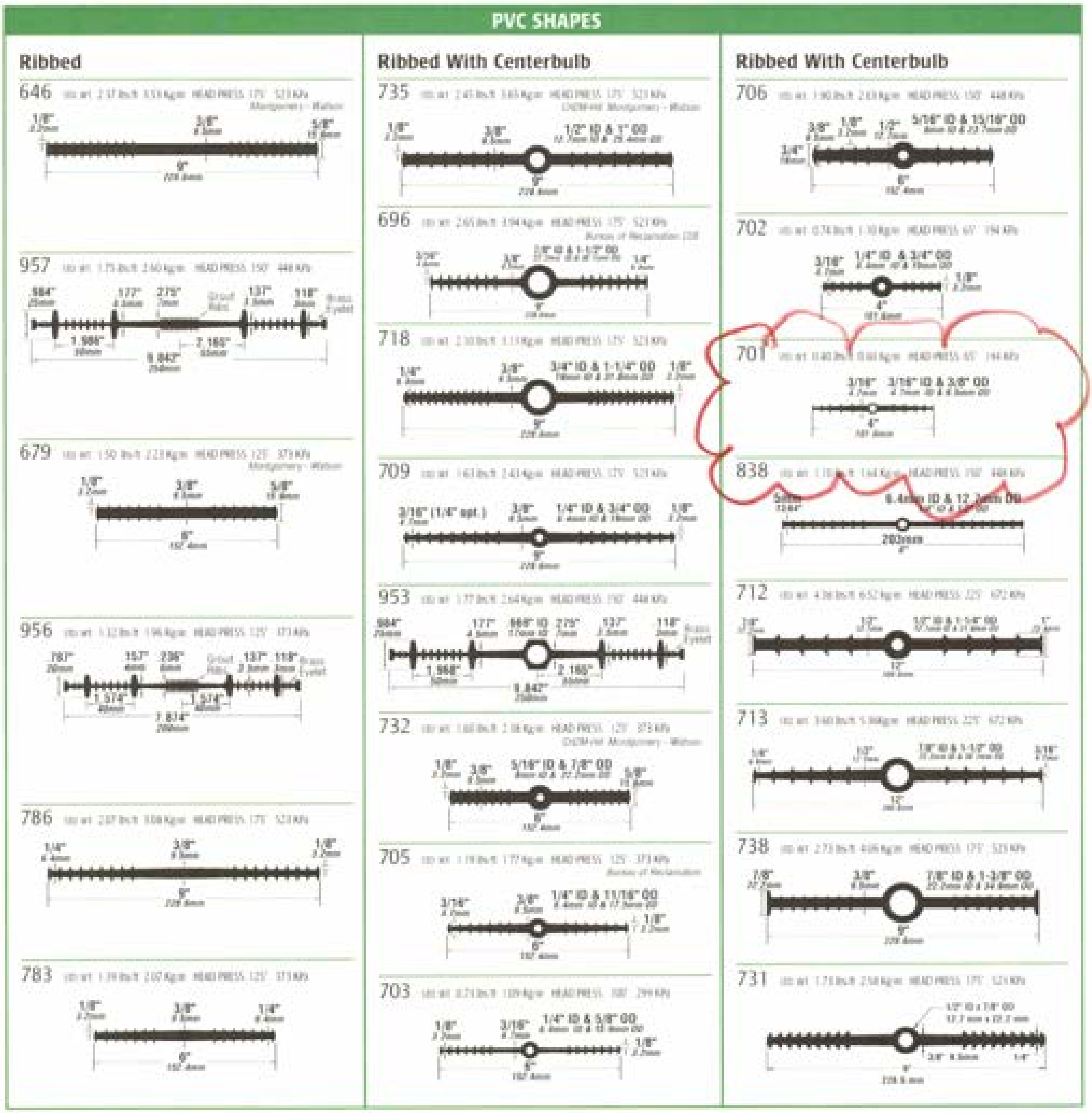
Greenstreak offers SBR and Neoprene waterstops for applications requiring the physical properties of rubber. These waterstops are manufactured to meet the Corps of Engineers and The Bureau of Reclamation's specifications for rubber waterstops.

WATERSTOP PROFILES

Once you have determined the joint type, the magnitude of the differential movements and the type of waterstop to meet project requirements, you must select a specific profile from the multitude of shapes. The following are a few of the most commonly specified profiles.

GREENSTREAK® waterstop is manufactured in widths from 4" to 12" and in thicknesses from 1/8" to 1/2". Over 110 different sizes and profiles are available to meet the most demanding requirements.

Should your project require a special shape, GREENSTREAK offers the world's broadest line of waterstop sizes and profiles. Custom orders will be considered. A Waterstop Profile supplement illustrating all of the profiles is available upon request. For a copy, call GREENSTREAK at (800)325-9504.



SUBMITTAL TRANSMITTAL

Date: 7/17/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 35 01 70.23
(List Section No., Article No., Paragraph)

1
(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Water Control Plan - Revised

MANUFACTURER / SUPPLIER

Name: EA Engineeringm Science & Technology, Inc

Address: 301 Metro Center Blvd, Ste 102, Warwick, RI

Telephone No.: 401-287-0363 Facsimile No.:

For Additional Information, Contact: Amy Hunt

E-mail Address: Ahunt@eaest.com

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

Title: Team Lead

Water Control Plan

Prepared for:

Easton Pond Dam North Spillway Repairs

AMY E. HUNT
No. 9256
REGISTERED
PROFESSIONAL ENGINEER
CIVIL
7/17/2023

June 27, 2023
Revised: July 17, 2023

Easton Pond Dam North Spillway Repairs
General Sequence and Approach

1. Mobilization to site.

2. Complete drawdown of Green End Pond to elevation 5.5 +/- Using 12” pumps (supplied with sound attenuated enclosures/curtains as needed) and in pond outlet pipe at primary spillway and discharging to Easton Pond. Water levels shall be monitored as the drawdown of the pond shall not exceed 3 inches per day. This process is intended to occur throughout the erosion control work and setting up of the temporary cofferdam. (The city of Newport shall have the water level at elev. 7.1 when SumCo arrives on site for the proposed start of work)

3. Set up erosion and sediment controls.

4. Establish site access, laydown and staging areas.

5. Establish temporary cofferdam (Portadam) to elevation 11.5 around the proposed work area within Green End Pond.

6. During the work of the project, maintain pumping as necessary to sustain the pond water levels at or near elevation 5.5.

7. Remove and stock the existing rip rap stone armor for reuse.

8. Demolish and dispose of the existing training walls and weir.

9. Excavate for the proposed training walls and weir. Form and place the new training walls and weir.

10. Complete repairs at the primary spillway. Monitor weather to confirm dry conditions.

11. Remove temporary cofferdam and water control items.
12. Allow for Green End Pond to fill to storage elevation.
13. Restore work, access and staging areas as required.
14. Remove erosion controls.
15. De-mobilize equipment.

Flood Contingency Plan

Water control plans were devised in an effort to minimize the number of workdays that the site will be occupied in an effort to bring the pond levels back to normal stage as quickly as possible.

SumCo will consult long range weather forecasts prior to starting and throughout construction. Work on critical items shall be delayed if weather forecasts predict storm events that could result in flooding of the worksite or overtopping of the cofferdam.

SumCo will monitor and will consider contingency action when 5.03" of rain or more is predicted over a 24-hour period. Weather will be monitored using NOAA's National Weather Service (10-year storm event).

SumCo will not store equipment (except for required pumps and accessories) within the auxiliary spillway of Easton Pond during non-working hours.

SumCo will install a stationary stream gage (elev 4.0 to elev 12.0) within Green End Pond to visually obtain current water elevations. Throughout the project, SumCo will check water levels within Green End Pond and Easton Pond daily, or as needed. Communications between Fuss & O'Neil and the City of Newport will be continuous.

If the contingency plan is implemented, all construction materials not installed will be removed from the work zone and bypass measures will be implemented.

SumCo will provide water control and diversions measures to pass the 10-year storm event. If more than 5.03" of rain is predicted over a 24-hour period, the 12" pumps will be activated to convey excess water within Green End Pond to Easton Pond. SumCo anticipates the use of two (2) pumps capable of pumping up to 6,900 gpm each, in conjunction with the pond outlet pipe and the primary spillway to reduce the anticipated flows to the project area.

SumCo to stockpile rip rap on site to assist with scour protection in the event of a large storm event. Prior to rainfall, install the 'temporary' rip rap within the bank of the pond in locations where the cofferdam could overtop. Further protection of the work area will be accomplished by installing rip rap in excavations and with installing filter fabric over current work and topping with rip rap. As weather will be monitored daily, critical work will not commence if extreme weather is in the forecast. All excavations will be backfilled promptly as allowable.

During non-working hours (i.e. holidays, nights, weekend) SumCo staff will periodically check site when temporary cofferdams are in place and stormy weather is occurring.

The pump within the dewatered area of work will be in operation full time throughout the proposed work, inclusive of a storm event.

Emergency Contacts:

JP Ferreira, Site Foreman	508-922-5597
Ron Ferraiuolo, Team Lead	508-989-0007
Paul DeVirgilio, Superintendent	781-710-2352

SumCo
ECO-CONTRACTING

Water Control Plan

LEGEND

EXIST	PROP	
10+00	10+00	PROJECT ALIGNMENT BASELINE
		EDGE OF WATER
WF 10		WETLAND FLAG AND LINE
		GRAVEL ROAD
		RETAINING WALL
2	4	MINOR CONTOUR
10	20	MAJOR CONTOUR
+		BENCH MARK
	LOD	CONTRACT LIMIT/LIMIT OF DISTURBANCE
		RIPRAP (BARE OR SOIL–FILLED, AS NOTED)
		COFFERDAM

GENERAL NOTES

See Attached General Sequence & Approach

1. FOR THE PURPOSE OF THIS PROJECT

   OWNER CITY OF NEWPORT – WATER DIVISION
   POINT OF CONTACT – ROBERT SCHULTZ, PE, PLS
   70 HALSEY ST,
   NEWPORT, RI 02840

   ENGINEER FUSS & O'NEILL, INC.
   317 IRON HORSE WAY, SUITE 204
   PROVIDENCE

2. ALL CONSTRUCTION INDICATED ON THESE PLANS SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE RHODE ISLAND STATE BUILDING CODE, THE TECHNICAL SPECIFICATIONS INCLUDED IN THIS CONTRACT, AND RIDEM RULES AND REGULATIONS FOR DAM SAFETY. THESE PLANS ARE INCOMPLETE UNLESS ACCOMPANIED BY THE TECHNICAL SPECIFICATIONS INCLUDED IN THE CONTRACT DOCUMENTS.
3. WHERE REFERENCE IS MADE TO ANY STANDARD SPECIFICATION IT SHALL MEAN THE CURRENT EDITION OF THE RHODE ISLAND DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (RIDOT BLUE BOOK).
4. EXISTING FEATURES AND TOPOGRAPHICAL INFORMATION REFLECTED WITHIN ARE BASED UPON A CLASS III SURVEY PERFORMED BY CONTROL POINT ASSOCIATES, INC. (CONTROL POINT) OF SOUTHBOROUGH, MA IN JUNE 2021. CONTROL POINT'S SURVEY WAS LIMITED TO AREAS WITHIN THE PROJECT AREA AT THE AUXILIARY SPILLWAY AND INCLUDES EXISTING FEATURES AND CHANNEL BOTTOM SPOT ELEVATIONS/TOPOGRAPHY. THE BASE PLAN WAS SUPPLEMENTED WITH AERIAL IMAGERY AND 2' LIDAR CONTOURS FROM RIGIS AT THE PRIMARY SPILLWAY.
5. WETLAND FLAGGING WITHIN THE PROJECT LIMITS WAS PERFORMED BY NATURAL RESOURCE SERVICES, INC. ON JUNE 30, 2021 AND FIELD LOCATED USING HAND–HELD GPS.
6. THE ELEVATION DATUM FOR THE PROJECT IS NAVD 1988. HORIZONTAL DATUM REFERENCES NAD 1983.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS.
8. CONSTRUCTION SHALL BE MADE FROM APPROVED SHOP DRAWINGS ONLY.
9. NOTES, TYPICAL DETAILS AND SCHEDULES APPLY TO ALL WORK UNLESS OTHERWISE NOTED. FOR CONDITIONS NOT SPECIFICALLY SHOWN, PROVIDE DETAILS OF SIMILAR NATURE. VERIFY APPLICABILITY BY SUBMITTING SHOP DRAWINGS FOR REVIEW.
10. INFORMATION REGARDING THE LOCATION OF SURROUNDING STRUCTURES, UTILITIES, AND THE AS–BUILT CONFIGURATION AND CONDITION OF THE EXISTING DAM AND SPILLWAY IS FURNISHED SOLELY FOR THE CONVENIENCE OF THE CONTRACTOR AND SHALL BE FIELD VERIFIED. THE CONTRACTOR SHALL CONDUCT ITS OWN INDEPENDENT EXAMINATION OF SITE CONDITIONS FOR THE PURPOSE OF BIDDING, FABRICATION, AND CONSTRUCTION ASSOCIATED WITH THE PROJECT. ANY RELIANCE UPON INFORMATION MADE AVAILABLE BY THE OWNER OR THE ENGINEER SHALL BE AT THE CONTRACTOR'S RISK.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF ALL PROJECT DEMOLITION AND EXCESS MATERIAL IN ACCORDANCE WITH RHODE ISLAND, LOCAL, AND FEDERAL LAWS. NO ONSITE BURNING OR DISPOSAL WILL BE ALLOWED.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE TO ADJACENT STRUCTURES AND UTILITIES AT NO ADDITIONAL COST TO THE OWNER.
13. THE CONTRACTOR SHALL FOLLOW ALL OSHA AND OTHER APPLICABLE FEDERAL, STATE, AND LOCAL STANDARDS FOR ALL PROJECT COMPONENTS AND ACTIVITIES. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL SITE SAFETY PROCEDURES AND PRACTICES REGARDLESS OF THE PRESENCE OR ACTIONS OF THE OWNER OR ENGINEER.
14. ALL CONSTRUCTION ACTIVITIES SHALL BE CONFINED TO THE LIMITS OF WORK DEFINED HEREIN.
15. CONTRACTOR WILL BE REQUIRED TO SUBMIT A CONSTRUCTION SCHEDULE TO THE OWNER WITHIN 5 DAYS OF THE NOTICE OF AWARD.
16. CONTRACTOR SHALL STAGE ALL EQUIPMENT IN THE DESIGNATED STAGING AREA. ALL GREASING AND REFUELING ACTIVITIES SHALL OCCUR IN THE STAGING AREA.
17. NO WORK OR DISCHARGES, OTHER THAN THAT SHOWN, SHALL BE PERFORMED WITHIN WETLANDS WITHOUT FIRST RECEIVING PROPER PERMITS FROM THE REGULATORY AGENCIES HAVING JURISDICTION OVER ALL OR PORTIONS OF THE WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING, RESTORING AND REPAIRING ALL DAMAGE AS A RESULT OF UNAUTHORIZED WORK OR DISCHARGES TO THE WETLAND AREA AT NO ADDITIONAL COST TO THE OWNER.
18. CONTRACTOR SHALL NOTIFY UTILITY LOCATOR SERVICE AT LEAST 72 HOURS BEFORE STARTING EXCAVATION.

    RHODE ISLAND: "CALL BEFORE YOU DIG" AT 1–888–344–7233.

19. CONTRACTOR WILL BE REQUIRED TO ATTEND WEEKLY PROGRESS MEETINGS AS REQUESTED BY THE OWNER/ENGINEER.

DEMOLITION NOTES

1. DEMOLITION ACTIVITY SHALL CONFORM TO CURRENT AIR POLLUTION CONTROL REGULATIONS. THE CONTRACTOR SHALL IMPLEMENT MEASURES TO ALLEVIATE DUST, NOISE, AND ODOR NUISANCE CONDITIONS THAT MAY OCCUR DURING THE DEMOLITION ACTIVITIES.
2. CONTRACTOR SHALL SUBMIT A SCHEDULE OF DEMOLITION AND REMOVAL PRIOR TO STARTING THE WORK.
3. PRIOR TO DEMOLISHING THE AUXILIARY SPILLWAY CREST, THE CONTRACTOR SHALL PROVIDE A SUBMITTAL INDICATING THE FIELD VERIFIED AUXILIARY SPILLWAY CREST ELEVATION.

LOAM AND SEED NOTES

1. CONTRACTOR SHALL APPLY FERTILIZER TO PREPARED TOPSOIL SURFACE AT THE RATES INDICATED IN THE PROJECT SPECIFICATIONS.
2. CONTRACTOR SHALL ESTABLISH VEGETATIVE COVER TO AREAS DISTURBED BY CONSTRUCTION AS INDICATED IN THE PROJECT SPECIFICATIONS.
3. CONTRACTOR SHALL PROTECT SEEDED AREAS WITH EROSION CONTROL BLANKETS OR APPROVED EQUIVALENT.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING SEEDED AREA THROUGH ONE GROWING SEASON, MAINTENANCE INCLUDES MOWING, WATERING, AND RE–SEEDING AS REQUIRED TO DEVELOP A SATISFACTORY STAND OF HEALTHY GRASS AS DEFINED IN THE PROJECT SPECIFICATIONS.

WATER CONTROL NOTES

*1. THE CONTRACTOR IS RESPONSIBLE FOR PERFORMING A TEMPORARY PROJECT RELATED DRAWDOWN THE TEMPORARY, PROJECT RELATED DRAWDOWN SHALL NOT EXCEED A RATE OF 3 INCHES/DAY BEYOND THE CITY'S DRAW–OFF FOR MUNICIPAL WATER USE. THE TEMPORARY PROJECT RELATED DRAWDOWN SHALL NOT BE INITIATED PRIOR TO MARCH 1, 2022.

2. THE CONTRACTOR SHALL PREPARE AND SUBMIT A CONTROL OF WATER PLAN PRIOR TO CONSTRUCTION.
3. MONITOR DAILY FORECASTS FROM THE NATIONAL WEATHER SERVICE AND THE NATIONAL HURRICANE CENTER AND PREPARE ACCORDINGLY.
4. THE CONTRACTOR SHALL PROVIDE TEMPORARY COFFERDAMS WITHIN THE UPSTREAM OR DOWNSTREAM AREA AND PROVIDE PUMPS OR OTHER MEANS OF DEWATERING AS NECESSARY TO FACILITATE CONSTRUCTION IN THE DRY. EARTHEN COFFERDAMS OR DISCHARGE OF OTHER FILLS WHICH CANNOT BE REMOVED IN THEIR ENTIRETY SHALL NOT BE PERMITTED.
5. THE ROUTINE OPERATION OF THE OUTLET TO DRAW WATER FOR MUNICIPAL USE AND THE TEMPORARY PROJECT RELATED DRAWDOWN SHALL BE INITIATED AND MAINTAINED BY THE OWNER, PRIOR TO CONTRACTOR'S MOBILIZATION.
6. THE IMPOUNDMENT LEVEL SHALL BE RESTORED TO THE ROUTINE OPERATIONAL LEVEL NO LATER THAN NOVEMBER 30, 2022.

ABBREVIATIONS

GENERAL		UTILITY	
APPROX	APPROXIMATE	PVC	POLYVINYL CHLORIDE PIPE
ELEV	ELEVATION		
EXIST	EXISTING		
MAX	MAXIMUM		
MIN	MINIMUM		
NTS	NOT TO SCALE		
PROP	PROPOSED		
TYP	TYPICAL		
R&D	REMOVE AND DISPOSE		
R&S	REMOVE AND STOCKPILE		
TW	TOP OF WALL		
BW	BOTTOM OF WALL		

~~RECOMMENDED CONSTRUCTION SEQUENCE~~

~~IT IS ANTICIPATED THAT THE FOLLOWING GENERAL CONSTRUCTION SEQUENCE MAY BE FOLLOWED: (SOME ACTIVITIES MAY OCCUR CONCURRENTLY AND CONTRACTOR MAY ADJUST THE ORDER OF WORK TO FACILITATE CONTRACTOR'S MEANS AND METHODS.)~~

1. ~~INSTALL THE TEMPORARY WATER CONTROL SYSTEM AND DRAWDOWN THE POND TO EL. 5.5 FT (4.62 FT BELOW THE AUXILIARY SPILLWAY), IF REQUIRED TO SUPPLEMENT THE CITY'S DRAWDOWN FOR MUNICIPAL WATER.~~
2. ~~INSTALL EROSION AND SEDIMENT CONTROL DEVICES INCLUDING STRAW BALES, SILT FENCE, AND TURBIDITY BARRIERS.~~
3. ~~ACCESS THE SITE; ESTABLISH ACCESS ROADWAYS, WORKING PLATFORMS, STAGING AREAS, AND CONSTRUCTION ACCESS APRON.~~
4. ~~CLEAR VEGETATION AS REQUIRED TO COMPLETE THE WORK.~~
5. ~~DEMOLISH AND DISPOSE OF THE STONE MASONRY WALLS, REMOVE AND STOCKPILE THE STONE MASONRY WEIR AND STONE ARMOR TO BE RESET TO RESTORE THE EXISTING STONE ARMOR APRON AFTER CONSTRUCTION.~~
6. ~~CONSTRUCT THE PROPOSED CAST IN PLACE CONCRETE FOOTING, WEIR, AND TRAINING WALLS AT THE AUXILIARY SPILLWAY.~~
7. ~~COMPLETE THE REPAIRS AT THE PRIMARY SPILLWAY, IF WORK FOR ADD/ALT. 1 IS CHOSEN BY THE OWNER.~~
8. ~~RESTORE THE IMPOUNDMENT TO THE NORMAL OPERATING LEVEL.~~
9. ~~LOAM AND SEED THE WORK AREA, STAGING AREAS, AND OTHER AREAS DISTURBED BY CONSTRUCTION ACTIVITIES. REMOVE EROSION AND SEDIMENTATION CONTROL DEVICES ONCE THE TURF IS ESTABLISHED.~~
10. ~~RESTORE ALL DISTURBED AREAS OF THE SITE AND DEMOBILIZE.~~
11. ~~RESTORE THE IMPOUNDMENT LEVEL.~~

EROSION CONTROL NOTES

1. WORK IS ANTICIPATED TO BE COMPLETED FROM SEPTEMBER 2022 TO FEBRUARY 2023.
2. DISTURBANCE OF SOIL SURFACES IS REGULATED BY STATE LAW AND LOCAL ORDINANCE. ALL WORK SHALL COMPLY WITH THE FOLLOWING CRITERIA TO PREVENT OR MINIMIZE SOIL EROSION.
3. THE CONTRACTOR IS RESPONSIBILE TO CLEAN ROADS, CONTROL DUST, AND TAKE ALL NECESSARY MEASURES TO ENSURE THAT THE SITE AND ALL ROADS BE MAINTAINED IN A MUD– AND DUST–FREE CONDITION AT ALL TIMES THROUGHOUT THE LIFE OF THE CONTRACT.
4. THE CONTRACTOR SHALL USE THE LATEST EDITION OF THE "STATE OF RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK" AS A GUIDE IN CONSTRUCTING THE EROSION AND SEDIMENT CONTROLS INDICATED ON THE PLANS. ALL EROSION AND SEDIMENT CONTROL MEASURES OR WORKS AND REHABILITATION MEASURES MUST CONFORM TO OR EXCEED THE SPECIFICATIONS OR STANDARDS SET OUT IN THIS HANDBOOK.
5. THE CONTRACTOR SHALL INSPECT EROSION AND SEDIMENT CONTROL DEVICES AT THE END OF EACH WORKING DAY, AFTER EACH STORM EVENT, AND AT LEAST DAILY DURING PROLONGED RAINFALL. REPAIR OR REPLACEMENT SHOULD BE MADE PROMPTLY AS NEEDED.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE TIMELY INSTALLATION, INSPECTION, MAINTENANCE, AND/OR REPLACEMENT OF ALL TEMPORARY AND PERMANENT EROSION CONTROL DEVICES TO ENSURE PROPER OPERATION THROUGHOUT THE LIFE OF THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF PERMANENT MEASURES UNTIL CONSTRUCTION OF THE PROJECT IS COMPLETED OR UNTIL IT IS ACCEPTED BY THE OWNER. THE OWNER IS RESPONSIBLE THEREAFTER.
7. ALL PROPOSED CONSTRUCTION ENTRANCES SHALL BE CONSTRUCTED AS SHOWN ON THE PLANS AND DETAILS. ALL VEHICLE TRAFFIC ENTERING OR EXITING THE PROJECT SITE SHALL PASS OVER THE CONSTRUCTION ENTRANCES TO REDUCE THE TRACKING OR FLOWING OF SEDIMENT ONTO THE SURROUNDING ROADWAYS. ADDITIONAL ENTRANCES FOR CONSTRUCTION PHASING SHALL BE INSTALLED AS REQUIRED TO PREVENT TRACKING OF SEDIMENT ONTO ROADWAYS.
8. THE CONTRACTOR SHALL INSTALL ALL PERIMETER SEDIMENT CONTROL BARRIERS AS SHOWN ON THE PLANS. A ROW OF STAKED HAYBALES OR A SILT FENCE SHALL ALSO BE INSTALLED AROUND ANY SOIL STOCKPILE AREAS.
9. ANY EXISTING STORMWATER DRAINAGE STRUCTURES WHICH MAY BE SUBJECT TO SEDIMENTATION PROCESSES, INCLUDING INLET/OUTLET STRUCTURES AND OUTFALL AREAS SHALL BE PROTECTED WITH STAKED HAYBALES, SILT SACKS, OR OTHER APPROVED MEASURES THROUGHOUT THE ENTIRE CONSTRUCTION PERIOD.

   THE PROPER INLET PROTECTION DEVICES SHALL BE INSTALLED AND MAINTAINED WHERE STORM DRAIN INLETS ARE TO BE MADE OPERATIONAL BEFORE PERMANENT STABILIZATION OF ANY DISTURBED DRAINAGE AREA.

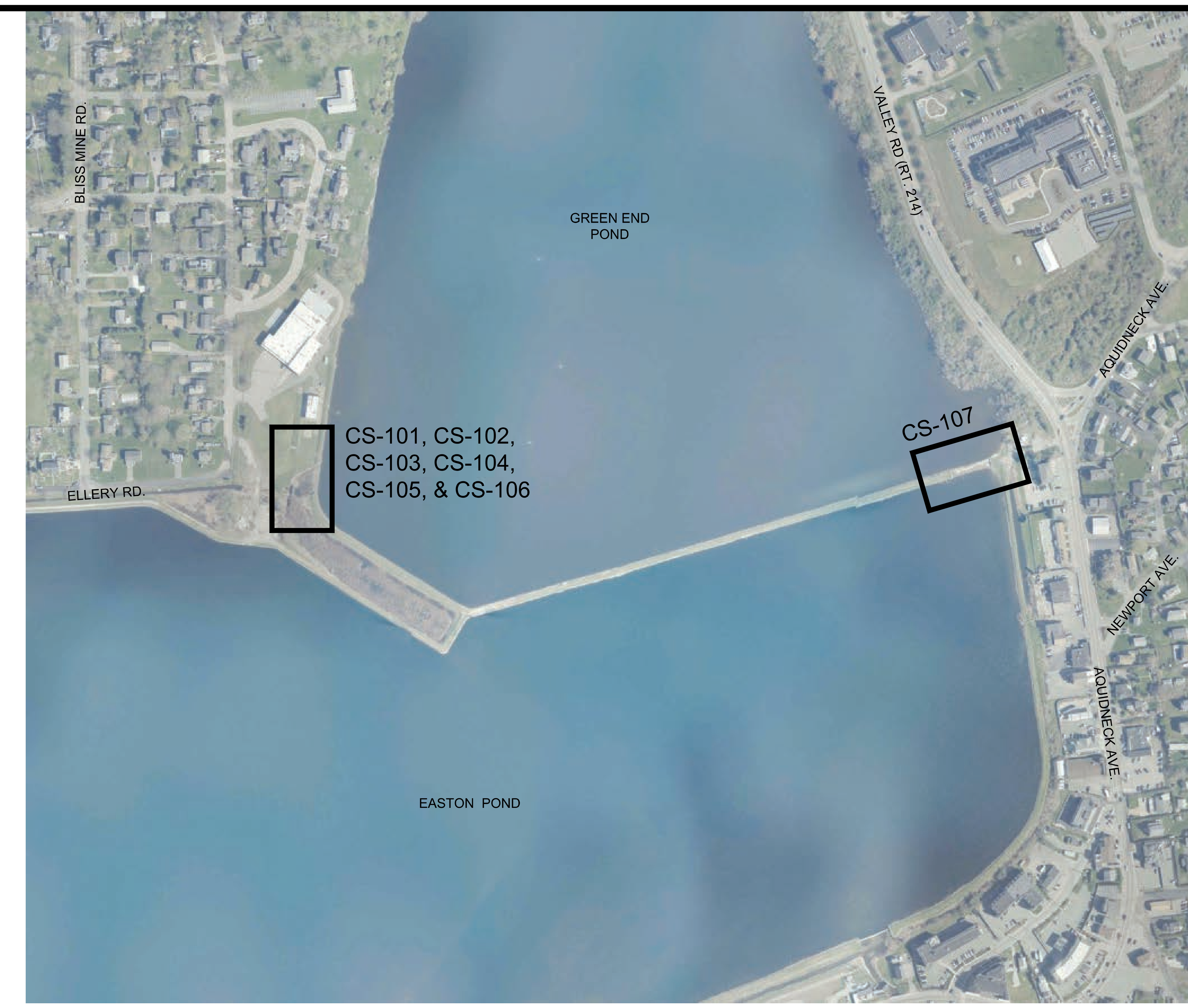
10. CONTRACTOR SHALL FURNISH, INSTALL, TEST, OPERATE, MONITOR, AND MAINTAIN AN ACTIVE GROUNDWATER DEWATERING SYSTEM (E.G., SUMP PUMPS, DEWATERING SYSTEM), AND WHATEVER ADDITIONAL BULKHEADS, CULVERTS, DITCHING, PUMPS AND DIKING OR OTHER APPROVED EQUIPMENT, MATERIALS AND METHODS PRIOR TO CONSTRUCTION.

    INSTALL A DEWATERING SYSTEM TO KEEP SUBGRADES FIRM AND UNYIELDING, AND CONVEY GROUND WATER AWAY FROM EXCAVATIONS AND WORK AREA. MAINTAIN DEWATERING UNTIL STRUCTURES, PIPES AND APPURTENANCES WILL NOT BE DAMAGED BY SURFACE OR GROUNDWATER. MAINTAIN UNTIL DEWATERING IS NO LONGER REQUIRED. ALL SUCH DEWATERING MATERIALS AND EQUIPMENT SHALL BE INSTALLED, OPERATED AND MAINTAINED ALONG WITH APPROPRIATE EROSION AND SEDIMENT CONTROLS TO ENSURE THAT NO SEDIMENT IS DISCHARGED TO SOUTH EASTON POND OR THE MOAT CHANNEL.

11. PUMP DISCHARGES SHALL BE MANAGED SUCH THAT THESE DO NOT CAUSE EROSION OF SOILS. PUMP INTAKES SHALL BE FLOATED TO MINIMIZE SEDIMENTATION. PUMPED WATER SHALL BE DISCHARGED INTO A DEWATERING AREA WHICH IS SURROUNDED BY A TIGHT ENCLOSURE OF SILT FENCE AND/OR HAY BALES OR OTHER CONTROL DEVICE (I.E., SILT BAG), SO AS TO FILTER MUDDY WATER PRIOR TO ITS RETURN TO THE WATERCOURSE. THE DISCHARGE OF THE PUMPED WATER SHALL BE ONTO AN EROSION FREE SURFACE SUCH AS A RIPRAP APRON SO AS TO AVOID ADDITIONAL SUSPENSION OF SOIL. WATER SHALL ONLY BE ALLOWED TO DISCHARGE DIRECTLY INTO THE WATERCOURSE AFTER IT IS RUNNING CLEAR WITHOUT ANY SUSPENDED SEDIMENT OR SILT.

SPILL PREVENTION AND EMERGENCY RESPONSE NOTES

1. WASTE DISPOSAL: MATERIALS WHICH COULD BE A POTENTIAL SOURCE OF STORMWATER POLLUTION SUCH AS GASOLINE, DIESEL FUEL, HYDRAULIC OIL, ETC., SHALL BE STORED AT THE END OF EACH DAY IN A STORAGE TRAILER OR COVERED LOCATION AND TAKEN OFF–SITE AND PROPERLY DISPOSED OF. ALL TYPES OF WASTE GENERATED AT THIS SITE SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH STATE LAW AND/OR REGULATIONS.
2. ANY INADVERTENT OR DELIBERATE DISCHARGE OF WASTE OIL OR ANY OTHER POLLUTANT TO THE STORMWATER DISPOSAL SYSTEM REQUIRES IMMEDIATE NOTIFICATION TO THE RIDEM OIL POLLUTION CONTROL PROGRAM AT 401–277–2284, AS PER THE OIL POLLUTION CONTROL REGULATIONS. DURING NON–WORKING HOURS, NOTIFICATION OF SPILLS CAN BE MADE TO THE RIDEM DIVISION OF ENFORCEMENT AT 401–277–3070 (THE 24–HOUR EMERGENCY RESPONSE PHONE NUMBER). THE NEWPORT WATER TREATMENT FACILITY–STATION 1 AND/OR THE NEWPORT WATER DIVISION AND THE WATER POLLUTION CONTROL DIVISION SHALL BE NOTIFIED IMMEDIATELY (70 HALSEY STREET, NEWPORT, 401–845–5600).
3. ANY INCIDENT OF GROUNDWATER CONTAMINATION RESULTING FROM THE IMPROPER DISCHARGE OF POLLUTANTS TO THE STORMWATER DISPOSAL SYSTEM SHALL BE THE RESPONSIBILITY OF THE PROPERTY OWNER AS WELL AS ANY OTHER PARTIES THAT THE RIDEM DETERMINES TO BE RESPONSIBLE FOR THE CONTAMINATION. PURSUANT TO STATE LAWS AND REGULATIONS, THE RIDEM MAY REQUIRE THE PROPERTY OWNER AND OTHER RESPONSIBLE PARTIES TO REMEDIATE ANY INCIDENTS THAT MAY ADVERSELY IMPACT GROUNDWATER QUALITY.
4. THE CONTRACTOR WILL CREATE A MAINTENANCE LOG, SHOWING THE DATE, TIME, NAME OF INSPECTOR, INSPECTION COMMENTS, AND ANY ACTIONS TAKEN BASED ON THE ABOVE REFERENCE SCHEDULE.



INDEX PLAN

SCALE: 1"=300'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
0	7/20/2022	ISSUED FOR CONSTRUCTION	KB/AJ	PWM

SEAL

PHILIP W. MORESCHI
No. 7428
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88

300 150 0 300
GRAPHIC SCALE

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

CITY OF NEWPORT

GENERAL NOTES AND LEGEND

EASTON POND NORTH DAM SPILLWAY REPAIRS

NEWPORT/MIDDLETOWN RHODE ISLAND

PROJ. No.: 20060901.D64
DATE: JULY 2022

CN-001

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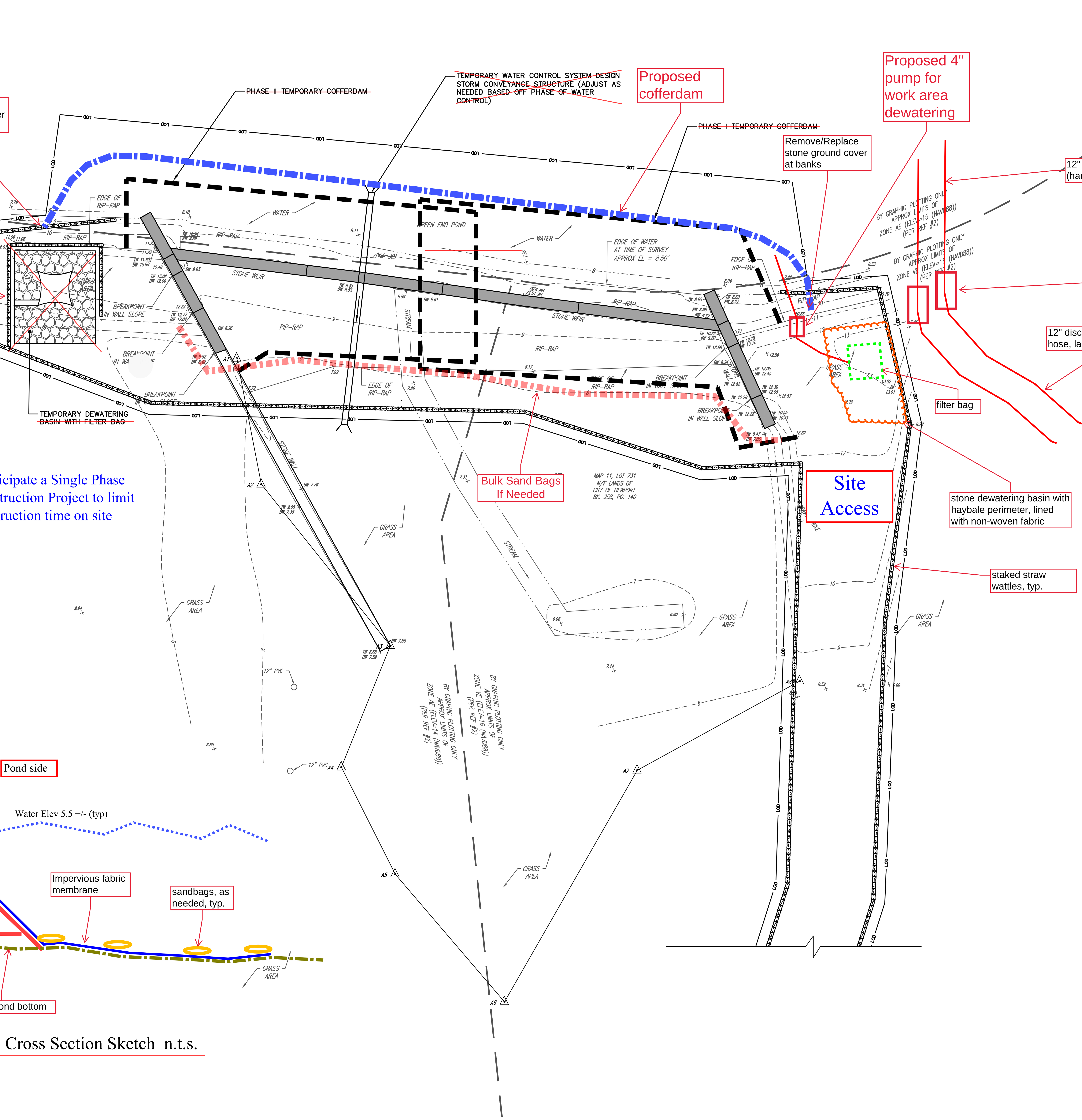
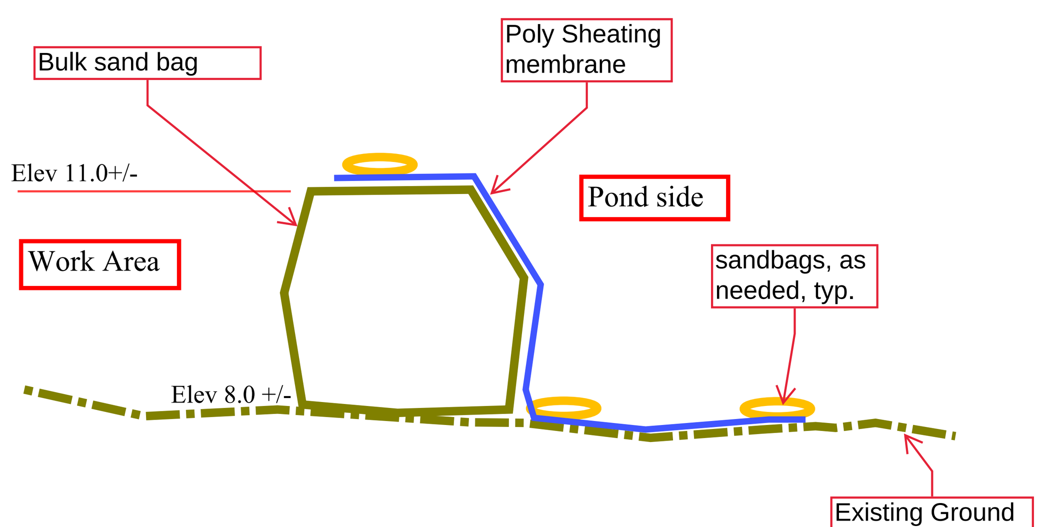
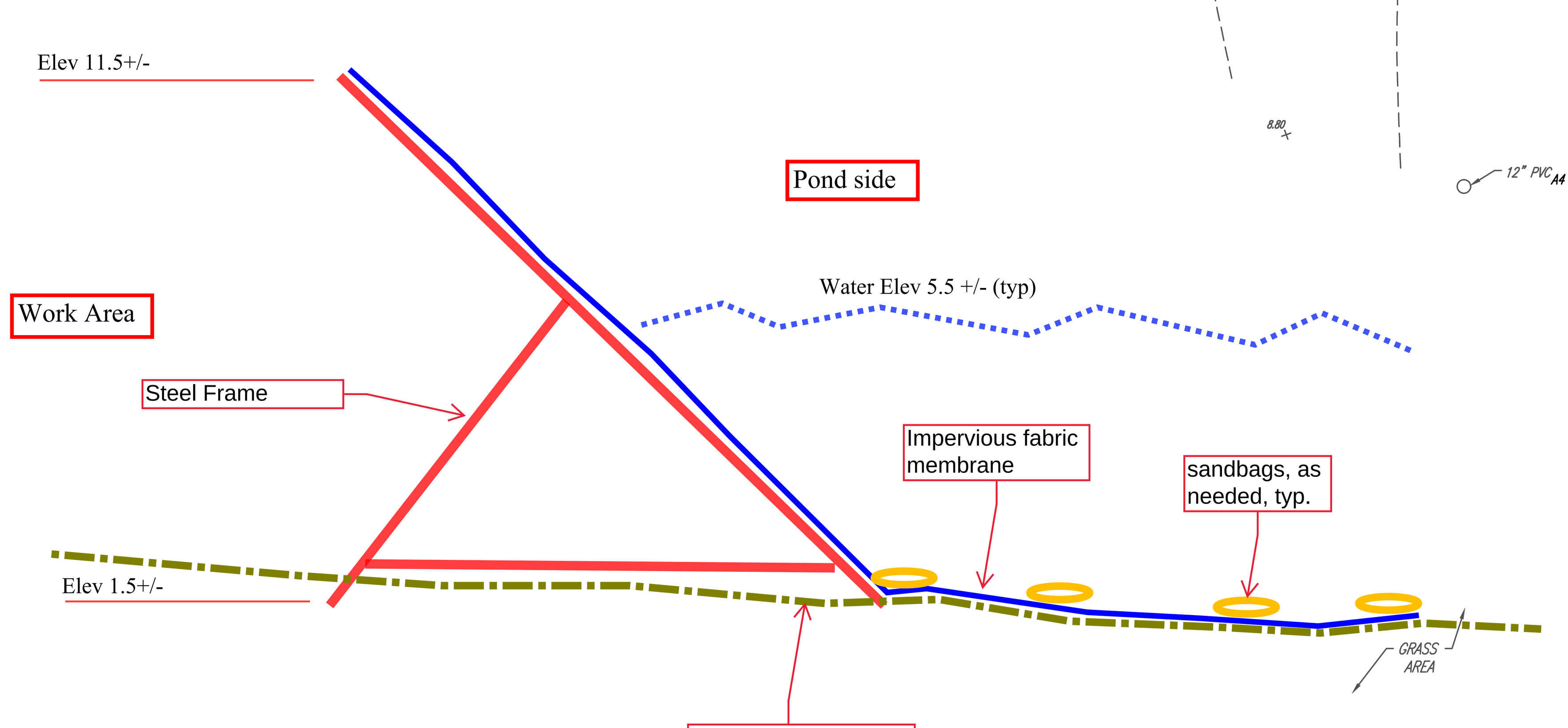




Bulk Sand Bag Detail n.t.s.



Portadam (cofferdam) Cross Section Sketch n.t.s.

WATER CONTROL NOTES:

THE FOLLOWING CONCEPTUAL WATER CONTROL SEQUENCE IS PROPOSED. THE TEMPORARY WATER CONTROL SYSTEM IS SUBJECT TO THE CONTRACTOR'S MEANS AND METHODS. THE CONTRACTOR SHALL SUBMIT A TEMPORARY WATER CONTROL PLAN DESIGNED AND STAMPED BY A PROFESSIONAL ENGINEER FOR REVIEW 15 DAYS PRIOR TO THE START OF CONSTRUCTION. THE TEMPORARY WATER CONTROL SYSTEM SHALL BE DESIGNED TO ACCOMMODATE A 10 YEAR DESIGN STORM:

1. THE CONTRACTOR SHALL PERFORM A TEMPORARY PROJECT RELATED DRAWDOWN OF THE POND TO EL. 5.5 FEET (4.62 FT BELOW THE AUXILIARY SPILLWAY CREST.
2. ~~THE CONTRACTOR SHALL INSTALL THE PHASE I TEMPORARY COFFERDAM TO COMPLETE THE WORK ON THE LEFT SIDE OF THE SPILLWAY (WHEN LOOKING DOWNSTREAM). COFFERDAMS SHALL PROTECT TO A PEAK WATER SURFACE ELEVATION OF 11.5 FT.~~
3. ~~UPON COMPLETION OF THE CONSTRUCTION ON THE LEFT SIDE OF THE SPILLWAY, THE CONTRACTOR SHALL REMOVE THE PHASE I COFFERDAM AND INSTALL THE PHASE 2 COFFERDAM TO PERFORM THE WORK ON THE RIGHT SIDE OF THE SPILLWAY (WHEN LOOKING DOWNSTREAM).~~
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A FLOOD CONTINGENCY PLAN OUTLINING MEASURES TO PROTECT THE WORK AREA DURING EXTREME INFLOW EVENTS BETWEEN THE 10 YEAR EVENT AND THE 100 YEAR STORM EVENT. THE ENGINEER SHALL PROVIDE PREVIOUS HYDROLOGIC AND HYDRAULIC EVALUATIONS FOR THE PURPOSE OF ESTABLISHING THE INFLOW ASSOCIATED WITH EXTREME INFLOW EVENTS IN EXCESS OF THE 10 YEAR EVENT.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
0	7/20/2022	ISSUED FOR CONSTRUCTION	KB/AJ	PWM

SEAL

PHILIP W. MORESCHI
No. 7428
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SCALE:
HORZ.: 1"= 10'
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
10 5 0 10
GRAPHIC SCALE

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

CITY OF NEWPORT

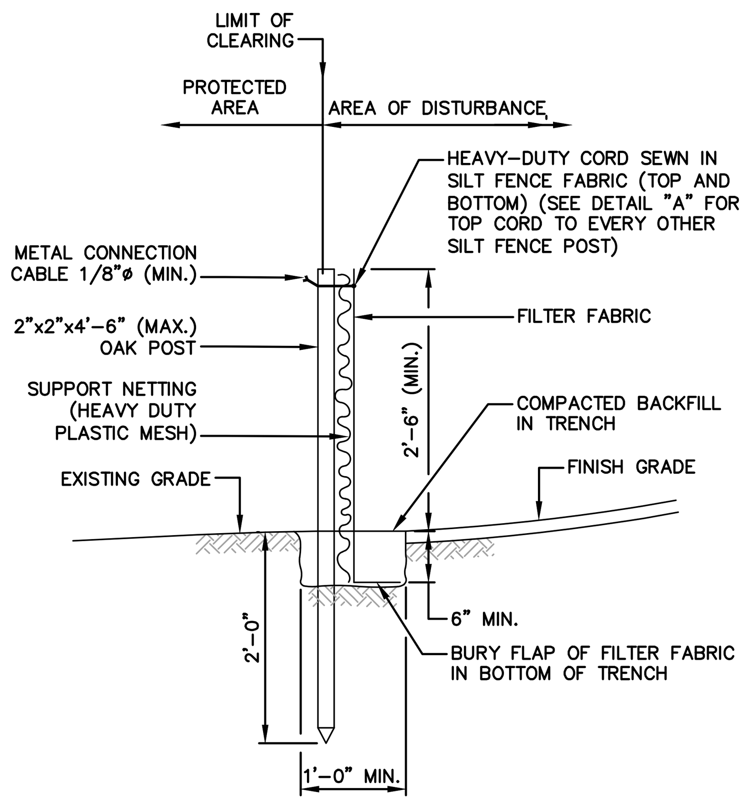
WATER CONTROL PLAN - AUXILIARY SPILLWAY

EASTON POND NORTH DAM SPILLWAY REPAIRS

NEWPORT/MIDDLETOWN RHODE ISLAND

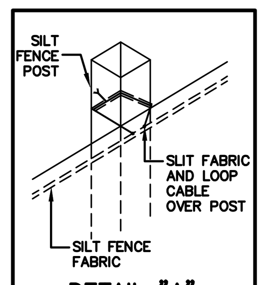
PROJ. No.: 20060901.D64
DATE: JULY 2022

CS-106



NOTES:

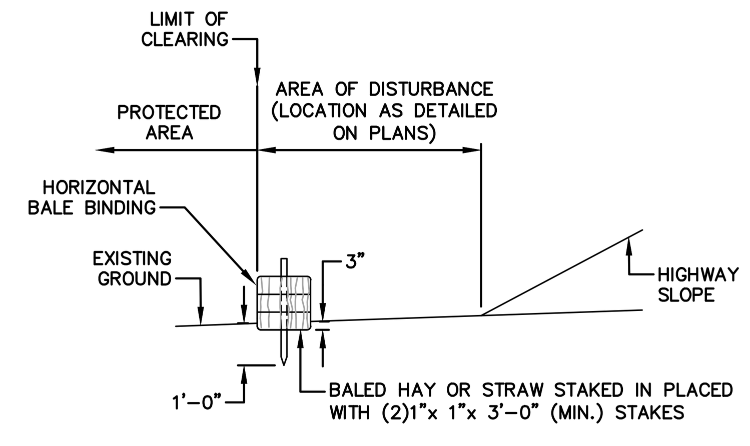
1. SHALL BE IN ACCORDANCE WITH SECTION 206 OF THE R.I. STANDARD SPECIFICATIONS.
2. 2"x2"x4'-6" (MAX.) OAK POSTS FOR SILT FENCE SHALL BE LOCATED 8'-0" (MAX.) O.C. IN WETLAND AREAS AND 4'-0" (MAX.) O.C. IN WETLAND RAVINE, GULLY OR DROP-OFF AREAS AS SHOWN ON PLANS.
3. 1"x1"x4"-6" (MIN.) POSTS PERMITTED FOR PRE-FABRICATED SILT FENCE.
4. SILT FENCE SHALL BE INSTALLED BEFORE ANY GRUBBING OR EARTH EXCAVATION TAKES PLACE.



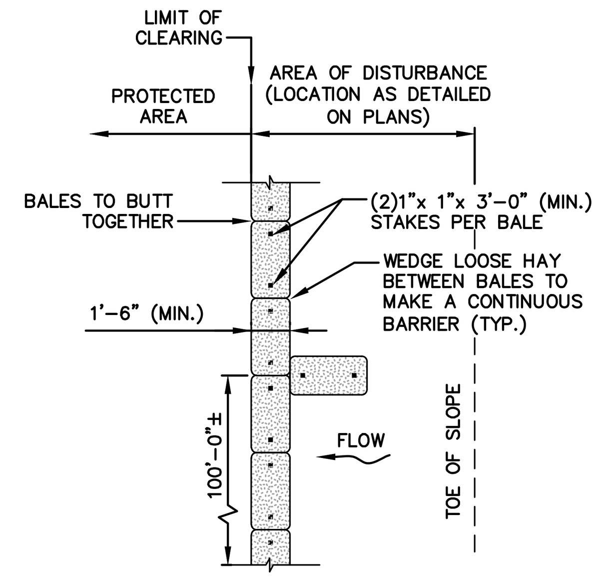
DETAIL "A"

SILT FENCE DETAIL (R.I. STD. 9.2.0)

NOT TO SCALE



ELEVATION



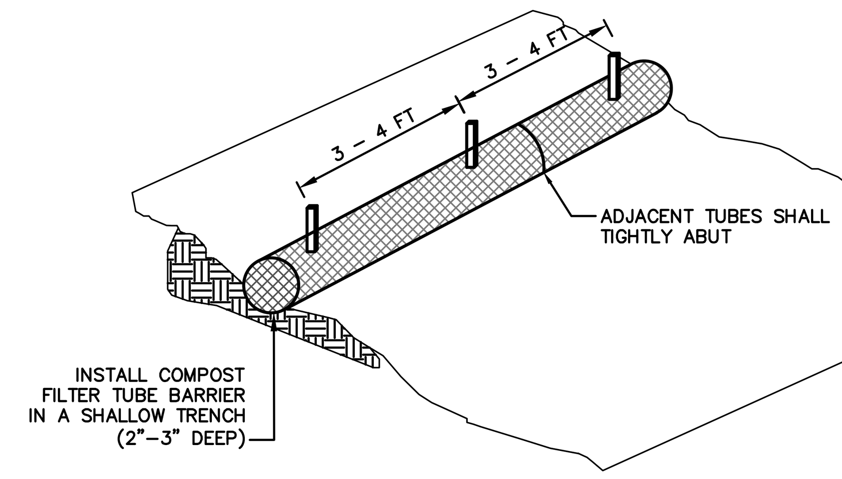
PLAN

NOTES:

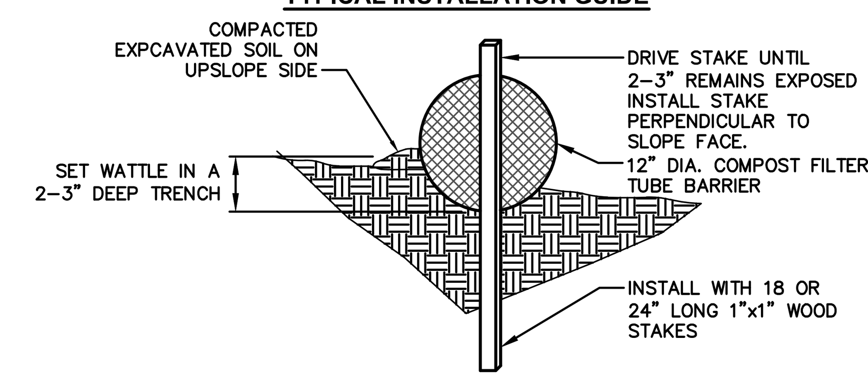
1. SHALL BE IN ACCORDANCE WITH SECTION 206 OF THE R.I. STANDARD SPECIFICATIONS.
2. TO BE USED WHERE THE EXISTING GROUND SLOPES AWAY FROM THE HIGHWAY EMBANKMENT AS CALLED FOR ON PLANS.
3. AT APPROXIMATE 100'-0" INTERVALS A BALE OF HAY IS TO BUTT PERPENDICULARLY.

BALED HAY EROSION CHECK (R.I. STD. 9.1.0)

NOT TO SCALE



TYPICAL INSTALLATION GUIDE



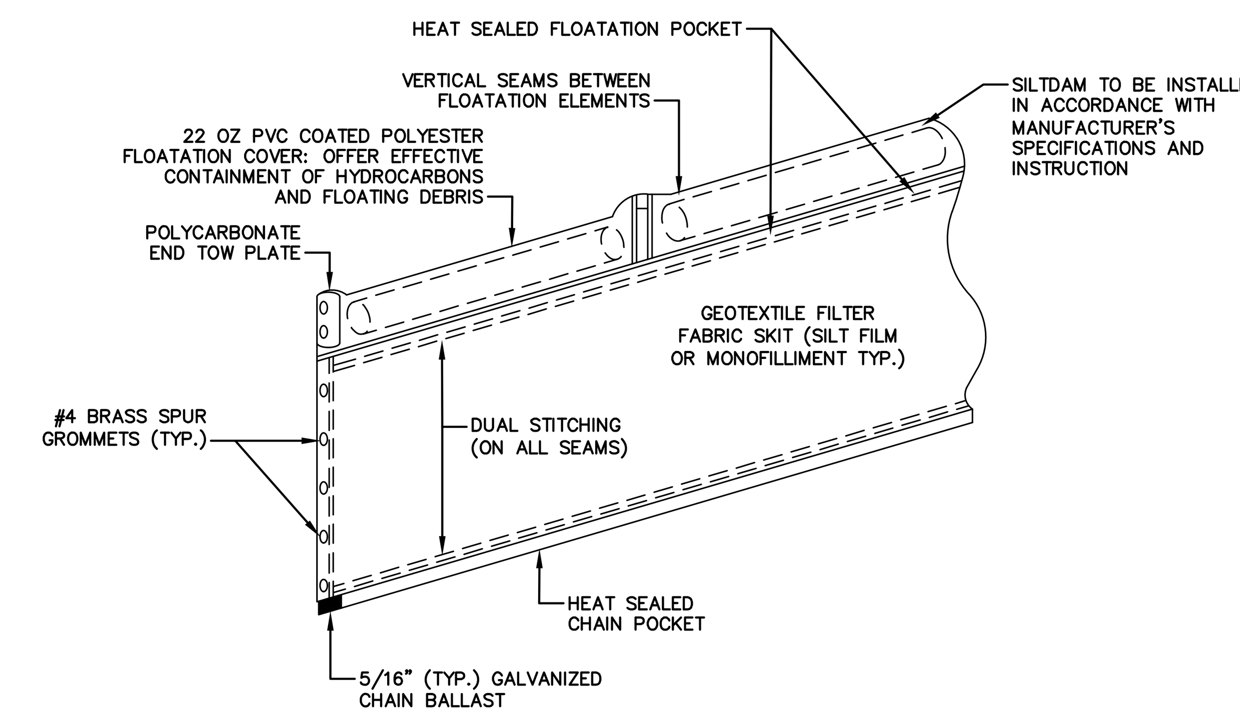
ENTRENCHMENT

NOTES:

1. 12-INCH DIAMETER STRAW WATTLE BARRIER SHALL BE INSTALLED WHERE INDICATED ON THE CONTRACT DRAWINGS AND BE CONSTRUCTED OF 100% BIODEGRADABLE MATERIAL. A ROW OF STRAW WATTLE BARRIERS (WEIGHTED DOWN AND NOT STAKED) SHALL ALSO BE INSTALLED AROUND ANY SOIL STOCKPILE AREAS UTILIZED BY THE CONTRACTOR DURING CONSTRUCTION.
2. STRAW WATTLE BARRIERS SHALL BE TRENCHED APPROXIMATELY 2-3 INCHES AND STAKED SUCH THAT IT DIRECTLY CONTACTS SOIL AND PREVENTS UNDERMINING OR BLOWOUTS. THE TRENCH SHALL BE APPROXIMATELY 9 INCHES WIDE. STAKES SHALL BE DRIVEN THROUGH THE CENTER OF EACH STRAW WATTLE TUBE AT A SPACING OF 3-4 FEET ON CENTER AND NO GREATER THAN 6" FROM EACH END OF THE COMPOST FILTER TUBE. STAKES SHALL BE 1-INCH BY 1-INCH WOODEN STAKES WITH A LENGTH OF 18-24 INCHES. COMPACT SOIL EXCAVATED TO CREATE A TRENCH ON THE UPHILL SIDE SIDE.
3. ENDS OF ADJACENT STRAW WATTLE TUBES SHALL BE TIGHTLY BUTTED OR OVERLAPPED SO THAT NO OPENING EXISTS FOR WATER TO PASS THROUGH. STRAW WATTLE TUBES SHALL BE FREE OF DAMAGE OR DEFECTS WHEN DELIVERED TO THE SHIPPER. NO VEHICLES SHALL BE DRIVEN OVER THE TUBES.

STRAW WATTLE BARRIER

NOT TO SCALE

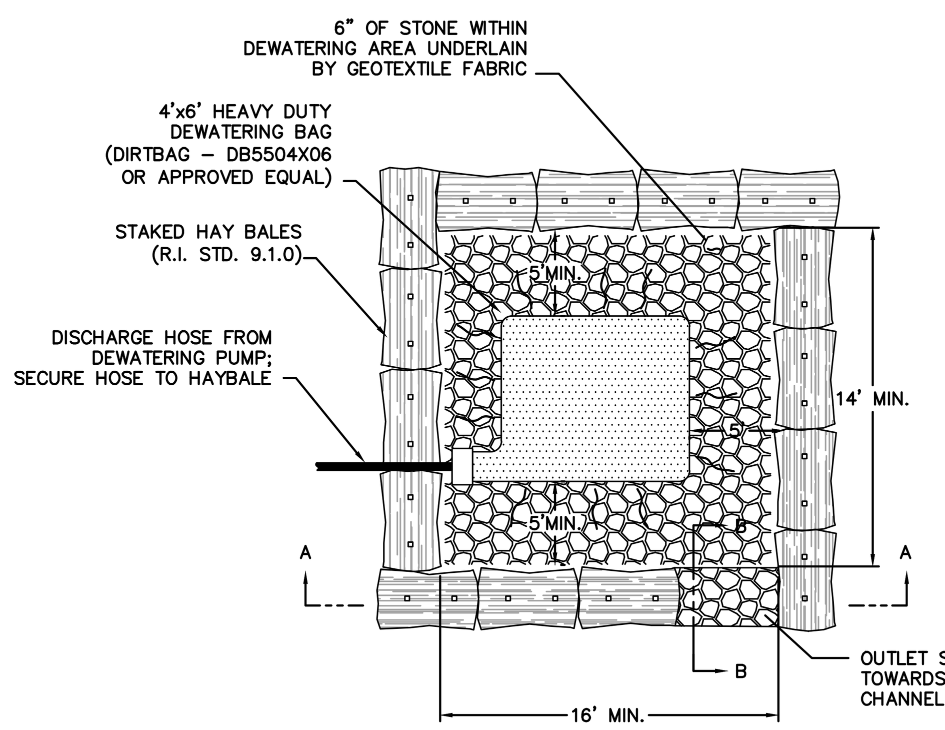


NOTES:

1. FLOATATION SIZE (6", 8" OR 12" DIA.) DETERMINED BY SKIRT DEPTH/SITE VARIABLES.
2. OTHER END TYPES AVAILABLE SUCH AS ALUMINUM UNIVERSAL SLIDE OR SLOTTED TUBE.
3. OPTIONAL TOP TENSION CABLE (5/16" TYP.) AVAILABLE FOR INCREASED STRENGTH.

SILTDAM FLOATING TURBIDITY BARRIER

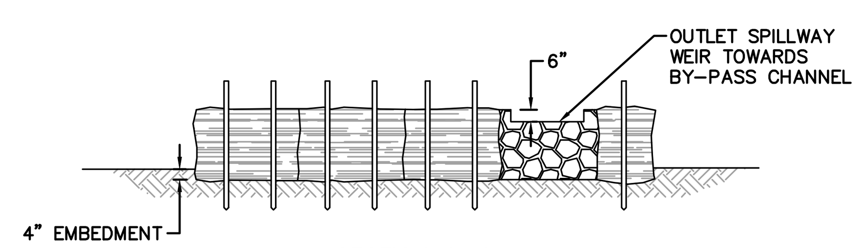
NOT TO SCALE



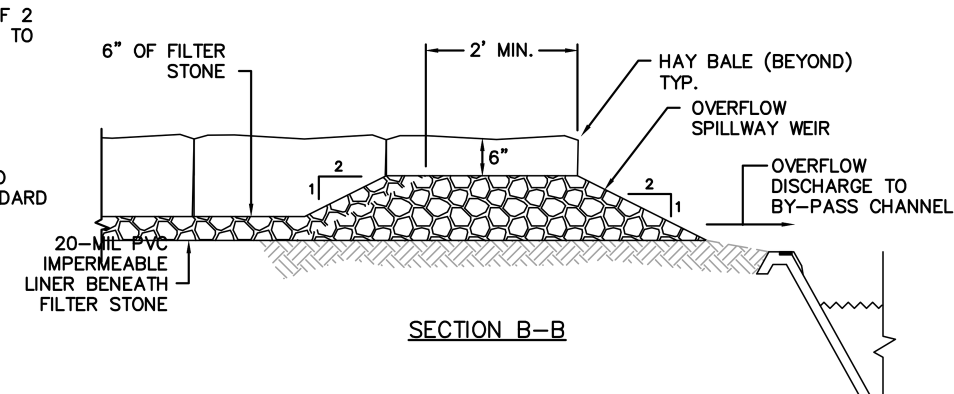
PLAN

NOTES:

1. HAY BALES FOR EROSION CONTROL SHALL CONFORM TO SECTION 206 OF THE RIDOT STANDARD SPECIFICATIONS INCLUDING MATERIALS AND CONSTRUCTION METHODS.
2. BALES OF HAY SHALL BE FASTENED WITH WIRE AND HAVE A MINIMUM SIZE OF 1'x1.5'x3'.
3. FILTER STONE SHALL CONSIST OF 2 INCH MINUS STONE CONFORMING TO FS-2 FILTER STONE PER SUBSECTION M10.03.1 OF THE STANDARD SPECIFICATIONS.
4. FILTER FABRIC SHALL BE A NON-WOVEN GEOTEXTILE FILTER FABRIC AND SHALL CONFORM TO SECTION 206.02.2 OF THE STANDARD SPECIFICATIONS.



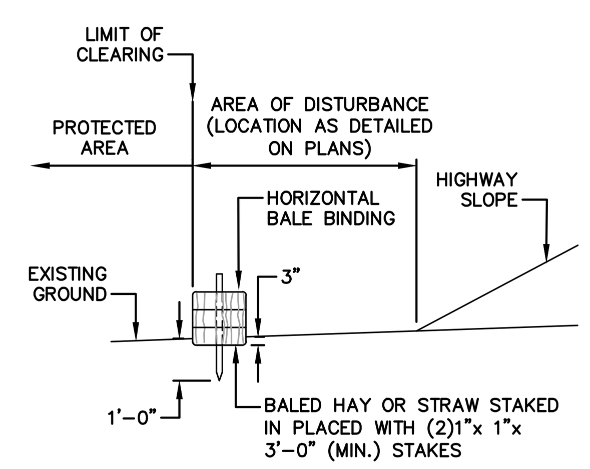
SECTION A-A



SECTION B-B

NOTES:

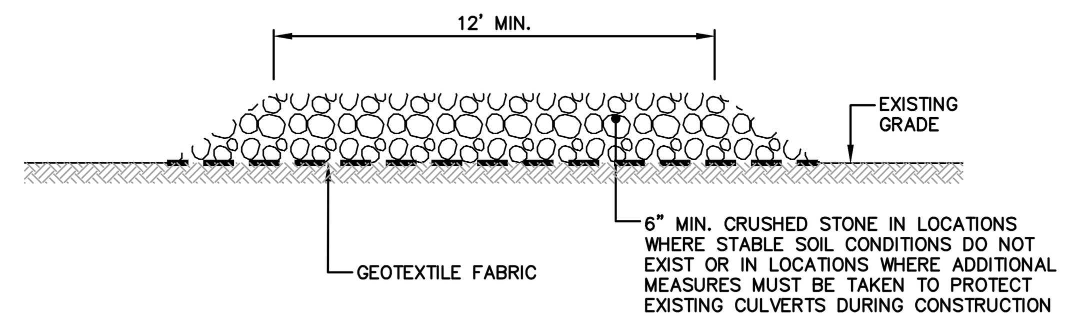
1. THE DEWATERING BAG, DIRTBAG® DB55 OR APPROVED EQUAL, SHALL BE HEAVY DUTY AND CONSIST OF A NONWOVEN BAG SEWN WITH A DOUBLE NEEDLE MATCHING USING A HIGH STRENGTH THREAD.
2. EACH DEWATERING BAG SHALL HAVE A FILL SPOUT LARGE ENOUGH TO ACCOMMODATE A 4-INCH DISCHARGE HOSE. THE BAG SHALL BE PROVIDED WITH STRAPS TO SECURE THE HOSE AND PREVENT PUMPED WATER FROM ESCAPING WITHOUT BEING FILTERED.
3. MAINTAIN DEWATERING BAG(S) AS NECESSARY TO EFFICIENTLY FILTER SEDIMENT OR PASS WATER AT A REASONABLE RATE. USE OF EXCESSIVE FLOW RATES OR OVERFILLING DIRTBAG® WITH SEDIMENT WILL CAUSE RUPTURES OF THE BAGS OR FAILURE OF THE HOSE ATTACHMENT STRAPS.
4. DISPOSE OF DEWATERING BAG AND CONTENTS AT OFF-SITE DISPOSAL FACILITY IN ACCORDANCE WITH THE APPROVED SOIL MANAGEMENT PLAN OR AS DIRECTED BY ENGINEER.
5. INSTALL DEWATERING BAG AND CRUSHED STONE BEDDING WITH A SLOPE SO INCOMING WATER FLOWS DOWNHILL THROUGH THE BAG WITHOUT CREATING MORE EROSION. STRAP THE NECK OF DEWATERING BAG TIGHTLY TO THE DISCHARGE HOSE.



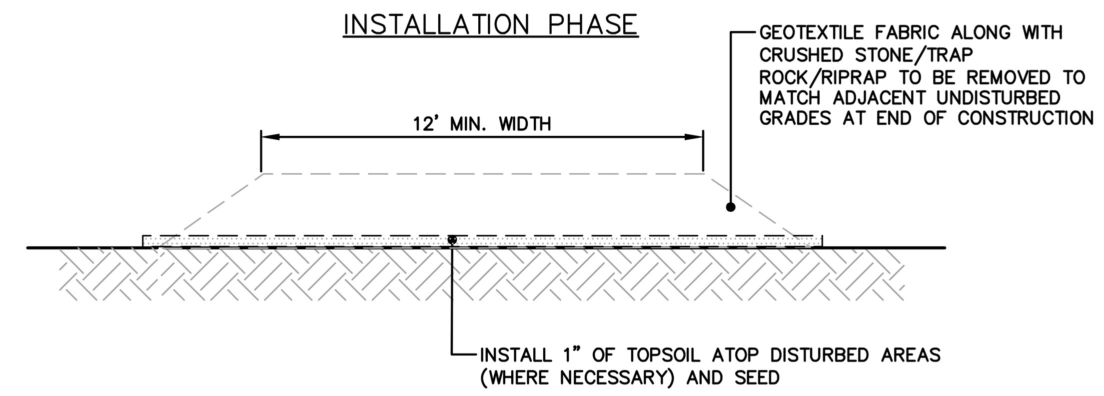
ELEVATION

TEMPORARY DEWATERING BASIN WITH FILTER BAG

NOT TO SCALE



INSTALLATION PHASE



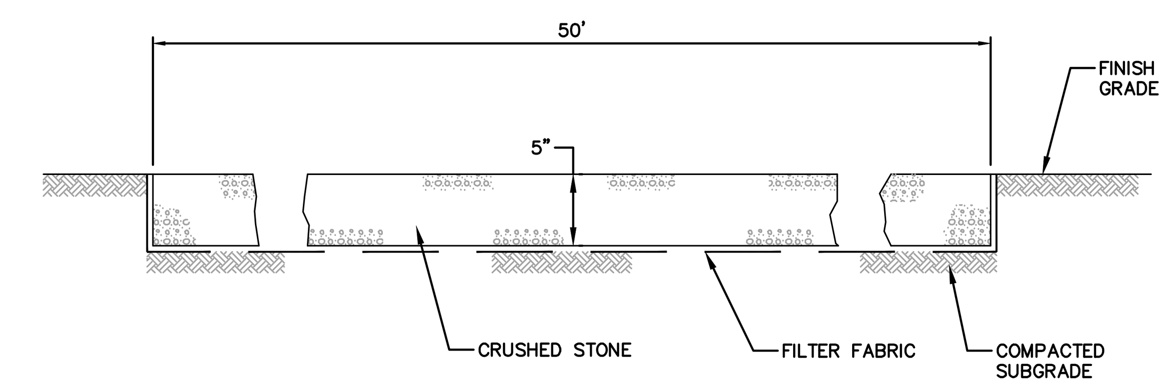
RESTORATION PHASE

NOTES:

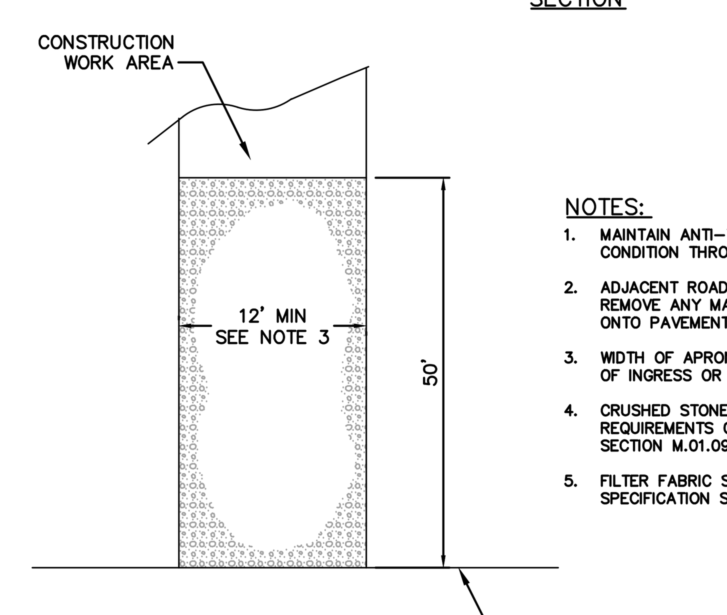
1. PLACE ADDITIONAL CRUSHED STONE AS REQUIRED THROUGHOUT CONSTRUCTION TO MAINTAIN STABLE ACCESS IN LOCATIONS ALONG ACCESSES WHERE STABLE SOILS DO NOT EXIST OR IN LOCATIONS WHERE ADDITIONAL MEASURES MUST BE TAKEN TO PROTECT EXISTING CULVERTS DURING CONSTRUCTION.
2. FOR WET AREAS, CONTRACTOR SHALL FURNISH AND PLACE ADDITIONAL MEASURES (E.G., SWAMP MATS, GEOGRID, GEOTEXTILE FABRIC, TRAP ROCK/RIPRAP, ADDITIONAL STONE, ETC.) AS REQUIRED TO MAINTAIN STABLE ACCESS FOR CONSTRUCTION EQUIPMENT AND VEHICLES REQUIRED TO COMPLETE WORK.
3. IN SUCH LOCATIONS WHERE ADDITIONAL CRUSHED STONE, TRAP ROCK/RIPRAP, ETC., IS REQUIRED, INSTALL MATERIALS ATOP GEOTEXTILE FILTER FABRIC TO FACILITATE THE REMOVAL OF THIS MATERIAL PRIOR TO RESTORATION ACTIVITIES.
4. AT END OF CONSTRUCTION AND PRIOR TO RESTORATION, REMOVE ALL GEOTEXTILE FILTER FABRIC AND STONE (I.E. THAT ABOVE ADJACENT EXISTING GROUND ELEVATION). TOP DRESS AREA WITH TOPSOIL (AS REQUIRED) AND SEED TO ESTABLISH GRASS VEGETATION.
5. CONTRACTOR SHALL PREPARE AND SUBMIT A DETAILED CONSTRUCTION ACCESS AND MAINTENANCE PLAN INDICATING PHASING, VEHICLES/EQUIPMENT, LOCATIONS AND TYPES OF MATERIALS TO BE EMPLOYED TO CREATE AND MAINTAIN STABLE ACCESS THROUGHOUT CONSTRUCTION WHILE AVOIDING IMPACTS TO EXISTING BURIED UTILITIES AND ASSURING CONTINUED ACCESS BY OWNER TO ALL SITE FACILITIES.

TEMPORARY CONSTRUCTION ACCESS ROUTE

NOT TO SCALE



SECTION



PLAN

NOTES:

1. MAINTAIN ANTI-TRACKING APRON IN GOOD CONDITION THROUGHOUT CONSTRUCTION PERIOD.
2. ADJACENT ROADWAY SHALL BE SWEPT DAILY TO REMOVE ANY MATERIAL THAT MAY BE TRACKED ONTO PAVEMENT.
3. WIDTH OF APRON SHALL NOT BE LESS THAN WIDTH OF INGRESS OR EGRESS.
4. CRUSHED STONE SHALL CONFORM TO THE REQUIREMENTS OF STANDARD SPECIFICATIONS SECTION M.01.09, TABLE 1, COLUMN 2.
5. FILTER FABRIC SHALL CONFORM TO STANDARD SPECIFICATION SECTION 206.02.2.

CONSTRUCTION ACCESS (R.I. STD. 9.9.0)

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
0	7/20/2022	ISSUED FOR CONSTRUCTION	KB/AJ	PWM

SEAL

PHILIP W. MORESCHI
No. 7428
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
1 0 1
GRAPHIC SCALE

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

CITY OF NEWPORT
CONSTRUCTION DETAILS
EASTON POND NORTH DAM SPILLWAY REPAIRS
NEWPORT/MIDDLETOWN RHODE ISLAND

PROJ. No.: 20060901.D64
DATE: JULY 2022

CD-501

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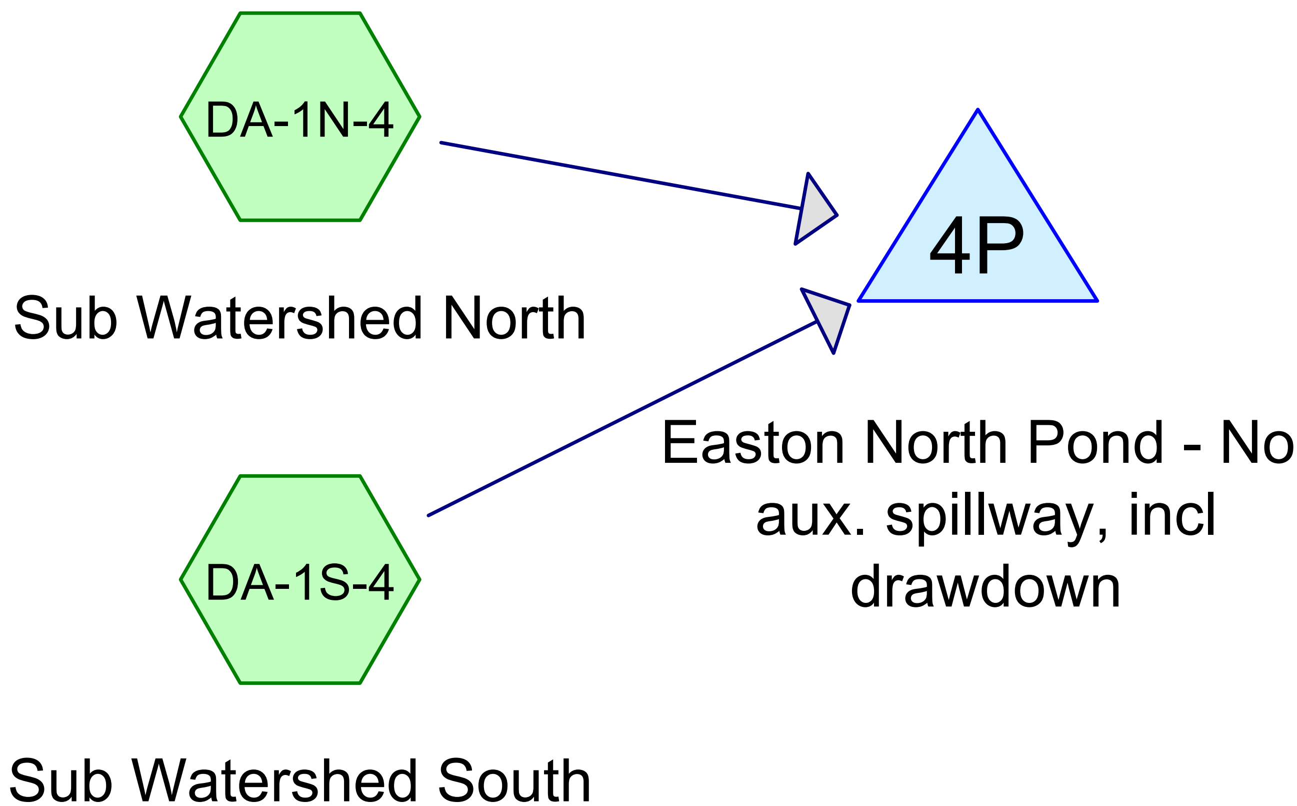
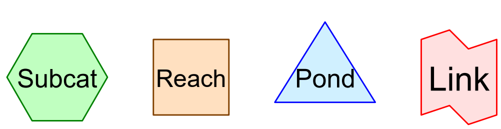
PC3: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 STB/CTB: FO.STB
MS VIEW:
LAYER STATE:

SumCo
ECO-CONTRACTING

HydroCAD Report





Routing Diagram for EastonNorthPondWC_final
Prepared by EA Engineering
HydroCAD® 10.20-3c s/n 08776 © 2023 HydroCAD Software Solutions LLC

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type II 24-hr		Default	24.00	1	3.40	2
2	5-year	Type II 24-hr		Default	24.00	1	4.29	2
3	10-year	Type II 24-hr		Default	24.00	1	5.03	2
4	25-year	Type II 24-hr		Default	24.00	1	6.05	2
5	50-year	Type II 24-hr		Default	24.00	1	6.80	2
6	100-year	Type II 24-hr		Default	24.00	1	7.62	2

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 4P: Easton North Pond - No aux. Peak Elev=9.29' Storage=893.441 af Inflow=1,396.17 cfs 379.297 af
Primary=50.13 cfs 39.185 af Secondary=0.00 cfs 0.000 af Outflow=50.13 cfs 39.185 af

Subcatchment DA-1N-4: Sub Runoff Area=1,933.855 ac 42.21% Impervious Runoff Depth=1.77"
Flow Length=16,125' Tc=105.4 min CN=83 Runoff=1,191.24 cfs 286.012 af

Subcatchment DA-1S-4: Sub Watershed Runoff Area=534.899 ac 57.50% Impervious Runoff Depth=2.09"
Flow Length=6,686' Tc=41.2 min CN=87 Runoff=783.64 cfs 93.285 af

Total Runoff Area = 2,468.754 ac Runoff Volume = 379.297 af Average Runoff Depth = 1.84"
54.48% Pervious = 1,344.863 ac 45.52% Impervious = 1,123.891 ac

Summary for Pond 4P: Easton North Pond - No aux. spillway, incl drawdown

Inflow Area = 2,468.754 ac, 45.52% Impervious, Inflow Depth = 1.84" for 2-year event
Inflow = 1,396.17 cfs @ 13.01 hrs, Volume= 379.297 af
Outflow = 50.13 cfs @ 25.05 hrs, Volume= 39.185 af, Atten= 96%, Lag= 722.5 min
Primary = 50.13 cfs @ 25.05 hrs, Volume= 39.185 af
Routed to nonexistent node 4R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 5.50' Storage= 529.393 af
Peak Elev= 9.29' @ 25.05 hrs Storage= 893.441 af (364.048 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 829.2 min (1,730.1 - 900.9)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.93'	1,316.353 af	**Custom Stage Data** Listed below

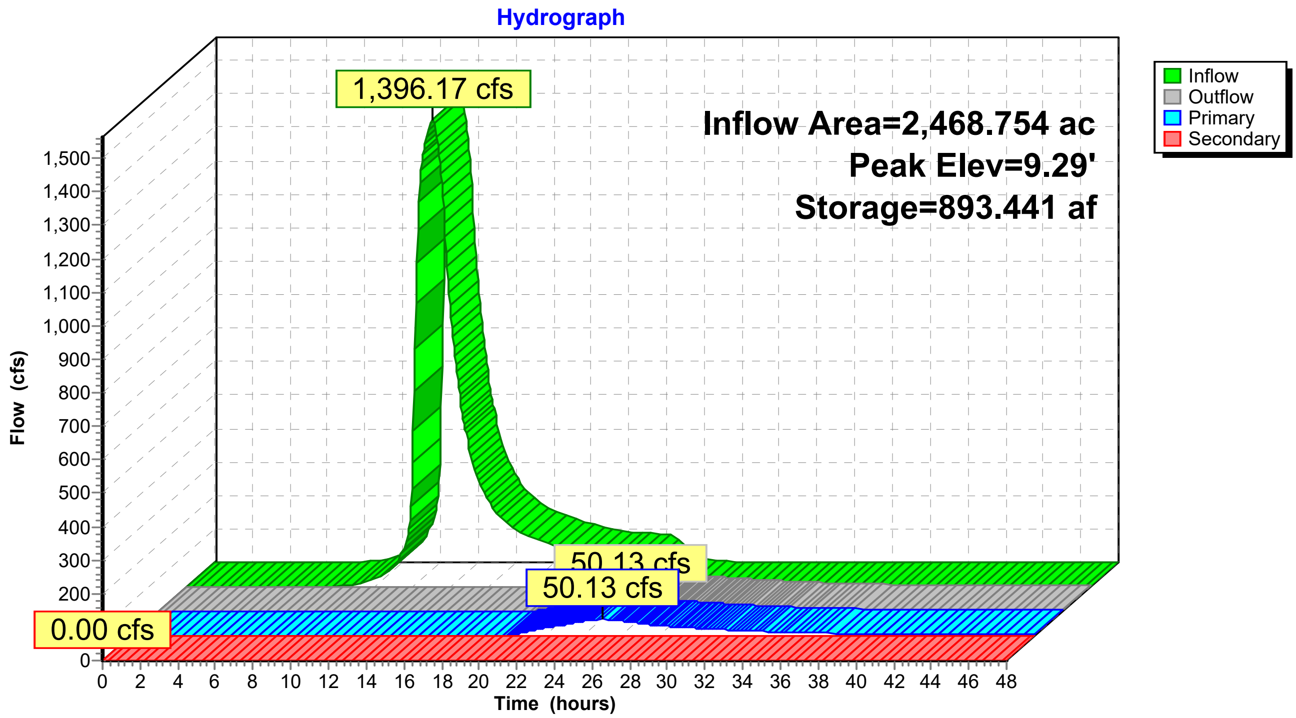
Elevation (feet)	Cum.Store (acre-feet)
-0.93	0.000
1.01	97.652
9.88	950.557
12.00	1,090.553
14.00	1,316.353

Device	Routing	Invert	Outlet Devices
#1	Primary	9.00'	**125.5' long x 2.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32
#2	Secondary	13.00'	**1,550.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

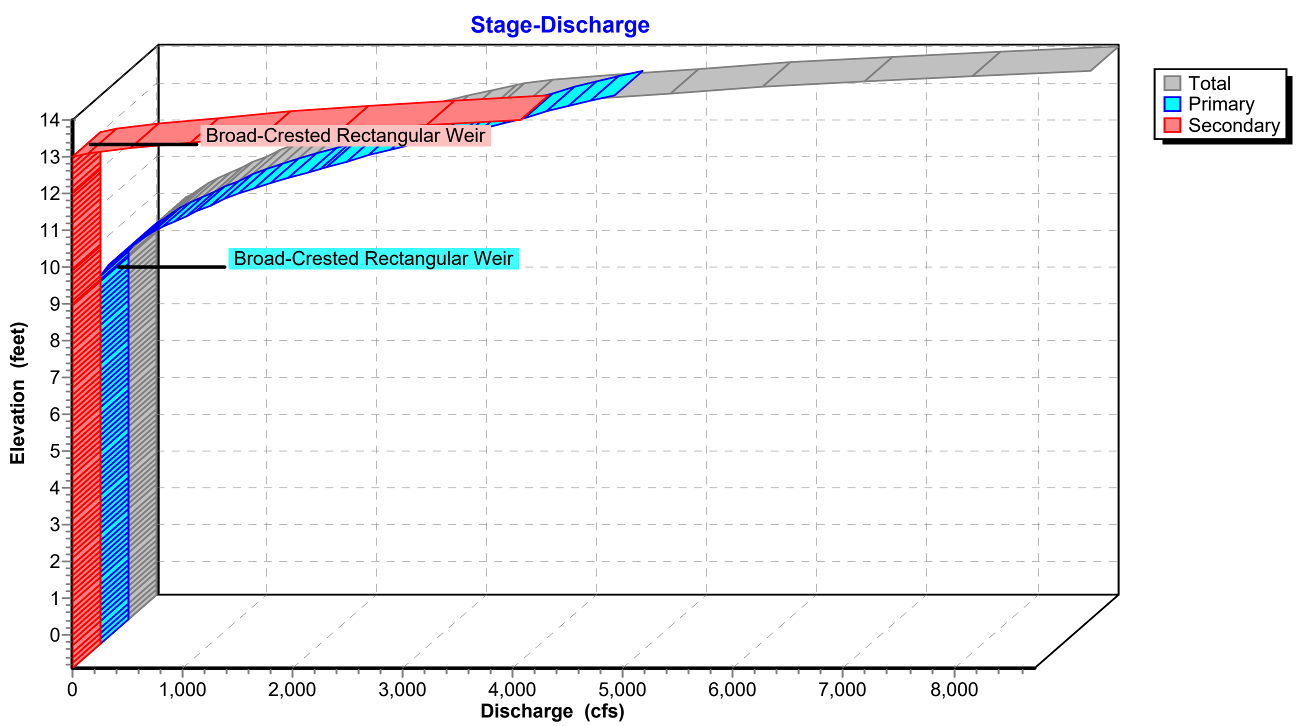
Primary OutFlow Max=48.59 cfs @ 25.05 hrs HW=9.29' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 48.59 cfs @ 1.35 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

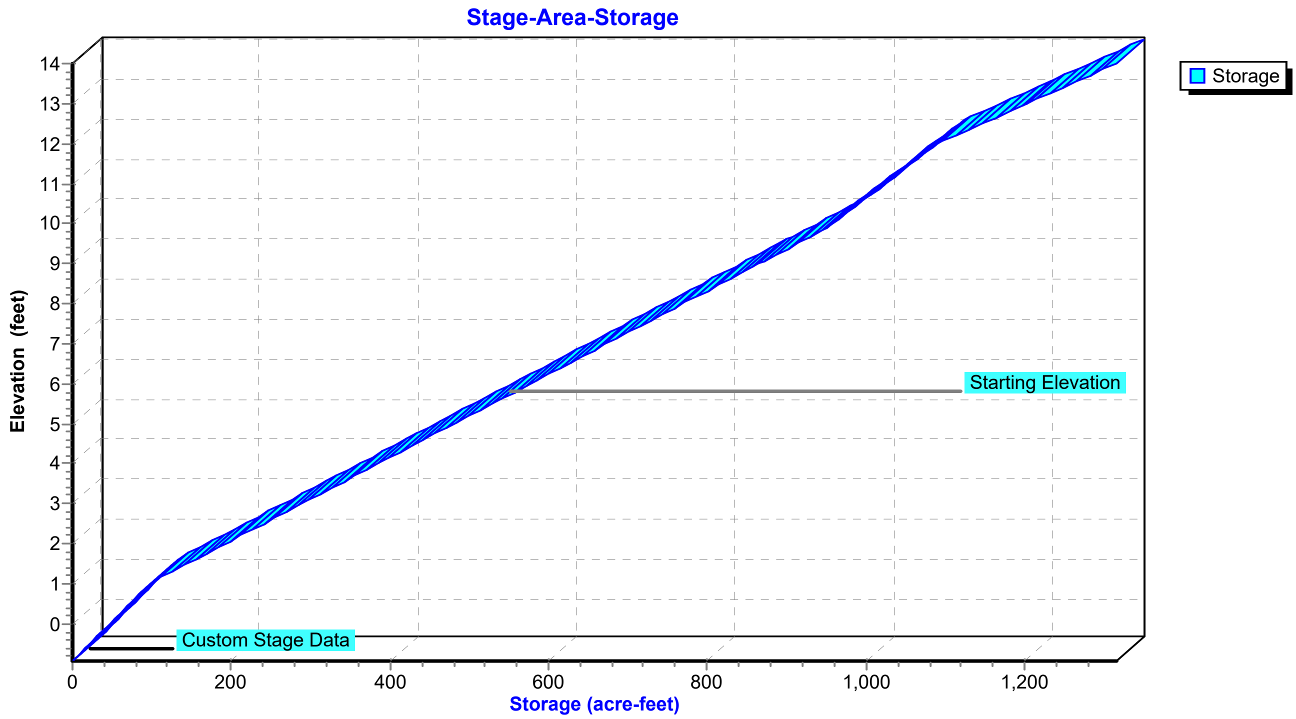
Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Summary for Subcatchment DA-1N-4: Sub Watershed North

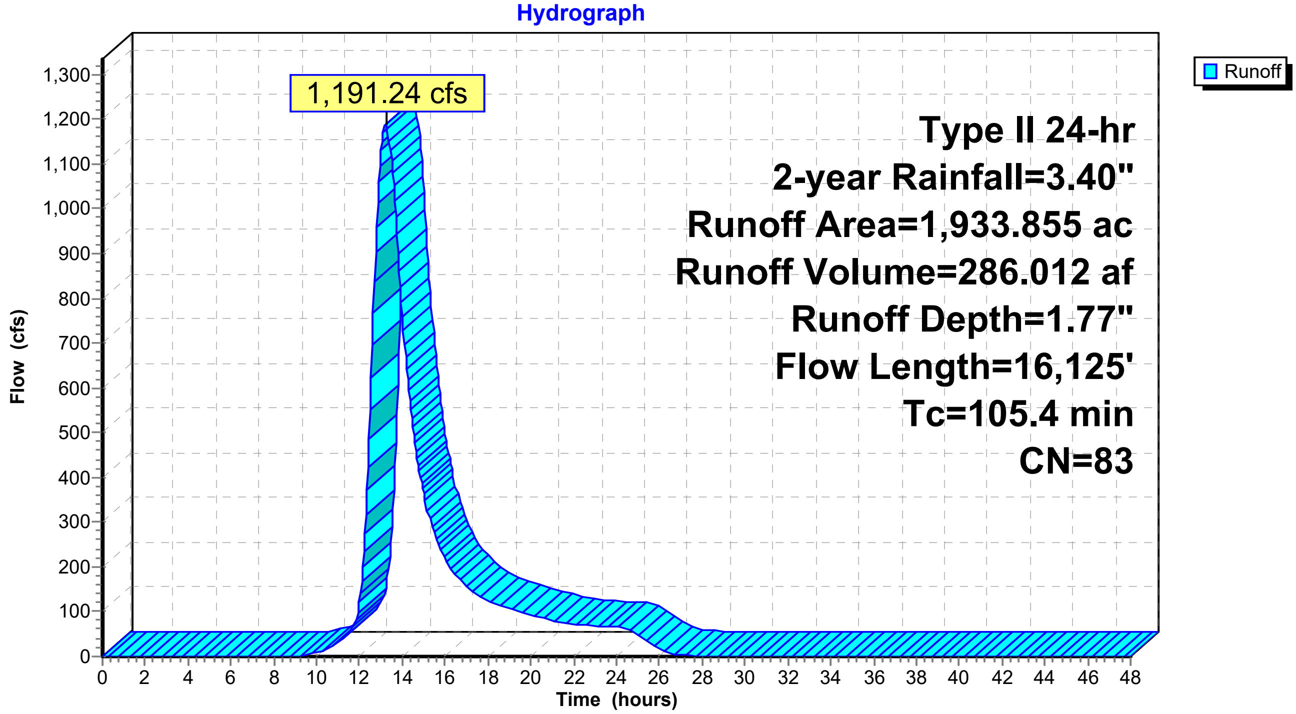
Runoff = 1,191.24 cfs @ 13.23 hrs, Volume= 286.012 af, Depth= 1.77"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.40"

Area (ac)	CN	Description
621.792	98	Paved parking, HSG C
504.320	83	1/4 acre lots, 38% imp, HSG C
230.673	79	Pasture/grassland/range, Fair, HSG C
2.880	98	Water Surface, HSG C
319.783	70	Woods, Good, HSG C
254.407	65	Brush, Good, HSG C
1,933.855	83	Weighted Average
1,117.541		57.79% Pervious Area
816.314		42.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
1.1	100	0.0100	1.50		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
90.5	15,925	0.0082	2.93	29.34	**Channel Flow, Channel Flow** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.035
105.4	16,125	Total			

Subcatchment DA-1N-4: Sub Watershed North



Summary for Subcatchment DA-1S-4: Sub Watershed South

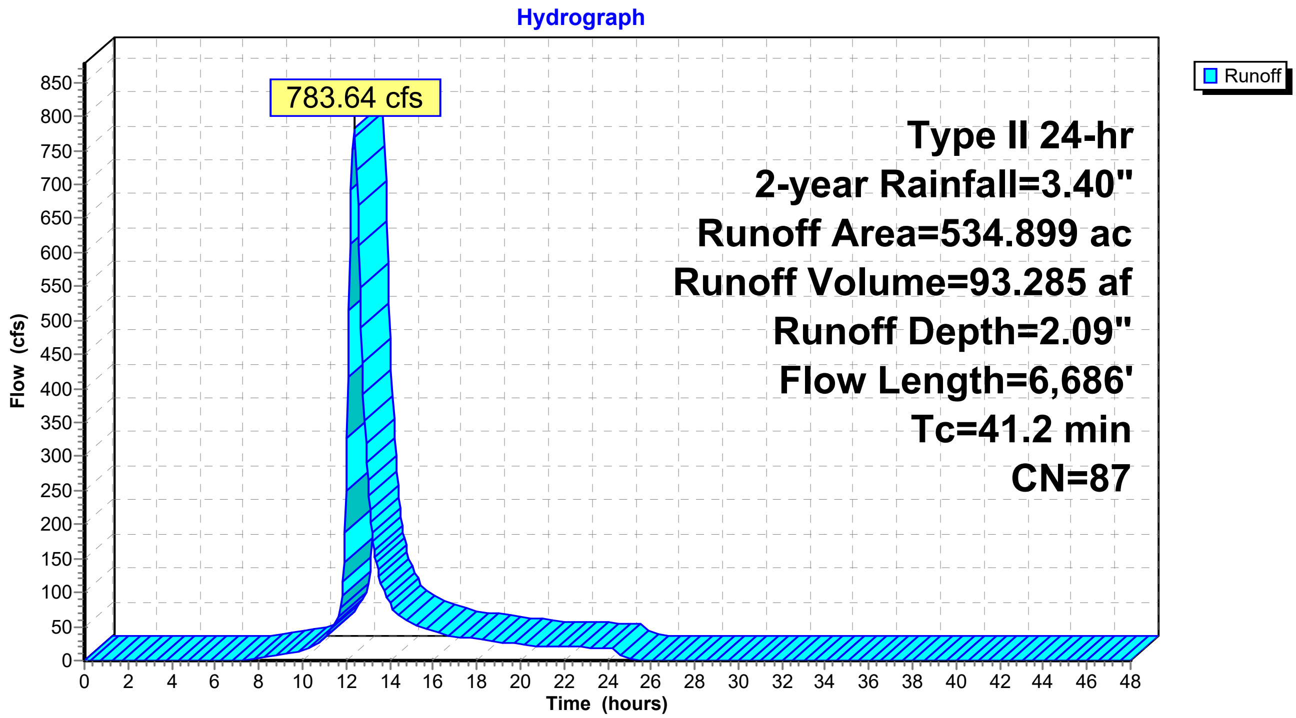
Runoff = 783.64 cfs @ 12.38 hrs, Volume= 93.285 af, Depth= 2.09"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.40"

Area (ac)	CN	Description
148.429	98	Paved parking, HSG C
136.687	83	1/4 acre lots, 38% imp, HSG C
17.933	79	Pasture/grassland/range, Fair, HSG C
107.207	98	Water Surface, HSG C
77.094	70	Woods, Good, HSG C
47.549	65	Brush, Good, HSG C
534.899	87	Weighted Average
227.322		42.50% Pervious Area
307.577		57.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
4.9	814	0.0344	2.78		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
22.5	5,772	0.0227	4.27	25.62	**Channel Flow, Channel Flow** Area= 6.0 sf Perim= 11.0' r= 0.55' n= 0.035
41.2	6,686	Total			

Subcatchment DA-1S-4: Sub Watershed South



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 4P: Easton North Pond - No aux. Peak Elev=9.75' Storage=938.412 af Inflow=2,005.29 cfs 538.740 af
Primary=214.49 cfs 197.707 af Secondary=0.00 cfs 0.000 af Outflow=214.49 cfs 197.707 af

Subcatchment DA-1N-4: Sub Runoff Area=1,933.855 ac 42.21% Impervious Runoff Depth=2.54"
Flow Length=16,125' Tc=105.4 min CN=83 Runoff=1,719.21 cfs 409.297 af

Subcatchment DA-1S-4: Sub Watershed Runoff Area=534.899 ac 57.50% Impervious Runoff Depth=2.90"
Flow Length=6,686' Tc=41.2 min CN=87 Runoff=1,084.38 cfs 129.443 af

Total Runoff Area = 2,468.754 ac Runoff Volume = 538.740 af Average Runoff Depth = 2.62"
54.48% Pervious = 1,344.863 ac 45.52% Impervious = 1,123.891 ac

Summary for Pond 4P: Easton North Pond - No aux. spillway, incl drawdown

Inflow Area = 2,468.754 ac, 45.52% Impervious, Inflow Depth = 2.62" for 5-year event
Inflow = 2,005.29 cfs @ 13.01 hrs, Volume= 538.740 af
Outflow = 214.49 cfs @ 17.78 hrs, Volume= 197.707 af, Atten= 89%, Lag= 286.3 min
Primary = 214.49 cfs @ 17.78 hrs, Volume= 197.707 af
Routed to nonexistent node 4R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 5.50' Storage= 529.393 af
Peak Elev= 9.75' @ 17.78 hrs Storage= 938.412 af (409.018 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 458.9 min (1,350.2 - 891.3)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.93'	1,316.353 af	**Custom Stage Data** Listed below

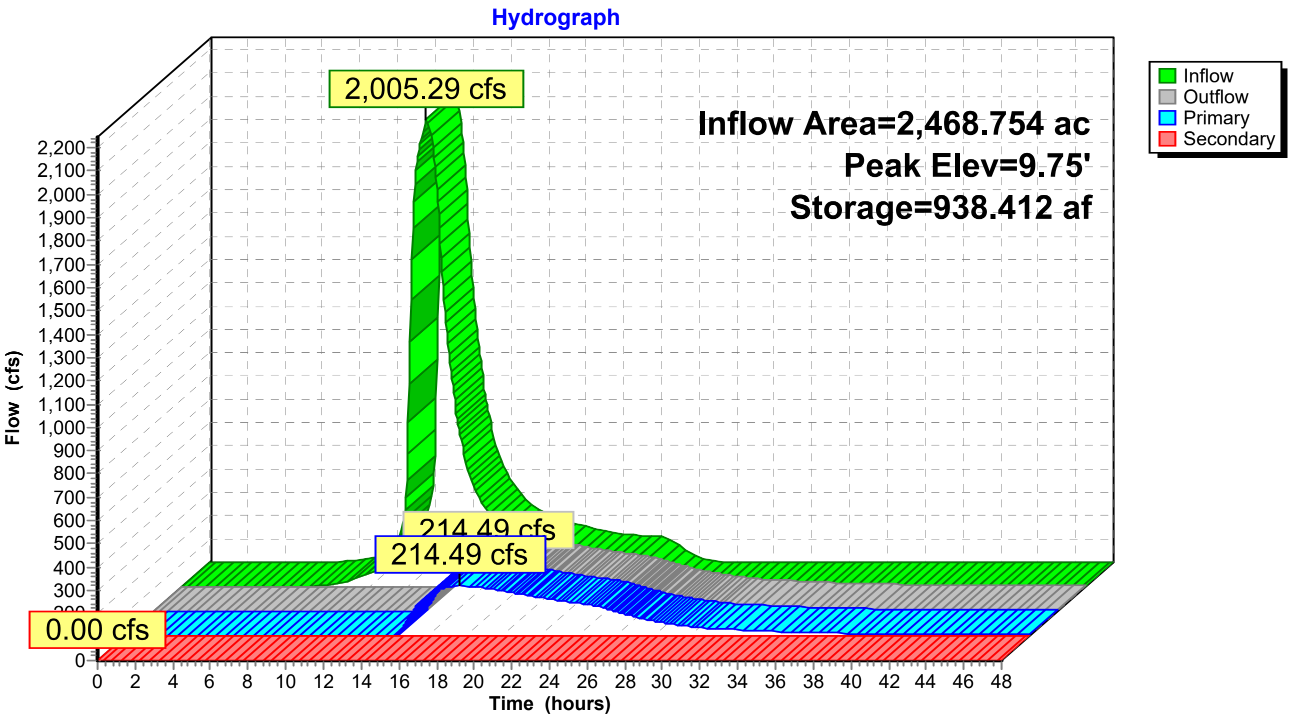
Elevation (feet)	Cum.Store (acre-feet)
-0.93	0.000
1.01	97.652
9.88	950.557
12.00	1,090.553
14.00	1,316.353

Device	Routing	Invert	Outlet Devices
#1	Primary	9.00'	**125.5' long x 2.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32
#2	Secondary	13.00'	**1,550.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

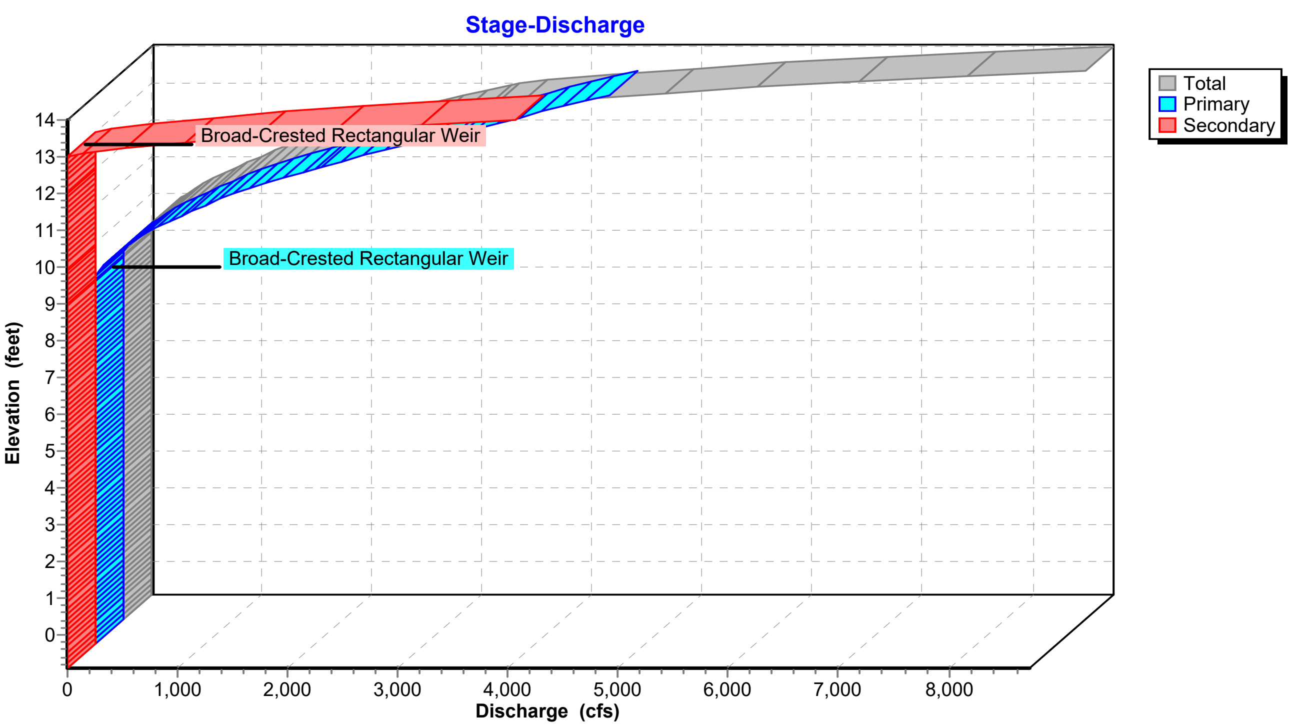
Primary OutFlow Max=213.50 cfs @ 17.78 hrs HW=9.75' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 213.50 cfs @ 2.26 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

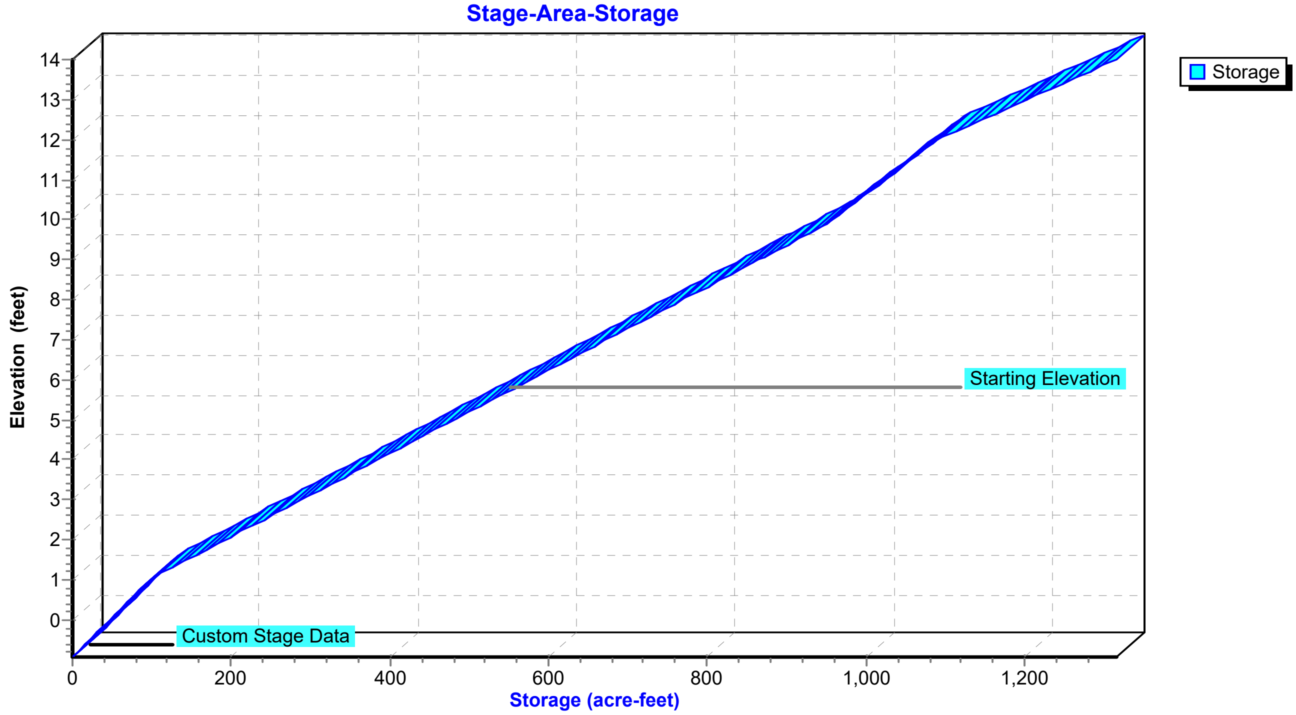
Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Summary for Subcatchment DA-1N-4: Sub Watershed North

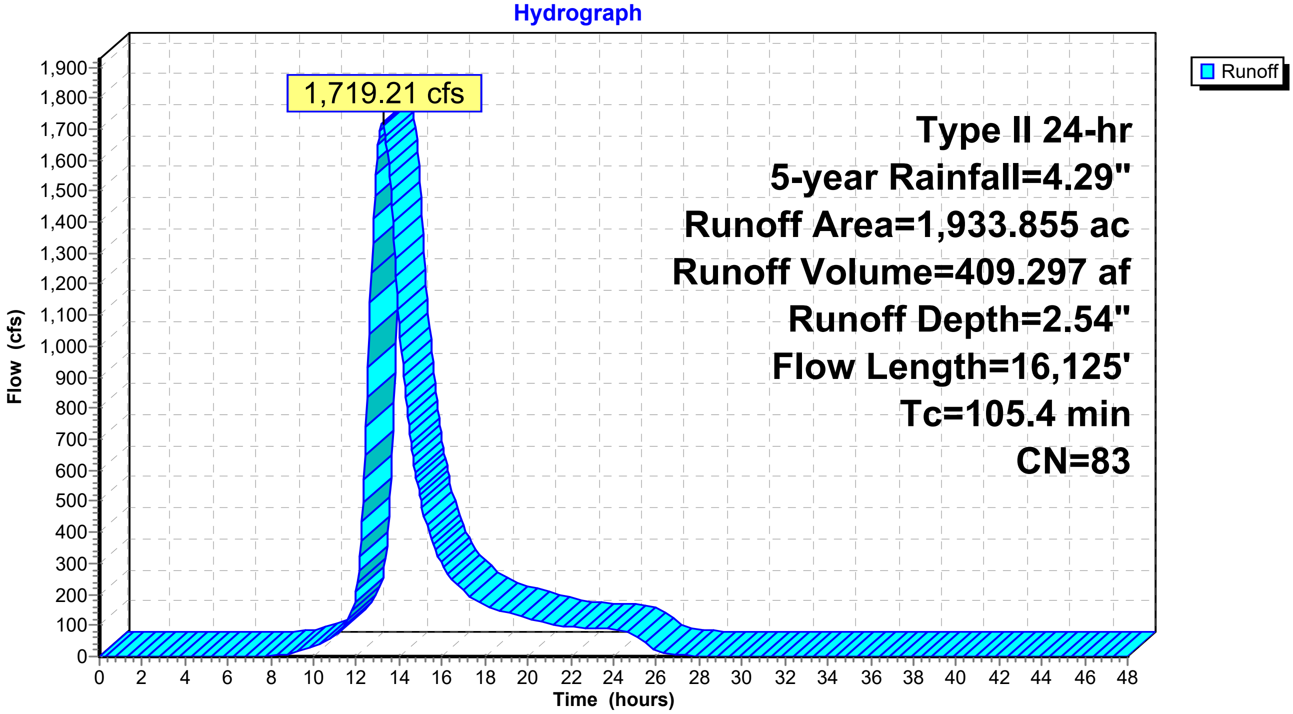
Runoff = 1,719.21 cfs @ 13.22 hrs, Volume= 409.297 af, Depth= 2.54"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-year Rainfall=4.29"

Area (ac)	CN	Description
621.792	98	Paved parking, HSG C
504.320	83	1/4 acre lots, 38% imp, HSG C
230.673	79	Pasture/grassland/range, Fair, HSG C
2.880	98	Water Surface, HSG C
319.783	70	Woods, Good, HSG C
254.407	65	Brush, Good, HSG C
1,933.855	83	Weighted Average
1,117.541		57.79% Pervious Area
816.314		42.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
1.1	100	0.0100	1.50		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
90.5	15,925	0.0082	2.93	29.34	**Channel Flow, Channel Flow** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.035
105.4	16,125	Total			

Subcatchment DA-1N-4: Sub Watershed North



Summary for Subcatchment DA-1S-4: Sub Watershed South

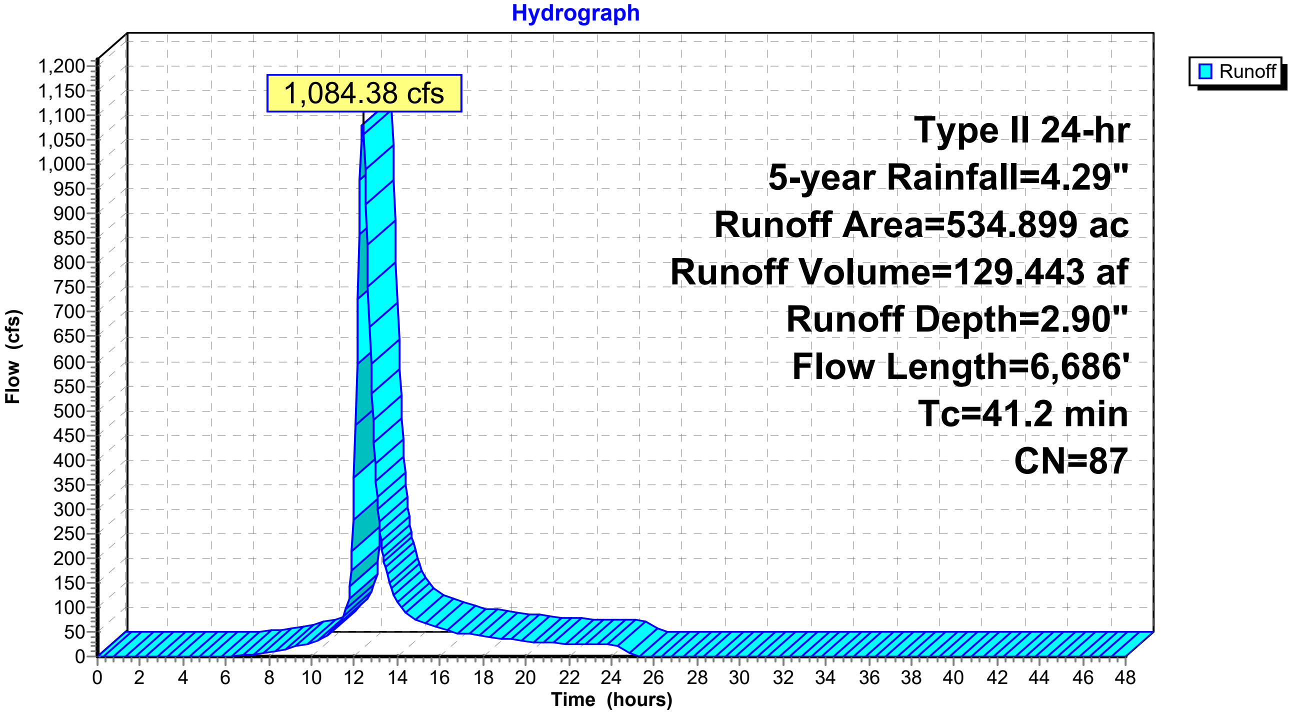
Runoff = 1,084.38 cfs @ 12.38 hrs, Volume= 129.443 af, Depth= 2.90"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 5-year Rainfall=4.29"

Area (ac)	CN	Description
148.429	98	Paved parking, HSG C
136.687	83	1/4 acre lots, 38% imp, HSG C
17.933	79	Pasture/grassland/range, Fair, HSG C
107.207	98	Water Surface, HSG C
77.094	70	Woods, Good, HSG C
47.549	65	Brush, Good, HSG C
534.899	87	Weighted Average
227.322		42.50% Pervious Area
307.577		57.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
4.9	814	0.0344	2.78		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
22.5	5,772	0.0227	4.27	25.62	**Channel Flow, Channel Flow** Area= 6.0 sf Perim= 11.0' r= 0.55' n= 0.035
41.2	6,686	Total			

Subcatchment DA-1S-4: Sub Watershed South



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 4P: Easton North Pond - No Peak Elev=10.34' Storage=981.210 af Inflow=2,525.55 cfs 676.168 af
Primary=523.68 cfs 334.933 af Secondary=0.00 cfs 0.000 af Outflow=523.68 cfs 334.933 af

Subcatchment DA-1N-4: Sub Runoff Area=1,933.855 ac 42.21% Impervious Runoff Depth=3.20"
Flow Length=16,125' Tc=105.4 min CN=83 Runoff=2,171.55 cfs 515.897 af

Subcatchment DA-1S-4: Sub Watershed Runoff Area=534.899 ac 57.50% Impervious Runoff Depth=3.60"
Flow Length=6,686' Tc=41.2 min CN=87 Runoff=1,336.58 cfs 160.272 af

Total Runoff Area = 2,468.754 ac Runoff Volume = 676.168 af Average Runoff Depth = 3.29"
54.48% Pervious = 1,344.863 ac 45.52% Impervious = 1,123.891 ac

Summary for Pond 4P: Easton North Pond - No aux. spillway, incl drawdown

Inflow Area = 2,468.754 ac, 45.52% Impervious, Inflow Depth = 3.29" for 10-year event
Inflow = 2,525.55 cfs @ 13.01 hrs, Volume= 676.168 af
Outflow = 523.68 cfs @ 15.56 hrs, Volume= 334.933 af, Atten= 79%, Lag= 153.0 min
Primary = 523.68 cfs @ 15.56 hrs, Volume= 334.933 af
Routed to nonexistent node 4R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 5.50' Storage= 529.393 af
Peak Elev= 10.34' @ 15.56 hrs Storage= 981.210 af (451.817 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 345.6 min (1,230.6 - 885.0)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.93'	1,316.353 af	**Custom Stage Data** Listed below

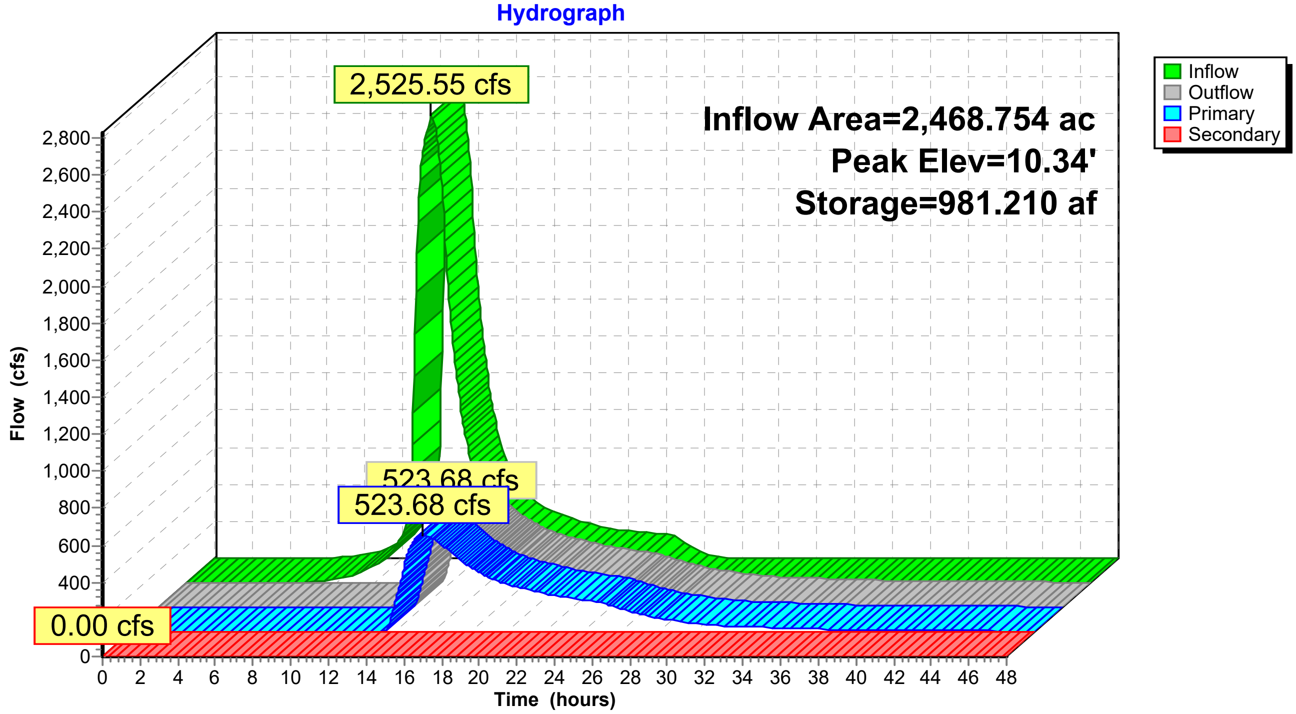
Elevation (feet)	Cum.Store (acre-feet)
-0.93	0.000
1.01	97.652
9.88	950.557
12.00	1,090.553
14.00	1,316.353

Device	Routing	Invert	Outlet Devices
#1	Primary	9.00'	**125.5' long x 2.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32
#2	Secondary	13.00'	**1,550.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

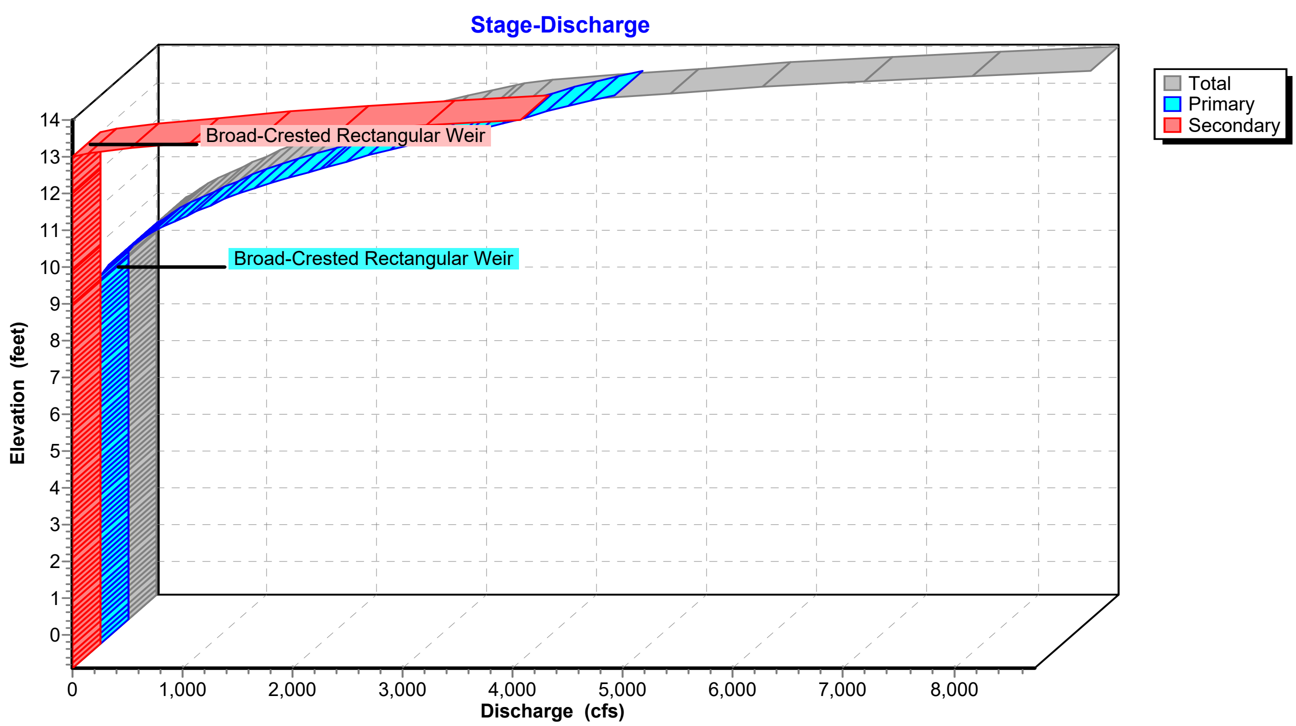
Primary OutFlow Max=522.51 cfs @ 15.56 hrs HW=10.34' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 522.51 cfs @ 3.10 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

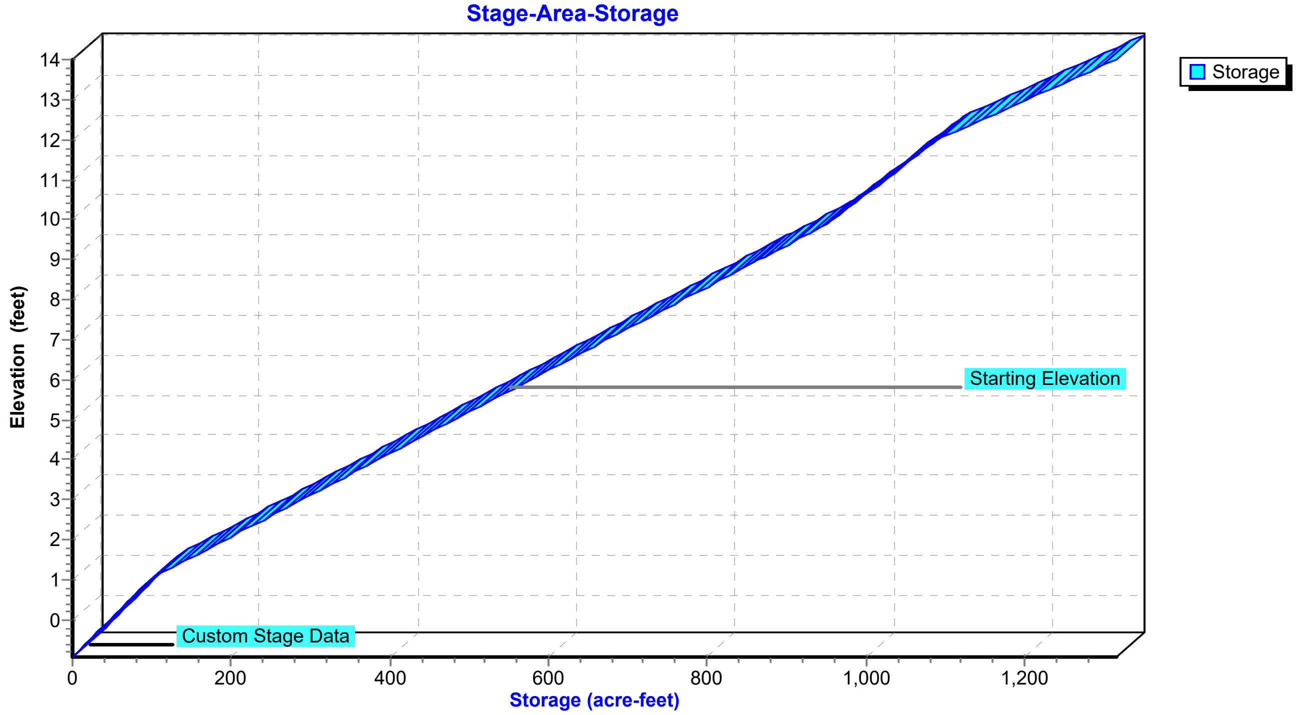
Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Summary for Subcatchment DA-1N-4: Sub Watershed North

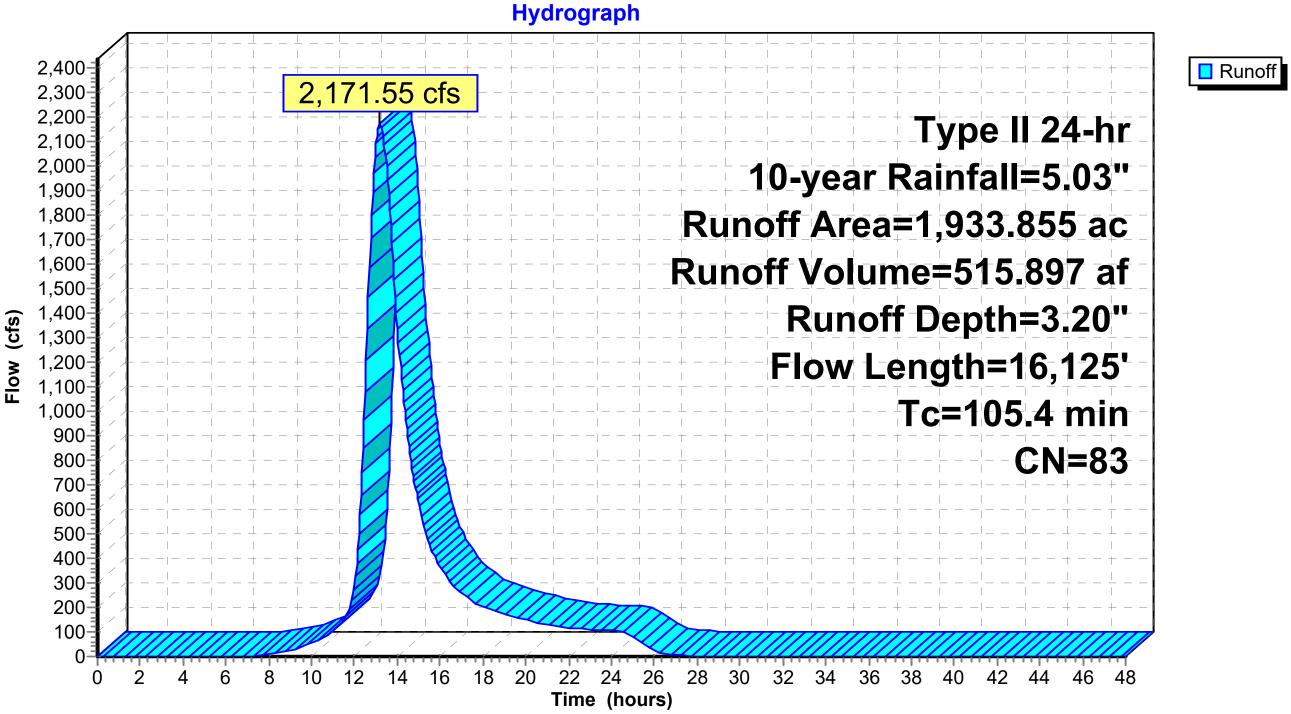
Runoff = 2,171.55 cfs @ 13.21 hrs, Volume= 515.897 af, Depth= 3.20"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.03"

Area (ac)	CN	Description
621.792	98	Paved parking, HSG C
504.320	83	1/4 acre lots, 38% imp, HSG C
230.673	79	Pasture/grassland/range, Fair, HSG C
2.880	98	Water Surface, HSG C
319.783	70	Woods, Good, HSG C
254.407	65	Brush, Good, HSG C
1,933.855	83	Weighted Average
1,117.541		57.79% Pervious Area
816.314		42.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
1.1	100	0.0100	1.50		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
90.5	15,925	0.0082	2.93	29.34	**Channel Flow, Channel Flow** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.035
105.4	16,125	Total			

Subcatchment DA-1N-4: Sub Watershed North



Summary for Subcatchment DA-1S-4: Sub Watershed South

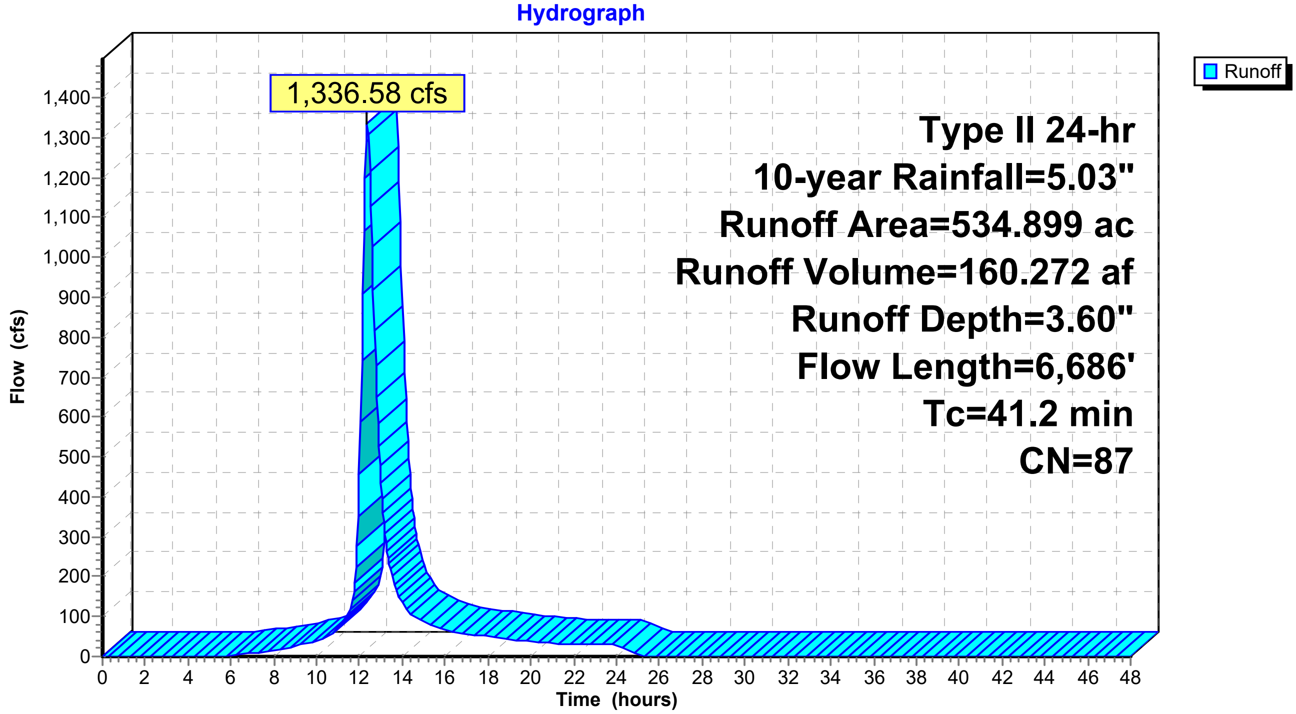
Runoff = 1,336.58 cfs @ 12.37 hrs, Volume= 160.272 af, Depth= 3.60"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.03"

Area (ac)	CN	Description
148.429	98	Paved parking, HSG C
136.687	83	1/4 acre lots, 38% imp, HSG C
17.933	79	Pasture/grassland/range, Fair, HSG C
107.207	98	Water Surface, HSG C
77.094	70	Woods, Good, HSG C
47.549	65	Brush, Good, HSG C
534.899	87	Weighted Average
227.322		42.50% Pervious Area
307.577		57.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
4.9	814	0.0344	2.78		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
22.5	5,772	0.0227	4.27	25.62	**Channel Flow, Channel Flow** Area= 6.0 sf Perim= 11.0' r= 0.55' n= 0.035
41.2	6,686	Total			

Subcatchment DA-1S-4: Sub Watershed South



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 4P: Easton North Pond - No Peak Elev=11.20' Storage=1,037.756 af Inflow=3,253.24 cfs 870.312 af
Primary=1,152.68 cfs 528.891 af Secondary=0.00 cfs 0.000 af Outflow=1,152.68 cfs 528.891 af

Subcatchment DA-1N-4: Sub Runoff Area=1,933.855 ac 42.21% Impervious Runoff Depth=4.14"
Flow Length=16,125' Tc=105.4 min CN=83 Runoff=2,804.91 cfs 666.825 af

Subcatchment DA-1S-4: Sub Watershed Runoff Area=534.899 ac 57.50% Impervious Runoff Depth=4.57"
Flow Length=6,686' Tc=41.2 min CN=87 Runoff=1,685.15 cfs 203.487 af

Total Runoff Area = 2,468.754 ac Runoff Volume = 870.312 af Average Runoff Depth = 4.23"
54.48% Pervious = 1,344.863 ac 45.52% Impervious = 1,123.891 ac

Summary for Pond 4P: Easton North Pond - No aux. spillway, incl drawdown

Inflow Area = 2,468.754 ac, 45.52% Impervious, Inflow Depth = 4.23" for 25-year event
Inflow = 3,253.24 cfs @ 13.00 hrs, Volume= 870.312 af
Outflow = 1,152.68 cfs @ 14.62 hrs, Volume= 528.891 af, Atten= 65%, Lag= 96.8 min
Primary = 1,152.68 cfs @ 14.62 hrs, Volume= 528.891 af
Routed to nonexistent node 4R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 5.50' Storage= 529.393 af
Peak Elev= 11.20' @ 14.62 hrs Storage= 1,037.756 af (508.363 af above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 263.4 min (1,141.6 - 878.1)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.93'	1,316.353 af	**Custom Stage Data** Listed below

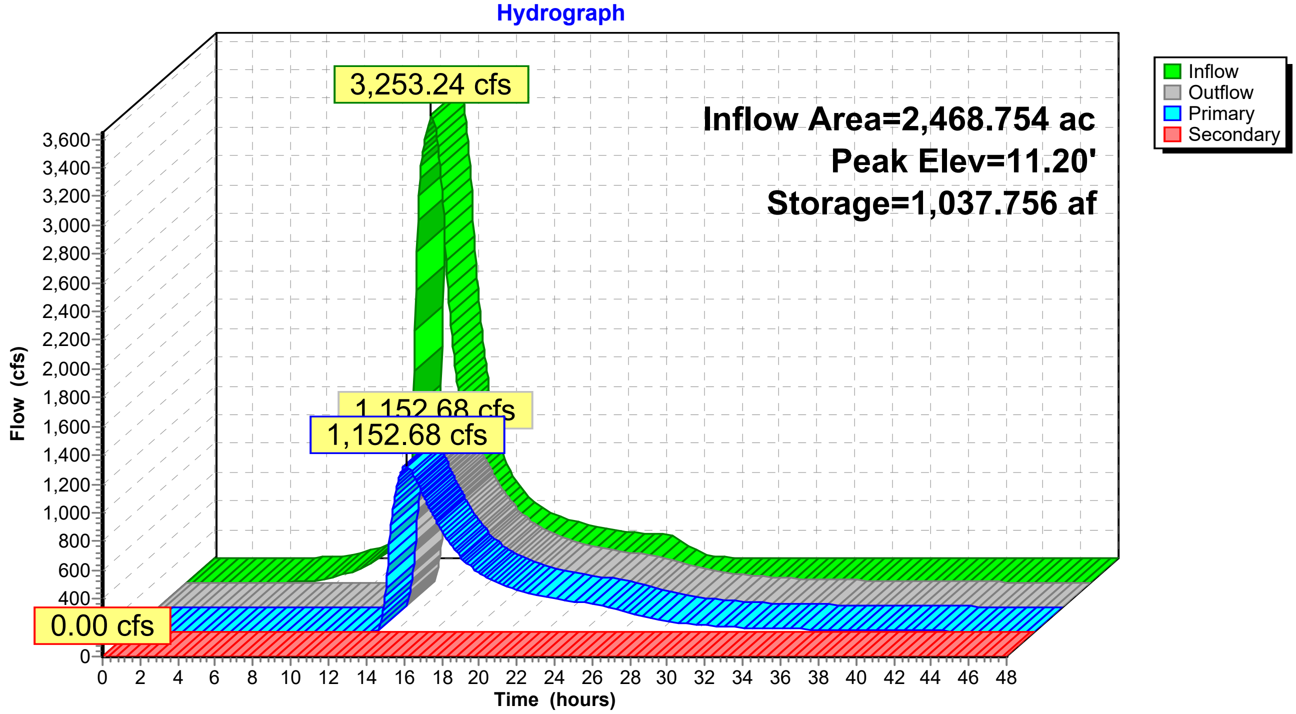
Elevation (feet)	Cum.Store (acre-feet)
-0.93	0.000
1.01	97.652
9.88	950.557
12.00	1,090.553
14.00	1,316.353

Device	Routing	Invert	Outlet Devices
#1	Primary	9.00'	**125.5' long x 2.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32
#2	Secondary	13.00'	**1,550.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

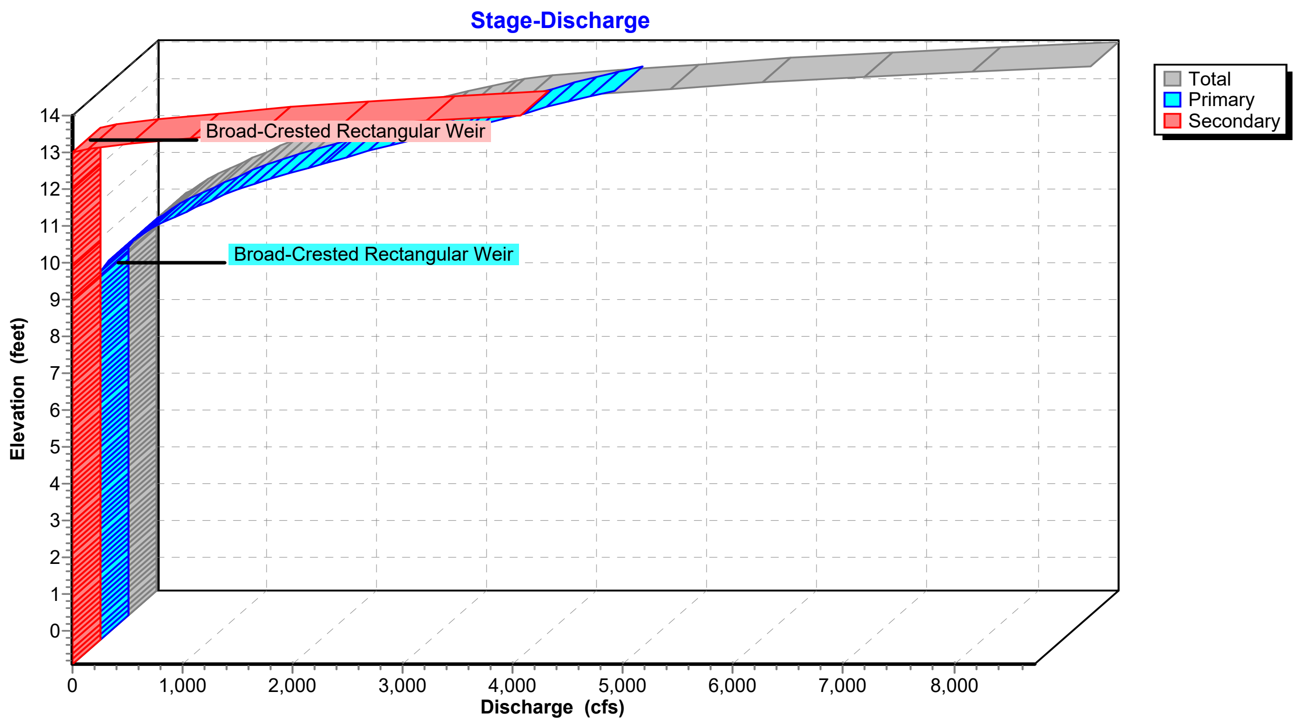
Primary OutFlow Max=1,151.74 cfs @ 14.62 hrs HW=11.20' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1,151.74 cfs @ 4.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

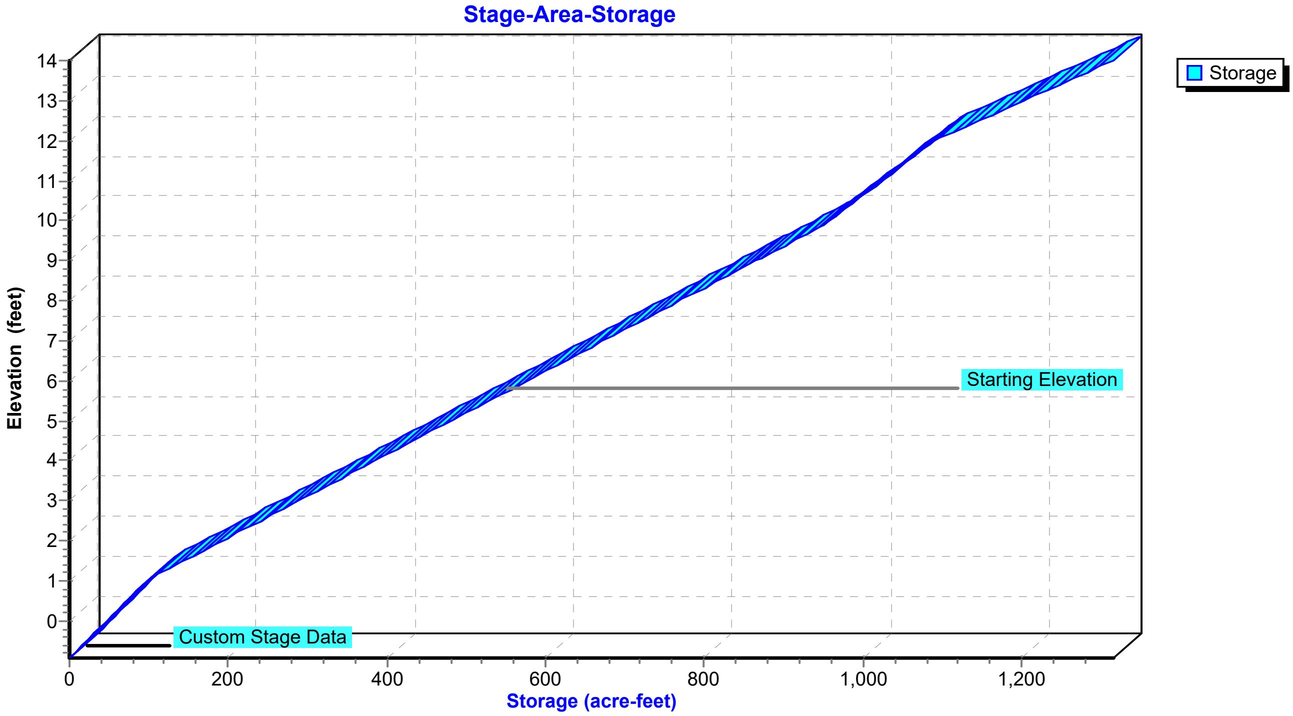
Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Summary for Subcatchment DA-1N-4: Sub Watershed North

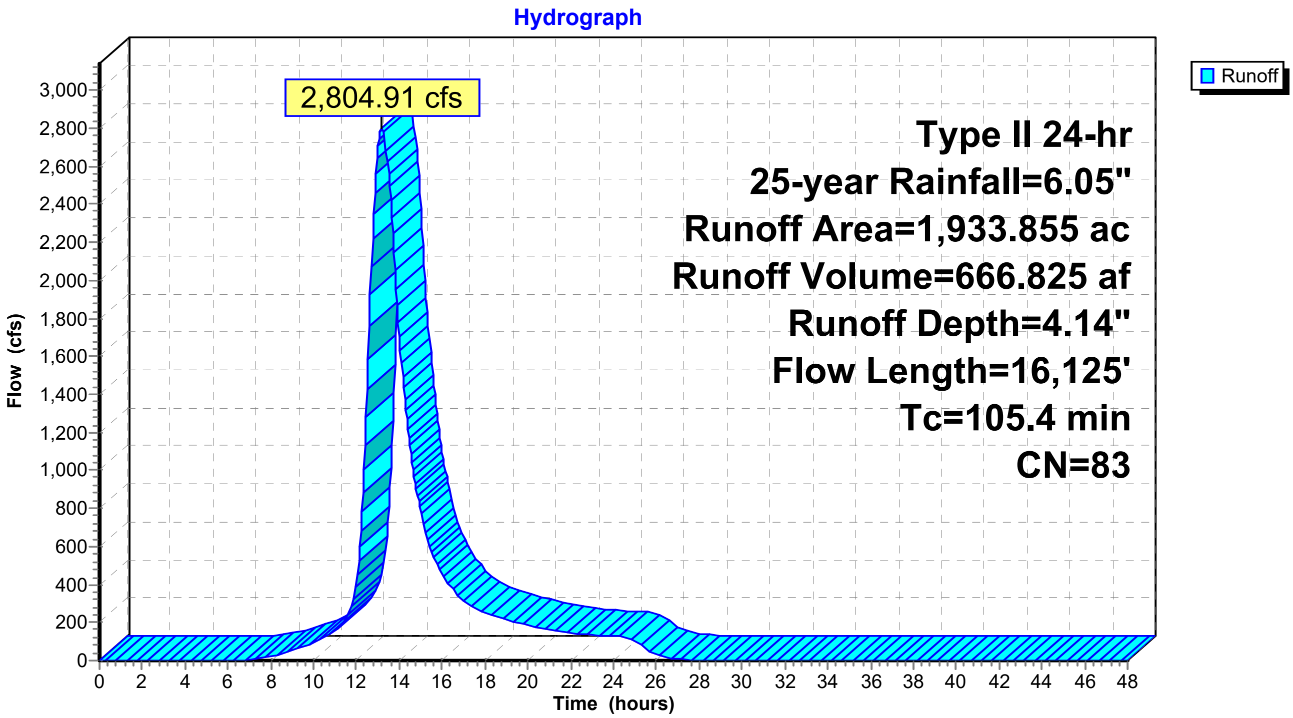
Runoff = 2,804.91 cfs @ 13.20 hrs, Volume= 666.825 af, Depth= 4.14"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
621.792	98	Paved parking, HSG C
504.320	83	1/4 acre lots, 38% imp, HSG C
230.673	79	Pasture/grassland/range, Fair, HSG C
2.880	98	Water Surface, HSG C
319.783	70	Woods, Good, HSG C
254.407	65	Brush, Good, HSG C
1,933.855	83	Weighted Average
1,117.541		57.79% Pervious Area
816.314		42.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
1.1	100	0.0100	1.50		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
90.5	15,925	0.0082	2.93	29.34	**Channel Flow, Channel Flow** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.035
105.4	16,125	Total			

Subcatchment DA-1N-4: Sub Watershed North



Summary for Subcatchment DA-1S-4: Sub Watershed South

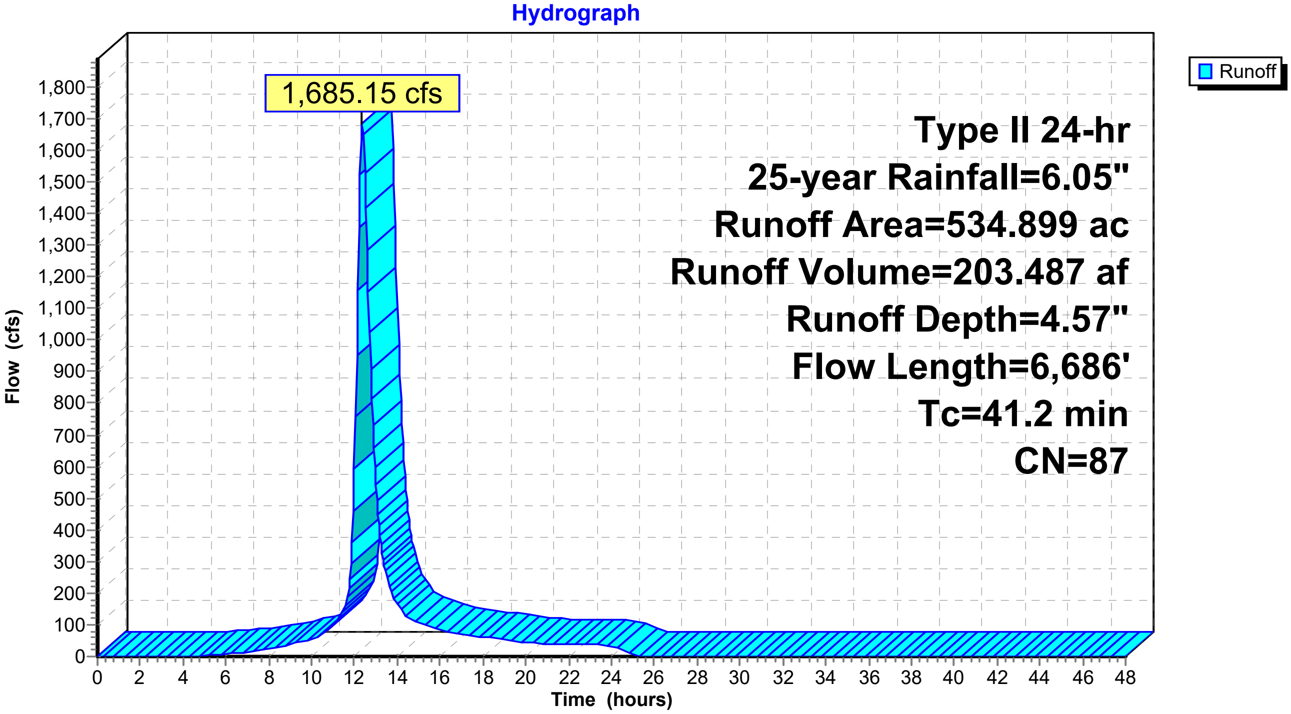
Runoff = 1,685.15 cfs @ 12.37 hrs, Volume= 203.487 af, Depth= 4.57"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year Rainfall=6.05"

Area (ac)	CN	Description
148.429	98	Paved parking, HSG C
136.687	83	1/4 acre lots, 38% imp, HSG C
17.933	79	Pasture/grassland/range, Fair, HSG C
107.207	98	Water Surface, HSG C
77.094	70	Woods, Good, HSG C
47.549	65	Brush, Good, HSG C
534.899	87	Weighted Average
227.322		42.50% Pervious Area
307.577		57.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
4.9	814	0.0344	2.78		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
22.5	5,772	0.0227	4.27	25.62	**Channel Flow, Channel Flow** Area= 6.0 sf Perim= 11.0' r= 0.55' n= 0.035
41.2	6,686	Total			

Subcatchment DA-1S-4: Sub Watershed South



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 4P: Easton North Pond - No Peak Elev=11.77' Storage=1,075.649 af Inflow=3,792.33 cfs 1,015.506 af
Primary=1,727.24 cfs 673.974 af Secondary=0.00 cfs 0.000 af Outflow=1,727.24 cfs 673.974 af

Subcatchment DA-1N-4: Sub Runoff Area=1,933.855 ac 42.21% Impervious Runoff Depth=4.84"
Flow Length=16,125' Tc=105.4 min CN=83 Runoff=3,274.40 cfs 779.876 af

Subcatchment DA-1S-4: Sub Watershed Runoff Area=534.899 ac 57.50% Impervious Runoff Depth=5.29"
Flow Length=6,686' Tc=41.2 min CN=87 Runoff=1,941.16 cfs 235.630 af

Total Runoff Area = 2,468.754 ac Runoff Volume = 1,015.506 af Average Runoff Depth = 4.94"
54.48% Pervious = 1,344.863 ac 45.52% Impervious = 1,123.891 ac

Summary for Pond 4P: Easton North Pond - No aux. spillway, incl drawdown

Inflow Area = 2,468.754 ac, 45.52% Impervious, Inflow Depth = 4.94" for 50-year event
Inflow = 3,792.33 cfs @ 13.00 hrs, Volume= 1,015.506 af
Outflow = 1,727.24 cfs @ 14.27 hrs, Volume= 673.974 af, Atten= 54%, Lag= 76.0 min
Primary = 1,727.24 cfs @ 14.27 hrs, Volume= 673.974 af
Routed to nonexistent node 4R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 5.50' Storage= 529.393 af
Peak Elev= 11.77' @ 14.27 hrs Storage= 1,075.649 af (546.256 af above start)

Plug-Flow detention time= 925.0 min calculated for 144.430 af (14% of inflow)
Center-of-Mass det. time= 228.2 min (1,102.1 - 873.9)

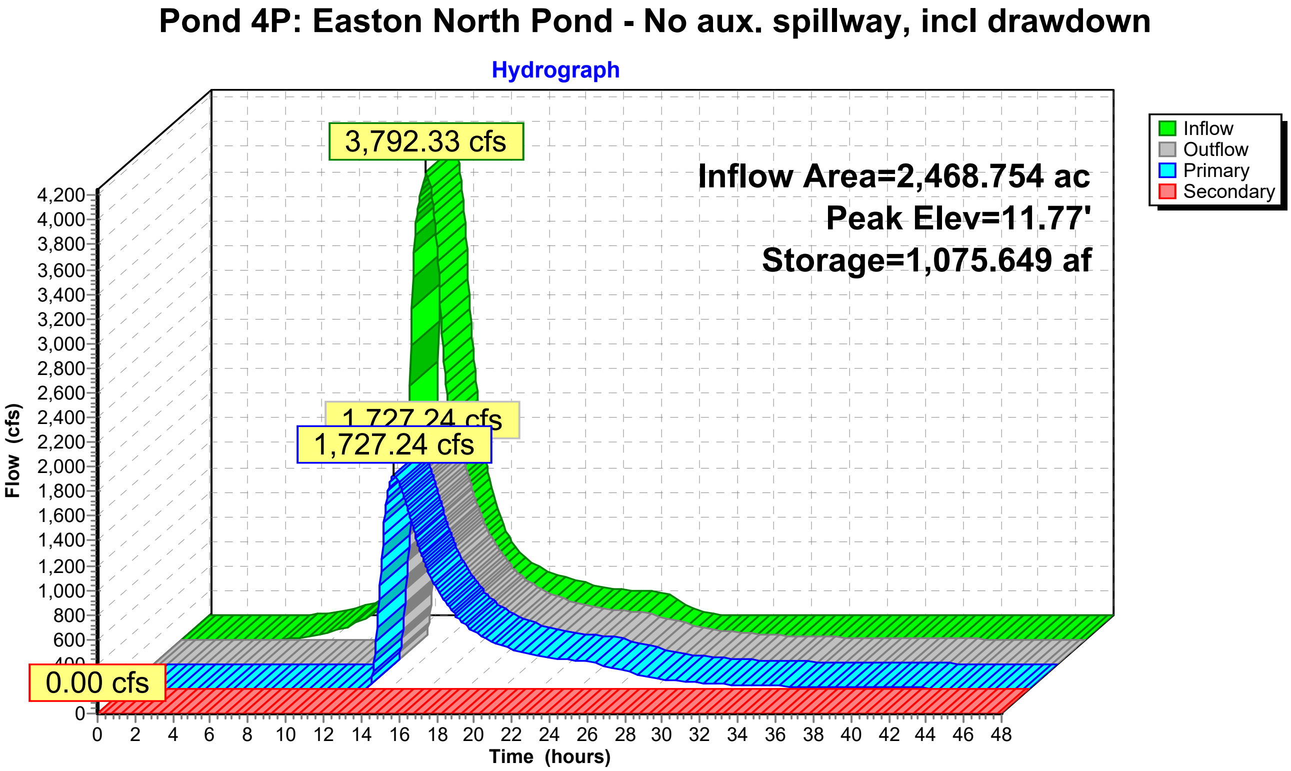
Volume	Invert	Avail.Storage	Storage Description
#1	-0.93'	1,316.353 af	**Custom Stage Data** Listed below

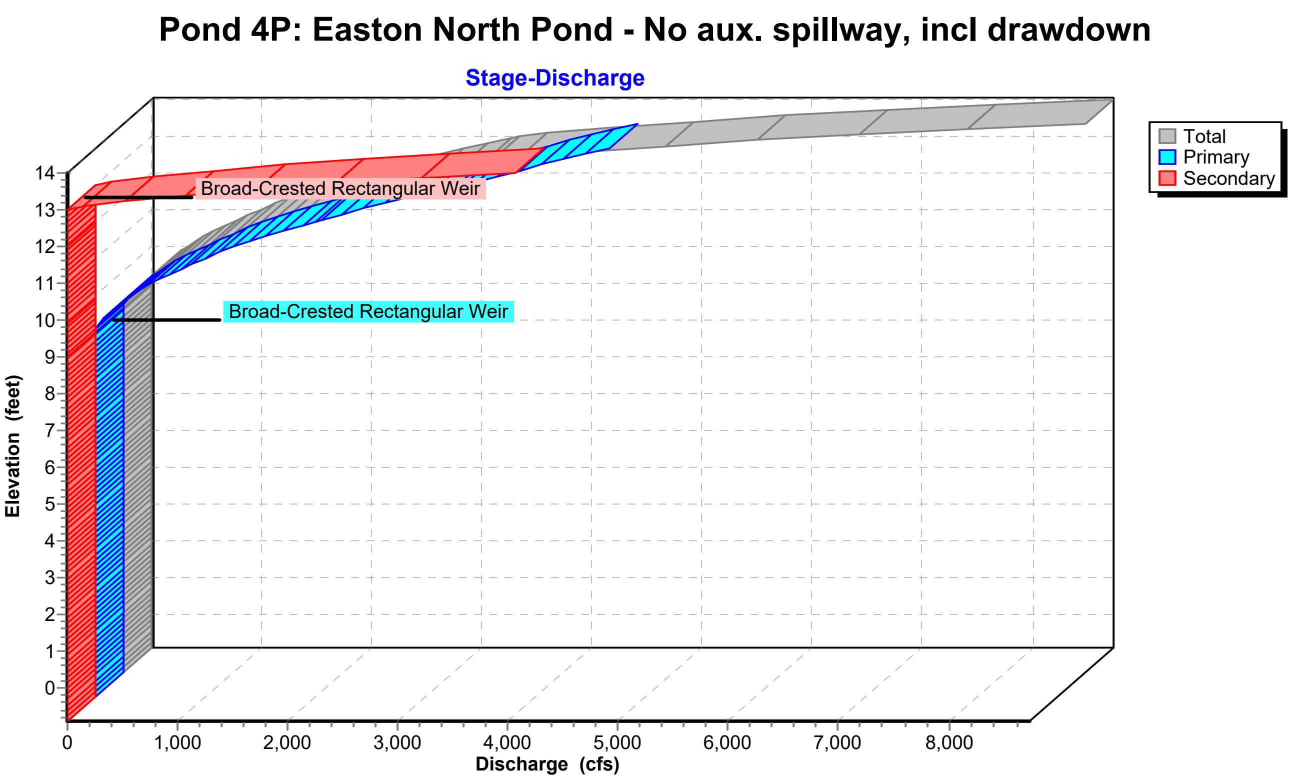
Elevation (feet)	Cum.Store (acre-feet)
-0.93	0.000
1.01	97.652
9.88	950.557
12.00	1,090.553
14.00	1,316.353

Device	Routing	Invert	Outlet Devices
#1	Primary	9.00'	**125.5' long x 2.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32
#2	Secondary	13.00'	**1,550.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

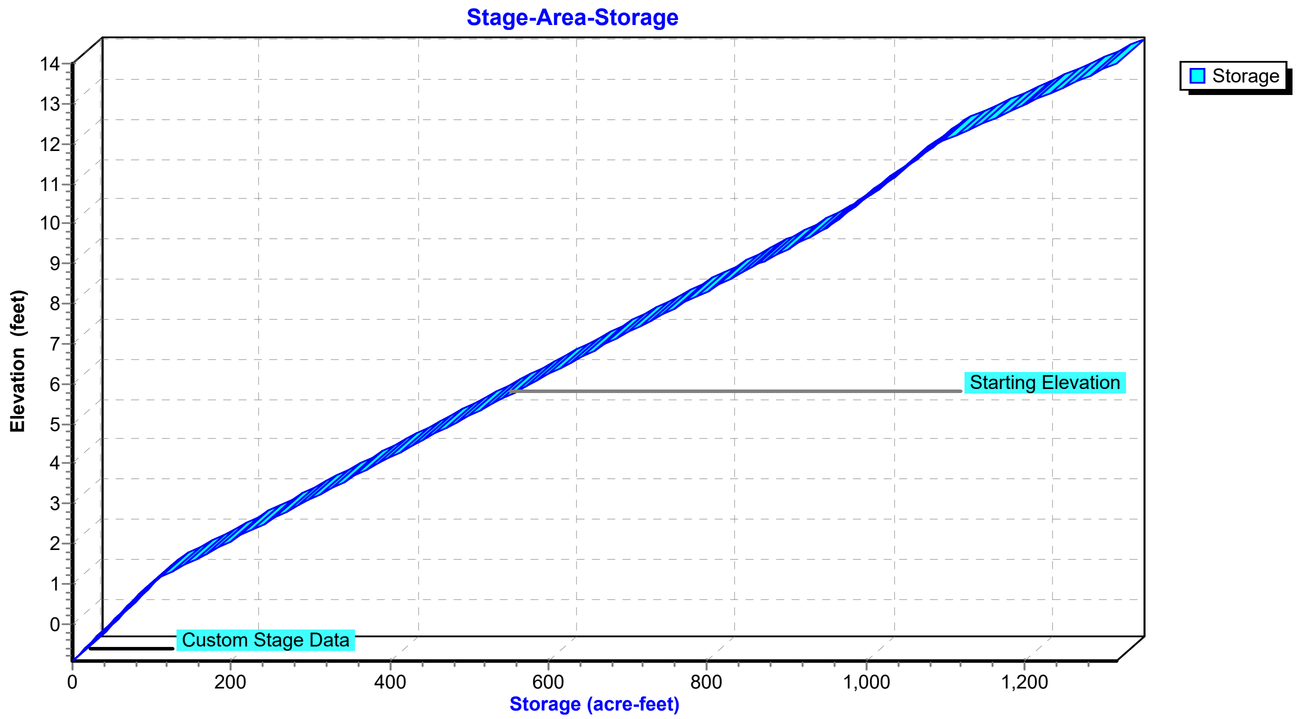
Primary OutFlow Max=1,726.30 cfs @ 14.27 hrs HW=11.77' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1,726.30 cfs @ 4.96 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)


Pond 4P: Easton North Pond - No aux. spillway, incl drawdown
Hydrograph
3,792.33 cfs
Inflow Area=2,468.754 ac
Peak Elev=11.77'
Storage=1,075.649 af
1,727.24 cfs
1,727.24 cfs
0.00 cfs
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
4,200
4,000
3,800
3,600
3,400
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48


Pond 4P: Easton North Pond - No aux. spillway, incl drawdown
Stage-Discharge
Total
Primary
Secondary
Broad-Crested Rectangular Weir
Broad-Crested Rectangular Weir
Elevation (feet)
Discharge (cfs)
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000

Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Summary for Subcatchment DA-1N-4: Sub Watershed North

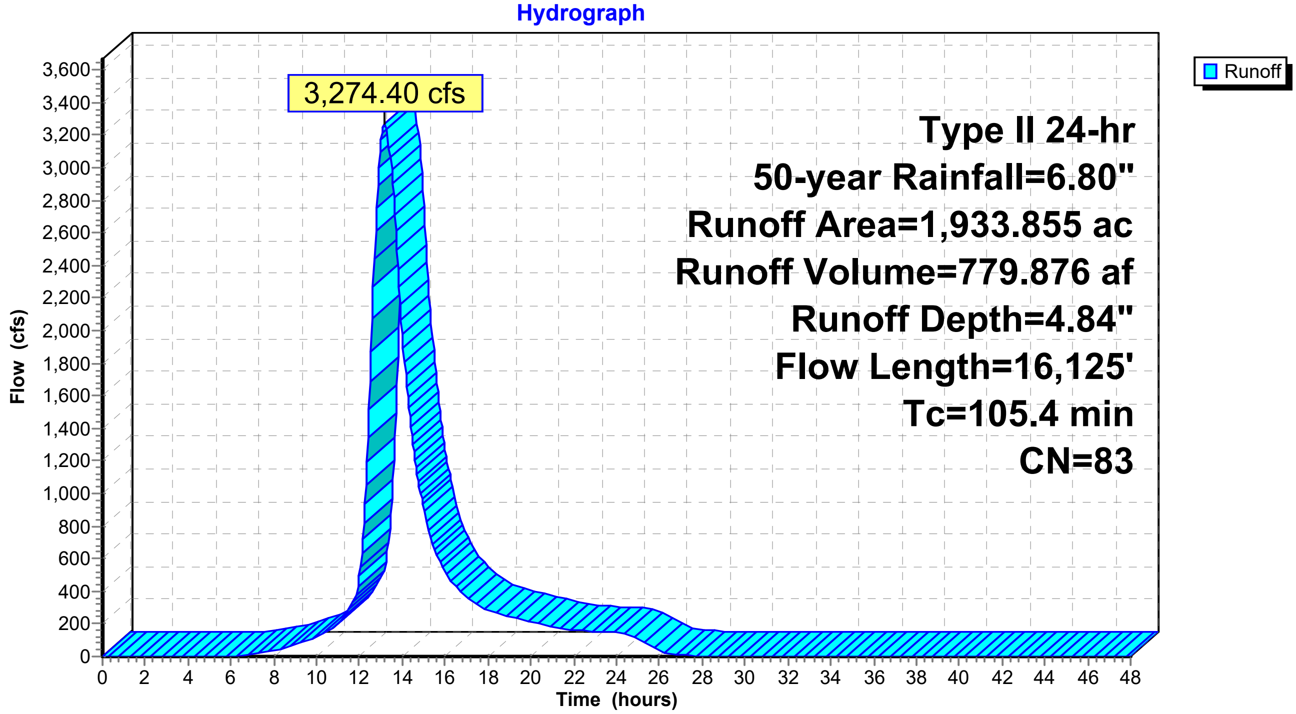
Runoff = 3,274.40 cfs @ 13.20 hrs, Volume= 779.876 af, Depth= 4.84"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-year Rainfall=6.80"

Area (ac)	CN	Description
621.792	98	Paved parking, HSG C
504.320	83	1/4 acre lots, 38% imp, HSG C
230.673	79	Pasture/grassland/range, Fair, HSG C
2.880	98	Water Surface, HSG C
319.783	70	Woods, Good, HSG C
254.407	65	Brush, Good, HSG C
1,933.855	83	Weighted Average
1,117.541		57.79% Pervious Area
816.314		42.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
1.1	100	0.0100	1.50		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
90.5	15,925	0.0082	2.93	29.34	**Channel Flow, Channel Flow** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.035
105.4	16,125	Total			

Subcatchment DA-1N-4: Sub Watershed North



Summary for Subcatchment DA-1S-4: Sub Watershed South

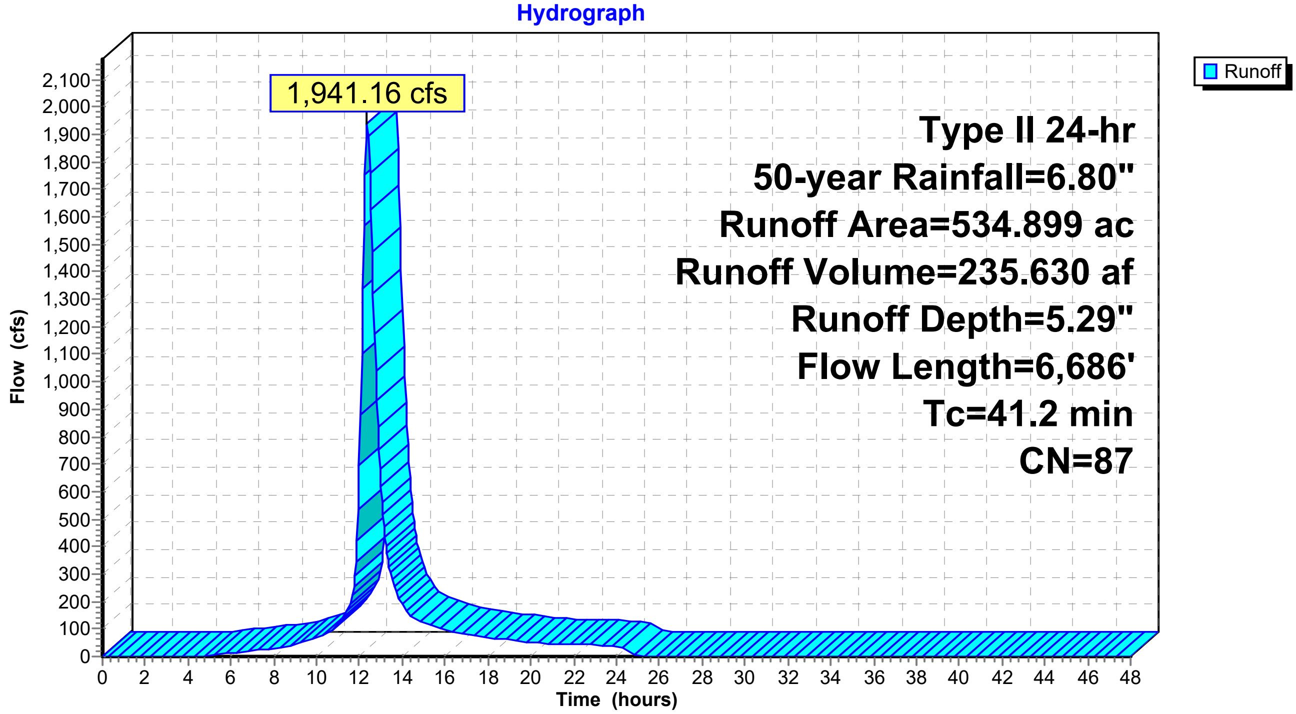
Runoff = 1,941.16 cfs @ 12.37 hrs, Volume= 235.630 af, Depth= 5.29"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-year Rainfall=6.80"

Area (ac)	CN	Description
148.429	98	Paved parking, HSG C
136.687	83	1/4 acre lots, 38% imp, HSG C
17.933	79	Pasture/grassland/range, Fair, HSG C
107.207	98	Water Surface, HSG C
77.094	70	Woods, Good, HSG C
47.549	65	Brush, Good, HSG C
534.899	87	Weighted Average
227.322		42.50% Pervious Area
307.577		57.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
4.9	814	0.0344	2.78		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
22.5	5,772	0.0227	4.27	25.62	**Channel Flow, Channel Flow** Area= 6.0 sf Perim= 11.0' r= 0.55' n= 0.035
41.2	6,686	Total			

Subcatchment DA-1S-4: Sub Watershed South



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 4P: Easton North Pond - No Peak Elev=12.24' Storage=1,117.544 af Inflow=4,383.46 cfs 1,175.951 af
Primary=2,280.99 cfs 834.315 af Secondary=0.00 cfs 0.000 af Outflow=2,280.99 cfs 834.315 af

Subcatchment DA-1N-4: Sub Runoff Area=1,933.855 ac 42.21% Impervious Runoff Depth=5.62"
Flow Length=16,125' Tc=105.4 min CN=83 Runoff=3,789.34 cfs 904.927 af

Subcatchment DA-1S-4: Sub Watershed Runoff Area=534.899 ac 57.50% Impervious Runoff Depth=6.08"
Flow Length=6,686' Tc=41.2 min CN=87 Runoff=2,220.42 cfs 271.023 af

Total Runoff Area = 2,468.754 ac Runoff Volume = 1,175.951 af Average Runoff Depth = 5.72"
54.48% Pervious = 1,344.863 ac 45.52% Impervious = 1,123.891 ac

Summary for Pond 4P: Easton North Pond - No aux. spillway, incl drawdown

Inflow Area = 2,468.754 ac, 45.52% Impervious, Inflow Depth = 5.72" for 100-year event
Inflow = 4,383.46 cfs @ 13.00 hrs, Volume= 1,175.951 af
Outflow = 2,280.99 cfs @ 14.10 hrs, Volume= 834.315 af, Atten= 48%, Lag= 66.0 min
Primary = 2,280.99 cfs @ 14.10 hrs, Volume= 834.315 af
Routed to nonexistent node 4R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 5.50' Storage= 529.393 af
Peak Elev= 12.24' @ 14.10 hrs Storage= 1,117.544 af (588.150 af above start)

Plug-Flow detention time= 679.1 min calculated for 304.922 af (26% of inflow)
Center-of-Mass det. time= 202.1 min (1,072.1 - 869.9)

Volume	Invert	Avail.Storage	Storage Description
#1	-0.93'	1,316.353 af	**Custom Stage Data** Listed below

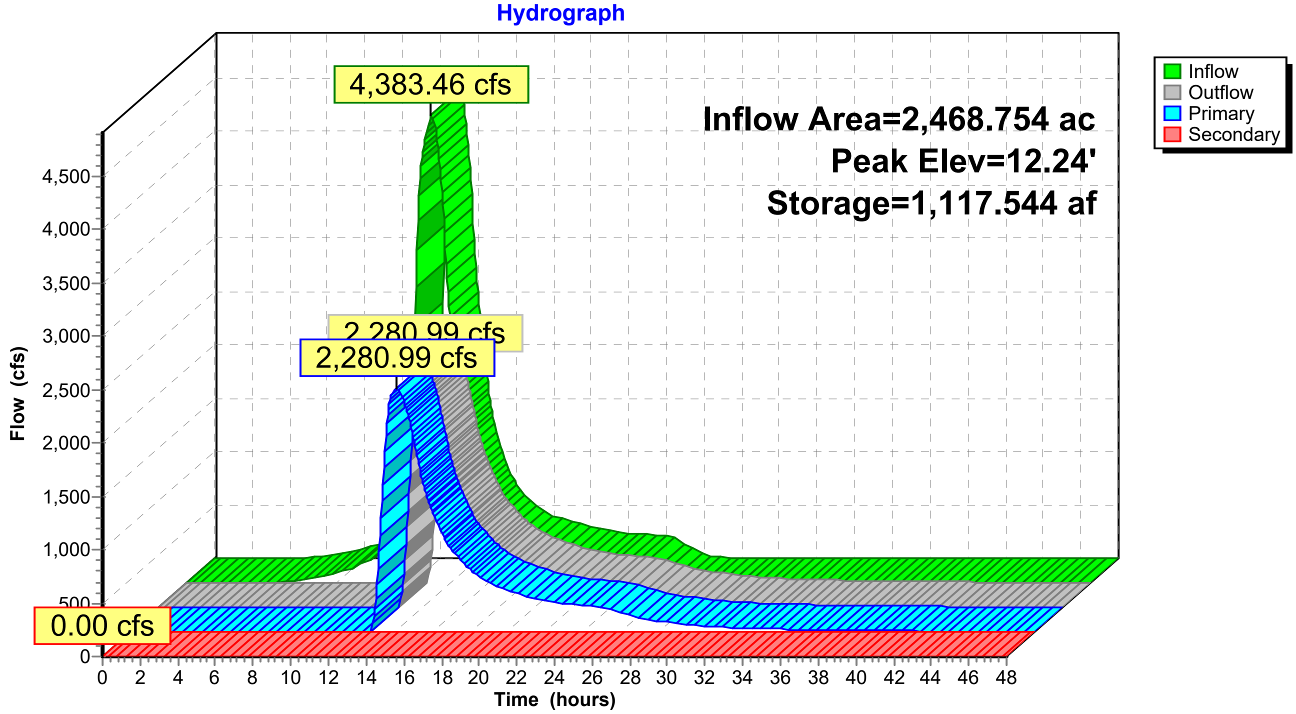
Elevation (feet)	Cum.Store (acre-feet)
-0.93	0.000
1.01	97.652
9.88	950.557
12.00	1,090.553
14.00	1,316.353

Device	Routing	Invert	Outlet Devices
#1	Primary	9.00'	**125.5' long x 2.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32
#2	Secondary	13.00'	**1,550.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

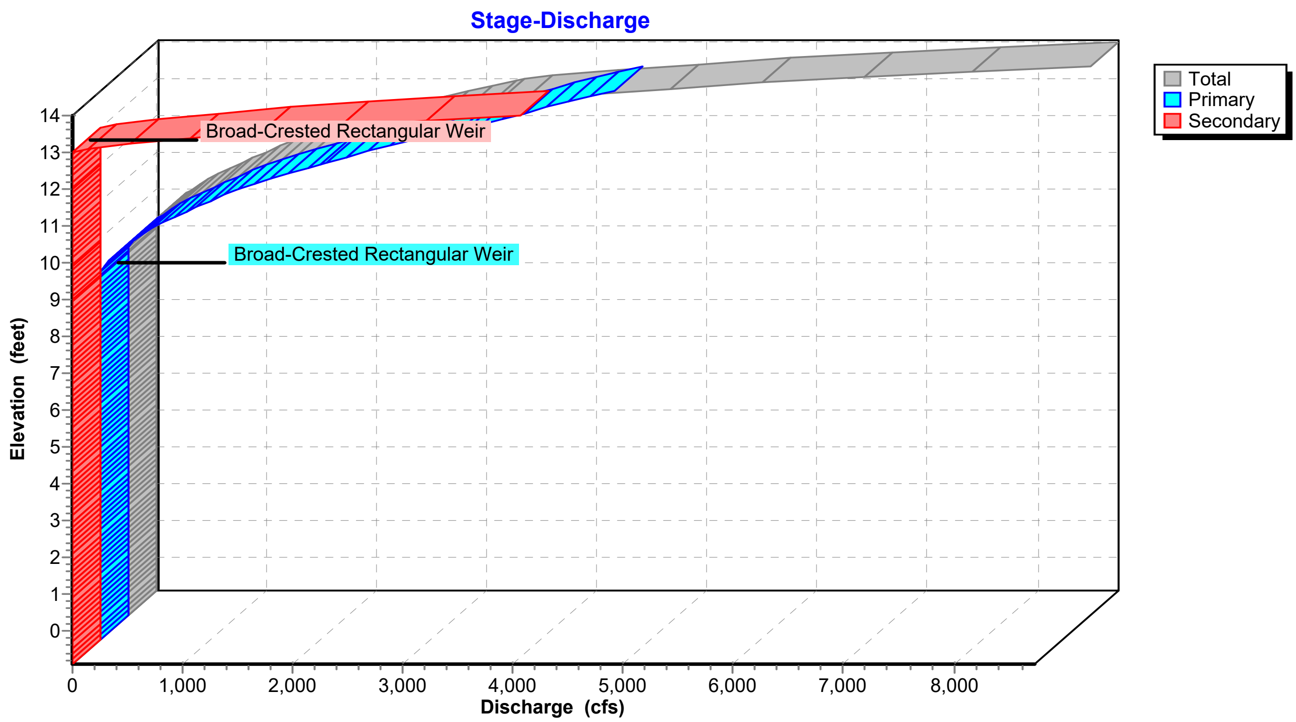
Primary OutFlow Max=2,280.31 cfs @ 14.10 hrs HW=12.24' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 2,280.31 cfs @ 5.61 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

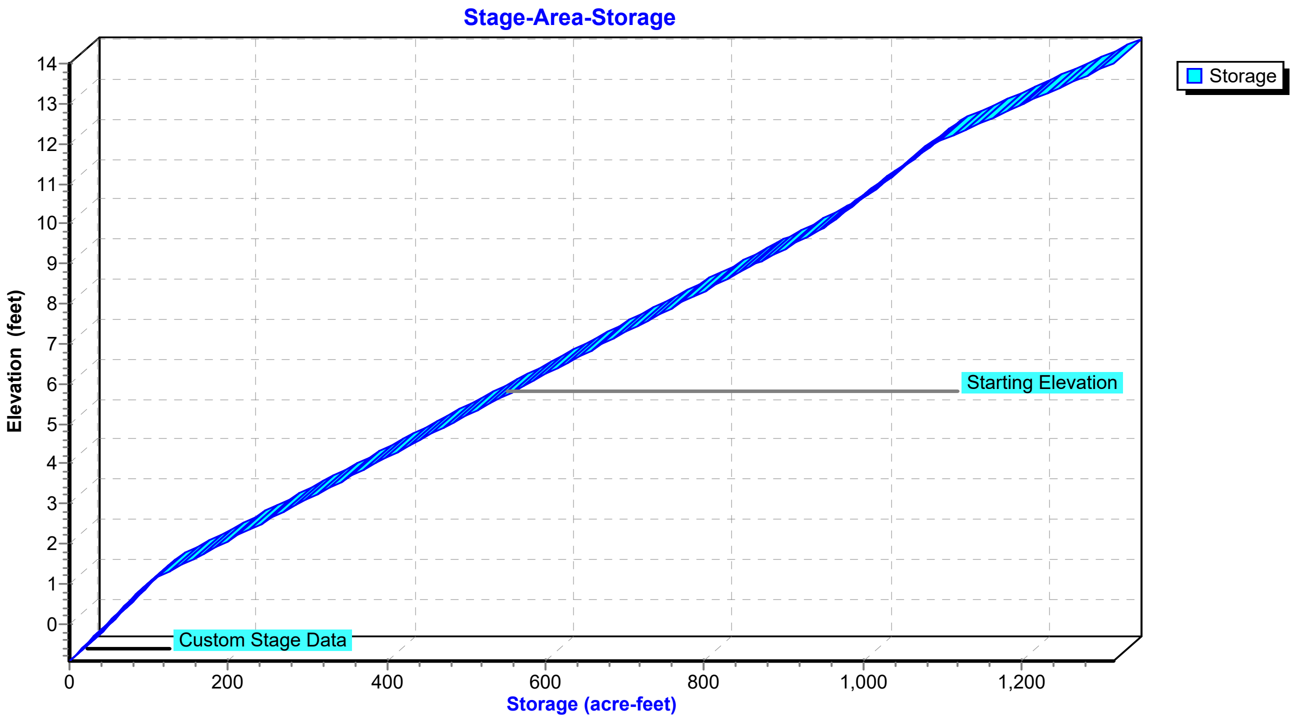
Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Pond 4P: Easton North Pond - No aux. spillway, incl drawdown



Summary for Subcatchment DA-1N-4: Sub Watershed North

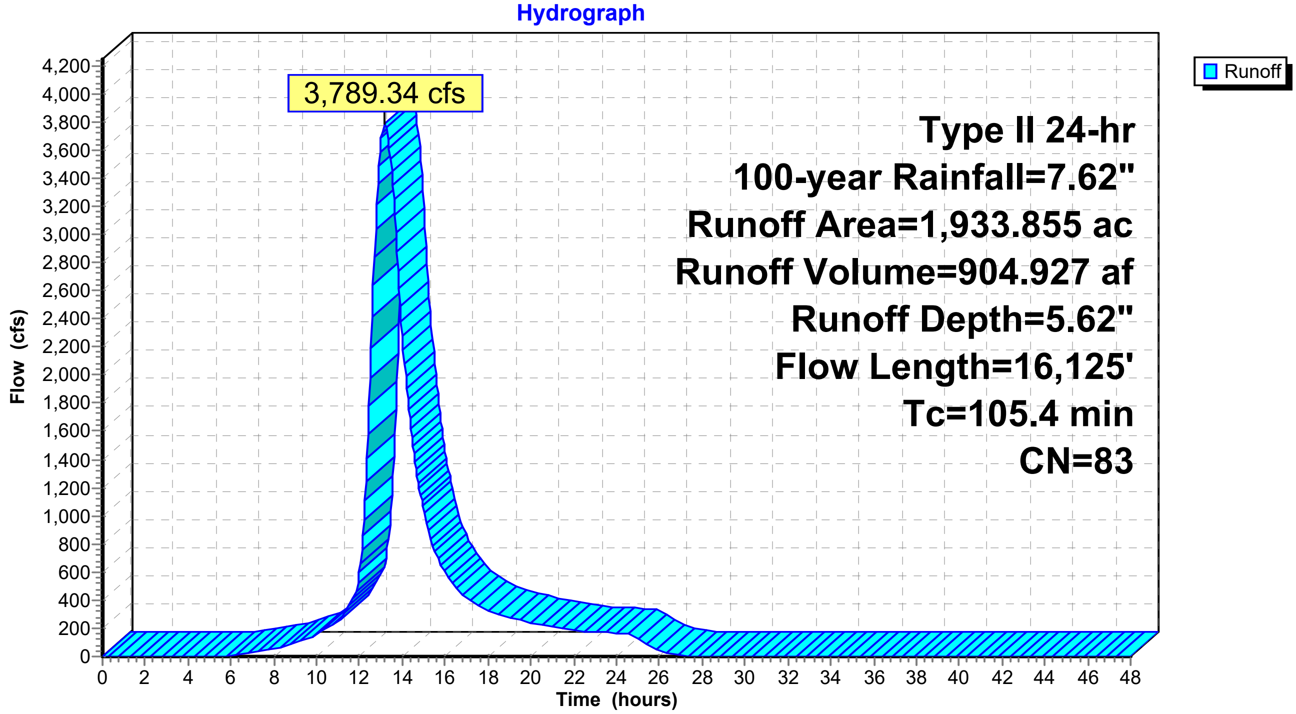
Runoff = 3,789.34 cfs @ 13.19 hrs, Volume= 904.927 af, Depth= 5.62"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=7.62"

Area (ac)	CN	Description
621.792	98	Paved parking, HSG C
504.320	83	1/4 acre lots, 38% imp, HSG C
230.673	79	Pasture/grassland/range, Fair, HSG C
2.880	98	Water Surface, HSG C
319.783	70	Woods, Good, HSG C
254.407	65	Brush, Good, HSG C
1,933.855	83	Weighted Average
1,117.541		57.79% Pervious Area
816.314		42.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
1.1	100	0.0100	1.50		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
90.5	15,925	0.0082	2.93	29.34	**Channel Flow, Channel Flow** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.035
105.4	16,125	Total			

Subcatchment DA-1N-4: Sub Watershed North



Summary for Subcatchment DA-1S-4: Sub Watershed South

Runoff = 2,220.42 cfs @ 12.37 hrs, Volume= 271.023 af, Depth= 6.08"
Routed to Pond 4P : Easton North Pond - No aux. spillway, incl drawdown

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=7.62"

Area (ac)	CN	Description
148.429	98	Paved parking, HSG C
136.687	83	1/4 acre lots, 38% imp, HSG C
17.933	79	Pasture/grassland/range, Fair, HSG C
107.207	98	Water Surface, HSG C
77.094	70	Woods, Good, HSG C
47.549	65	Brush, Good, HSG C
534.899	87	Weighted Average
227.322		42.50% Pervious Area
307.577		57.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0200	0.12		**Sheet Flow, Sheet Flow First 100 feet** Grass: Dense n= 0.240 P2= 3.40"
4.9	814	0.0344	2.78		**Shallow Concentrated Flow, 100 feet of shallow flow** Grassed Waterway Kv= 15.0 fps
22.5	5,772	0.0227	4.27	25.62	**Channel Flow, Channel Flow** Area= 6.0 sf Perim= 11.0' r= 0.55' n= 0.035
41.2	6,686	Total			

Subcatchment DA-1S-4: Sub Watershed South

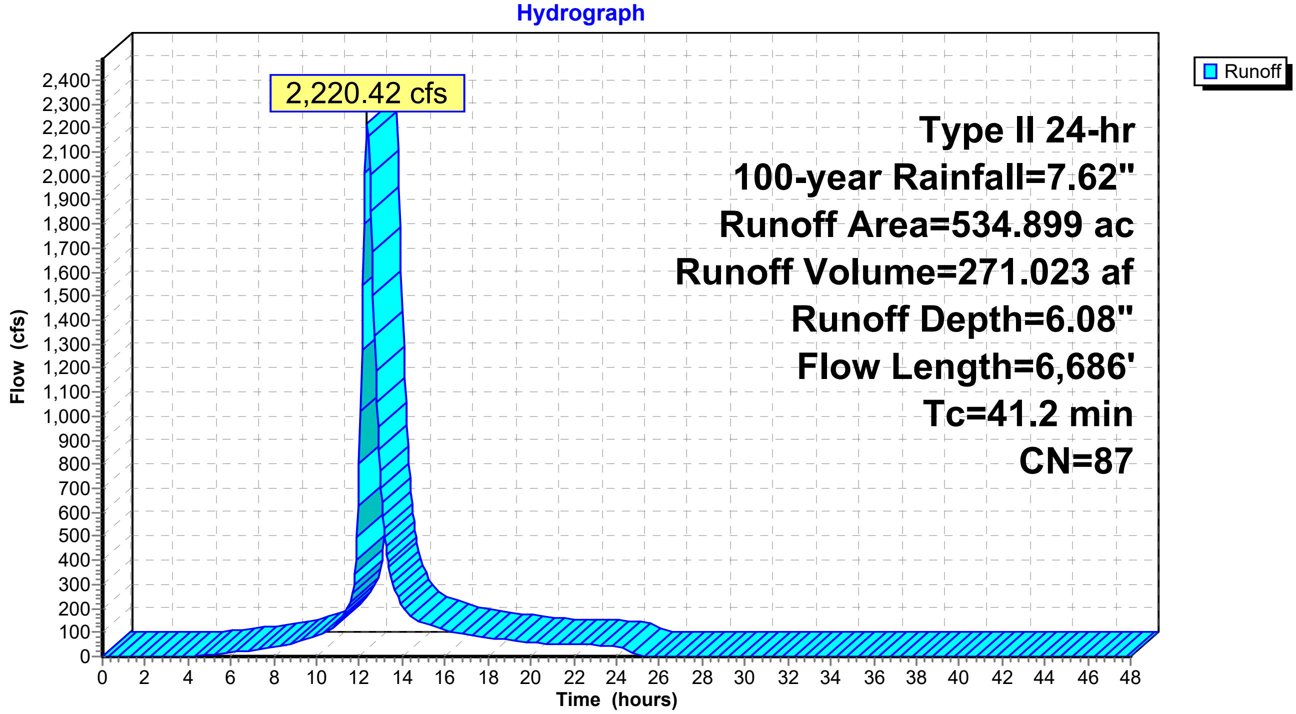


TABLE OF CONTENTS

SumCo
ECO-CONTRACTING

Spec Sheets/Product information

DIRTBAG

PUMPED SEDIMENT REMOVAL SYSTEM

SEDIMENT & PERIMETER CONTROL

DIRTBAG®

Retains the silt, sand and fines while allowing the filtered water to drain out into the drainage system.

Protect the environment effectively and economically with the ACF Dirtbag®!

The ACF Dirtbag® collects sand, silt and fines, while regulating that enters streams, surrounding property and storm sewers. ACF can make custom Dirtbags® to suit your needs. ACF Environmental manufactures the Dirtbag® using a variety of woven and nonwoven geotextile fabrics. We can produce any size, dimension, or fabric weight requested.

Each standard Dirtbag® has a fill spout large enough to accommodate a 4" discharge hose. Straps are attached to secure the hose and prevent pumped water from escaping without being filtered. To increase the efficiency of filtration, place the bag on an aggregate or haybale bed to maximize water flow through the surface area of the bag. Dirtbag® is full when it no longer can efficiently filter sediment or pass water at a reasonable rate. Flow and removal rates will vary depending on the size of Dirtbag®, the type and amount of sediment discharged into Dirtbag®, the type of surface, rock or other substance under the bag. Under most circumstances Dirtbag® will accommodate flow rates of 500 gallons per minute. Use of excessive flow rates or overfilling Dirtbag® with sediment will cause ruptures of the bags or failure of the hose attachment straps.

Dirtbag® must be monitored during use.
Dirtbag® and Dirtbag® HD have been tested under ASTM D-7880 and ASTM D-7701, which are Standard Test Methods for Determining Flow Rate of Water and Suspended Solids Retention from a Closed Geosynthetic Bag. Testing summary available upon request.

DirtBag®

Standard Dirtbag® Features

- Higher flow rate
- Higher removal rate
- Smaller openings

Dirtbag® HD

NEW

Dirtbag® HD Features

- Higher strength
- More cost effective
- Less susceptible to ruptures

DIRTBAG® SPECIFICATIONS

STANDARD DIRTBAG®

Standard Sizes:
4' x 6'
5' x 5'
8' x 10'
10' x 10'
15 x 15'
Custom Sizes available upon request.

Geotextile Properties - 8oz: Nonwoven

Property	Test Method	Units	Test Results
Weight	ASTM D-3776	oz/yd	8
Grab Tensile	ASTM D-4632	lbs.	205
CBR Puncture	ASTM D-6241	lbs.	525
Flow Rate	ASTM D-4491	gal/min/ft^2	90
Permittivity	ASTM D-4491	sec.$^{-1}$	1.4
UV Resistant	ASTM D-4355	%	70
AOS %	ASTM D-4751	US Sieve	80

DIRTBAG®HD

Standard Sizes:
3' x 5'
4' x 10'
6' x 20'
12' x 12.5'
12' x 18.75'
Custom Sizes available upon request.

Geotextile Properties - Woven

Property	Test Method	Units	Test Results
Weight	ASTM D-3776	oz/yd	6.13
Grab Tensile	ASTM D-4632	lbs.	168x300
CBR Puncture	ASTM D-6241	lbs.	901
Flow Rate	ASTM D-4491	gal/min/ft^2	66.2
Permittivity	ASTM D-4491	sec.$^{-1}$	0.862
UV Resistant	ASTM D-4355	%	96
AOS %	ASTM D-4751	US Sieve	30

Dirtbag® Test Results

Property	Test Method	Units	Standard Dirtbag Results	Results
Average Removal Efficiency	ASTM D-7701	%	99.6	95.3
Residual Low-Head	ASTM D-7701	gpm	<0.001	0.004
CBR Puncture	ASTM D-6241	lbs.	97.98	93.29

Dirtbag® Seam Test Results (under ASTM D4884)

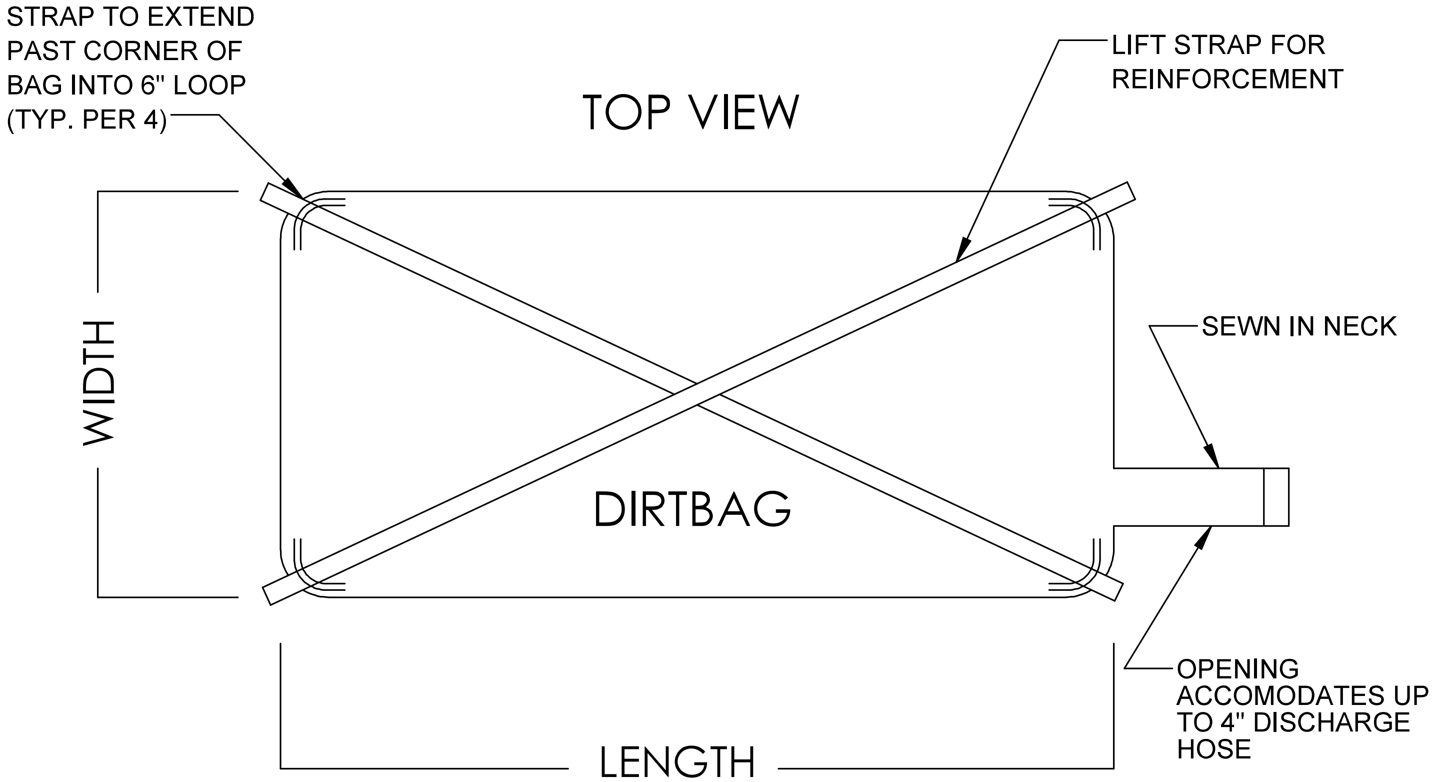
NonWoven Dirtbag	Woven Dirtbag
Maximum Load 786 lbs	Maximum Load 934 lbs
Maximum Strength 1178 lb/ft	Maximum Strength 1402 lb/ft
NOTE: Each test result was derived from a material failure rather than a stitch failure.	

All properties are Minimum Average Roll Value (MARV) except the weight of the fabric, which is given for information purposes only. Depending on soil conditions and filtration requirements, additional geotextile options are available. All test methods are ASTM or industry standard, and have been verified by a third party testing facility. Test data is available upon request.

Dirtbag^{HD} and Dirtbag^{SD} Tube are also available from ACF.

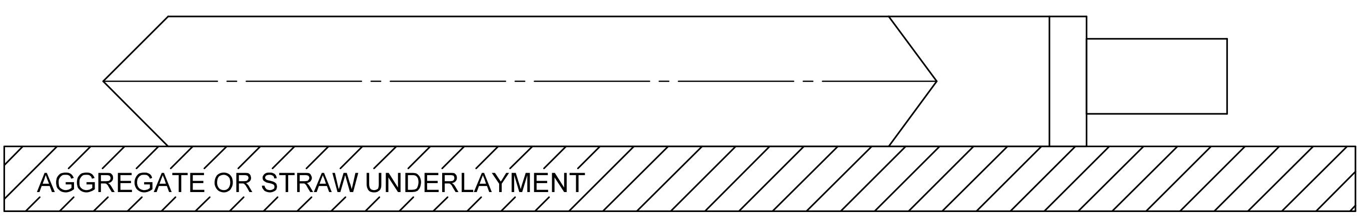
ACF ENVIRONMENTAL
LET'S GET IT DONE
800.448.3636
acfenvironmental.com

5 2016



NOTES:
1) DIRTBAG TO BE PLACED ON AGGREGATE OR STRAW
2) SEAMS MUST BE HIGH STRENGTH DOUBLE STITCHED "J" SEAMS
3) SEAM MUST BE TESTED UNDER ASTM D-4884. ACF TEST RESULTS AVAILABLE UPON REQUEST

CROSS SECTION



DB55 FABRIC PROPERTIES		
PROPERTY	TEST METHOD	MARV
TENSILE STRENGTH	ASTM D-4632	205 LBS
ELONGATION	ASTM D-4632	50%
CBR PUNCTURE	ASTM D-6241	525 LBS
UV RESISTANCE	ASTM D-4355	70%
AOS	ASTM D-4751	80 US SIEVE
PERMITTIVITY	ASTM D-4491	1.4 SEC-1
FLOW RATE	ASTM D-4491	90 GPM/SF

ACF ENVIRONMENTAL
LET'S GET IT DONE

CORPORATE OFFICE:
2831 CARDWELL ROAD
RICHMOND, VA 23234
PH: 800-448-3636
WWW.ACFENVIRONMENTAL.COM

ACF DB55 (8OZ) DIRTBAG

FOR ADDITIONAL INFORMATION PLEASE CONTACT ACF ENVIRONMENTAL
PH: 800-448-3636 / WWW.ACFENVIRONMENTAL.COM

#6: Bulk Bag Product Info:

US Construction Fabrics LLC

CONSTRUCTION FABRICS, LINERS & ENVIRONMENTAL PRODUCTS

Serving the Industry Since 1991

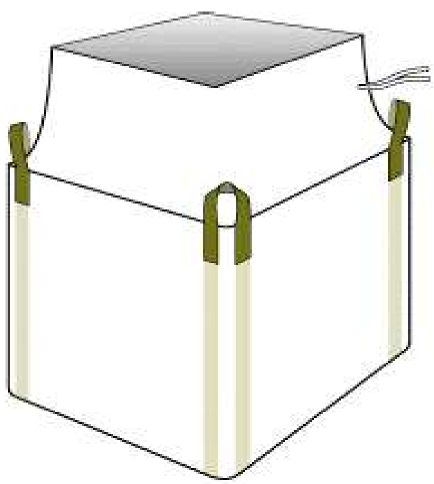
P.O. Box 505 Windham, NH 03087 · TEL **(603) 893-5480** · FAX **(603) 893-2154**

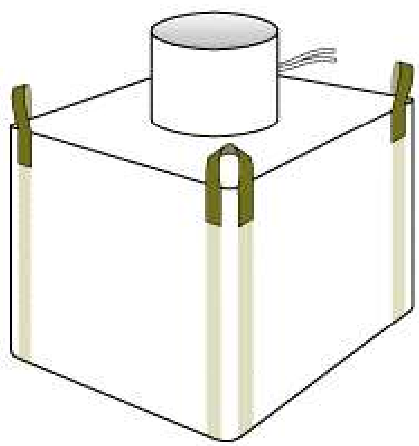
BULK BAG 3000

Fabric:
Our BULK bags are constructed using heavy-duty, UV treated woven polypropylene. The fabric weight (6.5 oz.) is tailored to meet required tensile strength and Safe Working Load (SWL) requirements up to 3,000 lbs with a Safety Factor of 5-1. To prevent material escape, extrusion coating and seam dust-proofing options are available upon request.

Design:
FIBCs (Flexible Intermediate Bulk Containers) are assembled in three standard construction styles:
· U-panel [one long "U" shaped panel with two side panels attached]
· Circular Woven [tubular bag, loom-woven, with bottom panel attached-fewer seams mean less particle entrapment]
· Baffle [polypropylene corner baffles sewn across inside corners of bag to maintain shape rigidity-takes up less volume/easier to stack]

Filling Options:
Duffle Top Spout





Discharge Options:
Bottom Spout-Single Closure

US Construction Fabrics LLC

CONSTRUCTION FABRICS, LINERS & ENVIRONMENTAL PRODUCTS

Serving the Industry Since 1991

P.O. Box 505 Windham, NH 03087 · TEL (603) 893-5480 · FAX (603) 893-2154

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Bulk Sand Bags 3000
BSB109

PHYSICAL PROPERTIES	MINIMUM VALUE
SIZE	35” x 35” x 44”
MATERIAL	2100D / 10X10 Coated
SWL	3,000 lbs.
FILLING OPTION	Duffle Top + Rain Hood 900D/12x12/Coated Width: 35” Height: 33”
DISCHARGE OPTION	Spout with Petal Cover Diameter: 14” Long: 18”
LIFTING OPTION	Cross Corner Loops Width: 4” Height: 12” – Sewing: 14”
SAFETY BAND	Yes – 2” Wide
DOCUMENT POUCH	Yes – 12” x 12”
OTHER	Rain Hood 40” X 40” with Tie Straps

#7: Sand Bag
Product Info:

US CONSTRUCTION FABRICS LLC

8 Ledge Rd, Windham, NH 03087 (603) 893-5480, Fax (603) 893-2154

www.usconstructionfabrics.com

Wholesale Distribution

CONSTRUCTION FABRICS, LINERS, & ENVIRONMENTAL PRODUCTS

SAND BAGS

PART #:	14981
SIZES:	14" X 26" (Hold 50 lbs) 18" X 27" (Hold 75 lbs)
COLORS:	WHITE, ORANGE & GREEN
MATERIAL:	850 DENIER NYLON POLYPROPYLENE
UV STABILIZED:	1600 HOURS
THREAD COUNT:	9" X 10"
TOP OF BAG:	HEAT CUT AND HEMMED
BOTTOM OF BAG:	HEMMED, FOLDED AND SEWN
NUMBER PER BAIL:	1000 BAGS
TIE:	POLYTIE

Plastic for Sand Bag Coffer Dam Sheeting

The HDX 20 ft. x 100 ft. Clear Plastic Sheeting is suitable for construction and DIY projects. It is made of premium-quality polyethylene to ensure long-term use. This sheeting can be used as a temporary cover for equipment and supplies. You can also create a vapor barrier or cover crawl spaces thanks to its multipurpose design.

- Made of polyethylene
- Up to 2,000 sq. ft. of coverage
- Clear (natural) color - allows light to pass through
- 6 mil thickness
- Serves as a temporary cover or vapor barrier
- Ideal for construction and DIY projects
- Get the right coverage - click here for Home Depot's buying guide
- For residential or commercial use

Specifications

Dimensions

Sheet Length (ft.)	100 ft	**Sheet Width (ft.)**	20 ft

Details

Color Family	Clear	**Features**	No Additional Features
Film Type	Construction Film	**Kit**	No
Package Quantity	1	**Paint Tool Product Type**	Plastic Sheeting
Product Type	Plastic Sheeting	**Product Weight (lb.)**	57.4
Returnable	90-Day	**Self-adhesive**	No

TECHNICAL DATA SHEET

MIRAFI 140N

MIRAFI® 140N is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. MIRAFI 140N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids. MIRAFI 140N meets AASHTO M288 Class 3 for Elongation > 50%.

TenCate Geosynthetics Americas (A Solmax Company) is accredited by Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

MIRAFI 140N meets Build America, Buy America Act, Pub. L. No. 117-58, div. G §§ 70901-52.

MECHANICAL PROPERTIES	TEST METHOD	UNIT	MINIMUM AVERAGE ROLL VALUE	
			MD	CD
Grab Tensile Strength	ASTM D4632	lbs (N)	120(534)	120 (534)
Grab Tensile Elongation	ASTM D4632	%	50	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	50 (223)	50 (223)
CBR Puncture Strength	ASTM D6241	lbs (N)	310 (1380)	
			MAXIMUM OPENING SIZE	
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve (mm)	70 (0.212)	
			MINIMUM ROLL VALUE	
Permittivity	ASTM D4491	sec^{-1}	1.7	
Flow Rate	ASTM D4491	gal/min/ft² (l/min/m²)	135 (5500)	
			MINIMUM TEST VALUE	
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70	

PHYSICAL PROPERTIES	TEST METHOD	UNIT	MINIMUM AVERAGE ROLL VALUE	
Weight	ASTM D5261	oz/yd² (g/m²)	4.0 (136)	
			ROLL SIZE	
Roll Dimensions (width x length)		ft (m)	12.5 x 360 (3.8 x 110)	15 x 360 (4.5 x 110)
Roll Area		yd² (m²)	500 (418)	600 (502)
Roll Weight		lbs (kg)	151 (69)	177 (80)

365 South Holland Drive Pendergrass, GA 30567

Tel +1 706 693 2226 www.tencategeo.us

FGS000385 ETQR98

SOLMAX

Sewage and Trash Pump DV100c

Overview:

The 6” suction x 4” discharge self-priming centrifugal DV100c trash pump provides up to a maximum of 1,450 gallons per minute pumping and up to 165 feet of head. This pump is usually mounted on a trailer and is equipped with a Run-Dry venturi or vacuum pump priming system which allows it to run continuously, unattended and even run dry. The optional Clean Prime feature allows continuous operation without pumping liquid carryover to contaminate the outside environment.

Features:

- Continuous self-priming
- Runs dry unattended
- 12 volt, electric start with auto-start capable control panel
- Flex coupled to diesel engine
- 24-hour minimum capacity fuel tank
- Compressor/Venturi or CleanPrime automatic priming system
- Cast iron wet end with enclosed impellers
- Replaceable wear plates
- SAE mounted

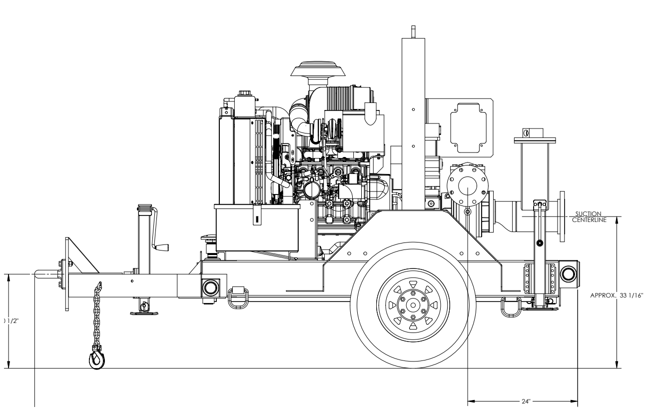
SA Option: 70 dB(A) @ 30 ft

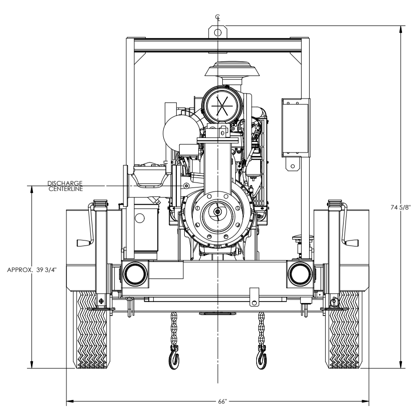
Specs:

Maximum Flow	1,450 GPM
Maximum Head	165 feet
Pump Size	6” x 4”
Dry Weight	2,400 lbs.
Wet Weight	2,700 lbs.
Maximum Solids Handling	3 inches
Footprint: Trailer mounted (approx)	106” x 62”
Fuel tank	40 or 60 gallon
Fuel consumption	1.9 gph @ 2,500 RPM

Accessories:

- Spillguard
- Suction and Discharge Hoses
- Fuel Nurse Tank





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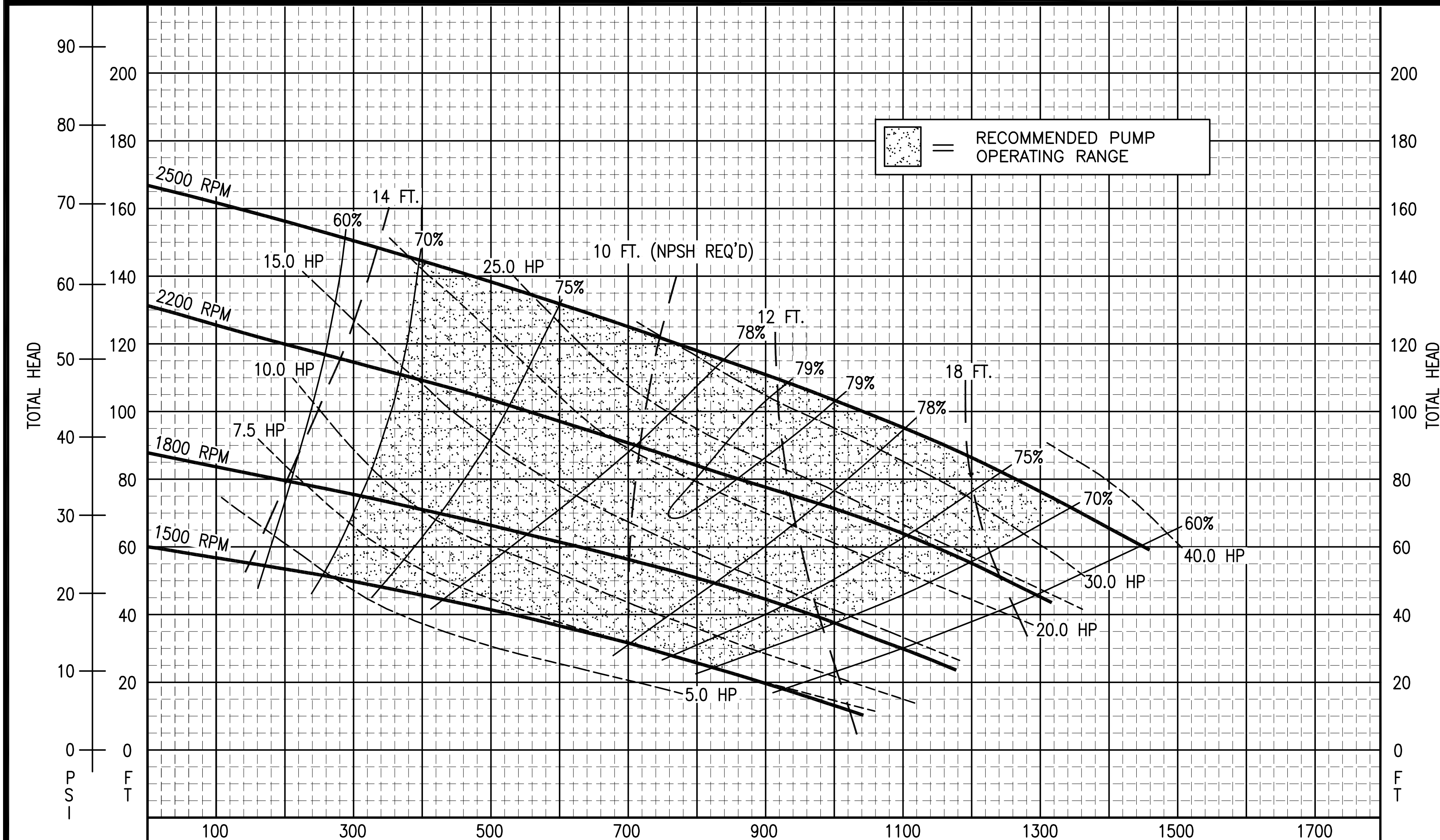
Rain For Rent

CURVE: 01-0133-02-20	PUMP : DV-100c

SUCTION	DISCHARGE	MAX. SPHERE	IMPELLER	IMPELLER	IMPELLER & WEAR RINGS
6”	4”	3”	ENCLOSED	8.25”	CAST IRON



FLOW – CLEAR WATER PERFORMANCE (US GPM)

CONFIDENTIAL

–PUMP PERFORMANCE CURVES DO NOT INCLUDE CHECK VALVE LOSSES

–POWER CURVES DO NOT INCLUDE PRIMING SYSTEM POWER CONSUMPTION

Sewage and Trash Pump DV300i

Overview:

The 12” suction x 12” discharge self-priming centrifugal DV300i trash pump provides up to a maximum of 6,900 gallons per minute pumping and up to 197 feet of head. This pump is usually mounted on a skid with sound attenuation and features the standard PowerPrime Clean Prime Venturi priming system which allows it to run continuously, unattended and even run dry.

*To be supplied with sound attenuated enclosure and or sound curtains

Features:

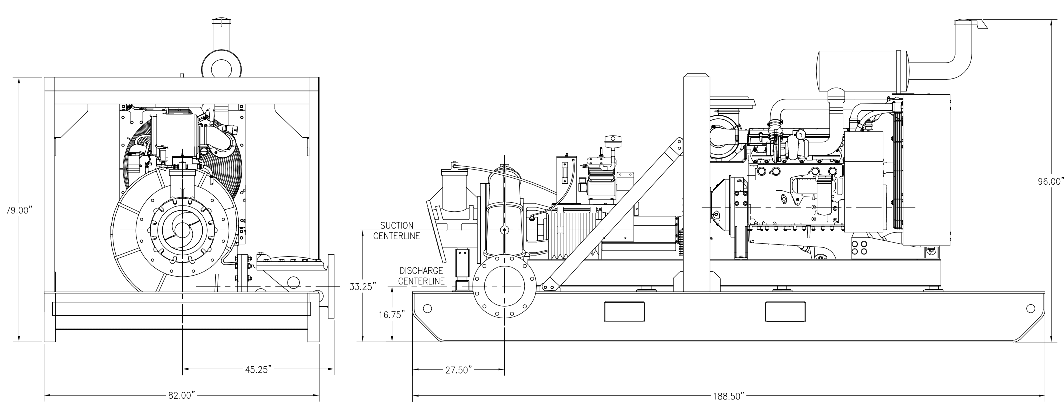
- Continuous self-priming
- Runs dry unattended
- 12 volt, eletric start with auto-start capable control panel
- Flex coupled to diesel engine
- 24-hour minimum capacity fuel tank
- Compressor fitted to operate the air-ejector priming system
- Cast iron wet end with open impellers
- Replaceable wear plates
- SAE Mounted
- Suction lift up to 28ft.

Specs:

Maximum Flow	6,900 GPM
Maximum Head	197 feet
Pump Size	12” x 12”
Maximum Solids Handling	3.5 inches
Dry weight	10,285 lbs.
Footprint: Trailer mounted model	188.5” x 82”
Fuel tank	250 gallon
Fuel consumption	8.9 gph @ 1,800 RPM

Accessories:

- Spillguard
- Suction and Discharge Hoses
- Fuel Nurse Tank
- VFD for electric driven models



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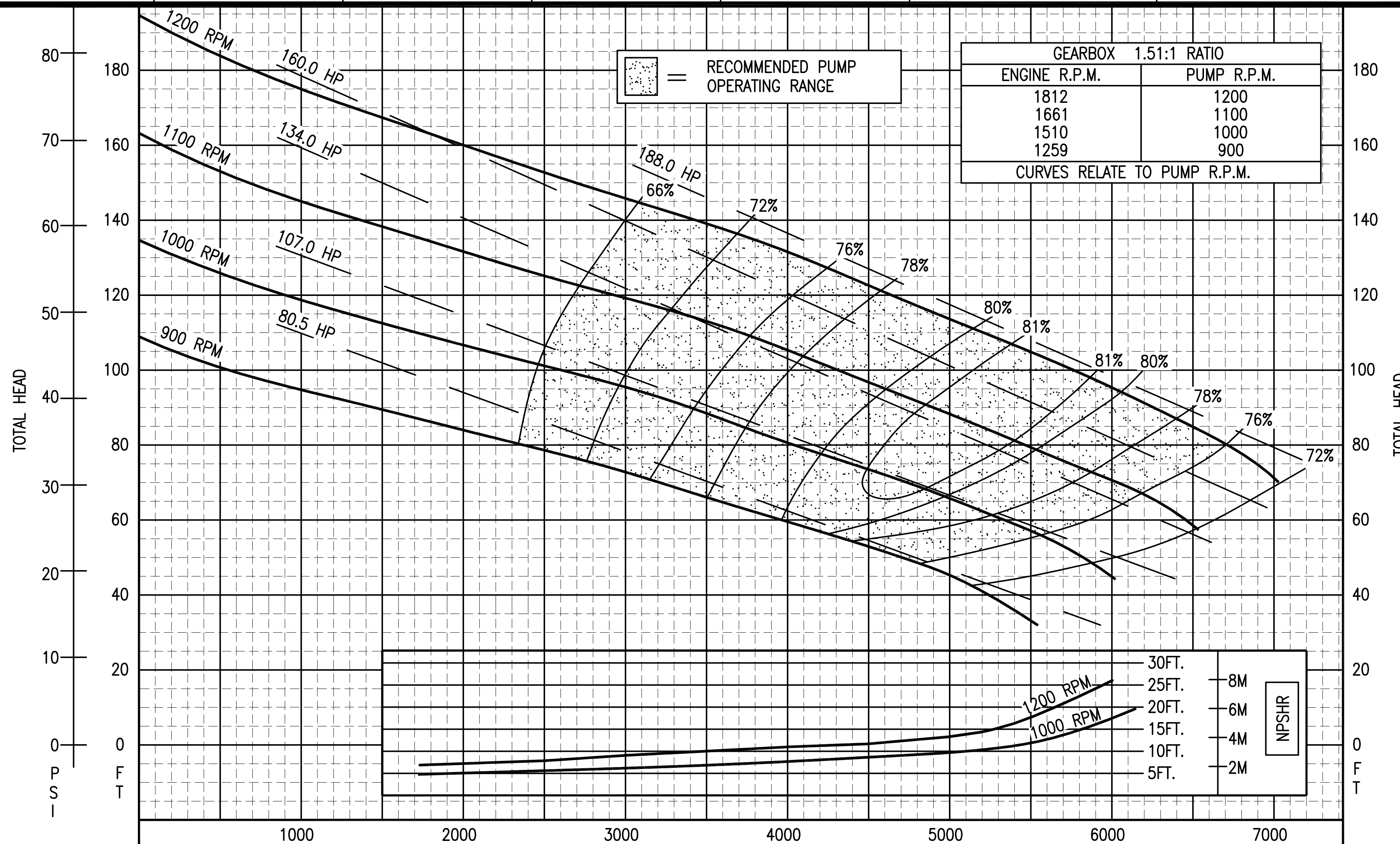
CURVE: 01–0133–02–17

PUMP : DV-300i

SUCTION	DISCHARGE	MAX. SPHERE	IMPELLER	IMPELLER	IMPELLER & WEAR RINGS
12”	12”	3.5”	OPEN	21.1”	316 S/S



GEARBOX 1.51:1 RATIO	
ENGINE R.P.M.	PUMP R.P.M.
1812	1200
1661	1100
1510	1000
1259	900
CURVES RELATE TO PUMP R.P.M.	

CONFIDENTIAL

–PUMP PERFORMANCE CURVES DO NOT INCLUDE CHECK VALVE LOSSES

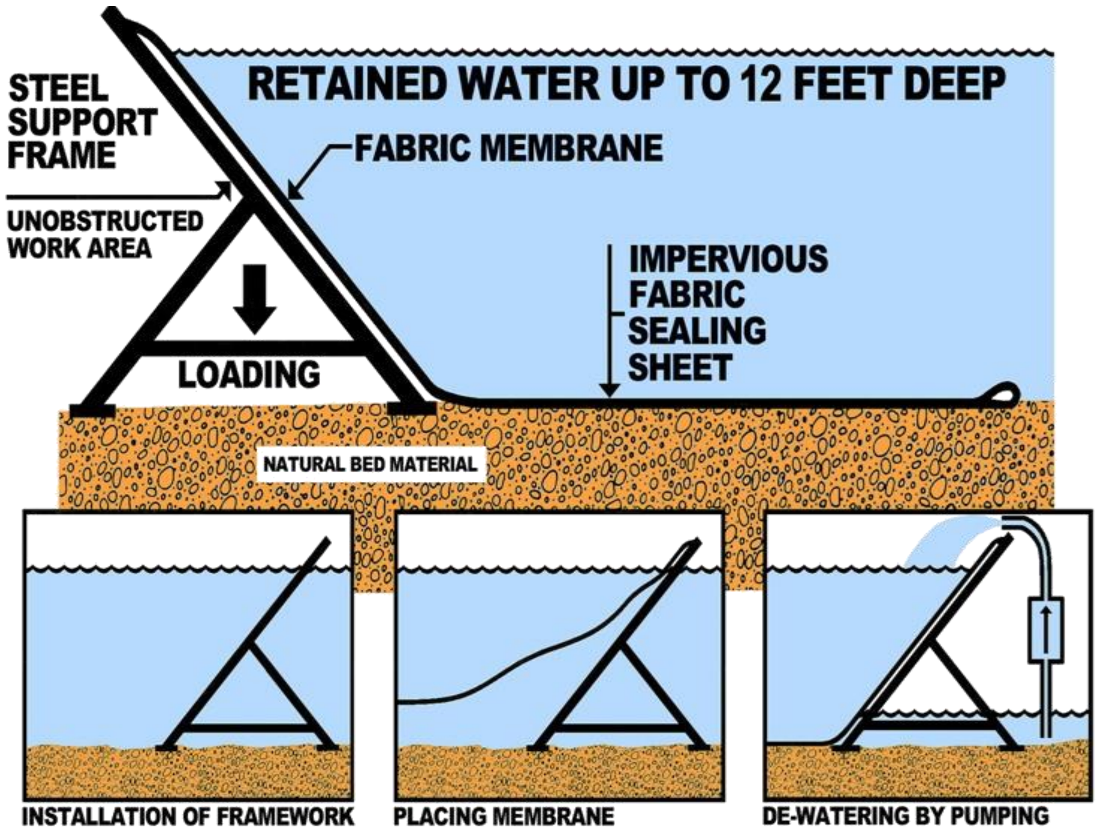
–POWER CURVES EXCLUDES AIR COMPRESSOR POWER CONSUMPTION

PORTADAM®

Temporary Cofferdam Solutions

Decades of Water Control Expertise

Temporary
Cofferdam
Solutions



Decades of Water Control Expertise

For nearly four decades, Portadam has provided superior customer service and product quality in the water diversion, flood protection and temporary water storage industries. Our exceptional service and broad portfolio of engineered solutions deliver advantages in both cost and schedule to our customers, enabling project success. Combining knowledge with innovation, Portadam identifies exactly what is required - customizing our solution to your needs. Our team of experts have executed over 5000 projects in the US and internationally. Let us be your choice for your next water diversion, flood protection or temporary water storage project!

Frames set in place

Fabric deployed

Work area dewatered

Index

Boathouses, Ramps & Structures

Temporary Cofferdam Solutions

Installation or repair of boat ramps, boathouses and other related structures becomes an easy, land-based operation with the use of the Portadam cofferdam system. A 3-sided structure, open to the shore, allows full, open access to the boat ramp work area. No cross bracing is required, leaving the entire work area free of obstruction. No floating equipment or costly pile driving machinery is needed to install a Portadam.

Since the main component of the Portadam system is a nylon reinforced PVC fabric liner, the water body is completely protected from the work area. All excavation and concrete work is conducted behind a barrier that keeps the lake, river or stream completely free of siltation, turbidity and pollution.

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Bridge Construction & Maintenance

The Portadam system can be installed in virtually any configuration. It can be installed under existing spans, allowing for continued traffic flow. Expensive span removal is not required as with driven sheeting methods. If the bridge pier work area is close to shore, the customer might opt for a 3-sided cofferdam structure so that they can access the pier directly from the shore. This configuration will allow for construction equipment and supplies to be utilized directly from the river bed (fill material is not required).

Excavation is made easier because the equipment operator is closer to the work (not digging through added fill) and can readily see the entire work area (not digging underwater). If the bridge pier is away from shore, as in large multi-span bridges, the system can be installed in a box or rectangular configuration.

The cofferdam is positioned directly on the river or lake bed. Access to the work area is either from the bridge deck or from floating equipment. Because the system is free-standing, the pier work area is unobstructed by cross-bracing or tie-backs to the pier face, thus improving project schedule flexibility.

This open space allows for clear access to excavate, assemble form-work and place protective measures. With the area dry, concrete pours become more visible, controllable, non-polluting and successful.

Canals & Channelization

Temporary Cofferdam Solutions

The flexibility of the proprietary Portadam system allows for installation in practically any configuration and over almost any contour. This feature permits installation along stream banks for restoration such as bulkheads, gabion structures, architectural walls and geoliners.

Dewatering these work areas allows for better control of excavation at toe of slope, so that proper “key-in” can be made to achieve the best possible construction techniques. Channelizing the flow permits access to both sides of the stream. This enables project execution flexibility.

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Dam & Spillway Repairs

Portadam systems can be utilized to divert river flow to allow spillway repairs under any conditions. Repairs can then be made to the entire dam, forebay, trashrack or tailrace structures. Portadam solutions are used extensively for additions of fish ladders and gate structures.

Low head dam rehabilitation and retrofit can easily be accomplished behind a Portadam cofferdam system. Water flow can be diverted to one side of the river in a two phase construction sequence, or diverted through an alternate bypass channel. The Portadam steel framework and liner components adapt easily to the spillway shape to construct a continuous cofferdam line, both upstream and downstream. This provides cost saving opportunities and schedule flexibility.

Dewatering upstream of a hydro plant intake structure can facilitate repair or replacement of old trashracks. Portadam technology is also used for tailrace area dewatering, gate replacement and concrete spillway repairs. This equipment offers plant operators alternatives for dewatering areas without the problems associated with earthen fill or the costs of sheet piling operations.

Environmental Remediation

Temporary Cofferdam Solutions

Keeping the affected area separated from the clean area is a major consideration on all HazMat remediation sites. Especially in water, there is a great advantage to keeping the clean water from making contact with the contaminated materials.

The Portadam system offers an effective method of surrounding an in-water remediation site and separating the clean water from the work area while maintaining natural stream or river flow. In addition, by working in a dry area, excavated material dewatering is minimized.

This cofferdam method is clean and re-usable. The system does not penetrate the subsurface, reducing the risk of additional contamination to the waterway.

The modularity of the Portadam system allows it to be utilized in a multi-phase remediation project while offering clear, unobstructed access to the work area (lake or river bed). This can drive significant cost and schedule benefits.

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Portadam's custom flume bypass solutions allow the body of water to flow continuously without the need for pumping and filtration. Working with customers, we create custom fabric systems to fit the bypass configuration required. This can drive significant cost savings and schedule benefits.

Concrete intake structures situated along the edge of a river or lake can be repaired or constructed in a dry work area behind a Portadam system. The system can be installed in a 3-sided configuration to provide access into the water body without adverse effects to the water system. This cofferdam method produces an unobstructed work area for excavation and forming as required to construct a new intake structure.

Outfall pipelines with diffuser sections are easily installed in the dry behind a Portadam structure. The Portadam system provides river bed access in an unobstructed work area for trench excavation, pipe assembly and concrete encasement. Typically, no river bed preparation or fill material is required to install a Portadam system. No costly fill removal or contour grade adjustments are required after removal of the Portadam system. The water course remains virtually unaffected.

Flume Bypasses

Intakes & Outfalls

Pipeline Crossings

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The Portadam system has proven to be a clean and effective method of enabling open cut construction of pipelines across rivers and streams. A two-phase operation provides schedule flexibility and allows for unimpeded flow of water around the work site. This provides an environmentally-friendly cofferdam system with no introduction of harmful materials to the watercourse.

Adjustment of the river or streambed prior to installation is normally not required. Flexibility of the Portadam system equipment allows for installation over irregular contours and around obstructions. The "free-standing" characteristic of this system leaves the work area unobstructed and completely free of cross bracing, allowing the pipeline installation to proceed from the land portion directly to the riverbed.

Since no fill material is required, excavation depths are greatly reduced. Concrete encasement can be poured in the dry without fear of watercourse contamination. Pipeline river crossing in a two-phase operation. Portadam can be used in most streams and rivers and be less costly than directional drilling.

Temporary
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Solutions

Silt & Sediment Containment

Disturbed soils on a construction site have the potential to leave the site via stormwater runoff and negatively impact receiving water, roadways, and neighboring property. The Portadam system can be used as a sediment trap or a basin to intercept concentrated flows of stormwater discharge from a construction site.

Shoreline Stabilization

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The flexibility of the Portadam system equipment allows for installation in practically any configuration and over almost any contour. This feature permits installation along stream banks for restoration such as bulkheads, gabion structures, architectural walls and geo-liners.

Dewatering these work areas allows for better control of excavation at toe of slope, so that proper "key-in" can be made to achieve the best possible construction techniques.

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Construction and rehabilitation of water and wastewater treatment plants can be facilitated with a temporary cofferdam. Facilities can remain operational and lagoons maintain activity. The modularity of the Portadam system allows for custom configurations, meeting the site-specific requirements.

Treatment Facilities

A variety of weir structures can be created with the Portadam temporary cofferdam system.

Weir Structures

PORTADAM®

Portadam, Inc.
3082 South Black Horse Pike
Williamstown, NJ 09084
P: 856-740-0606
www.portadam.com

PDCD220

ENGINEERING CALCULATIONS

FOR

10 FOOT PORTADAM SYSTEM

WJC #10-2078-13 Ph13

Prepared By:

W.J. Castle PE & Associates

Tynddol Building
1345 Route 38 West
Hainesport, New Jersey 08036

STATE OF NEW YORK
WILLIAM J. CASTLE
055780
LICENSED PROFESSIONAL ENGINEER

William J. Castle, P.E.	**11/07/13**
NY License No. 055780-1	**Date**

GENERAL NOTES

The following calculations were developed from the original calculations supplied by the fabricator of system.

PRODUCT INFORMATION

General Information:

The “PORTADAM” (cofferdam) or retention system is designed to divert or retain water to the maximum equipment height for all types of excavation, construction, inspection or flood protection where either a dry work area or additional water storage is required. However, for these applications, the Company recommends the end user to factor in sufficient freeboard to account for water depth variations, weather related events and/or seasonality fluctuations associated with their specific project.

Because the system consists of individual steel support members and flexible fabric membrane, almost any configuration can be arranged, including straight across overflow weirs, complete four sided box or a three sided arrangement with one side open to the beach for easy access of heavy equipment.

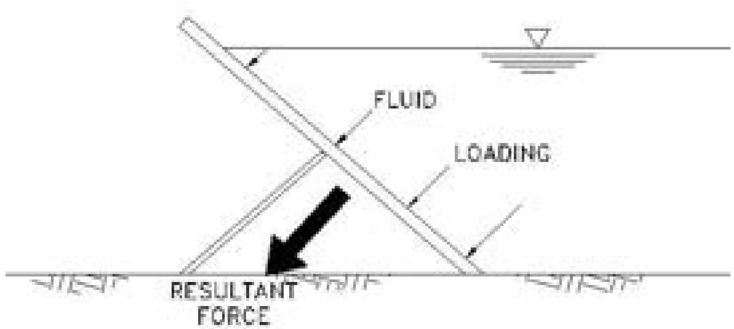
The high strength fabric membrane is inert and can be used in many fluids other than water.

This equipment was originally developed to comply with strict government controls for construction of the nation’s inland waterways. For water diversions or cofferdam applications, the PORTADAM equipment can be used in place of sheet piling, sandbags and earth fill construction methods to reduce siltation and introduction of hazardous materials into the waterway. For water storage applications, the PORTADAM equipment can be used in place of in-ground impoundments or other above ground storage tanks to reduce road wear, acid mining drainage (AMD), erosion and to decrease disturbed land area. The equipment is completely removable and re-usable.

Concept:

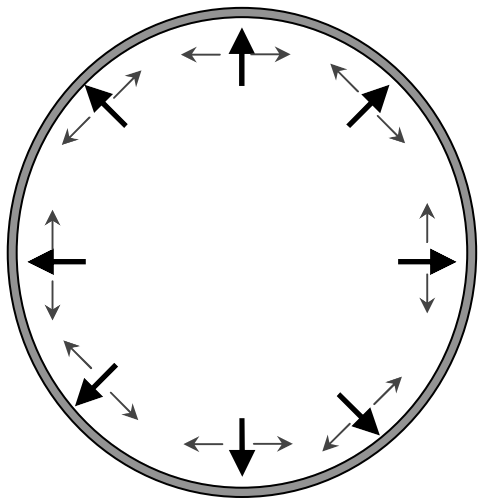
The concept is to utilize the mechanical and resistive properties of modern synthetic fabrics to provide both temporary and semi-permanent barriers and weirs for fluid damming and control.

System support is provided by welded steel members designed to transfer fluid loading to a near vertical downward load, thereby reducing lateral forces.

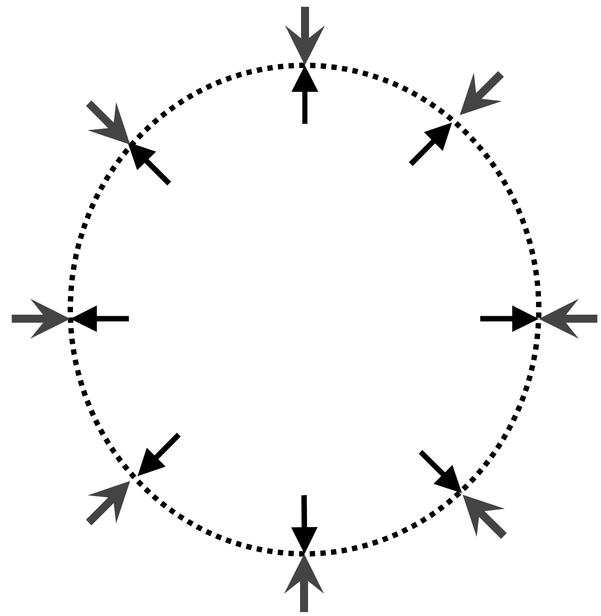


This design eliminates the need for internal cross bracing or heavy anchorage and provides an obstruction-free work area. Individual framing permits light handling loads and more flexibility over irregular bottom contours.

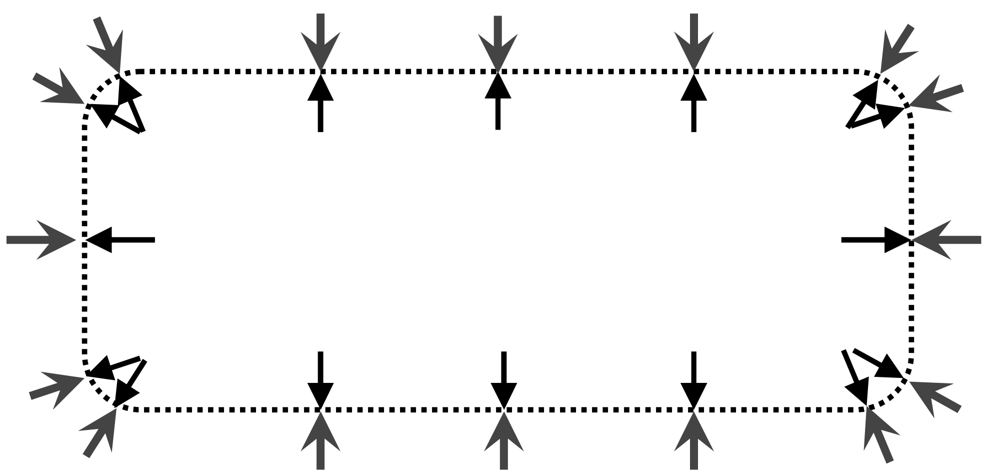
As previously noted, PORTADAM can be used in virtually any configuration. Common applications of the system involve straight sections; however, PORTADAM is also suited for applications involving rounded corners and shapes.



In a typical hoop or barrel retention system, the hydrostatic forces pushing outward are resisted by high internal tensile forces generated within the hoop material. (compression when used in a cofferdam configuration)



In a round PORTADAM configuration, the hydrostatic forces pushing outward are predominantly resisted by the out-standing PORTADAM frames, which transfer the load into the supporting ground. This holds true for a rounded corner, as well.



Common configurations such as rectangular also follow the PORTADAM design for resisting hydrostatic forces. As shown above, frames are located along the entire circumference of the required shape.

Impervious fabric membrane provides the waterstop when positioned along the diagonal face around the perimeter of the framework assembly installed. The tailored fabric membrane consists of a nylon reinforced vinyl upper portion for strength between steel frames and a lower section of lighter, flexible fabric extending out across the riverbed to provide sealing by hydrostatic pressure.

Structure:

The light tubular steel framework is assembled using bolted clamps and pinned connections along a predetermined line or perimeter of any shape. Steel framework is available in heights referred to as 12', 10', 7' and 5'. Sizes can normally be mixed to follow varying water depths. Frame spacing is normally held at 15 inches but can be altered for specific site conditions. Outside fanned corners (90° turns) require 12 single frames.

Riverbed consistency is critical in determining load support under framework. Hard, rocky bottoms, clay and gravel are usually ideal for support. Softer areas can be transversed using distribution pads under the framework or by driving steel poles down to suitable subsurface material and supporting framework on these poles. Assembly of the framework requires in water labor to position frame toes properly and can be accomplished using floating, light lift equipment or landside crane service if available. Riverbed contour adjustments are not normally required, unless the end user is required to maintain a specific site elevation of protection. In this case, the end user may need to alter the bottom conditions to meet the elevation requirements of their specific project. The Company makes no representations or warranties regarding the suitability of the subsurface or pad conditions to withstand hydrostatic forces. The end user is solely responsible to determine site suitability for their intended use of the PORTADAM equipment.

The fabric membrane is supplied in various straight and curved sections with waterproof connection joint to accommodate almost any configuration. The fabric sections are connected on shore, rolled and floated into position on the assembled framework. After connection of the top of the fabric at the desired elevation, it is unrolled down the diagonal face of the framework and extended over the riverbed to a preset distance out from the ties. A heavy chain sewn into the outer perimeter of the fabric is used to sink the scaling sheet to facilitate initial de-watering. The sealing sheet is designed to tightly follow bottom contours into crevasses and over rocks to provide the best possible seal.

Applications:

For water diversion, PORTADAM can be used in most rivers, canals, lakes, ponds, culverts, or man made lagoons within the depth limitations of the various frame sizes. Freeboard requirements below the top of the assembly are determined by specific site conditions such as flow, wave actions, boat traffic, foundation support, and water level fluctuations. Top of fabric elevation can be set at any height, permitting use of the structure as an overflow retention weir or flood control device.

The versatile nature of the system also makes it well suited for above-ground storage, allowing almost any size or configuration.

As previously noted, the flexible nature of the PORTADAM system enables it to conform to virtually any pad geometry including rectangles, squares, or odd shapes.

Solid rock or concrete beds which restrict use of driven sheet pilings are ideal for PORTADAM installations. Environmentally sensitive areas, where use of earth fill cofferdams is restricted, are also candidates for the PORTADAM system. All components are clean and completely removable. No siltation is created; no hazardous materials are left in the area. All components are re-useable.

Areas less suitable for installation include rivers with swift currents, rivers prone to severe rapid flooding and areas with non-supportive, very soft or highly permeable foundation materials. The fabric sealing sheet will seal out most water, but is ineffective against subsurface ground water.

Service:

Site conditions, including bottom profile and sub-bottom information, area very critical to determine height, configuration and support requirements. PORTADAM, Inc. may provide a site visit to assist the end user in determining the specific rental equipment heights and linear footage required for their specific water diversion or water storage application. The Company's expertise is strictly limited to the mechanical assembly or disassembly of the PORTADAM equipment. Any visit by PORTADAM, Inc. to the jobsite does ***NOT*** infer the Company is familiar with the site conditions, plans, specifications, special conditions, general conditions, addenda or other elements of the cofferdam, water diversion or water storage system. As a provider of Rental Equipment, with an option of providing in-water or dry land technical assistance at the end users request, the Company is not responsible for meeting the plans or specifications of the final structure.

The end user may request PORTADAM, Inc. to provide in-water technical assistance to assemble and disassemble the PORTADAM rental equipment. However, this assistance is not a requirement and the end user may install and/or remove system without PORTADAM, Inc.'s assistance. While PORTADAM, Inc. may provide estimated installation and removal rates, these rates are based on what previous end users have achieved and production rates may vary greatly based on site conditions and the end users capabilities.

Rentals for particular applications are available on a linear foot/time basis upon the end users specific request and will include all necessary PORTADAM components for a continuous cofferdam, water diversion or water storage system.

Design:

I. RESISTANCE TO OVERTURNING

The Leigh "PORTADAM" can't be overturned backwards by the water pressure unless the line of action of the water pressure acts above the lowest back part of the frame where it rests on the channel bed. The pressure acts perpendicular to the sloping member of the frame and the angle of slope of the frame member is selected to ensure that this can't happen. Figure 1 below shows forces.

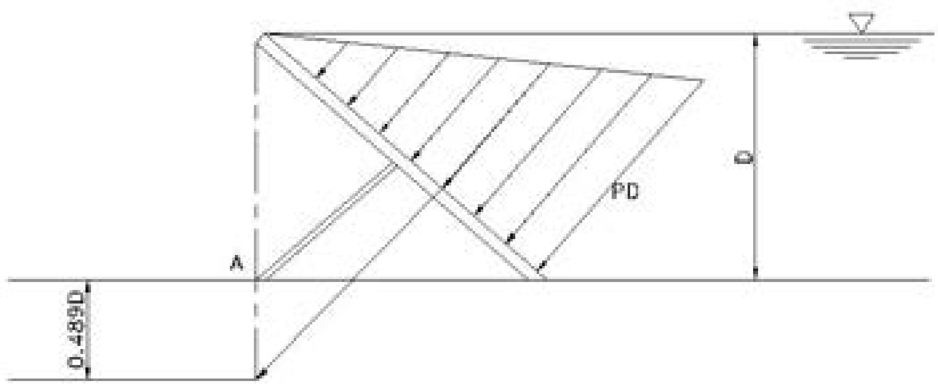


Fig. 1

The pressure varies linearly from zero at the top to "PD" at the bottom where "P" is the density of the water and "D" the depth. The centre of the pressure therefore is one third of the way up the sloping member.

By examining the limiting case, it is possible to calculate the maximum angle the rib can lie at to the channel bed before the dam is liable to overturn. This would occur if the perpendicular force component acting one third of the way up the sloping rib where to intercept the back support where the frame rests on the channel bed at "A" in Figure 2.

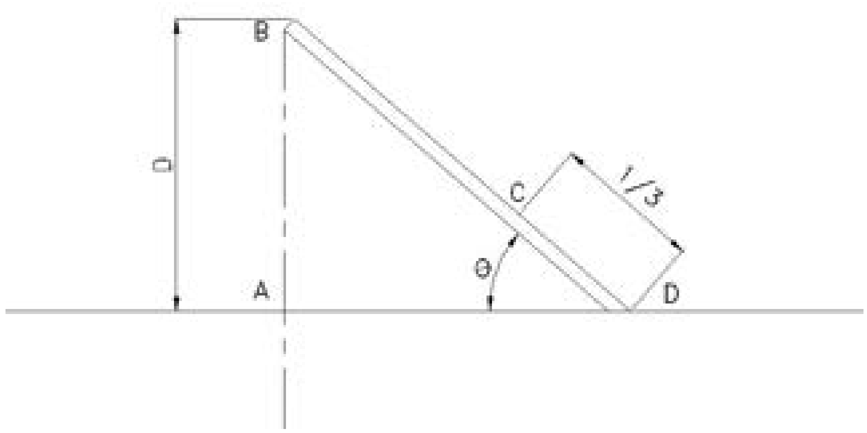


Fig. 2

D = AB = L sin θ
BC = 2/3L

$$AB = \frac{2/3L}{\sin\theta} \text{ also}$$

$$L \sin\theta = \frac{2/3L}{\sin\theta}$$

$$\sin\theta^2 = 2/3$$

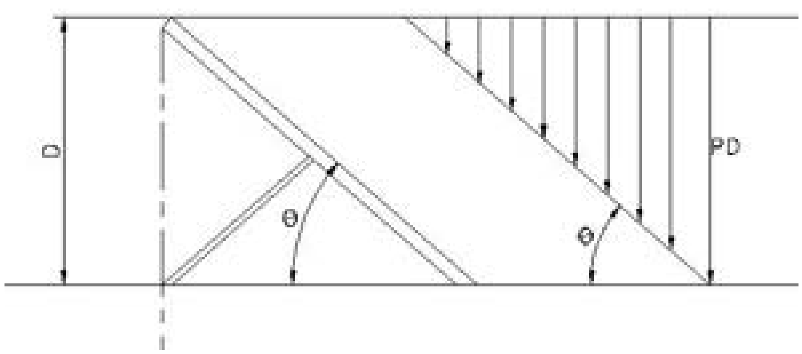
$$\theta = 54.73°$$

The actual angle of the sloping rib is 42° so the water pressure force component will intercept the vertical through the heel of the frame 0.489D below the heel (see figure 1).

II. RESISTANCE TO SLIDING

One of the principles of the Leigh "PORTADAM" is that the ratio of the horizontal components of pressure forces to the vertical components of pressure forces should be less than the coefficient of friction between the metal support frames and the bed of the channel.

As shown below, the vertical force components is $P\,{}^{D}/_{2}$ x D x ${}^{1}/\tan\theta$ per unit width of dam where P = density of water, D = depth of dam, and θ the angle of the sloping ri b to the horizontal.



The horizontal force component for any dam can be given as $P\,\frac{D^2}{2}$

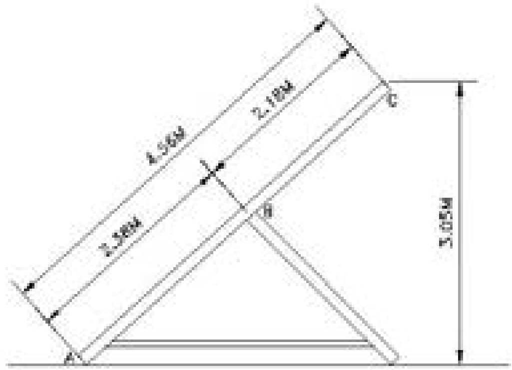
It follows that the limiting case is when the coefficient of friction between the metal support frame and the bed is equal to the ratio or the horizontal forces to the vertical forces, that is

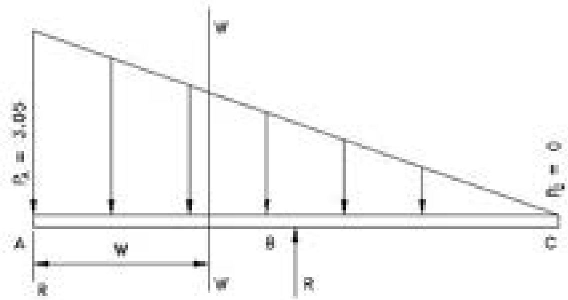
$$\mu = \frac{P\,\frac{D^2}{2}}{P\,\frac{D^2}{2}\ \frac{x\ 1}{\tan\theta}} = \tan\theta$$

In other words, the dam can't slide if tan θ < μ. Experiments showed that for structural steel hollow sections sliding on rough concrete surfaces, the coefficient of friction was invariably greater than about 1, so a slope angle for the rib of 42° was selected and has proved satisfactory under a wide range of conditions.

Where the channel bed is irregular or granular, much higher coefficients of friction are generally achieved. Certain sorts of smooth rock slab can cause problems and in these instances a recess or irregularity for the frame heels to sit in must be sought. Similarly, concrete can also cause problems due to the lower coefficients of friction and in these instances a hole is drilled and a small diameter pin is inserted into the concrete, which acts as a bearing point. When operating on soft beds, a heavy vertical picket attached to the back of the frame is driven down until firmer soil is found. This picket both prevents the frame sliding and stops them from sinking. Since all these fixings for the dam are on the drained or dry side of the dam, it follows that the longer the dam is installed the greater the strength of the bed and security of the dam as the bed drains and consolidates.

III. STRESSING – 10ft HIGH DAM FRAME





For simplicity, the frame will be treated as a simply supported beam between A and B, and a cantilever from B to C.

Initially the calculations will be based on a frame spacing of a unit width.

And the density of water will be taken as γ = 62.4-pcf.

A. Reactions (R) at A and B

The pressure at the base of the frame can be calculated as follows:

$p = \gamma * D$ $\quad$ p = 62.4-pcf * 10-ft $\quad$ p = 624-psf

Total load on frame, where F = Average force between A & C, per unit width on the frame:

F = 1/2 * p * H * L

F = 1/2 * 624-psf * 15-ft $\quad$ F = 4,680-lb (per ft)

Taking moments about A, to solve for R_B :

$F * 1/3 * L = R_B * L_A$

$$R_B = \frac{F * \frac{1}{3} * L}{L_A} = \frac{4{,}680 \text{ lb (per ft)} * \frac{1}{3} * 15 \text{ ft}}{7.81 \text{ ft}}$$

$R_B =$ 2,996.16 –lb (per ft)

And then summing the applied forces and reactions to solve for R_A :

$F = R_A - R_B$

$R_A = F - R_B$

$R_A =$ 1,683.84 –lb (per ft)

B. Maximum Bending Moment Between Supports

It can be assumed that the maximum bending moment between "A" and "B" will occur at some unknown distance "w" to the right of point "A". That moment (per unit width) can be calculated "cutting a section" in the moment curve and summing the moments at point "w":

$$M_w = (R_A * w) - \left(p_w * w * \frac{w}{2}\right) - \left((p - p_w) * \frac{w}{2} * \frac{2 * w}{3}\right)$$

$$M_w = R_A * w - \left(\frac{p_w}{2} * w^2\right) - \left(\frac{(p - p_w)}{3} * w^2\right)$$

Substituting in the pressure at location "w": $p_w = p - \frac{p}{L} * w$

$$M_w = R_A * w - \left(\frac{p * w^2}{2} - \frac{p * w^3}{2 * L}\right) - \left(\frac{p * w^3}{3 * L}\right)$$

$$M_w = R_A * w - \frac{p * w^2}{2} + \frac{p * w^3}{6 * L} \qquad \ldots\ \ldots\ \ldots\ \ldots \quad \textbf{(1)}$$

And substituting in the above noted known values:

R_A = 1,683.84 –lb (per ft width) p = 624-psf (per ft width) L = 15-ft

$$M_w = \left(1{,}683.84 \frac{\text{lb}}{\text{ft}}\right) * w - \left(312 \frac{\text{psf}}{\text{ft}}\right) * w^2 + \left(6.93 \frac{\text{pcf}}{\text{ft}}\right) * w^3$$

Noting that the value of the bending moment is at a maximum when the first derivative of the moment curve with respect to the length of the frame ($\frac{dM}{dw}$) is equal to zero, we can solve for "w" using the quadratic equation:

$$\frac{dM}{dw} = 20.79 * w^2 - 614 * w + 1{,}683.84 = 0 \qquad \ldots\ \ldots\ \ldots\ \ldots\ \mathbf{(2)}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad w = \frac{-(-614) \pm \sqrt{(-614)^2 - 4(20.79)(1{,}683.84)}}{2(20.79)}$$

w = {3.06-ft, ~~26.47~~-ft)

We can disregard the illogical result of the quadratic equation and recalculate equation **(1)** using the accepted value of "w":

M (w = 3.06-ft) = 2430.72 lb-ft (per ft width)

C. Maximum Cantilever Bending Moment at "B"

To calculate the cantilevered end moment at "B", we can simply recalculate equation **(1)** using "w = L_A", where "L_A" is the distance between points "A" and "B":

M (w = L_A = 7.81-ft) = -2,578.68 lb-ft (per unit width)

D. Maximum Stress

The above noted calculations are for a unit-wide frame spacing. This can be used to calculate the stress when frames are spaced "s" units apart:

s = 15-inch = 1.25-ft
M_{max} = 2,578.68 lb-ft * 1.25-ft
M_{max} = 3,223.35 lb-ft = 38.68 kip-inch

Knowing the section properties of the frame member, we can translate the previously calculated forces (moment) into member stress, using the relationship below:

Section:	5-in x 2-in x 0.188-in rhs (rectangular hollow section)
Material:	ASTM A500 Gr. A, F_y = 39-ksi
Elastic Section Modulus:	S = 2.60 in^3

$$f_b = \frac{M}{S} = \frac{38.68\ \text{kip} - \text{inch}}{2.60\text{in}^3} = 14.88\ \text{ksi}$$

And considering an allowable bending stress in the member to be:

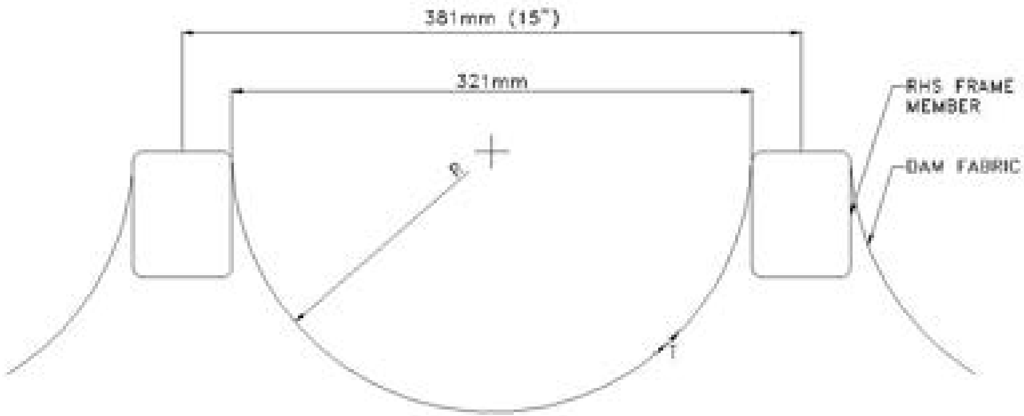
F_b = 0.6 * F_y = 0.6 * 39-ksi = 23.4-ksi

Then it is clear that the frame member is sufficient.

IV. STRESSING OF FABRIC - 10ft HIGH DAM

A. Failure by Bursting

All the bending loads are carried by the steel frames, as discussed in the dam stressing analysis. The fabric membrane is only stressed between the frames in the lateral direction. There is no fabric stress in the vertical direction since the semi-cylinders of fabric are open at the top and supported by the bed at the bottom.



Fabric tension, T is the product of pressure, P * radius R. Thus the maximum tension is at the bottom of the frames where pressure is at a maximum.

Taking density of water will be taken as γ = 62.4-pcf.

T = P * R

Where: P = γ * D = 62.4-pcf * 10-ft = 624-psf = 4.33-psi
R = s / 2 = 15-inch / 2 = 7.5-inch

T = 4.33-psi * 7.5-inch = 32.5 lb / inch

Fabric stress is commonly measured per 2-inch width:

$T_{2\text{-in}}$ = 65-lb / 2-inch

B. Fabric Alternatives

The following fabrics are considered acceptable against bursting and tear strength. Any other alternate liner to be selected needs to be equal or greater to the allowable values;

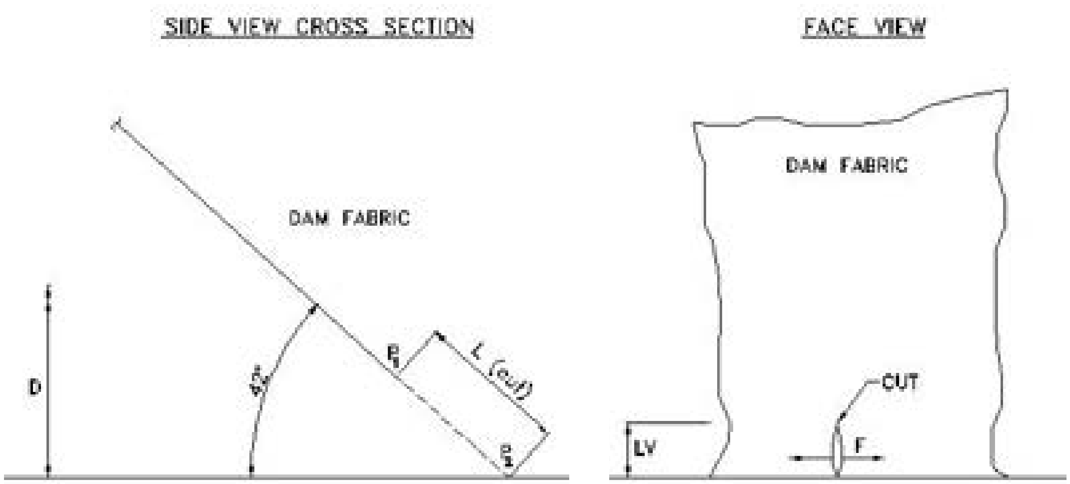
- **Design tensile strength of 32.5 lb / inch**

Fabric liner Description	Ultimate Tensile Strength	Allowable Tensile Strength
	(lb / inch)	(lb / inch)
Rufco 4010B (30 mil)	154	77
DURA-SKRIM K30B (27 mil)	159	79
DURA-SKRIM K36B (32 mil)	166	83
TMI SAVE – T PVC Coated Polyester Fabric	395	197

C. Failure by Propagation of cut or tear

If the fabric is cut or torn and this damage is in the vertical direction, the tensile bursting force discussed in Section A, will be cumulative for the length of the damage, and be focused at the ends of the opening. There will obviously be a point when the cut is of such a length that the accumulated force exceeds the material tear strength and the dam will tear open from bottom to top.

As in section A, the worst place for such damage is at the bottom of the dam where the water pressure is greatest.



The tearing force F = the average fabric tension over the cut length, times the cut length

$$\text{Thus } F = (P_1R + P_2R) * \tfrac{1}{2} * L = \frac{R * L}{2} * (P_1 + P_2)$$

Where: Bottom of cut is assumed to be at maximum depth "D"
The values of P1 and P2 are the pressures at the top and bottom of the tear, respectively
L and LV are the total length and the vertical length of the cut, respectively

R is the radius of the fabric under load (half of the frame spacing)

$$\gamma = 62.4\,pcf = \frac{62.4}{1728}\,pci$$

LV = L * sin 42
D = 10-ft = 120-inch
R = s / 2 = 15-inch / 2 = 7.5-inch

$$P_1 = \gamma * (D - LV) = \gamma * (D - L * \sin 42)$$
$$P_2 = \gamma * D$$

Θ = Reduction Factor = 1

Again assume that ½F is concentrated at each end of the cut, thus when ½F = the fabric tear strength, the dam will fail.

Substituting the appropriate values into equation 1: -

$$\left[\frac{R * L}{4} * (\gamma * (D - L * \sin 42) + \gamma * D) = C\right] / \Theta$$

$$\left(-\frac{\gamma * R * \sin 42}{4} * L^2 + \frac{\gamma * R * D}{2} * L - C\right) / \Theta \; = 0$$

For a given fabric tear strength a maximum cut length can be calculated to assure the tear will not propagate.

Rufco 4010B:

$$\frac{\left(-\frac{\left(\frac{62.4}{1728}\right) * 7.5 * \sin 42}{4} * L^2 + \frac{\left(\frac{62.4}{1728}\right) * 7.5 * 60}{2} * L - 22\right)}{1} = 1.36 \text{ inches}$$

Fabric liner Description	Tear Strength	Maximum Tear Length
	(lbs)	(in)
*Rufco 4010B (30 mil)	22	1.36
DURA-SKRIM K30B (27 mil)	85	5.31
DURA-SKRIM K36B (32 mil)	110	6.90
TMI SAVE – T PVC Coated Polyester Fabric	110	6.90

* Mirafi BXG11 is a Geotextile gird material required for use with this liner.

The vertical tear or cut at the base of the fabric is observed while retaining maximum water depth.

The proper repair measure shall be applied to the damaged portion of fabric before it reaches the maximum tear length to avoid the possible propagation of cut along the height of fabric.

REFERENCES

INC. TMI incorporated

For Reference Purposes

PRODUCT SPECIFICATIONS

SAVE-T PVC Coated Polyester Fabric
22 OZ

Material Description		
Roll Dimensions	**English**	**Metric**
Material Weight	22 oz/yd^2 +/- .5oz	735 g/m^2 +/- 17g
Roll Width	61"	154.9 cm
Roll Length	110 yards	100.6 meters
Net Weight	256 lbs	114.5 kg
Base Fabric		
Material Weight	6.2 oz/yd^2	210 g/m^2
Fiber	Polyester – Woven Cloth	
Fabric Count	16/16 (thread/inch)	DIN 53853
Type of Coating	PVC	

Physical Properties						
				Test Method		
		English	Metric	FS-191	ASTM	DIN
Tensile Strength	Warp	418 lbs/in	190 kgf/2.5cm	FS 5100	ASTM D 5035	DIN 53354
	Fill	395 lbs/ in	180 kgf/2.5cm			
Tear Strength	Warp	110 lbs	50 kgf	FS 5134	ASTM D 2261	DIN 53356
	Fill	110 lbs	50 kgf			
Elongation	Warp			FS 5102	ASTM D 5035	DIN 53354
	Fill					
Adhesion		17 lbs/ 2in	8 kgf/5 cm	FS 5970	ASTM D 2724	DIN 53357
Water Resistance		600 lbs /in^2	42.3 kgf/cm^2	-	ASTM D 751	DIN53886
Temperature Resistance		-22 ~ +160°F	-30 ~ +70°C	-	ASTM D 2136	DIN 53361
Abrasion		-	-	FS 5306	ASTM D 3884	-
Weather Stability		-	-	FS 5660	ASTM G 26	DIN 54004
Flame Resistance		-	-	-	ASTM D 1230	-

Note: The information contained herein is believed to be reliable but no representations, guarantees or warrantees of any kind are made as to its accuracy or suitability for particular applications.

TMI incorporated
5350 Campbells Run Road
Pittsburgh, PA 15205-9738
Web-Site: www.tmi-pvc.com

Toll Free: 800-888-9750
Phone: 412-787-9750
Fax: 412-787-3665
E-mail: customer-service@tmi-pvc.com

SUBMITTAL TRANSMITTAL

Date: 7/31/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 31 00 00
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Dense Grade Gravel, sieve analysis
1			Dense Grade Gravel, proctor results

MANUFACTURER / SUPPLIER

Name: Tiverton Materials

Address: 810 Fish Rd, Tiverton, RI

Telephone No.: 401-625-1131 Facsimile No.:

For Additional Information, Contact: Michael Trant

E-mail Address:

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

Title: Team Lead

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.8	29.2	11.7	16.8	21.8	5.7	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2"	100.0		
1 1/2"	99.6		
1"	91.6		
3/4"	85.2		
1/2"	75.4		
3/8"	69.6		
#4	56.0		
#10	44.3		
#20	35.0		
#40	27.5		
#60	19.5		
#100	11.6		
#200	5.7		

* (no specification provided)

Soil Description

Brown poorly graded sand with silt and gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 23.5253 D_{85}= 18.8882 D_{60}= 5.9241
D_{50}= 3.1579 D_{30}= 0.5234 D_{15}= 0.1898
D_{10}= 0.1289 C_u= 45.95 C_c= 0.36

Classification

USCS= SP-SM AASHTO= A-1-a

Remarks

Sample was not washed per D1140

Source of Sample: On-Site **Depth:** -
Sample Number: 1.5" D.G Gravel

Date: 04.28.23

Thielsch Engineering Inc. Cranston, RI	**Client:** Tiverton Material **Project:** Product Testing Tiverton, RI **Project No:** 74-23-0002.69 **Figure** 23-S-1831

Tested By: SF / AF / JGW **Checked By:**

COMPACTION TEST REPORT

Project No.: **Date:** 2/8/2023

Project: Various Gravel Materials From Tiverton Materials

Client: Tiverton Materials

Source of Sample: 1.5" Dense Graded Gravel

Sample Number: 1.5" Dense Graded

Remarks:

MATERIAL DESCRIPTION

Description: 1.5" Dense Graded Gravel sampled from Tiverton Materials on 2/6/2023

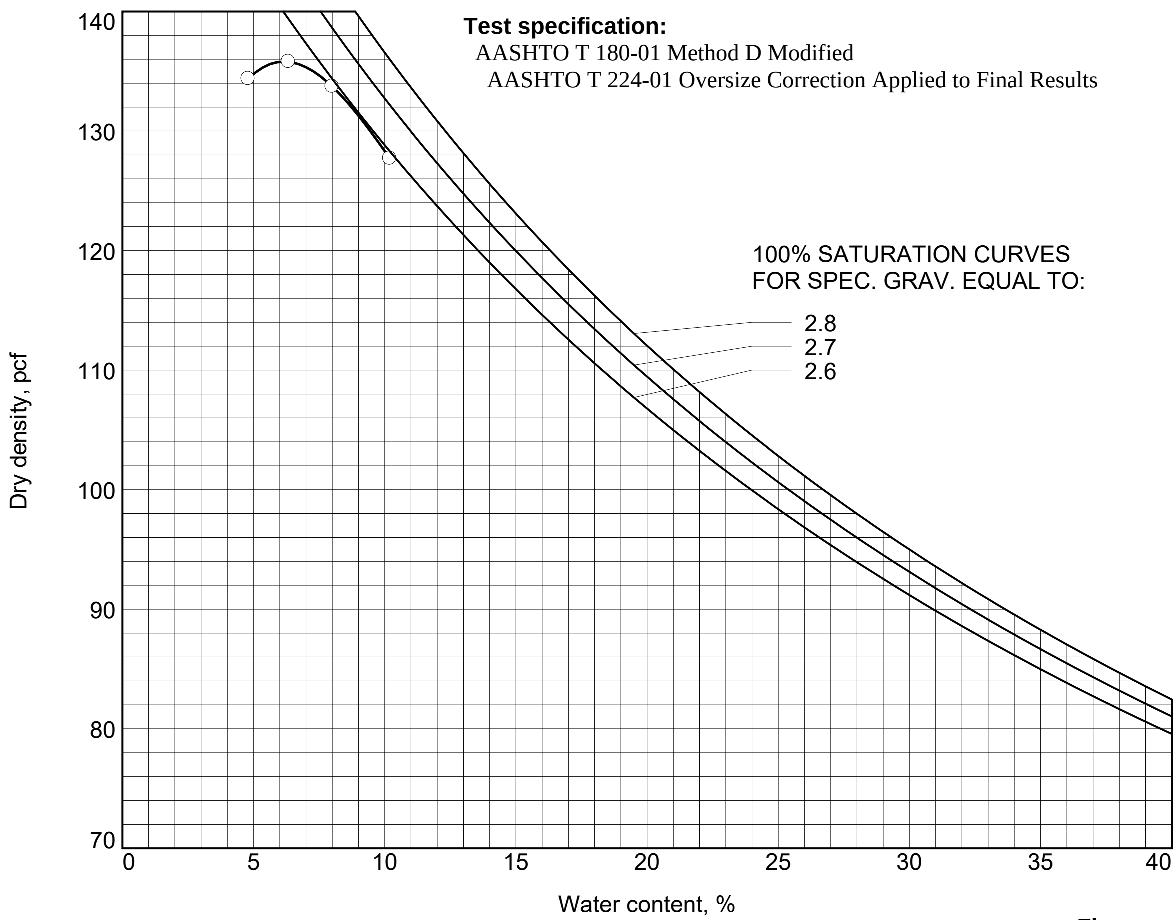
Classifications - **USCS:** GW-GM **AASHTO:** A-1-a

Nat. Moist. = **Sp.G. =**

Liquid Limit = NV **Plasticity Index =** NP

% < No.200 = 9.1 %

ROCK CORRECTED TEST RESULTS	UNCORRECTED
Maximum dry density = 140 pcf	136 pcf
Optimum moisture = 5 %	6 %



Figure

J.H. Lynch & Sons

Tested By: N. Plante **Checked By:** C. Froh - 236 SALT

SUBMITTAL TRANSMITTAL

Date: 8/7/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03 30 01
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Anchor Epoxy, DeWalt AC100+ Gold
			Alternative to Hilti HIT-RE 100

MANUFACTURER / SUPPLIER

Name: DeWalt Corporation

Address: Brewster NY

Telephone No.: 800-524-3244 Facsimile No.:

For Additional Information, Contact: Ben Bade, Whitecap Rep 508-272-5759

E-mail Address: benjamin.bade@whitecap.com

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

Title: Team Lead

GENERAL INFORMATION

AC100+ GOLD®

Vinylester Injection Adhesive Anchoring System

PRODUCT DESCRIPTION

The AC100+ Gold is a two-component vinylester adhesive anchoring system. The system includes injection adhesive in plastic cartridges, mixing nozzles, dispensing tools and hole cleaning equipment. The adhesive is designed for bonding threaded rod and reinforcing bar elements into drilled holes in concrete and masonry base materials. It can be considered for use in solid base materials as well as hollow base materials with screen tubes.

GENERAL APPLICATIONS AND USES

- Bonding threaded rod and reinforcing bar into hardened concrete and masonry
- Evaluated for use in dry and water-saturated concrete (including water filled holes)
- Suitable to resist loads in cracked or uncracked concrete base materials
- Adhesive system can be installed in a wide range of base material temperatures; qualified for structural applications in concrete and masonry as low as 14ºF (-10ºC)
- Qualified for seismic (earthquake) and wind loading

FEATURES AND BENEFITS

+ Designed for use with threaded rod and reinforcing bar hardware elements
+ Consistent performance in low and high strength concrete
+ Evaluated and recognized for freeze/thaw performance (interior and exterior applications)
+ Evaluated and recognized for a range of embedments
+ Versatile low odor formula with optimized cure time
+ Evaluated and recognized for long term and short term loading (see performance tables)
+ Mixing nozzles proportion adhesive and provide simple delivery method into drilled holes
+ Cartridge design allows for multiple uses using extra mixing nozzles
+ Universal product for concrete and masonry (hollow and solid base materials)

APPROVALS AND LISTINGS

- International Code Council, Evaluation Service (ICC-ES) ESR-2582 for concrete
- International Code Council, Evaluation Service (ICC-ES) ESR-3200 for masonry
- International Code Council, Evaluation Service (ICC-ES) ESR-4105 for Unreinforced Masonry (URM)
- Code compliant with the 2018 IBC/IRC, 2015 IBC/IRC, 2012 IBC/IRC, and 2009 IBC/IRC
- Tested in accordance with ASTM E488 / ACI 355.4 and ICC-ES AC308 for use in structural concrete with ACI 318-14 Chapter 17 and ACI 318-11/08 Appendix D
- Compliant with NSF/ANSI Standard 61 for drinking water system components – health effects; meets requirements for materials in contact with potable water and water treatment
- Conforms to requirements of ASTM C 881 and AASHTO M235, Types I, II, IV and V, Grade 3, Classes A & B (meets Type III with exception of elongation)
- Department of Transportation listings – see www.DEWALT.com or contact transportation agency

GUIDE SPECIFICATIONS

CSI Divisions: 03 16 00 - Concrete Anchors, 04 05 19.16 - Masonry Anchors and 05 05 19 - Post-Installed Concrete Anchors. Adhesive anchoring system shall be AC100+ Gold as supplied by DEWALT, Towson, MD. Anchors shall be installed in accordance with published instructions and requirements of the Authority Having Jurisdiction.

TENSION ZONE CRACKED CONCRETE | SEISMIC REGION QUALIFICATION | NSF | CODE LISTED ICC-ES ESR-2582 CONCRETE | CODE LISTED ICC-ES ESR-3200 MASONRY | CODE LISTED ICC-ES ESR-4105 URM | DDA DEWALT DESIGN ASSIST

SECTION CONTENTS

AC100+ GOLD

PACKAGING (10:1 MIX RATIO)

Coaxial Cartridge

- 9.5 fl. oz. (280 ml or 17.1 in³)

Dual Cartridge, side-by-side

- 11.5 fl. oz. (345 ml or 21.0 in³)
- 28 fl. oz. (825 ml or 50.3 in³)

STORAGE LIFE & CONDITIONS

Eighteen months in a dry, dark environment with temperature ranging from 32°F and 86°F (-0°C to 30°C)

ANCHOR SIZE RANGE (TYPICAL)

- 3/8" to 1-1/4" diameter rod
- No. 3 to No. 10 rebar

SUITABLE BASE MATERIALS

- Normal-weight concrete
- Lightweight concrete
- Grouted concrete masonry (CMU)
- Hollow concrete masonry (CMU)
- Hollow core concrete
- Brick masonry
- Unreinforced Masonry (URM Walls)

PERMISSIBLE INSTALLATION CONDITIONS (ADHESIVE)

- Dry concrete
- Water-saturated concrete (wet)
- Water-filled holes (flooded)

REFERENCE DATA (ASD)

Allowable Stress Design (ASD) Installation Table for AC100+ Gold (Solid Concrete Base Materials)

Dimension/Property		Notation	Units	Nominal Anchor Size								
Nominal threaded rod size		-	in.	3/8	1/2	5/8	3/4	7/8	1	-	1-1/4	-
Carbide drill bit nominal size (ANSI) for threaded rod		d_{bit}	in.	7/16	9/16	11/16 or 3/4	7/8	1	1-1/8	-	1-3/8	-
Reinforcing bar size		-	No.	3	4	5	6	7	8	9	-	10
Carbide drill bit nominal size (ANSI) for rebar		d_{bit}	in.	7/16	1/2	3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2
Nominal anchor/rebar diameter		d	in. (mm)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)	0.875 (22.2)	1.000 (25.4)	1.125 (28.6)	1.250 (31.8)	1.250 (31.8)
Minimum nominal embedment depth		$h_{nom,min}$	in. (mm)	2-3/8 (61)	2-3/4 (70)	3-1/8 (79)	3-1/2 (89)	3-1/2 (89)	4 (102)	4-1/2 (114)	5 (127)	5 (127)
Maximum torque (only possible after full cure time of adhesive)	A36 or F1554 Grade 36 carbon steel rod	T_{max}	ft.-lb. (N-m)	10 (13)	25 (34)	50 (68)	90 (122)	125 (169)	165 (224)	-	280 (379)	-
	F593 Condition CW stainless steel rod or ASTM A193, Grade B7 carbon steel rod	T_{max}	ft.-lb. (N-m)	16 (22)	33 (45)	60 (81)	105 (142)	125 (169)	165 (224)	-	280 (379)	-

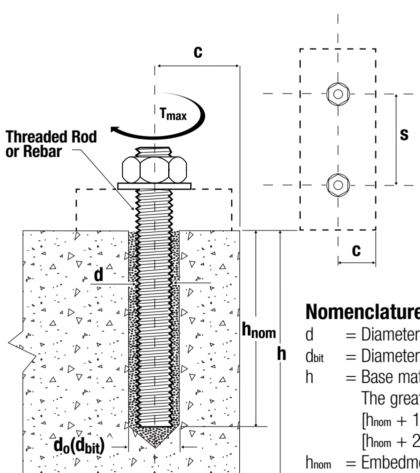
1. The listed drill bit sizes are also applicable to installations into grouted concrete masonry.

Allowable Stress Design (ASD) Installation Table for AC100+ Gold (Hollow Base Material with Screen Tube)

Dimension/Property	Notation	Units	Nominal Size - Stainless Steel						Nominal Size - Plastic			
Nominal threaded rod size	-	in.	1/4	3/8	1/2	5/8	3/4	-	1/4	3/8	1/2	5/8
Nominal anchor diameter	d	in. (mm)	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)	-	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)
Reinforcing bar size	-	No.	-	-	3	4	5	6	-	-	-	-
Nominal rebar diameter	d	in.	-	-	0.375	0.500	0.625	0.750	-	-	-	-
Nominal screen tube diameter	-	in.	1/4	3/8	1/2	5/8	3/4	15/16	1/4	3/8	1/2	5/8
Carbide drill bit nominal size (ANSI)	d_{bit}	in.	3/8	1/2	5/8	3/4	7/8	1	1/2	9/16	3/4	7/8
Maximum torque, for threaded rods (only possible after full cure time of adhesive)	T_{max}	ft.-lbf. (N-m)	4 (5)	6 (8)	10 (14)	10 (14)	10 (14)	-	4 (5)	6 (8)	10 (14)	10 (14)

For Unreinforced Masonry (URM Walls) see separate installation details and information in this section for 'Retrofit Bolt Anchors in URM Walls'.

Detail of Steel Hardware Elements used with Injection Adhesive System



Nomenclature

d = Diameter of anchor
d_{bit} = Diameter of drilled hole
h = Base material thickness
The greater of:
[h_{nom} + 1-1/4"] and
[h_{nom} + $2d_{bit}$]
h_{nom} = Embedment depth
s = Spacing of anchors
c = Edge distance
T_{max} = Maximum torque

Threaded Rod and Deformed Reinforcing Bar Material Properties

Steel Description (General)	Steel Specification (ASTM)	Nominal Anchor Size (inch)	Minimum Yield Strength, f_y (ksi)	Minimum Ultimate Strength, f_u (ksi)
Carbon Rod	A36 or F1554 Grade 36	3/8 through 1-1/4	36.0	58.0
Stainless Rod (Alloy 304 / 316)	F593, Condition CW	3/8 through 5/8	65.0	100.0
		3/4 through 1-1/4	45.0	85.0
High Strength Carbon Rod	A193 Grade B7	3/8 through 1-1/4	105.0	125.0
Reinforcing Bar	A615, A767, Grade 75	3/8 through 1-1/4 (#3 through #10)	75.0	100.0
	A615, A767, Grade 60	3/8 through 1-1/4 (#3 through #10)	60.0	90.0
	A706, A767, Grade 60	3/8 through 1-1/4 (#3 through #10)	60.0	80.0
	A615, A767, Grade 40	3/8 through 1-1/4 (#3 through #10)	40.0	60.0

Ultimate and Allowable Load Capacities for AC100+ Gold Installed into Normal Weight Concrete with Threaded Rod and Reinforcing Bar (based on bond strength/concrete capacity)[1,2,3,4,5,6]

Nominal Rod Diameter or Rebar Size d in. or #	Minimum Embedment Depth h_{nom} in.	Minimum Concrete Compressive Strength							
		f'c = 3,000 psi		f'c = 4,000 psi		f'c = 5,000 psi		f'c = 6,000 psi	
		Ultimate Tension Load Capacity lbs (kN)	Allowable Tension Load Capacity lbs (kN)	Ultimate Tension Load Capacity lbs (kN)	Allowable Tension Load Capacity lbs (kN)	Ultimate Tension Load Capacity lbs (kN)	Allowable Tension Load Capacity lbs (kN)	Ultimate Tension Load Capacity lbs (kN)	Allowable Tension Load Capacity lbs (kN)
3/8 or #3	2-3/8	4,840 (21.5)	1,210 (5.4)	5,040 (22.4)	1,260 (5.6)	5,180 (23.0)	1,295 (5.8)	5,320 (23.7)	1,330 (5.9)
	3-1/2	7,140 (31.8)	1,785 (7.9)	7,420 (33.0)	1,855 (8.3)	7,640 (34.0)	1,910 (8.5)	7,820 (34.8)	1,955 (8.7)
	4-1/2	9,180 (40.8)	2,295 (10.2)	9,540 (42.4)	2,385 (10.6)	9,820 (43.7)	2,455 (10.9)	10,060 (44.7)	2,515 (11.2)
1/2 or #4	2-3/4	7,980 (35.5)	1,995 (8.9)	8,280 (36.8)	2,070 (9.2)	8,540 (38.0)	2,135 (9.5)	8,740 (38.9)	2,185 (9.7)
	4-3/8	12,720 (56.6)	3,180 (14.1)	13,200 (58.7)	3,300 (14.7)	13,580 (60.4)	3,395 (15.1)	13,900 (61.8)	3,475 (15.5)
	6	17,420 (77.5)	4,355 (19.4)	18,100 (80.5)	4,525 (20.1)	18,620 (82.8)	4,655 (20.7)	19,080 (84.9)	4,770 (21.2)
5/8 or #5	3-1/8	11,220 (49.9)	2,805 (12.5)	11,660 (51.9)	2,915 (13.0)	12,000 (53.4)	3,000 (13.3)	12,300 (54.7)	3,075 (13.7)
	5-1/4	19,200 (85.4)	4,800 (21.4)	19,960 (88.8)	4,990 (22.2)	20,540 (91.4)	5,135 (22.8)	21,020 (93.5)	5,255 (23.4)
	7-1/2	27,660 (123.0)	6,915 (30.8)	28,720 (127.8)	7,180 (31.9)	29,560 (131.5)	7,390 (32.9)	30,280 (134.7)	7,570 (33.7)
3/4 or #6	3-1/2	13,320 (59.3)	3,330 (14.8)	13,820 (61.5)	3,455 (15.4)	14,220 (63.3)	3,555 (15.8)	14,560 (64.8)	3,640 (16.2)
	6-1/4	26,880 (119.6)	6,720 (29.9)	27,900 (124.1)	6,975 (31.0)	28,720 (127.8)	7,180 (31.9)	29,420 (130.9)	7,355 (32.7)
	9	40,440 (179.9)	10,110 (45.0)	42,000 (186.8)	10,500 (46.7)	43,220 (192.3)	10,805 (48.1)	44,260 (196.9)	11,065 (49.2)
7/8 or #7	3-1/2	13,320 (59.3)	3,330 (14.8)	13,820 (61.5)	3,455 (15.4)	14,220 (63.3)	3,555 (15.8)	14,560 (64.8)	3,640 (16.2)
	7	36,680 (163.2)	9,170 (40.8)	38,080 (169.4)	9,520 (42.3)	39,200 (174.4)	9,800 (43.6)	40,140 (178.6)	10,035 (44.6)
	10-1/2	60,040 (267.1)	15,010 (66.8)	62,340 (277.3)	15,585 (69.3)	64,180 (285.5)	16,045 (71.4)	65,700 (292.2)	16,425 (73.1)
1 or #8	4	16,260 (72.3)	4,065 (18.1)	16,880 (75.1)	4,220 (18.8)	17,380 (77.3)	4,345 (19.3)	17,800 (79.2)	4,450 (19.8)
	8	46,540 (207.0)	11,635 (51.8)	48,300 (214.8)	12,075 (53.7)	49,740 (221.3)	12,435 (55.3)	50,920 (226.5)	12,730 (56.6)
	12	76,820 (341.7)	19,205 (85.4)	79,740 (354.7)	19,935 (88.7)	82,080 (365.1)	20,520 (91.3)	84,060 (373.9)	21,015 (93.5)
1-1/4 or #10	5	22,740 (101.2)	5,685 (25.3)	23,600 (105.0)	5,900 (26.2)	24,300 (108.1)	6,075 (27.0)	24,880 (110.7)	6,220 (27.7)
	10	65,880 (293.0)	16,470 (73.3)	68,400 (304.3)	17,100 (76.1)	70,420 (313.2)	17,605 (78.3)	72,100 (320.7)	18,025 (80.2)
	15	109,040 (485.0)	27,260 (121.3)	113,200 (503.5)	28,300 (125.9)	116,540 (518.4)	29,135 (129.6)	119,320 (530.8)	29,830 (132.7)

1. Allowable load capacities listed are calculated using an applied safety factor of 4.0 which includes an assessment of freezing/thawing conditions and sensitivity to sustained loads (i.e. creep resistance). Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety or overhead.
2. Linear interpolation may be used to determine allowable loads for intermediate embedments and compressive strengths.
3. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances and where the minimum member thickness is the greater of [h_{nom} + 1-1/4] and [h_{nom} + $2d_{bit}$].
4. The tabulated load values are applicable for dry concrete. Holes must be drilled with a hammer drill and an ANSI carbide drill bit. Installations into saturated (wet) concrete and water-filled holes require a reduction in capacity for tabulated values of 15 percent and 50 percent, respectively. Contact DEWALT for more information concerning these installation conditions.
5. Adhesives experience reductions in capacity at elevated temperatures. See the In-Service Temperature chart for allowable loads capacity reduction factors.
6. Allowable bond strength/concrete capacity must be checked against allowable steel strength to determine the controlling allowable load. Allowable shear capacity is controlled by allowable steel strength for the given conditions.

ALLOWABLE STRESS DESIGN ASD

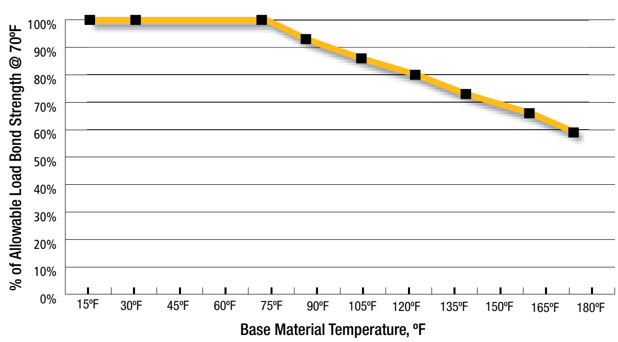
Allowable Load Capacities for Threaded Rod and Reinforcing Bar (Based on Steel Strength)[1,2,3,4,5]

Nominal Rod Diameter or Rebar Size (in. or #)	Steel Elements - Threaded Rod and Reinforcing Bar																	
	A36 or F1554, Grade 36		A36 or F1554, Grade 55		A 193, Grade B7 or F1554, Grade 105		F 593, CW (SS)		ASTM A615 Grade 40 Rebar		ASTM A615 Grade 60 Rebar		ASTM A706 Grade 60 Rebar		ASTM A615 Grade 75 Rebar		ASTM A706 Grade 80 Rebar	
	Tension lbs. (kN)	Shear lbs (kN)	Tension lbs. (kN)	Shear lbs (kN)	Tension lbs. (kN)	Shear lbs (kN)	Tension lbs. (kN)	Shear lbs (kN)	Tension lbs. (kN)	Shear lbs (kN)	Tension lbs. (kN)	Shear lbs (kN)	Tension lbs. (kN)	Shear lbs (kN)	Tension lbs. (kN)	Shear lbs (kN)	Tension lbs. (kN)	Shear lbs (kN)
3/8 or #3	2,115 (9.4)	1,090 (4.8)	2,735 (12.2)	1,410 (6.3)	4,555 (20.3)	2,345 (10.4)	3,645 (16.2)	1,880 (8.4)	2,210 (9.8)	1,125 (5.0)	2,650 (11.8)	1,690 (7.5)	2,650 (11.8)	1,500 (6.7)	2,650 (11.8)	1,875 (8.3)	2,650 (11.8)	1,875 (8.3)
1/2 or #4	3,760 (16.7)	1,935 (8.6)	4,860 (21.6)	2,505 (11.1)	8,100 (36.0)	4,170 (18.5)	6,480 (28.8)	3,340 (14.9)	3,925 (17.5)	2,005 (8.9)	4,710 (21.0)	3,005 (13.4)	4,710 (21.0)	2,670 (11.9)	4,710 (21.0)	3,335 (14.8)	4,710 (21.0)	3,335 (14.8)
5/8 or #5	5,870 (26.1)	3,025 (13.5)	7,595 (33.8)	3,910 (17.4)	12,655 (56.3)	6,520 (29.0)	10,125 (45.0)	5,215 (23.2)	6,135 (27.3)	3,130 (13.9)	7,365 (32.8)	4,695 (20.9)	7,365 (32.8)	4,170 (18.5)	7,365 (32.8)	5,215 (23.2)	7,365 (32.8)	5,215 (23.2)
3/4 or #6	8,455 (37.6)	4,355 (19.4)	10,935 (48.6)	5,635 (25.1)	18,225 (81.1)	9,390 (41.8)	12,390 (55.1)	6,385 (28.4)	8,835 (39.3)	4,505 (20.0)	10,605 (47.2)	6,760 (30.1)	10,605 (47.2)	6,010 (26.7)	10,605 (47.2)	7,510 (33.4)	10,605 (47.2)	7,510 (33.4)
7/8 or #7	11,510 (51.2)	5,930 (26.4)	14,885 (66.2)	7,665 (34.1)	24,805 (110.3)	12,780 (56.8)	16,865 (75.0)	8,690 (38.7)	-	-	14,430 (64.2)	9,200 (40.9)	14,430 (64.2)	8,180 (36.4)	14,430 (64.2)	10,220 (45.5)	14,430 (64.2)	10,220 (45.5)
1 or #8	15,035 (66.9)	7,745 (34.5)	19,440 (86.5)	10,015 (44.5)	32,400 (144.1)	16,690 (74.2)	22,030 (98.0)	11,350 (50.5)	-	-	18,850 (83.8)	12,015 (53.4)	18,850 (83.8)	10,680 (47.5)	18,850 (83.8)	13,350 (59.4)	18,850 (83.8)	13,350 (59.4)
#9	-	-	-	-	-	-	-	-	-	-	23,985 (106.7)	15,290 (68.0)	23,985 (106.7)	13,590 (60.5)	23,985 (106.7)	16,990 (75.6)	23,985 (106.7)	16,990 (75.6)
1-1/4	23,490 (104.5)	12,100 (53.8)	30,375 (135.1)	15,645 (69.6)	50,620 (225.2)	26,080 (116.0)	34,425 (153.1)	17,735 (78.9)	-	-	-	-	-	-	-	-	-	-
#10	-	-	-	-	-	-	-	-	-	-	30,405 (135.2)	19,380 (86.2)	30,405 (135.2)	17,230 (76.6)	30,405 (135.2)	21,535 (95.8)	30,405 (135.2)	21,535 (95.8)

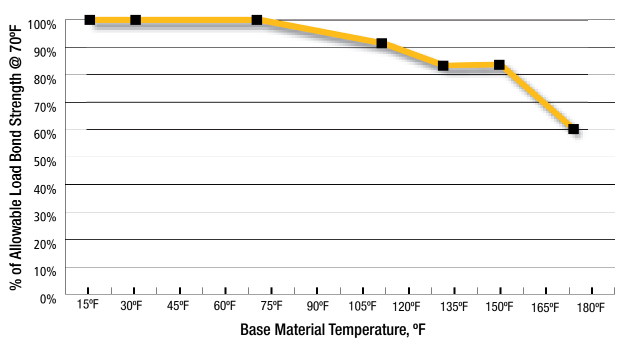
1. AISC defined steel strength (ASD) for threaded rod: Tensile = $0.33 \bullet F_u \bullet A_{nom}$, Shear = $0.17 \bullet F_u \bullet A_{nom}$
2. For reinforcing bars: The allowable steel tensile strength is based on 20 ksi for Grade 40 and 24 ksi for Grade 60 and higher, applied to the cross sectional area of the bar; allowable steel shear strength = $0.17 \bullet F_u \bullet A_{nom}$
3. Allowable load capacities are calculated for the steel element type. Consideration of applying additional safety factors may be necessary depending on the application, such as life safety or overhead.
4. Allowable steel strength in tension must be checked against allowable bond strength/concrete capacity in tension to determine the controlling allowable load.
5. The tabulated load values are applicable to single anchors installed at critical edge and spacing distances and where the minimum member thickness is the greater of $[h_{nom} + 1\text{-}1/4"]$ and $[h_{nom} + 2d_{bit}]$

In-Service Temperature Chart For Allowable Load Capacities

Concrete Base Materials



Masonry Units

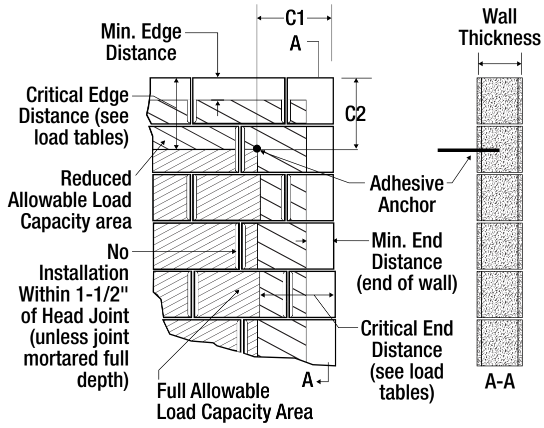


Allowable Load Capacities for Threaded Rod Installed with AC100+ Gold into Grout-Filled Concrete Masonry (Based on Bond Strength/Masonry Strength)[1,2,3,7,9,12]

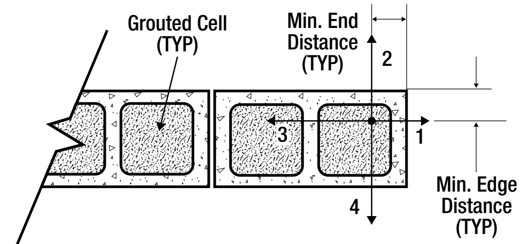
Anchor Diameter d inch	Minimum Embedment h_{nom} inch	Critical Spacing Distance s_{cr} inch	Minimum Edge Distance c_{min} inch	Minimum End Distance c_{min} inch	Tension Load lbs	Direction of Shear Loading	Shear Load lbs
Anchor Installed Into Grouted Masonry Wall Faces[4,5,6,8,10,11,13]							
3/8	3	6	3	3	615	Towards Edge/End	275
			3	3	615	Away From Edge/End	340
			3	4	735	Any	490
			12	12	960	Any	855
1/2	4	8	3	3	720	Towards Edge/End	430
			3	3	720	Away From Edge/End	1320
			4	4	985	Any	655
			12	12	960	Towards Edge/End	1430
			12	12	960	Away From Edge/End	1760
			7-3/4 (Bed Joint)	3	935	Load To Edge	460
5/8	5	10	3	3	710	Towards Edge/End	460
			3	3	710	Away From Edge/End	1410
			12	12	1095	Towards Edge/End	1530
			12	12	1095	Away From Edge/End	1880
			7-3/4 (Bed Joint)	3	1030	Load To Edge	590
3/4	6	12	4	4	755	Towards Edge/End	630
			4	4	755	Away From Edge/End	1450
			12	12	1160	Towards Edge/End	1570
			12	12	1160	Away From Edge/End	1930
			7-3/4 (Bed Joint)	4	945	Load To Edge	565
Anchor Installed Into Tops of Grouted Masonry Walls[14,15]							
Anchor Diameter d inch	**Minimum Embedment h_{nom} inch**	**Minimum Spacing Distance**	**Minimum Edge Distance c_{min} inch**	**Minimum End Distance c_{min} inch**	**Tension Load lbs**	**Direction of Shear Loading**	**Shear Load lbs**
1/2	2-3/4	1 anchor per cell	1-3/4	4	595	Any	300
	4			3	520	Load To Edge	190
	4			3	520	Load To End	300
	10	1 anchor per block[16]		10-1/2	1670	Load To Edge	190
	10			10-1/2	1670	Load To End	300
5/8	5	1 anchor per cell		3	745	Load To Edge	240
	5			3	745	Load To End	300
	12-1/2	1 anchor per block[16]	1-3/4	10-1/2	2095	Load To Edge	240
	12-1/2			10-1/2	2095	Load To End	300
3/4	6	1 anchor per cell		4	1260	Load To Edge	410
	6			4	1260	Load To End	490

1. Tabulated load values are for anchors installed in nominal 8-inch wide (203 mm) Grade N, Type II, lightweight, medium-weight or normal-weight grout filled concrete masonry units with a minimum masonry strength, f'm, of 1,500 psi (10.3 MPa) conforming to ASTM C 90. If the specified compressive strength of the masonry, f'm, is 2,000 psi (13.8 MPa) minimum the tabulated values may be increased by 4 percent (multiplied by 1.04).
2. Allowable bond or masonry strengths in tension and shear are calculated using a safety factor of 5.0 and must be checked against the allowable tension and shear capacities for threaded rod based on steel strength to determine the controlling factor. See allowable load table based on steel strength.
3. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor.
4. Anchors may be installed in the grouted cells, cell webs and bed joints not closer than 1-1/2-inch from the vertical mortar joint (head joint) provided the minimum edge and end distances are maintained. Anchors may be placed in the head joint if the vertical joint is mortared full-depth.
5. A maximum of two anchors may be installed in a single masonry cell in accordance with the spacing and edge or end distance requirements.
6. The critical spacing, s_{cr}, for use with the anchor values shown in this table is 16 anchor diameters. The critical spacing, s_{cr}, distance is the distance where the full load values in the table may be used. The minimum spacing distance, s_{min}, is the minimum anchor spacing for which values are available and installation is permitted. For 3/8-inch diameter anchors, the spacing may be reduced to 8 anchor diameters when using a tension reduction factor of 0.70 and a shear reduction factor of 0.45. For ½ - and 5/8 – inch diameter anchors, the spacing may be reduced to 8 anchor diameters when using a tension reduction factor of 0.85 and a shear reduction factor of 0.45. For 3/4-inch diameter anchors, the spacing may be reduced to 8 anchor diameters when using a tension reduction factor of 1.00 and a shear reduction factor of 0.45.
7. Spacing distance is measured from the centerline to centerline between two anchors.
8. The critical edge or end distance, c_{cr}, is the distance where full load values in the table may be used. The minimum edge or end distance, c_{min}, is the minimum distance for which values are available and installation is permitted.
9. Edge or end distance is measured from anchor centerline to the closest unrestrained edge.
10. Linear interpolation of load values between the minimum spacing, s_{min}, and critical spacing, s_{cr}, distances and between minimum edge or end distance, c_{min}, and critical edge or end distance, c_{cr}, is permitted.
11. The tabulated values are applicable for anchors in the ends of grout-filled concrete masonry units where minimum edge and end distances are maintained.
12. The tabulated values must be adjusted for increased in-service base material temperatures in accordance with the In-Service Temperature chart, as applicable.
13. Concrete masonry width (wall thickness) must be equal to or greater than 1.5 times the anchor embedment depth (e.g. 3/8-inch and 1/2-inch diameter anchors are permitted in nominally 6-inch-thick concrete masonry). The 5/8-inch and 3/4-inch diameter anchors must be installed in minimum nominally 8-inch-thck concrete masonry.
14. Anchors must be installed into the grouted cell; anchors are not permitted to be installed in a head joint, flange or web of the concrete masonry unit.
15. Allowable shear loads parallel or perpendicular to the edge of a masonry wall may be applied in or out of plane.
16. Anchors with minimum spacing distance of one anchor per block may not be installed in adjacent cells (i.e. one cell must separate the anchor locations).

AC100+ Gold Adhesive Anchors Installed into Grouted Concrete Masonry Wall

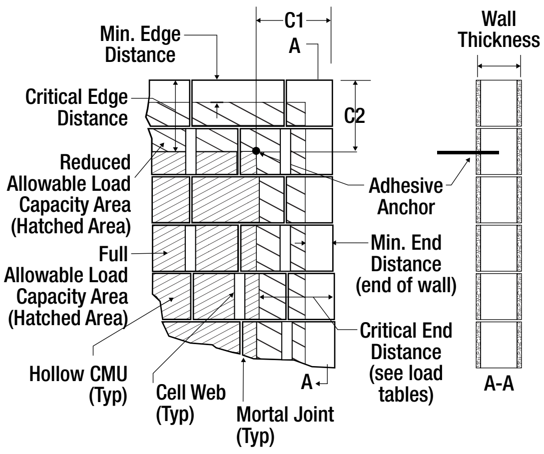


AC100+ Gold Adhesive Anchors Installed into Top of Grouted Concrete Masonry Wall

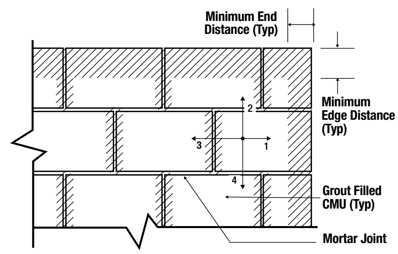


1. Shear load parallel to Edge and perpendicular to End
2. Shear load parallel to End and perpendicular to Edge
3. Shear load parallel to Edge and perpendicular away from End
4. Shear load parallel to End and perpendicular to opposite Edge

AC100+ Gold Adhesive Anchors Installed into Hollow Concrete Masonry Wall



Direction of Shear Loading in Relation to Edge and End of Masonry Wall



1. Shear load parallel to Edge and perpendicular to End
2. Shear load parallel to End and perpendicular to Edge
3. Shear load parallel to Edge and perpendicular away from End
4. Shear load parallel to End and perpendicular away from Edge

Allowable Load Capacities for Threaded Rod Installed with AC100+ Gold into Hollow Concrete Masonry Walls with Stainless Steel and Plastic Screen Tubes[1,2,3,4,5,6,7,8,9,10,11,12,13]

Anchor Diameter d inch	Screen Tube type	Minimum Embedment h_{nom} inch (mm)	Critical Spacing Distance s_{cr} inch (mm)	Minimum Edge Distance c_{min} inch (mm)	Minimum End Distance c_{min} inch (mm)	Allowable Load		
						Tension Load lbs (kN)	Direction of Shear Loading	Shear Load lbs (kN)
1/4	Stainless Steel	1-1/4 (32)	4 (102)	1-1/2 (38)	1-1/2 (38)	280 (1.2)	Towards Edge/End	140 (0.6)
		1-1/4 (32)	4 (102)	3 (76)	3 (76)	350 (1.6)	Towards Edge/End	275 (1.2)
		1-1/4 (32)	4 (102)	1-1/2 (38)	1-1/2 (38)	280 (1.2)	Away From Edge/End	235 (1.0)
		1-1/4 (32)	4 (102)	3 (76)	3 (76)	350 (1.6)	Away From Edge/End	465 (2.1)
	Plastic	1-1/4 (32)	1 anchor per cell	3 (76)	3 (76)	140 (0.6)	Towards Edge/End	235 (1.0)
3/8	Stainless Steel	1-1/4 (32)	6 (152)	1-7/8 (48)	1-7/8 (48)	320 (1.4)	Towards Edge/End	145 (0.6)
		1-1/4 (32)	6 (152)	3-3/4 (95)	3-3/4 (95)	400 (1.8)	Towards Edge/End	290 (1.3)
		1-1/4 (32)	6 (152)	1-7/8 (48)	1-7/8 (48)	320 (1.4)	Away From Edge/End	245 (1.1)
		1-1/4 (32)	6 (152)	3-3/4 (95)	3-3/4 (95.3)	400 (1.8)	Away From Edge/End	490 (2.2)
	Plastic	1-1/4 (32)	1 anchor per cell	3 (76)	3 (76.2)	140 (0.6)	Towards Edge/End	235 (1.0)
1/2	Stainless Steel	1-1/4 (32)	8 (203)	3-3/4 (95)	3-3/4 (95.3)	380 (1.7)	Towards Edge/End	215 (1.0)
		1-1/4 (32)	8 (203)	11-1/4 (286)	11-1/4 (286)	400 (1.8)	Towards Edge/End	430 (1.9)
		1-1/4 (32)	8 (203)	3-3/4 (95)	3-3/4 (95)	380 (1.7)	Away From Edge/End	365 (1.6)
		1-1/4 (32)	8 (203)	11-1/4 (285.8)	11-1/4 (286)	400 (1.8)	Away From Edge/End	730 (3.2)
	Plastic	1-1/4 (32)	1 anchor per cell	3 (76.2)	3 (76)	150 (0.7)	Towards Edge/End	215 (1.0)
5/8	Stainless Steel	1-1/4 (32)	8 (203.2)	3-3/4 (95)	3-3/4 (95)	380 (1.7)	Towards Edge/End	215 (1.0)
		1-1/4 (31.8)	8 (203.2)	11-1/4 (286)	11-1/4 (286)	400 (1.8)	Towards Edge/End	430 (1.9)
		1-1/4 (31.8)	8 (203.2)	3-3/4 (95)	3-3/4 (95)	380 (1.7)	Away From Edge/End	365 (1.6)
		1-1/4 (31.8)	8 (203.2)	11-1/4 (286)	11-1/4 (286)	400 (1.8)	Away From Edge/End	730 (3.2)
	Plastic	1-1/4 (31.8)	1 anchor per cell	3 (76.2)	3 (76)	150 (0.7)	Towards Edge/End	215 (1.0)
3/4	Stainless Steel	1-1/4 (32)	8 (203)	3-3/4 (95)	3-3/4 (95)	380 (1.7)	Towards Edge/End	215 (1.0)
		1-1/4 (32)	8 (203)	11-1/4 (286)	11-1/4 (286)	400 (1.8)	Towards Edge/End	430 (1.9)
		1-1/4 (32)	8 (203)	3-3/4 (95)	3-3/4 (95)	380 (1.7)	Away From Edge/End	365 (1.6)
		1-1/4 (32)	8 (203)	11-1/4 (286)	11-1/4 (286)	400 (1.8)	Away From Edge/End	730 (3.2)

1. Tabulated load values are for anchors installed in hollow concrete masonry with minimum masonry strength, f'm, of 1,500 psi (10.3 MPa). Concrete masonry units must be lightweight, medium-weight or normal-weight conforming to ASTM C 90. Allowable loads have been calculated using a safety factor of 5.0.
2. Anchors must be installed into the hollow cell; anchors are not permitted to be installed in a mortar joint, flange or web of the concrete masonry unit.
3. A maximum of two anchor may be installed in a single masonry cell in accordance with the spacing and edge distance requirements, except as noted in the table.
4. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor.
5. Edge or end distance is measured from anchor centerline to the closest unrestrained edge of the CMU block.
6. The critical spacing, s_{cr}, for use with the anchor values shown in this table is 16 anchor diameters, except as noted in the table. The critical spacing, s_{cr}, distance is the distance where the full load values in the table may be used. The minimum spacing distance, s_{min}, is the minimum anchor spacing for which values are available and installation is permitted. The spacing may be reduced to 8 anchor diameters by multiplying the tension load value by a reduction factor of 0.60 and multiplying the shear load value by a reduction factor of 0.45.
7. Spacing distance is measured from the centerline to centerline between two anchors.
8. Linear interpolation of load values between the minimum spacing, s_{min}, and critical spacing, s_{cr}, distances and between minimum edge or end distance, c_{min}, and critical edge or end distance, c_{cr}, is permitted if applicable.
9. Concrete masonry width (wall thickness) may be minimum nominal 6-inch-thick provided the minimum embedment (i.e. face shell thickness) is maintained.
10. The tabulated values are applicable for anchors in the ends of hollow concrete masonry units where minimum face shell thickness, minimum edge and end distances are maintained.
11. Anchors are recognized to resist dead, live and wind tension and shear load applications.
12. Allowable loads must be the lesser of the adjusted masonry or bond values tabulated above and the steel strength values.
13. The tabulated values must be adjusted for increased in-service base material temperatures in accordance with the In-Service Temperature chart, as applicable.

Ultimate and Allowable Load Capacities for AC100+ Gold into Precast Hollow Core Concrete with Stainless Steel Screen Tubes[1,2,3,4,5,6,7]

Anchor Diameter d in.	Drill Bit Diameter d_{bit} in.	Minimum Embedment h_{nom} in. (mm)	Minimum End Distance in. (mm)	Minimum Edge Distance in. (mm)	Ultimate Load		Allowable Load	
					Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4	3/8	1-1/2 (38)	4 (102)	4 (102)	900 (4.0)	1,550 (6.9)	180 (0.8)	310 (1.4)
3/8	1/2	1-1/2 (38)	6 (152)	6 (152)	1,975 (8.8)	3,650 (16.2)	395 (1.8)	730 (3.2)
1/2	5/8	1-1/2 (38)	8 (203)	8 (203)	4,400 (19.6)	5,875 (26.1)	880 (3.9)	1,175 (5.2)

1. Tabulated load values are for anchors installed in precast hollow core concrete with minimum strength, f'm, of 5,000 psi (34.5 MPa). Allowable loads have been calculated using a safety factor of 5.0.
2. Anchors must be installed into the hollow core; anchors are not permitted to be installed in a cell web of the hollow core concrete member.
3. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor.
4. Edge or end distance is measured from anchor centerline to the closest unrestrained edge of the concrete member.
5. The tabulated values are for anchors installed at a minimum of 16 anchor diameters on center for 100 percent capacity. Spacing distance is measured from the centerline to centerline between two anchors.
6. Allowable loads must be the lesser of the adjusted masonry or bond values tabulated above and the steel strength values.
7. The tabulated values must be adjusted for increased in-service base material temperatures in accordance with the In-Service Temperature chart, as applicable.

Ultimate and Allowable Load Capacities for Knurled Dropins Installed with AC100+ Gold into Normal Weight Concrete[1,2,3,4,5]

Anchor Diameter d in.	Knurled Dropin Anchor Cat. No.	Drill Bit Diameter in.	Minimum Embedment h_{nom} in. (mm)	Minimum Edge Distance in. (mm)	Ultimate Load		Allowable Load	
					Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
1/4	6340	1/2	1 (25)	2 (51)	1,340 (6.0)	1,880 (8.4)	335 (1.5)	470 (2.1)
3/8	6342	5/8	1-9/16 (40)	3 (76)	2,740 (12.2)	3,800 (16.9)	685 (3.0)	950 (4.2)
1/2	6344	3/4	2 (51)	4 (102)	3,160 (14.1)	5,460 (24.3)	790 (3.5)	1,365 (6.1)

1. Allowable load capacities listed are calculated using an applied safety factor of 4.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.
2. Knurled dropin anchors installed with AC100+ Gold adhesive are not recommended for overhead applications.
3. The tabulated values are for anchors installed at a minimum of 16 anchor diameters on center for 100 percent capacity. Spacing distance is measured from the centerline to centerline between two anchors.
4. The tabulated values must be adjusted for increased in-service base material temperatures in accordance with the In-Service Temperature chart, as applicable.
5. Tabulated allowable capacities must be checked against allowable steel strength of the threaded rod insert to determine the controlling allowable load.

Ultimate and Allowable Load Capacities for Threaded Rod Installed with AC100+ Gold into Brick Masonry Walls[1,2,3,4]

Anchor Diameter d in.	Drill Diameter d_{bit} in.	Minimum Embedment h_{nom} in. (mm)	Minimum End Distance in. (mm)	Minimum Edge Distance in. (mm)	Ultimate Load		Allowable Load	
					Tension lbs. (kN)	Shear lbs. (kN)	Tension lbs. (kN)	Shear lbs. (kN)
Anchors Installed into the Face of Brick Masonry Walls								
3/8	1/2	3-1/2 (89)	2-1/2 (64)	2-1/2 (64)	3,600 (16.0)	4,505 (20.0)	720 (3.2)	900 (4.0)
		3-1/2 (89)	6 (152)	6 (152)	5,845 (26.0)	4,580 (20.4)	1,170 (5.2)	915 (4.1)
		6 (152)	6 (152)	6 (152)	10,420 (46.4)	4,580 (20.4)	2,085 (9.3)	915 (4.1)
1/2	5/8	6 (152)	8 (203)	8 (203)	11,500 (51.2)	9,300 (41.4)	2,300 (10.2)	1,860 (8.3)
5/8	3/4	3-1/8 (79)	9-1/2 (241)	9-1/2 (241)	4,715 (21.0)	7,700 (34.3)	945 (4.2)	1,540 (6.6)
		6 (152)	9-1/2 (241)	9-1/2 (241)	9,925 (44.2)	7,700 (34.3)	1,985 (8.8)	1,540 (6.6)
Anchors Installed into the Top of Brick Masonry Walls								
3/8	1/2	3-1/2 (89)	2-1/2 (64)	2-1/2 (64)	3,665 (16.3)	2,435 (10.8)	735 (3.3)	485 (2.2)

1. Tabulated load values are for anchors installed in minimum 2 wythe, Grade SW, solid clay brick masonry conforming to ASTM C 62. Mortar must be N, S or M.
2. Allowable loads are calculated using an applied safety factor or 5.0. Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.
3. Allowable loads apply to installations in the face of brick or mortar joint. The tabulated values are for anchors installed at a minimum of 16 anchor diameters on center for 100 percent capacity.
4. The tabulated values must be adjusted for increased in-service base material temperatures in accordance with the In-Service Temperature chart, as applicable.

Allowable Load Capacities for Threaded Rods and Reinforcing Bars or Rebar Dowel with AC100+ Gold Installed in Unreinforced Masonry Walls with Stainless Steel Screen Tubes (Retrofit Bolt Anchors in URM Walls)[1,2]

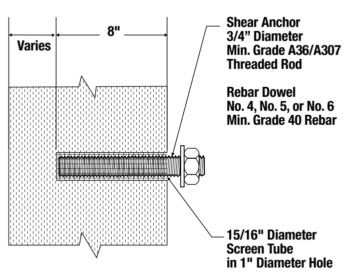


Figure 1

Shear Anchor – Configuration A (See Figure 1)

Rod Dia. or Rebar Size d in.	Minimum Embed. h_{nom} in. (mm)	Minimum Wall Thickness in. (mm)	Allowable Tension lbs. (kN)	Allowable Shear lbs. (kN)
3/4	8 (203)	13 (330)	-	1,000 (4.5)
No. 4	8 (203)	13 (330)	-	500 (2.3)
No. 5	8 (203)	13 (330)	-	750 (3.4)
No. 6	8 (203)	13 (330)	-	1,000 (4.5)

1. Allowable load values are applicable only where in-place shear tests indicate minimum mortar strength of 35 psi net.
2. The anchors installed in unreinforced brick walls are limited to resisting seismic or wind loads only.

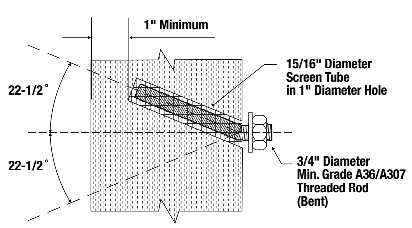


Figure 2

22-1/2° Combination Anchor – Configuration B (See Figure 2)

Rod Dia. or Rebar Size d in.	Minimum Embed. h_{nom} in. (mm)	Minimum Wall Thickness in. (mm)	Allowable Tension lbs. (kN)	Allowable Shear lbs. (kN)
3/4	Within 1 inch (25mm) of opposite wall surface	13 (330)	1,200 (5.4)	1,000 (4.5)

1. Allowable load values are applicable only where in-place shear tests indicate minimum mortar strength of 35 psi net.
2. The anchors installed in unreinforced brick walls are limited to resisting seismic or wind loads only.

Anchor Description	Minimum Vertical Spacing in.	Minimum Horizontal Spacing in.	Minimum Edge Distance in.
Shear Anchor - Configuration A (See Figure 1)	16	16	16
22-1/2° Combination Anchor - Configuration B (See Figure 2)	16	16	16

STRENGTH DESIGN (SD)

CODE LISTED
ICC-ES ESR-2582

STRENGTH DESIGN SD TABLES

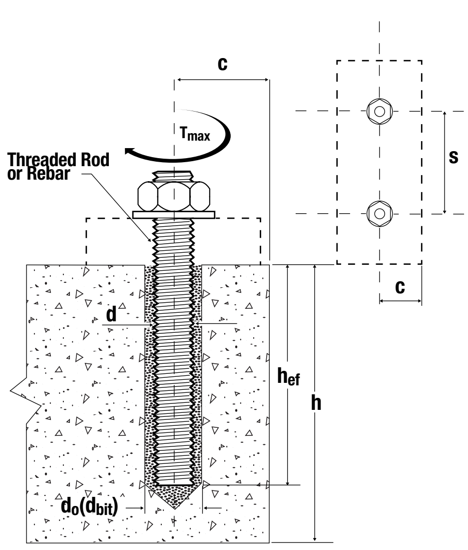
Strength Design Installation Table for AC100+ Gold[1]

Parameter	Symbol	Units	Fractional Nominal Rod Diameter (Inch) / Reinforcing Bar Size									
			3/8 or #3	1/2	#4	5/8 or #5	3/4 or #6	7/8 or #7	1 or #8	#9	1-1/4	#10
Threaded rod outside diameter	d_a	inch (mm)	0.375 (9.5)	0.500 (12.7)		0.625 (15.9)	0.750 (19.1)	0.875 (22.2)	1.000 (25.4)	-	1.250 (31.8)	-
Rebar nominal outside diameter	d_a	inch (mm)	0.375 (9.5)	0.500 (12.7)		0.625 (15.9)	0.750 (19.1)	0.875 (22.2)	1.000 (25.4)	1.125 (28.7)	-	1.250 (31.8)
Carbide drill bit nominal size	d_o (d_{bit})	inch	7/16	9/16	5/8	11/16 or 3/4	7/8	1	1-1/8	1-3/8	1-3/8	1-1/2
Minimum embedment	$h_{ef,min}$	inch (mm)	2-3/8 (60)	2-3/4 (70)		3-1/8 (79)	3-1/2 (89)	3-1/2 (89)	4 (102)	4-1/2 (114)	5 (127)	5 (127)
Maximum embedment	$h_{ef,max}$	inch (mm)	4-1/2 (114)	6 (152)		7-1/2 (191)	9 (229)	10-1/2 (267)	12 (305)	13-1/2 (343)	15 (381)	15 (381)
Minimum member thickness	h_{min}	inch (mm)	h_{ef} + 1-1/4 (h_{ef} + 30)			$h_{ef} + 2d_o$						
Minimum anchor spacing	s_{min}	inch (mm)	1-7/8 (48)	2-1/2 (64)		3-1/8 (79)	3-3/4 (95)	4-3/8 (111)	5 (127)	5-5/8 (143)	6-1/4 (159)	6-1/4 (159)
Minimum edge distance, reduced[5]	$c_{min,red}$	inch (mm)	1-3/4 (45)	1-3/4 (45)		1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	2-3/4 (70)	2-3/4 (70)	2-3/4 (70)
Minimum edge distance	c_{min}	inch (mm)	1-7/8 (48)	2-1/2 (64)		3-1/8 (79)	3-3/4 (95)	4-3/8 (111)	5 (127)	5-5/8 (143)	6-1/4 (159)	6-1/4 (159)
Max. rod torque[2]	T_{max}	ft-lbs	15	33		60	105	125	165	-	280	-
Max. torque[2,3] (A36/Grade 36 rod)	T_{max}	ft-lbs	10	25		50	90	125	165	-	280	-
Max. torque[2,4] (Class 1 SS rod)	T_{max}	ft-lbs	5	20		40	60	100	165	-	280	-

For pound-inch units: 1 mm = 0.03937 inch, 1 N-m = 0.7375 ft-lbf. For SI: 1 inch = 25.4 mm, 1 ft-lbf = 1.356 N-m.

1. For use with the design provisions of ACI 318-14 Ch. 17 or ACI 318-11 Appendix D as applicable and ICC-ES AC308, Section 4.2 and ESR-2582.
2. Torque may not be applied to the anchors until the full cure time of the adhesive has been achieved.
3. These torque values apply to ASTM A 36 / F 1554 Grade 36 carbon steel threaded rods.
4. These torque values apply to ASTM A 193 Grade B8/B8M (Class 1) stainless steel threaded rods.
5. For installation between the minimum edge distance, c_{min}, and the reduced minimum edge distance, $c_{min,red}$, the maximum torque must be reduced (multiplied) by a factor of 0.45.

Detail of Steel Hardware Elements used with Injection Adhesive System



Threaded Rod and Deformed Reinforcing Bar Material Properties

Steel Description (General)	Steel Specification (ASTM)	Nominal Anchor Size (inch)	Minimum Yield Strength, f_y (ksi)	Minimum Ultimate Strength, f_u (ksi)
Carbon rod	ASTM A 36 and F 1554 Grade 36	3/8 through 1-1/4	36.0	58.0
	ASTM F 1554 Grade 55	3/8 through 1-1/4	55.0	75.0
	ASTM A 449	3/8 through 1	92.0	120.0
		1-1/4	81.0	105.0
High Strength Carbon rod	ASTM A 193 Grade B7 and F 1554 Grade 105	3/8 through 1-1/4	105.0	125.0
Stainless rod (Alloy 304/316)	ASTM F 593 Condition CW	3/8 through 5/8	65.0	100.0
		3/4 through 1-1/4	45.0	85.0
	ASTM A 193 Grade B8/B8M, Class 1	3/8 through 1-1/4	30.0	75.0
	ASTM A 193 Grade B8/B8M2, Class 2B	3/8 through 1-1/4	75.0	95.0
Reinforcing Bar	ASTM A 615, A 767, Grade 75	3/8 through 1-1/4 (#3 through #10)	75.0	100.0
	ASTM A 615, A 767, Grade 60	3/8 through 1-1/4 (#3 through #10)	60.0	90.0
	ASTM A 706, A 767, Grade 60	3/8 through 1-1/4 (#3 through #10)	60.0	80.0
	ASTM A 615, A 767, Grade 40	3/8 through 1-1/4 (#3 through #10)	40.0	60.0

Steel Tension and Shear Design for Threaded Rod in Normal Weight Concrete (For use with load combinations taken from ACI 318-14 Section 5.3)

CODE LISTED ICC-ES ESR-2582

STRENGTH DESIGN TABLES SD

Design Information		Symbol	Units	Nominal Rod Diameter[1] (inch)						
				3/8	1/2	5/8	3/4	7/8	1	1-1/4
Threaded rod nominal outside diameter		d_a	inch (mm)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)	0.875 (22.2)	1.000 (25.4)	1.250 (31.8)
Threaded rod effective cross-sectional area		A_{se}	inch² (mm²)	0.0775 (50)	0.1419 (92)	0.2260 (146)	0.3345 (216)	0.4617 (298)	0.6057 (391)	0.9691 (625)
ASTM A 36 and ASTM F 1554 Grade 36	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	4,495 (20.0)	8,230 (36.6)	13,110 (58.3)	19,400 (86.3)	26,780 (119.1)	35,130 (156.3)	56,210 (250.0)
		V_{sa}	lbf (kN)	2,695 (12.0)	4,940 (22.0)	7,860 (35.0)	11,640 (51.8)	16,070 (71.4)	21,080 (93.8)	33,725 (150.0)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM F 1554 Grade 55	Nominal strength as governed by steel strength(for a single anchor)	N_{sa}	lbf (kN)	5,810 (25.9)	10,640 (47.3)	16,950 (75.4)	25,085 (111.6)	34,625 (154.0)	45,425 (202.0)	72,680 (323.3)
		V_{sa}	lbf (kN)	3,485 (15.5)	6,385 (28.4)	10,170 (45.2)	15,050 (67.0)	20,775 (92.4)	27,255 (121.2)	43,610 (194.0)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM A 193 Grade B7 and ASTM F 1554 Grade 105	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	9,685 (43.1)	17,735 (78.9)	28,250 (125.7)	41,810 (186.0)	57,710 (256.7)	75,710 (336.8)	121,135 (538.8)
		V_{sa}	lbf (kN)	5,815 (25.9)	10,640 (7.3)	16,950 (75.4)	25,085 (111.6)	34,625 (154.0)	45,425 (202.1)	72,680 (323.3)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM A 449	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	9,300 (41.4)	17,025 (75.7)	27,120 (120.6)	40,140 (178.5)	55,905 (248.7)	72,685 (323.3)	101,755 (452.6)
		V_{sa}	lbf (kN)	5,580 (24.8)	10,215 (45.4)	16,270 (72.4)	24,085 (107.1)	33,540 (149.2)	43,610 (194.0)	61,050 (271.6)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM F 593 CW Stainless (Types 304 and 316)	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	7,750 (34.5)	14,190 (63.1)	22,600 (100.5)	28,430 (126.5)	39,245 (174.6)	51,485 (229.0)	82,370 (366.4)
		V_{sa}	lbf (kN)	4,650 (20.7)	8,515 (37.9)	13,560 (60.3)	17,060 (75.9)	23,545 (104.7)	30,890 (137.4)	49,425 (219.8)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[3]	ϕ	-	0.65						
	Strength reduction factor for shear[3]	ϕ	-	0.60						
ASTM A 193 Grade B8/B8M, Class 1 Stainless (Types 304 and 316)	Nominal strength as governed by steel strength (for a single anchor)[4]	N_{sa}	lbf (kN)	4,420 (19.7)	8,090 (36.0)	12,880 (57.3)	19,065 (84.8)	26,315 (117.1)	34,525 (153.6)	55,240 (245.7)
		V_{sa}	lbf (kN)	2,650 (11.8)	4,855 (21.6)	7,730 (34.4)	11,440 (50.9)	15,790 (70.2)	20,715 (92.1)	33,145 (147.4)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						
ASTM A 193 Grade B8/ B8M2, Class 2B Stainless (Types 304 and 316)	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	7,365 (32.8)	13,480 (60.0)	21,470 (95.5)	31,775 (141.3)	43,860 (195.1)	57,545 (256.0)	92,065 (409.5)
		V_{sa}	lbf (kN)	4,420 (19.7)	8,085 (36.0)	12,880 (57.3)	19,065 (84.8)	26,315 (117.1)	34,525 (153.6)	55,240 (245.7)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75						
	Strength reduction factor for shear[2]	ϕ	-	0.65						

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N. For pound-inch units: 1 mm = 0.03937 inches, 1 N = 0.2248 lbf.

1. Values provided for steel element material types are based on minimum specified strengths and calculated in accordance with ACI 318-14 Eq. 17.4.1.2 and Eq. 17.5.1.2b or ACI 318-11 Eq. (D-2) and Eq. (D-29), as applicable, except where noted. Nuts and washers must be appropriate for the rod. Nuts must have specified proof load stresses equal to or greater than the minimum tensile strength of the specified threaded rod.
2. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.4. Values correspond to ductile steel elements.
3. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.4. Values correspond to brittle steel elements
4. In accordance with ACI 318-14 17.4.1.2 and 17.5.1.2 or ACI 318-11 D.5.1.2 and D.6.1.2, as applicable, the calculated values for nominal tension and shear strength for ASTM A193 Grade B8/B8M Class 1 stainless steel threaded rods are based on limiting the specified tensile strength of the anchor steel to 1.9fy or 57,000 psi (393 MPa).

Steel Tension and Shear Design for Reinforcing Bars in Normal Weight Concrete (For use with load combinations taken from ACI 318-14 Section 5.3)

CODE LISTED
ICC-ES ESR-2582

STRENGTH DESIGN TABLES SD

Design Information		Symbol	Units	Nominal Reinforcing Bar Size (Rebar)[1]							
				No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10
Rebar nominal outside diameter		d_a	inch (mm)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)	0.750 (19.1)	0.875 (22.2)	1.000 (25.4)	1.125 (28.7)	1.250 (32.3)
Rebar effective cross-sectional area		A_{se}	inch² (mm²)	0.110 (71.0)	0.200 (129.0)	0.310 (200.0)	0.440 (283.9)	0.600 (387.1)	0.790 (509.7)	1.000 (645.2)	1.270 (819.4)
ASTM A 615 Grade 75	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	11,000 (48.9)	20,000 (89.0)	31,000 (137.9)	44,000 (195.7)	60,000 (266.9)	79,000 (351.4)	100,000 (444.8)	127,000 (564.9)
		V_{sa}	lbf (kN)	6,600 (29.4)	12,000 (53.4)	18,600 (82.7)	26,400 (117.4)	36,000 (160.1)	47,400 (210.8)	60,000 (266.9)	76,200 (338.9)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[3]	ϕ	-	0.65							
	Strength reduction factor for shear[3]	ϕ	-	0.60							
ASTM A 615 Grade 60	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	9,900 (44.0)	18,000 (80.1)	27,900 (124.1)	39,600 (176.1)	54,000 (240.2)	71,100 (316.3)	90,000 (400.3)	114,300 (508.4)
		V_{sa}	lbf (kN)	5,940 (26.4)	10,800 (48.0)	16,740 (74.5)	23,760 (105.7)	32,400 (144.1)	42,660 (189.8)	54,000 (240.2)	68,580 (305.0)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75							
	Strength reduction factor for shear[2]	ϕ	-	0.65							
ASTM A 706 Grade 60	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	8,800 (39.1)	16,000 (71.2)	24,800 (110.3)	35,200 (156.6)	48,000 (213.5)	63,200 (281.1)	80,000 (355.9)	101,600 (452.0)
		V_{sa}	lbf (kN)	5,280 (23.5)	9,600 (42.7)	14,880 (66.2)	21,120 (94.0)	28,800 (128.1)	37,920 (168.7)	48,000 (213.5)	60,960 (271.2)
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80	0.80	0.80	0.80	0.80
	Strength reduction factor for tension[2]	ϕ	-	0.75							
	Strength reduction factor for shear[2]	ϕ	-	0.65							
ASTM A 615 Grade 40	Nominal strength as governed by steel strength (for a single anchor)	N_{sa}	lbf (kN)	6,600 (29.4)	12,000 (53.4)	18,600 (82.7)	26,400 (117.4)	In accordance with ASTM A 615, Grade 40 bars are furnished only in sizes No. 3 through No. 6			
		V_{sa}	lbf (kN)	3,960 (17.6)	7,200 (32.0)	11,160 (49.6)	15,840 (70.5)				
	Reduction factor for seismic shear	$\alpha_{V,seis}$	-	0.70	0.70	0.80	0.80				
	Strength reduction factor for tension[2]	ϕ	-	0.75							
	Strength reduction factor for shear[2]	ϕ	-	0.65							

1. Values provided for reinforcing bar material types based on minimum specified strengths and calculated in accordance with ACI 318-14 Eq. 17.4.1.2 and Eq. 17.5.1.2b or ACI 318-11 Eq. (D-2) and Eq. (D-29), as applicable.
2. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.4. Values correspond to ductile steel elements. In accordance with ACI 318-14 17.2.3.4.3(a)(vi) or ACI 318-11 D.3.3.4.3(a)6, as applicable, deformed reinforcing bars meeting this specification used as ductile steel elements to resist earthquake effects shall be limited to reinforcing bars satisfying the requirements of ACI 318-14 20.2.2.4 and 20.2.2.5 or ACI 318-11 21.1.5.2 (a) and (b), as applicable.
3. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.4. Values correspond to brittle steel elements.

Concrete Breakout Design Information for Threaded Rod and Reinforcing Bars (For use with loads combinations taken from ACI 318-14 Section 5.3)[1]

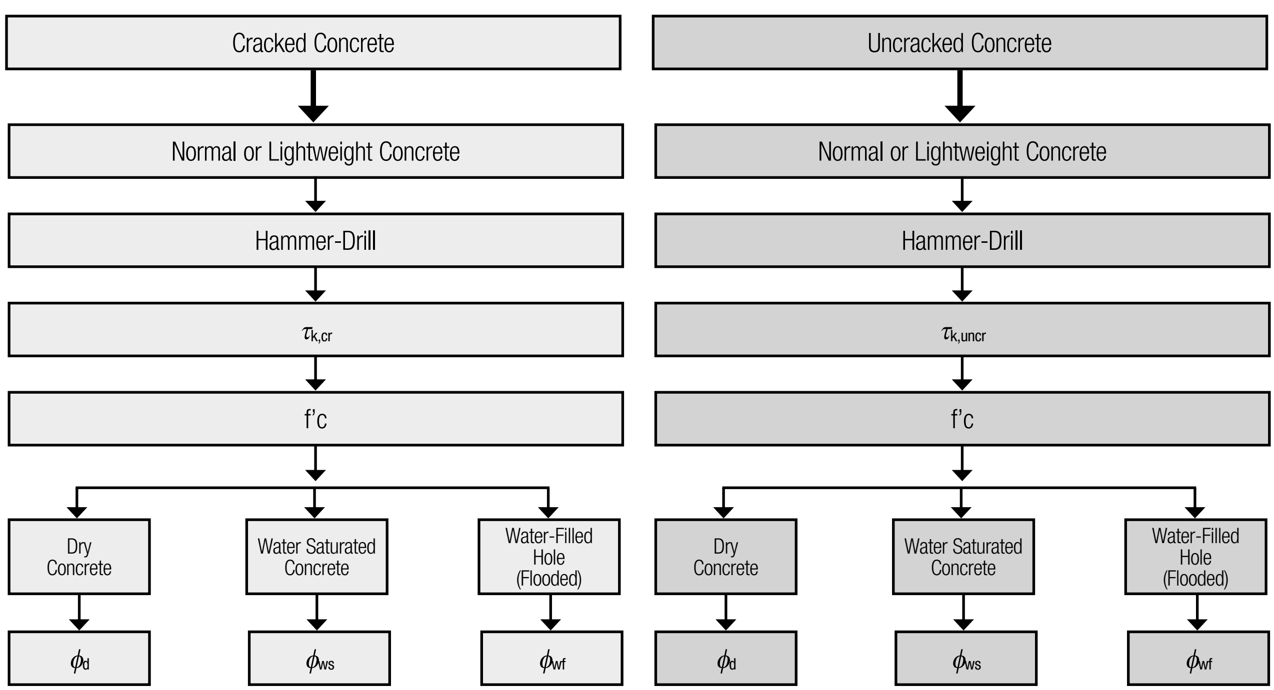
CODE LISTED
ICC-ES ESR-2582

Design Information	Symbol	Units	Nominal Rod Diameter (inch) / Reinforcing Bar Size							
			3/8 or #3	1/2 or #4	5/8 or #5	3/4 or #6	7/8 or #7	1 or #8	#9	1-1/4 or #10
Effectiveness factor for cracked concrete	$k_{c,cr}$	- (SI)	Not Applicable	17 (7.1)						
Effectiveness factor for uncracked concrete	$k_{c,uncr}$	- (SI)	24 (10.0)							
Minimum embedment	$h_{ef,min}$	inch (mm)	2-3/8 (60)	2-3/4 (70)	3-1/8 (79)	3-1/2 (89)	3-1/2 (89)	4 (102)	4-1/2 (114)	5 (127)
Maximum embedment	$h_{ef,max}$	inch (mm)	4-1/2 (114)	6 (152)	7-1/2 (191)	9 (229)	10-1/2 (267)	12 (305)	13-1/2 (343)	15 (381)
Minimum anchor spacing	s_{min}	inch (mm)	1-7/8 (48)	2-1/2 (64)	3-1/8 (79)	3-3/4 (95)	4-3/8 (111)	5 (127)	5-5/8 (143)	6-1/4 (159)
Minimum edge distance[2]	c_{min}	inch (mm)	5*d* where *d* is nominal outside diameter of the anchor							
Minimum edge distance, reduced[2]	$c_{min,red}$	inch (mm)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	1-3/4 (45)	2-3/4 (70)	2-3/4 (70)
Minimum member thickness	h_{min}	inch (mm)	h_{ef} + 1-1/4 (h_{ef} + 30)		$h_{ef} + 2d_o$ where d_o is hole diameter;					
Critical edge distance—splitting (for uncracked concrete only)[3]	c_{ac}	inch	$c_{ac} = h_{ef} \cdot (\frac{\tau_{uncr}}{1160})^{0.4} \cdot [3.1\text{-}0.7\frac{h}{h_{ef}}]$							
		(mm)	$c_{ac} = h_{ef} \cdot (\frac{\tau_{uncr}}{8})^{0.4} \cdot [3.1\text{-}0.7\frac{h}{h_{ef}}]$							
Strength reduction factor for tension, concrete failure modes, Condition B[4]	ϕ	-	0.65							
Strength reduction factor for shear, concrete failure modes, Condition B[4]	ϕ	-	0.70							

For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N. For pound-inch units: 1 mm = 0.03937 inch, 1 N = 0.2248 lbf.

1. Additional setting information is described in the installation instructions.
2. For installation between the minimum edge distance, c_{min}, and the reduced minimum edge distance, $c_{min,red}$, the maximum torque applied must be reduced (multiplied) by a factor of 0.45.
3. $\tau_{k,uncr}$ need not be taken as greater than: $\tau_{k,uncr} = \frac{k_{uncr} \cdot \sqrt{h_{ef} \cdot f'c}}{\pi \cdot d}$ and $\frac{h}{h_{ef}}$ need not be taken as larger than 2.4.
4. Condition A requires supplemental reinforcement, while Condition B applies where supplemental reinforcement is not provided or where pryout governs, as set forth in ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. The tabulated value of ϕ applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 5.3 or ACI 318-11 9.2, as applicable, are used in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.4.

FLOWCHART FOR THE ESTABLISHMENT OF DESIGN BOND STRENGTH



Bond Strength Design Information for Threaded Rods
(For use with load combinations taken from ACI 318-14 Section 5.3)[1,2]

Design Information		Symbol	Units	Nominal Rod Diameter (Inch) / Reinforcing Bar Size						
				3/8	1/2	5/8	3/4	7/8	1	1-1/4
Minimum embedment		$h_{ef,min}$	inch (mm)	2-3/8 (60)	2-3/4 (70)	3-1/8 (79)	3-1/2 (89)	3-1/2 (89)	4 (102)	5 (127)
Maximum embedment		$h_{ef,max}$	inch (mm)	4-1/2 (114)	6 (152)	7-1/2 (191)	9 (229)	10-1/2 (267)	12 (305)	15 (381)
122°F (50°C) Maximum Long-Term Service Temperature; 176°F (80°C) Maximum Short-Term Service Temperature[3,4]	Characteristic bond strength in cracked concrete[4,7]	$\tau_{k,cr}$	psi (N/mm²)	Not Applicable	498 (3.4)	519 (3.6)	519 (3.6)	519 (3.6)	519 (3.6)	525 (3.6)
	Characteristic bond strength in uncracked concrete[4,8]	$\tau_{k,uncr}$	psi (N/mm²)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	823 (5.7)	743 (5.1) Not applicable in water-filled hole installation condition	588 (4.1)
162°F (72°C) Maximum Long-Term Service Temperature; 248°F (120°C) Maximum Short-Term Service Temperature[3,4]	Characteristic bond strength in cracked concrete[4,7]	$\tau_{k,cr}$	psi (N/mm²)	Not Applicable	245 (1.7)	255 (1.8)	255 (1.8)	255 (1.8)	255 (1.8)	255 (1.8)
	Characteristic bond strength in uncracked concrete[4,8]	$\tau_{k,uncr}$	psi (N/mm²)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8)	405 (2.8) Not applicable in water-filled hole installation condition	366 (2.5)	Not Applicable
Permissible installation conditions[6]	Dry concrete	ϕ_d	-	0.65				0.65	0.65	0.65
	Water-saturated concrete	ϕ_{ws}	-	0.55				0.55	0.55	0.55
	Water-filled hole (flooded)	ϕ_{wf}	-	0.45				0.45	0.45	0.45
		κ_{wf}		0.78				0.70	0.69	0.67
Reduction factor for seismic tension		$\alpha_{N,seis}$	-	0.95						

For SI: 1 inch = 25.4 mm, 1 psi = 0.006894 MPa. For pound-inch units: 1 mm = 0.03937 inch, 1 MPa = 145.0 psi.

1. Bond strength values correspond to a normal-weight concrete compressive strength f'c = 2,500 psi (17.2 MPa). For concrete compressive strength, f'c between 2,500 psi and 8,000 psi (17.2 MPa and 55.2 MPa), the tabulated characteristic bond strength may be increased by a factor of $(f'c / 2{,}500)^{0.13}$ [For SI: $(f'c / 17.2)^{0.13}$].
2. The modification factor for bond strength of adhesive anchors in lightweight concrete shall be taken as given in ACI 318-14 17.2.6 where applicable.
3. Long-term and short-term temperatures meet the requirements of Section 8.5 of ACI 355.4 and Table 9.1, Temperature Category A.
4. Short-term base material service temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling. Long-term base material service temperatures are roughly constant over significant periods of time.
5. Characteristic bond strengths are for sustained loads including dead and live loads.
6. Permissible installation conditions include dry concrete, water-saturated concrete and water-filled holes. Water-filled holes include applications in dry or water-saturated concrete where the drilled holes contain standing water at the time of anchor installation.
7. For structures assigned to Seismic Design Categories C, D, E or F, the tabulated bond strength values for cracked concrete must be adjusted by an additional reduction factor, $\alpha_{N,seis}$, as given in this table.
8. Bond strength values for uncracked concrete are applicable for structures assigned to Seismic Design Categories A and B only.

Bond Strength Design Information for Reinforcing Bar
(For use with load combinations taken from ACI 318-14 Section 5.3)[1,2]

STRENGTH DESIGN SD TABLES

<table>
<tr><th colspan="2" rowspan="2">Design Information</th><th rowspan="2">Symbol</th><th rowspan="2">Units</th><th colspan="8">Nominal Rod Diameter (Inch) / Reinforcing Bar Size</th></tr>
<tr><th>#3</th><th>#4</th><th>#5</th><th>#6</th><th>#7</th><th>#8</th><th>#9</th><th>#10</th></tr>
<tr><td colspan="2">Minimum embedment</td><td>$h_{ef,min}$</td><td>inch (mm)</td><td>2-3/8 (60)</td><td>2-3/4 (70)</td><td>3-1/8 (79)</td><td>3-1/2 (89)</td><td>3-1/2 (89)</td><td>4 (102)</td><td>4-1/2 (114)</td><td>5 (127)</td></tr>
<tr><td colspan="2">Maximum embedment</td><td>$h_{ef,max}$</td><td>inch (mm)</td><td>4-1/2 (114)</td><td>6 (152)</td><td>7-1/2 (191)</td><td>9 (229)</td><td>10-1/2 (267)</td><td>12 (305)</td><td>13-1/2 (343)</td><td>15 (381)</td></tr>
<tr><td rowspan="3">122°F (50°C) Maximum Long-Term Service Temperature; 176°F (80°C) Maximum Short-Term Service Temperature[3,4]</td><td>Characteristic bond strength in cracked concrete[4,7]</td><td>$\tau_{k,cr}$</td><td>psi (N/mm²)</td><td>Not Applicable</td><td>331 (2.3)</td><td>345 (2.4)</td><td>345 (2.4)</td><td>345 (2.4)</td><td>345 (2.4)</td><td>349 (2.4)</td><td>349 (2.4)</td></tr>
<tr><td rowspan="2">Characteristic bond strength in uncracked concrete[4,8]</td><td rowspan="2">$\tau_{k,uncr}$</td><td rowspan="2">psi (N/mm²)</td><td rowspan="2">823 (5.7)</td><td rowspan="2">823 (5.7)</td><td rowspan="2">823 (5.7)</td><td rowspan="2">823 (5.7)</td><td rowspan="2">823 (5.7)</td><td>743 (5.1)</td><td>655 (4.5)</td><td>588 (4.1)</td></tr>
<tr><td colspan="3">Not applicable in water-filled hole installation condition</td></tr>
<tr><td rowspan="3">162°F (72°C) Maximum Long-Term Service Temperature; 248°F (120°C) Maximum Short-Term Service Temperature[3,4]</td><td>Characteristic bond strength in cracked concrete[4,7]</td><td>$\tau_{k,cr}$</td><td>psi (N/mm²)</td><td>Not Applicable</td><td>163 (1.1)</td><td>170 (1.2)</td><td>170 (1.2)</td><td>170 (1.2)</td><td>170 (1.2)</td><td>170 (1.2)</td><td>170 (1.2)</td></tr>
<tr><td rowspan="2">Characteristic bond strength in uncracked concrete[4,8]</td><td rowspan="2">$\tau_{k,uncr}$</td><td rowspan="2">psi (N/mm²)</td><td rowspan="2">405 (2.8)</td><td rowspan="2">405 (2.8)</td><td rowspan="2">405 (2.8)</td><td rowspan="2">405 (2.8)</td><td>405 (2.8)</td><td>366 (2.5)</td><td>329 (2.3)</td><td rowspan="2">Not Applicable</td></tr>
<tr><td colspan="3">Not applicable in water-filled hole installation condition</td></tr>
<tr><td rowspan="4">Permissible installation conditions[6]</td><td>Dry concrete</td><td>ϕ_d</td><td>-</td><td colspan="4">0.65</td><td>0.65</td><td>0.65</td><td>0.65</td><td>0.65</td></tr>
<tr><td>Water-saturated concrete</td><td>ϕ_{ws}</td><td>-</td><td colspan="4">0.55</td><td>0.55</td><td>0.55</td><td>0.55</td><td>0.55</td></tr>
<tr><td rowspan="2">Water-filled hole (flooded)</td><td>ϕ_{wf}</td><td>-</td><td colspan="4">0.45</td><td>0.45</td><td>0.45</td><td>0.45</td><td>0.45</td></tr>
<tr><td>κ_{wf}</td><td></td><td colspan="4">0.78</td><td>0.70</td><td>0.69</td><td>0.68</td><td>0.67</td></tr>
<tr><td colspan="2">Reduction factor for seismic tension</td><td>$\alpha_{N,seis}$</td><td>-</td><td colspan="8">0.95</td></tr>
</table>

For SI: 1 inch = 25.4 mm, 1 psi = 0.006894 MPa. For pound-inch units: 1 mm = 0.03937 inch, 1 MPa = 145.0 psi.

1. Bond strength values correspond to a normal-weight concrete compressive strength f'c = 2,500 psi (17.2 MPa). For concrete compressive strength, f'c between 2,500 psi and 8,000 psi (17.2 MPa and 55.2 MPa), the tabulated characteristic bond strength may be increased by a factor of $(f'c / 2{,}500)^{0.13}$ [For SI: $(f'c / 17.2)^{0.13}$].
2. The modification factor for bond strength of adhesive anchors in lightweight concrete shall be taken as given in ACI 318-14 17.2.6 where applicable.
3. Long-term and short-term temperatures meet the requirements of Section 8.5 of ACI 355.4 and Table 9.1, Temperature Category A.
4. Short-term base material service temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling. Long-term base material service temperatures are roughly constant over significant periods of time.
5. Characteristic bond strengths are for sustained loads including dead and live loads.
6. Permissible installation conditions include dry concrete, water-saturated concrete and water-filled holes. Water-filled holes include applications in dry or water-saturated concrete where the drilled holes contain standing water at the time of anchor installation.
7. For structures assigned to Seismic Design Categories C, D, E or F, the tabulated bond strength values for cracked concrete must be adjusted by an additional reduction factor, $\alpha_{N,seis}$, as given in this table.
8. Bond strength values for uncracked concrete are applicable for structures assigned to Seismic Design Categories A and B only.

Tension and Shear Design Strength for Threaded Rod and Reinforcing Bar Installed in Uncracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 122°F (50°C) Maximum Long-Term Service Temperature; 176°F (80°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

STRENGTH DESIGN TABLES SD

Nominal Rod/Rebar Size (in. or #)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
3/8 or #3	2-3/8	1,495	1,610	1,535	1,650	1,590	1,715	1,675	1,805	1,740	1,875
	3	1,890	2,955	1,935	3,270	2,010	3,830	2,120	4,565	2,200	4,735
	4-1/2	2,835	5,395	2,905	5,965	3,015	6,495	3,180	6,845	3,300	7,105
1/2 or #4	2-3/4	2,310	2,780	2,365	3,075	2,455	3,605	2,590	4,505	2,690	5,280
	4	3,360	5,230	3,440	5,785	3,575	6,780	3,765	8,110	3,910	8,420
	6	5,040	9,530	5,165	10,540	5,360	11,545	5,650	12,170	5,865	12,630
5/8 or #5	3-1/8	3,280	3,695	3,360	4,085	3,490	4,785	3,680	5,990	3,820	7,020
	5	5,250	8,155	5,380	9,015	5,585	10,565	5,885	12,675	6,110	13,160
	7-1/2	7,880	14,850	8,065	16,420	8,375	18,035	8,825	19,015	9,165	19,735
3/4 or #6	3-1/2	4,285	4,730	4,380	5,230	4,535	6,130	4,760	7,670	4,925	8,990
	6	7,565	11,515	7,745	12,730	8,040	14,925	8,475	18,250	8,795	18,950
	9	11,345	20,970	11,615	23,190	12,060	25,975	12,710	27,380	13,195	28,420
7/8 or #7	3-1/2	4,370	4,930	4,475	5,470	4,635	6,410	4,865	8,020	5,040	9,400
	7	10,295	14,500	10,540	16,035	10,940	18,795	11,535	23,510	11,975	25,790
	10-1/2	15,440	26,410	15,810	29,210	16,415	34,235	17,300	37,265	17,960	38,685
1 or #8	4	5,210	6,045	5,325	6,685	5,515	7,835	5,795	9,800	6,000	11,490
	8	12,140	17,000	12,430	18,800	12,905	22,040	13,600	27,565	14,120	30,410
	12	18,205	30,965	18,645	34,245	19,355	40,140	20,400	43,940	21,180	45,615
#9	5	5,795	6,845	5,925	7,570	6,135	8,875	6,445	11,100	6,670	13,010
	10	13,545	19,320	13,865	21,365	14,395	25,045	15,175	31,325	15,755	33,930
	15	20,315	35,195	20,800	38,920	21,595	45,620	22,760	49,025	23,630	50,895
1-1/4	5	6,575	7,695	6,720	8,510	6,955	9,975	7,305	12,480	7,565	14,625
	10	15,010	21,630	15,370	23,920	15,955	28,035	16,820	35,065	17,460	37,605
	15	22,515	39,390	23,055	43,560	23,930	51,060	25,225	54,335	26,190	56,405
#10	5	6,490	7,685	6,635	8,495	6,870	9,960	7,215	12,455	7,470	14,600
	10	15,010	21,665	15,370	23,960	15,955	28,085	16,820	35,130	17,460	37,605
	15	22,515	39,465	23,055	43,640	23,930	51,155	25,225	54,335	26,190	56,405

☐ - Concrete Breakout Strength ☐ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in uncracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14, Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14, Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14, Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14, Ch.17 and ICC-ES AC308 and ESR-2582.
9. Long term concrete temperatures are roughly constant over significant periods of time. Short-term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Tension and Shear Design Strength for Threaded Rod Installed in Cracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 122°F (50°C) Maximum Long-Term ServiceTemperature; 176°F (80°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

Nominal Rod/Rebar Size (in.)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
1/2	2-3/4	1,400	1,985	1,430	2,195	1,485	2,575	1,565	3,220	1,625	3,505
	4	2,035	3,735	2,085	4,130	2,160	4,655	2,280	4,910	2,365	5,095
	6	3,050	6,570	3,125	6,730	3,245	6,985	3,420	7,365	3,550	7,645
5/8	3-1/8	2,070	2,640	2,120	2,915	2,200	3,420	2,320	4,275	2,410	5,015
	5	3,310	5,825	3,390	6,440	3,520	7,550	3,710	7,995	3,855	8,300
	7-1/2	4,970	10,605	5,085	10,955	5,280	11,375	5,565	11,990	5,780	12,445
3/4	3-1/2	2,705	3,380	2,760	3,735	2,860	4,380	3,000	5,480	3,105	6,420
	6	4,770	8,225	4,885	9,095	5,070	10,660	5,345	11,510	5,550	11,950
	9	7,155	14,980	7,325	15,780	7,605	16,380	8,015	17,265	8,320	17,925
7/8	3-1/2	2,755	3,525	2,820	3,910	2,920	4,580	3,070	5,730	3,180	6,715
	7	6,490	10,360	6,645	11,455	6,900	13,425	7,275	15,665	7,550	16,265
	10-1/2	9,735	18,865	9,970	20,865	10,350	22,295	10,910	23,500	11,325	24,395
1	4	3,640	4,320	3,720	4,775	3,855	5,595	4,045	7,000	4,190	8,205
	8	8,480	12,145	8,680	13,430	9,015	15,740	9,500	19,690	9,865	21,240
	12	12,720	22,120	13,025	24,460	13,520	28,670	14,250	30,695	14,795	31,865
1-1/4	5	5,870	5,495	6,000	6,080	6,210	7,125	6,525	8,915	6,755	10,445
	10	13,400	15,450	13,720	17,085	14,245	20,025	15,015	25,050	15,590	29,360
	15	20,100	28,135	20,585	31,115	21,370	36,470	22,525	45,620	23,385	50,365

☐ - Concrete Breakout Strength ☐ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in cracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14 Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14 Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Ch.17 and ICC-ES AC308 and ESR-2582.
9. Long term concrete temperatures are roughly constant over significant periods of time. Short-term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Tension and Shear Design Strength for Reinforcing Bar Installed in Cracked Concrete (Bond or Concrete Strength) Drilled with a Hammer-Drill and Carbide Bit in a Dry Hole Condition 122°F (50°C) Maximum Long-Term Service Temperature; 176°F (80°C) Maximum Short-Term Service Temperature[1,2,3,4,5,6,7,8,9]

STRENGTH DESIGN SD TABLES

Nominal Rod/Rebar Size (#)	Embed. Depth h_{ef} (in.)	Minimum Concrete Compressive Strength									
		f'c = 2,500 (psi)		f'c = 3,000 (psi)		f'c = 4,000 (psi)		f'c = 6,000 (psi)		f'c = 8,000 (psi)	
		ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)	ϕN_{cb} or ϕN_a Tension (lbs.)	ϕV_{cb} or ϕV_{cp} Shear (lbs.)
#4	2-3/4	930	1,985	950	2,050	990	2,130	1,040	2,245	1,080	2,330
	4	1,350	2,910	1,385	2,980	1,435	3,095	1,515	3,265	1,575	3,385
	6	2,030	4,365	2,075	4,470	2,155	4,645	2,270	4,895	2,360	5,080
#5	3-1/8	1,375	2,640	1,410	2,915	1,465	3,150	1,540	3,320	1,600	3,445
	5	2,200	4,740	2,255	4,855	2,340	5,040	2,465	5,315	2,560	5,515
	7-1/2	3,300	7,115	3,380	7,285	3,510	7,560	3,700	7,970	3,840	8,275
#6	3-1/2	1,795	3,380	1,835	3,735	1,900	4,095	1,995	4,300	2,065	4,450
	6	3,170	6,830	3,245	6,990	3,370	7,260	3,550	7,650	3,690	7,945
	9	4,755	10,240	4,870	10,490	5,055	10,890	5,330	11,475	5,530	11,915
#7	3-1/2	1,830	3,525	1,875	3,910	1,945	4,185	2,040	4,395	2,110	4,550
	7	4,315	9,295	4,420	9,515	4,585	9,880	4,835	10,415	5,020	10,810
	10-1/2	6,475	13,940	6,630	14,275	6,880	14,820	7,255	15,620	7,530	16,215
#8	4	2,420	4,320	2,475	4,775	2,560	5,515	2,690	5,795	2,785	6,000
	8	5,635	12,140	5,770	12,430	5,990	12,905	6,315	13,600	6,555	14,120
	12	8,455	18,210	8,655	18,645	8,985	19,355	9,475	20,405	9,835	21,180
#9	5	3,090	4,890	3,155	5,410	3,270	6,340	3,435	7,395	3,555	7,655
	10	7,215	13,800	7,390	15,260	7,670	16,520	8,085	17,415	8,395	18,080
	15	10,825	23,315	11,085	23,870	11,505	24,780	12,130	26,125	12,590	27,120
#10	5	3,855	5,490	3,940	6,070	4,080	7,115	4,280	8,900	4,435	9,550
	10	8,910	15,475	9,120	17,115	9,470	20,060	9,980	21,500	10,365	22,320
	15	13,365	28,190	13,685	29,470	14,205	30,595	14,975	32,250	15,545	33,480

■ - Concrete Breakout Strength ■ - Bond Strength/Pryout Strength

1. Tabular values are provided for illustration and are applicable for single anchors installed in cracked normal-weight concrete with minimum slab thickness, $h_a = h_{min}$, and with the following conditions:
   - c_{a1} is greater than or equal to the critical edge distance, c_{ac}
   - c_{a2} is greater than or equal to 1.5 times c_{a1}.
2. Calculations were performed according to ACI 318-14 Ch.17 and ICC-ES AC308. The load level corresponding to the failure mode listed [Concrete breakout strength, bond strength/pryout strength] must be checked against the tabulated steel strength of the corresponding threaded rod or rebar size and type, the lowest load level controls.
3. Strength reduction factors (ϕ) for concrete breakout strength are based on ACI 318-14 Section 5.3 for load combinations. Condition B was assumed.
4. Strength reduction factors (ϕ) for bond strength are determined from reliability testing and qualification in accordance with ICC-ES AC308 and are tabulated in this product information and in ESR-2582.
5. Tabular values are permitted for static loads only, seismic loading is not considered with these tables. Periodic special inspection must be performed where required by code, see ESR-2582 for applicable information.
6. For anchors subjected to tension resulting from sustained loading a supplemental check must be performed according to ACI 318-14 17.3.1.2.
7. For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-14 Ch.17.
8. Interpolation is not permitted to be used with the tabular values. For intermediate base material compressive strengths, please see ACI 318-14 Ch.17, ICC-ES AC308 and information included in this product supplement. For other design conditions including seismic considerations please see ACI 318-14 Ch.17 and ICC-ES AC308 and ESR-2582.
9. Long term concrete temperatures are roughly constant over significant periods of time. Short-term elevated temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

STRENGTH DESIGN SD TABLES

Tension Design of Steel Elements (Steel Strength)[1,2]

Nominal Rod/Rebar Size (in. or No.)	ASTM A36 and ASTM F1554 Grade 36	ASTM F1554 Grade 55	ASTM A193 Grade B7 and ASTM F1554 Grade 105	ASTM F593 CW Stainless (Types 304 and 316)	ASTM A193 Grade B8/ B8M, Class 1 Stainless (Types 304 and 316)	ASTM A193 Grade B8/ B8M2, Class 2B Stainless (Types 304 and 316)	ASTM A615 Grade 75 Rebar	ASTM A615 Grade 60 Rebar	ASTM A706 Grade 60 Rebar	ASTM A615 Grade 40 Rebar
	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)
3/8 or #3	3,370	4,360	7,265	5,040	3,315	5,525	7,150	7,425	6,600	4,950
1/2 or #4	6,175	7,980	13,300	9,225	6,070	10,110	13,000	13,500	12,000	9,000
5/8 or #5	9,835	12,715	21,190	14,690	9,660	16,105	20,150	20,925	18,600	13,950
3/4 or #6	14,550	18,815	31,360	18,480	14,300	23,830	28,600	29,700	26,400	19,800
7/8 or #7	20,085	25,970	43,285	25,510	19,735	32,895	39,000	40,500	36,000	-
1 or #8	26,350	34,070	56,785	33,465	25,895	43,160	51,350	53,325	47,400	-
#9	-	-	-	-	-	-	65,000	67,500	60,000	-
1-1/4 or #10	42,160	54,510	90,850	53,540	41,430	69,050	82,550	85,725	76,200	-

■ - Steel Strength

1. Steel tensile design strength according to ACI 318-14 Ch.17 Appendix D, $\phi N_{sa} = \phi \bullet A_{se,N} \bullet f_{uta}$
2. The tabulated steel design strength in tension must be checked against the bond strength/concrete capacity design strength to determine the controlling failure mode, the lowest load level controls.

Shear Design of Steel Elements (Steel Strength)[1,2]

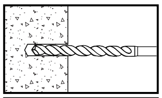
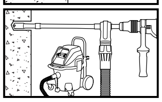
Nominal Rod/Rebar Size (in. or No.)	ASTM A36 and ASTM F1554 Grade 36	ASTM F1554 Grade 55	ASTM A193 Grade B7 and ASTM F1554 Grade 105	ASTM F593 CW Stainless (Types 304 and 316)	ASTM A193 Grade B8/ B8M, Class 1 Stainless (Types 304 and 316)	ASTM A193 Grade B8/ B8M2, Class 2B Stainless (Types 304 and 316)	ASTM A615 Grade 75 Rebar	ASTM A615 Grade 60 Rebar	ASTM A706 Grade 60 Rebar	ASTM A615 Grade 40 Rebar
	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)	ϕN_{sa} Tension (lbs.)
3/8 or #3	1,755	2,265	3,775	2,790	1,725	2,870	3,960	3,860	3,430	2,575
1/2 or #4	3,210	4,150	6,915	5,110	3,155	5,255	7,200	7,020	6,240	4,680
5/8 or #5	5,115	6,610	11,020	8,135	5,025	8,375	11,160	10,880	9,670	7,255
3/4 or #6	7,565	9,785	16,305	10,235	7,435	12,390	15,840	15,445	13,730	10,295
7/8 or #7	10,445	13,505	22,505	14,130	10,265	17,105	21,600	21,060	18,720	-
1 or #8	13,700	17,715	29,525	18,535	13,465	22,445	28,440	27,730	24,650	-
#9	-	-	-	-	-	-	36,000	35,100	31,200	-
1-1/4 or #10	21,920	28,345	47,240	29,655	21,545	35,905	45,720	44,575	39,625	-

■ - Steel Strength

1. Steel shear design strength according to ACI 318-14 Ch.17 Appendix D, $\phi V_{sa} = \phi \bullet 0.60 \bullet A_{se,V} \bullet f_{uta}$
2. The tabulated steel design strength in shear must be checked against the bond strength/concrete capacity design strength to determine the controlling failure mode, the lowest load level controls.

INSTALLATION INSTRUCTIONS (SOLID BASE MATERIALS)

DRILLING

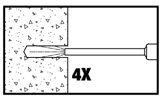
1- Drill a hole into the base material with rotary hammer drill (i.e. percussion drill) and a carbide drill bit to the size and embedment required by the selected steel hardware element (reference installation specifications for threaded rod and reinforcing bar). The tolerances of the carbide drill bits, including hollow bits, must meet ANSI Standard B212.15.

- Precaution: Use suitable eye and skin protection. Avoid inhalation of dust during drilling and/or removal (see dust extraction equipment by DEWALT to minimize dust emission).
- Note! In case of standing water in the drilled hole (flooded hole condition), all the water has to be removed from the hole (e.g. vacuum, compressed air, etc.) prior to cleaning.

Drilling in dry base material is recommended when using hollow drill bits (vacuum must be on).

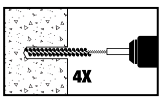
GO TO STEP 3 FOR HOLES DRILLED WITH DUSTX+™ DRILLING AND CLEANING SYSTEM; OTHERWISE GO TO STEP 2A.

HOLE CLEANING DRY (BLOW 4X, BRUSH 4X, BLOW 4X)



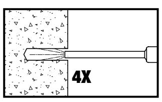
2a- Starting from the bottom or back of the anchor hole, blow the hole clean using a compressed air nozzle (min. 90 psi) or a hand pump (supplied by DEWALT) a minimum of four times (4x).

- Use a compressed air nozzle (min. 90 psi) or a hand pump (min. volume 25 fl. oz.) for anchor rod 3/8" to 3/4" diameter or reinforcing bar (rebar) sizes #3 to #6.
- Use a compressed air nozzle (min. 90 psi) for anchor rod 7/8" to 1-1/4" diameter and rebar sizes #7 to #10. A hand pump shall not be used with these anchor sizes.



2b- Determine wire brush diameter (see installation specifications) and attach the brush with adaptor to a rotary drill tool or battery screwgun. Brush the hole with the selected wire brush a minimum of four times (4x). A brush extension (supplied by DEWALT, Cat. #08282) should be used for holes drilled deeper than the listed brush length.

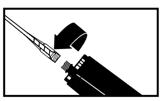
- The wire brush diameter should be checked periodically during use. The brush should resist insertion into the drilled hole and come into contact with the sides of the drilled hole. If not the brush is too small and must be replaced.



2c- Finally, blow the hole clean again a minimum of four times (4x).

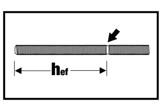
- Use a compressed air nozzle (min. 90 psi) or a hand pump (min. volume 25 fl. oz.) for anchor rod 3/8" to 3/4" diameter or reinforcing bar (rebar) sizes #3 to #6.
- Use a compressed air nozzle (min. 90 psi) for anchor rod 7/8" to 1-1/4" diameter and rebar sizes #7 to #10. A hand pump shall not be used with these anchor sizes.
- When finished the hole should be clean and free of dust, debris, ice, grease, oil or other foreign material.

PREPARING



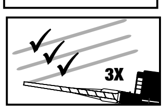
3- Check adhesive expiration date on cartridge label. Do not use expired product. Review Safety Data Sheet (SDS) before use. Cartridge temperature must be between 23°F - 95°F (-5°C - 35°C) when in use unless otherwise noted. Review gel (working) and cure time table. Consideration should be given to the reduced gel time of the adhesive in warm temperatures.

- Attach a supplied mixing nozzle to the cartridge. Unless otherwise noted do not modify the mixer in any way and make sure the mixing element is inside the nozzle. Load the cartridge into the correct dispensing tool.
- Note: Always use a new mixing nozzle with new cartridges of adhesive and also for all work interruptions exceeding the published working time of the adhesive.



4- Prior to inserting the anchor rod or rebar into the filled bore hole, the position of the embedment depth has to be marked on the anchor

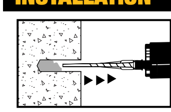
- Verify anchor element is straight and free of surface damage.



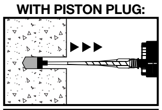
5- Adhesive must be properly mixed to achieve published properties. For new cartridges and nozzles, prior to dispensing adhesive into the drilled hole, separately dispense at least three full strokes of adhesive through the mixing nozzle until the adhesive is a consistent **GRAY** color. Do not attach a used nozzle when changing to a new cartridge.

- Review and note the published working and cure times (see gel time and curing time table) prior to injection of the mixed adhesive into the cleaned anchor hole.

INSTALLATION

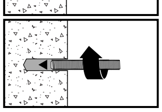


WITH PISTON PLUG:

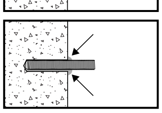


6- Fill the cleaned hole approximately to two-thirds full with mixed adhesive starting from the bottom or back of the anchor hole. Slowly withdraw the mixing nozzle as the hole fills to avoid creating air pockets or voids. If the bottom or back of the anchor hole is not reached with the mixing nozzle only, a plastic extension tube must be used with the mixing nozzle (see reference tables for installation).

- Piston plugs (see installation specifications) must be used with and attached to the mixing nozzle and extension tube for horizontal and overhead installations in concrete with anchor rod 5/8" to 1-1/4" diameter and rebar size #5 to #10. Insert piston plug to the back of the drilled hole and inject as described in the method above. During installation the piston plug will be naturally extruded from the drilled hole by the adhesive pressure.
- **Attention!** Do not install anchors overhead without proper training and installation hardware provided by DEWALT. Contact DEWALT for details prior to use.

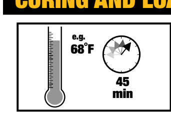


7- The anchor should be free of dirt, grease, oil or other foreign material. Push clean threaded rod or reinforcing bar into the anchor hole while turning slightly to ensure positive distribution of the adhesive until the embedment depth is reached. Observe the gel (working) time.



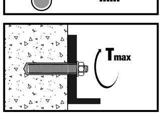
8- Be sure that the anchor is fully seated at the bottom of the hole to the specified embedment. Adhesive must completely fill the annular gap between the anchor and the base material. Protect the anchor element threads from fouling with adhesive. For all installations the rebar must be restrained from movement throughout the specified curing period (as necessary) where necessary through the use of temporary wedges, external supports, or other methods. Minor adjustments to the position of the anchor element may be performed during the gel (working) time only.

CURING AND LOADING



9- Allow the adhesive anchor to cure to the specified full curing time prior to applying any load (reference gel time and curing time table).

- Do not disturb, torque or load the anchor until it is fully cured.

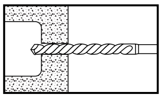


10- After full curing of the adhesive anchor, a fixture can be installed to the anchor and tightened up to the maximum torque (reference gel time and curing table) by using a calibrated torque wrench.

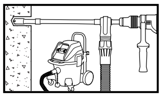
- Take care not to exceed the maximum torque for the selected anchor.

INSTALLATION INSTRUCTIONS (UNREINFORCED MASONRY [URM WALLS] AND HOLLOW BASE MATERIALS)

DRILLING



1- Drill a hole into the base material with a rotary drill tool to the size and embedment required by the selected screen tube size and steel anchor element (see installation specifications for threaded rod in hollow base material with screen tube supplied by DEWALT). Holes drilled in hollow concrete masonry units may be drilled with a rotary hammer-drill. The tolerances of the drill bit, including hollow drill bits, must meet the requirements of ANSI B212.15.

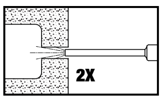


- Precaution: Wear suitable eye and skin protection. Avoid inhalation of dust during drilling and/or removal (see dust extraction by DEWALT to minimize dust emission).

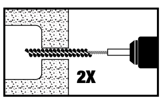
Drilling in dry base materials is recommended when using hollow drill bits (vacuum must be on).

GO TO STEP 3 FOR HOLES DRILLED WITH DUSTX+™ DRILLING AND CLEANING SYSTEM; OTHERWISE GO TO STEP 2A.

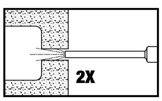
HOLE CLEANING (BLOW 2X, BRUSH 2X, BLOW 2X)



2- Starting from the bottom or back of the anchor hole, blow the hole clean with a hand pump (min. volume 25 fl.oz. supplied by DEWALT) or compressed air nozzle a minimum of two times (2x).

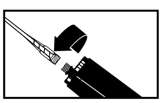


- Determine the wire brush diameter (see installation specifications) and attach the brush with adaptor to a rotary drill tool or battery screw gun. Brush the hole with the selected wire brush a minimum of two times (2x). A brush extension (supplied by DEWALT, Cat #08282) should be used for holes drilled deeper than the listed brush length.
- The wire brush should be checked periodically during use. The brush should resist insertion into the drilled hole and come into contact with the sides of the drilled hole. If not the brush is too small and must be replaced.



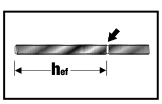
- Finally, blow the hole clean again a minimum of two times (2x)
- When finished the hole should be clean and free of dust, debris, ice, grease, oil or other foreign material.

PREPARING

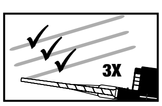


3- Check adhesive expiration date on cartridge label. Do not use expired product. Review Safety Data Sheet (SDS) before use. Cartridge temperature must be between 23°F - 95°F (-5°C - 35°C) when in use unless otherwise noted. Review gel (working) time and curing time table. Consideration should be given to the reduced gel (working) time of the adhesive in warm temperatures.

- Attach a supplied mixing nozzle to the cartridge. Unless otherwise noted do not modify the mixer in any way and make sure the mixing element is inside the nozzle. Load the cartridge into the correct dispensing tool.
- Note: Always use a new mixing nozzle with new cartridges of adhesive and also for all work interruptions exceeding the published working time of the adhesive.



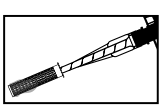
4- Prior to inserting the anchor into the filled screen tube, the position of the embedment depth has to be marked on the anchor. Verify anchor element is straight and free of surface damage.



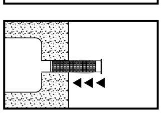
5- Adhesive must be properly mixed to achieve published properties. Prior to dispensing adhesive into the drilled hole, separately dispense at least three full strokes of adhesive through the mixing nozzle until the adhesive is a consistent **GRAY** color. Do not attach a used nozzle when changing to a new cartridge.

- Review and note the published working and cure times (see gel time and curing time table) prior to injection of the mixed adhesive into the screen tube.

INSTALLATION

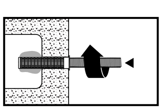


6- Select a screen tube of suitable length (supplied by DEWALT). Fill the screen tube full with adhesive starting from the bottom or back of the tube. Slowly withdraw the mixing nozzle as the screen fills to avoid creating air pockets or voids. A plastic extension tube must be used with the mixing nozzle if the back of the screen tube cannot be reached (see reference tables for installation).



7- Insert the screen tube filled with adhesive into the cleaned anchor hole. Inject additional adhesive into the screen tube as necessary to ensure the screen tube is completely filled.

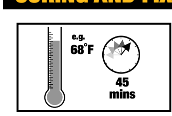
- Note: Overfilling the screen tube is acceptable but not required.



8- Prior to inserting the anchor rod into the screen tube inspect it to ensure that it is free of dirt, grease, oil or other foreign material.

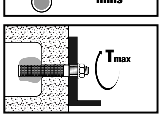
- Push the threaded rod into the screen tube while turning slightly to ensure positive distribution of the adhesive until back of the tube is reached.
- Note: In cases where the drilled hole size is larger than specified due to rotary drilling (e.g. an elongated opening), the annular space between the screen tube and the hole at the base material surface must be filled with adhesive.

CURING AND FIXTURE



9- Allow the adhesive anchor to cure to the specified full curing time prior to applying any load.

- Do not disturb, torque or load the anchor until it is fully cured (see gel time and curing time table).



10- After full curing of the adhesive anchor, a fixture can be installed to the anchor and tightened up to the maximum torque (see installation specifications for threaded rod in hollow base material) by using a calibrated torque wrench.

- Take care not to exceed the maximum torque for the selected anchor.

REFERENCE TABLES FOR INSTALLATION

Gel (working) Time and Curing Table

Temperature of Base Material		Gel (working) Time	Full Curing Time
°F	°C		
14	-10	90 minutes	24 hours
23	-5	90 minutes	14 hours
32	0	45 minutes	7 hours
41	5	25 minutes	2 hours
50	10	15 minutes	90 minutes
68	20	6 minutes	45 minutes
86	30	4 minutes	25 minutes
95	35	2 minutes	20 minutes
104	40	1.5 minutes	15 minutes

The gel (working) times listed for 32°F to 95°F are also applicable for the temperature of the adhesive and use of mixing nozzes during installation.
For installations in base material temperatures between 14°F and 23°F (-10ºC and -5ºC) the cartridge temperature must be conditioned to between 68°F and 95°F (20°C - 35°C).

Hole Cleaning Equipment Selection Table for AC100+ Gold[1,2,3,4]

Threaded Rod Diameter (inch)	Rebar Size (no.)	Drill Bit Diameter (inch)	Overall Brush Length, L (inches)	Steel Wire Brush (Cat. #)	Blowout Tool	Number of Cleaning Actions
Solid Base Material						
3/8	#3	7/16	6-3/4	08284	Hand-pump (Cat #08280) or compressed air nozzle	4x blowing 4x brushing 4x blowing
1/2	-	9/16	6-3/4	08285		
-	#4	5/8	6-3/4	08275		
5/8	#5	11/16	7-7/8	08286		
5/8	#5	3/4	7-7/8	08278		
3/4	#6	7/8	7-7/8	08287		
7/8	#7	1	11-7/8	08288	Compressed air nozzle only	
1	#8	1-1/8	11-7/8	08289		
1-1/4	#9	1-3/8	11-7/8	08290		
-	#10	1-1/2	11-7/8	08291		
Hollow Base Material (with Screen Tube)						
1/4	-	3/8 (SS screen)	6-3/4	08284	Hand pump (Cat# 08280) or compressed air nozzle	2x blowing 2x brushing 2x blowing
1/4	-	1/2 (plastic screen)	6-3/4	08284		
3/8	-	1/2 (SS screen)	6-3/4	08284		
3/8	-	9/16 (plastic screen)	6-3/4	08285		
1/2	#3	5/8 (SS screen)	6-3/4	08275		
1/2	-	3/4 (plastic screen)	7-7/8	08278		
5/8	#4	3/4 (SS screen)	7-7/8	08278		
5/8	-	7/8 (plastic screen)	7-7/8	08287		
3/4	#5	7/8 (SS screen)	7-7/8	08287		
15/16	#6	1 (SS screen)	11-7/8	08288		

1. An SDS-plus adaptor (Cat. #08283) or Jacobs chuck style adaptor (Cat. #08296) is required to attach a steel wire brush to the drill tool.
2. A brush extension (Cat. #08282) must be used for holes drilled deeper than the listed brush length.
3. See ordering information for selection of piston plugs (where applicable).
4. For any case, it must be possible for the steel anchor element to be inserted into the cleaned hole without resistance.

See separate installation details in this section for 'Retrofit Bolt Anchors in URM Walls': threaded Rods and Reinforcing Bars or Rebar Dowel with AC100+ Gold Installed in Unreinforced Masonry Walls with Stainless Steel Screen Tubes.

ORDERING INFORMATION

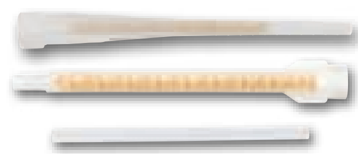
AC100+ Gold Cartridges

Cat No.	Description	Std. Pack	Std. Carton	Pallet
8478SD	AC100+ Gold 9.5 fl. oz. Quik-Shot	12	36	648
8486SD	AC100+ Gold 11.5 fl. oz. dual cartridge	-	12	540
8490SD	AC100+ Gold 28 fl. oz. dual cartridge	-	8	240

One AC100+ Gold mixing nozzle is packaged with each cartridge.
AC100+ Gold mixing nozzles must be used to ensure complete and proper mixing of the adhesive.

Cartridge System Mixing Nozzles

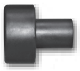
Cat No.	Description	Std. Pack	Std. Carton
08293	Extra mixing nozzle for AC100+ Gold (10 oz. & 12 oz.)	2	24
08294	Extra mixing nozzle (with an 8" extension) for AC100+ Gold 28 oz.	2	24
08281	Mixing nozzle extension, 8" minimum	2	24
08297	Mixing nozzle extension, 20" long		



Dispensing Tools for Injection Adhesive

Cat No.	Description	Std. Pack	Std. Ctn.
08437	Manual caulking gun for Quik-Shot	1	12
08479	High performance caulking gun for Quik-Shot	1	6
08485	AC100+ Gold high performance manual tool	1	20
08494	AC100+ Gold 28 oz. standard all metal manual tool	1	-
08496	AC100+ Gold 28 oz. pneumatic tool	1	-
DCE595D1	AC100+ Gold 28 oz. 20v battery powered dispensing tool	1	-

Piston Plugs for Adhesive Anchors



Cat. No.	Description	Drill Bit Dia.	Std. Pack	Std. Ctn.
08304	5/8" Plug	5/8"	10	100
08258	11/16" Plug	11/16"	10	100
08259	3/4" Plug	3/4"	10	100
08300	7/8" Plug	7/8"	10	100
08301	1" Plug	1"	10	100
08303	1-1/8" Plug	1-1/8"	10	100
08305	1-3/8" Plug	1-3/8"	10	100
08307	1-1/4" Plug	1-1/4"	10	100
08309	1-1/2" Plug	1-1/2"	10	100

A plastic extension tube (Cat# 08281 or 08297) or equivalent approved by DEWALT must be used with piston plugs.

Hole Cleaning Tools and Accessories

Cat No.	Description	Std. Pack
08284	Wire brush for 7/16" or 1/2" ANSI hole, 6-3/4" length	1
08285	Wire brush for 9/16" ANSI hole, 6-3/4" length	1
08275	Wire brush for 5/8" ANSI hole, 6-3/4" length	1
08286	Wire brush for 11/16" ANSI hole, 7-7/8" length	1
08278	Wire brush for 3/4" ANSI hole, 7-7/8" length	1
08287	Wire brush for 7/8" ANSI hole, 7-7/8" length	1
08288	Wire brush for 1" ANSI hole, 11-7/8" length	1
08289	Wire brush for 1-1/8" ANSI hole, 11-7/8" length	1
08276	Wire brush for 1-1/4" ANSI hole, 11-7/8" length	1
08290	Wire brush for 1-3/8" ANSI hole, 11-7/8" length	1
08291	Wire brush for 1-1/2" ANSI hole, 11-7/8" length	1
08283	SDS-plus adapter for steel brushes	1
08296	Standard drill adapter for steel brushes (e.g. Jacobs Chuck)	1
08282	Steel brush extension, 12" length	1
08280	Hand pump/dust blower (25 ft. oz. clylinder volume)	1
08292	Air compressor nozzle with extension, 18" length	1
52073	Adhesive cleaning kit, includes 4 wire brushes (08284, 08285, 08286, 08287), steel brush extension (08282), SDS-plus adapter (08283), standard drill adapter (08296), hand pump/dust blower (08280), gloves and safety glasses	1

Stainless Steel Screen Tubes

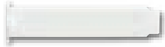
Cat. No.	Description	Drill Bit Dia.	Std. Pack
07960	1/4" x 2" Screen Tube	3/8"	25
07862	1/4" x 6" Screen Tube*	3/8"	25
07864	1/4" x 8"Screen Tube*	3/8"	25
07856	3/8" x 2" Screen Tube	1/2"	25
07961	3/8" x 3-1/2" Screen Tube	1/2"	25
07962	3/8" x 6" Screen Tube*	1/2"	25
07963	3/8" x 8" Screen Tube*	1/2"	25
07964	3/8" x 10" Screen Tube*	1/2"	25
07857	1/2" x 2" Screen Tube	5/8"	25
07965	1/2" x 3-1/2" Screen Tube	5/8"	25
07966	1/2" x 6" Screen Tube*	5/8"	25
07967	1/2" x 8" Screen Tube*	5/8"	25
07968	1/2" x 10" Screen Tube*	5/8"	25
07858	5/8" x 2" Screen Tube	3/4"	25
07969	5/8" x 4-1/2" Screen Tube	3/4"	20
07970	5/8" x 6" Screen Tube	3/4"	20
07971	5/8" x 8" Screen Tube*	3/4"	20
07972	5/8" x 10" Screen Tube*	3/4"	20
07859	3/4" x 2" Screen Tube	7/8"	25
07855	15/16" x 2" Screen Tube	1"	25
07865	15/16" x 8" Screen Tube	1"	10
07867	15/16" x 13" Screen Tube	1"	10

Screen tubes are made from a 300 series stainless steel. The nominal diameter of the screen listed indicates the matching rod diameter (except for the 15/16" screen tubes, see next note).

15/16" screen tubes can accept 3/4" diameter threaded rods and #4, #5 or #6 reinforcing bars for unreinforced masonry wall applications (URM). See separate installation details and information in this section for 'Retrofit Bolt Anchors in URM Walls'.

*Includes extension tubing.

Plastic Screen Tubes



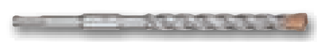
Cat. No.	Description	Drill Bit Dia.	Std. Pack
08310	3/8" x 3-1/2" Plastic Screen	9/16"	25
08311	3/8" x 6" Plastic Screen	9/16"	25
08313	3/8" x 8" Plastic Screen	9/16"	25
08315	1/2" x 3-1/2" Plastic Screen	3/4"	25
08317	1/2" x 6" Plastic Screen	3/4"	25
08321	5/8" x 6" Plastic Screen	7/8"	25
08323	3/4" x 6" Plastic Screen	1"	10

SDS Max 4-Cutter Carbide Drill Bits

Cat. No.	Diameter	Usable Length	Overall Length
DW5806	5/8"	8"	13-1/2"
DW5809	5/8"	16"	21-1/2"
DW5807	5/8"	31"	36"
DW5808	11/16"	16"	21-1/2"
DW5810	3/4"	8"	13-1/2"
DW5812	3/4"	16"	21-1/2"
DW5813	3/4"	31"	36"
DW5814	13/16"	16"	21-1/2"
DW5815	7/8"	8"	13-1/2"
DW5816	7/8"	16"	21-1/2"
DW5851	7/8"	31"	36"
DW5817	27/32"	16"	21-1/2"
DW5818	1"	8"	13-1/2"
DW5819	1"	16"	22-1/2"
DW5852	1"	24"	29"
DW5820	1"	31"	36"
DW5821	1-1/8"	10"	15"
DW5822	1-1/8"	18"	22-1/2"
DW5853	1-1/8"	24"	29"
DW5854	1-1/8"	31"	36"
DW5824	1-1/4"	10"	15"
DW5825	1-1/4"	18"	22-1/2"

SDS+ Full Head Carbide Drill Bits

Cat. No.	Diameter	Usable Length	Overall Length
DW5502	3/16"	2"	4-1/2"
DW5503	3/16"	4"	6-1/2"
DW5504	3/16"	5"	8-1/2"
DW5506	3/16"	10"	12"
DW5512	7/32"	8"	10"
DW5517	1/4"	4"	6"
DW5518	1/4"	6"	8-1/2"
DW55200	1/4"	10"	12"
DW5521	1/4"	12"	14"
DW5524	5/16"	4"	6"
DW5526	5916"	10"	12"
DW5527	3/8"	4"	6-1/2"
DW5529	3/8"	8"	10"
DW55300	3/8"	10"	12"
DW5531	3/8"	16"	18"
DW5537	1/2"	4"	6"
DW5538	1/2"	8"	10-1/2"
DW5539	1/2"	10"	12"
DW5540	1/2"	16"	18"

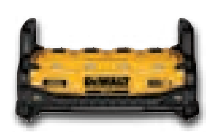


SDS+ 4-Cutter Carbide Drill Bits

Cat. No.	Diameter	Usable Length	Overall Length
DW5471	5/8"	8"	10"
DW5472	5/8"	16"	18"
DW5474	3/4"	8"	10"
DW5475	3/4"	16"	18"
DW5477	7/8"	8"	10"
DW5478	7/8"	16"	18"
DW5479	1"	8"	10"
DW5480	1"	16"	18"
DW5481	1-1/8"	8"	10"
DW5482	1-1/8"	6"	18"

Dust Extraction

Cat. No.	Description
DWV012	10 Gallon Wet/Dry Hepa/Rrp Dust Extractor DWV9402 Fleece bag (5 pack) for DEWALT dust extractors DWV9316 Replacement Anti-Static Hose DWV9320 Replacement HEPA Filter Set (Type 1)
DWH050K	Dust Extraction with two interchangeable drilling heads
DCB1800B	1800 Watt Portable Power Station & Parallel Battery Charger Bare Unit



Hollow Drill Bits

	Cat. No.	Diameter	Overall Length	Usable Length	Recommended Hammer
SDS+	DWA54012	1/2"	14-1/2"	9-3/4"	DCH133 / DCH273 / DCH293
	DWA54916	9/16"	14-1/2"	9-3/4"	DCH133 / DCH273 / DCH293
	DWA54058	5/8"	14-1/2"	9-3/4"	DCH133 / DCH273 / DCH293
	DWA54034	3/4"	14-1/2"	9-3/4"	DCH133 / DCH273 / DCH293
SDS Max	DWA58058	5/8"	23-5/8"	15-3/4"	DCH481 / D25603K
	DWA58958	5/8"	47-1/4"	39-3/8"	DCH481 / D25603K
	DWA58116	11/16"	24-3/4"	15-3/4"	DCH481 / D25603K
	DWA58034	3/4"	23-5/8"	15-3/4"	DCH481 / D25603K
	DWA58934	3/4"	47-1/4"	39-3/8"	DCH481 / D25603K
	DWA58078	7/8"	23-5/8"	15-3/4"	DCH481 / D25603K
	DWA58001	1"	23-5/8"	15-3/4"	DCH481 / D25603K
	DWA58901	1"	47-1/4"	39-3/8"	DCH481 / D25603K
	DWA58118	1-1/8"	23-5/8"	15-3/4"	DCH481 / D25603K
	DWA58918	1-1/8"	47-1/4"	39-3/8"	DCH481 / D25603K
	DWA58114	1-1/4"	47-1/4"	39-3/8"	DCH481 / D25603K
	DWA58138	1-3/8"	47-1/4"	39-3/8"	DCH481 / D25603K
	DWA58112	1-1/2"	47-1/4"	39-3/8"	DCH481 / D25603K

DUSTX+
ANCHOR INSTALLATION SYSTEM

SUBMITTAL TRANSMITTAL

Date: 8/7/23

To: Fuss & O'Neill, Inc.
317 Iron Horse Way, Suite 204
Providence, RI 02908
ATTN: Andrea Judge, P.E.

From: SumCo Eco-Contracting, LLC
2 Centennial Dr, Ste 4D
Peabody, MA 01960
Attn: Ron Ferraiuolo, Team Lead

PROJECT: Easton Pond North Dam
Spillway Repairs
100 Bliss Mine Road
Newport, RI

SUBMITTAL NO.: 03 30 01
(List Section No., Article No., Paragraph)

(Revision: 1st, 2nd, 3rd, etc.)

Transmitted herewith for review and comment are the following:

Copies	Dwg.	No.	Description
1			Bonding Agent, Sika, SikaTop, Armatec 110 EpoCem
1			Repair Mortar, Sika, SikaRepair 224
1			Crack Repair, Sika, Sikadur Crack Fix
1			Waterstop, Sika, Hydrotite expandable waterstop

MANUFACTURER / SUPPLIER

Name: Sika Corporation

Address: 201 Polito Ave, Lyndhurst, NJ

Telephone No.: 201-933-8800 Facsimile No.: 201-804-1076

For Additional Information, Contact: Ben Bade, Whitecap Rep 508-272-5759

E-mail Address: benjamin.bade@whitecap.com

I hereby certify that I have carefully examined the enclosed submittal and have determined and verified all field measurements, construction criteria, materials, catalog numbers and similar data, coordinated the submittal with other submissions and the work of other trades and contractors, and that to the best of my knowledge and belief, the enclosed submittal is in full compliance with the Contract Documents, except for the following deviations:

BY:
Signature:

Title: Team Lead

PRODUCT DATA SHEET

SikaTop® Armatec®-110 EpoCem®

BONDING PRIMER AND REINFORCEMENT CORROSION PROTECTION

DESCRIPTION

SikaTop® Armatec®-110 EpoCem® is a cementitious, epoxy resin compensated 3-component coating material with corrosion inhibitor, used as bonding primer and reinforcement corrosion protection.
SikaTop® Armatec®-110 EpoCem® meets the requirement of EN 1504-7.
Suitable for use in hot and tropical climatic conditions.

USES

- Suitable for control of anodic areas (Principle 11, method 11.1 EN 1504-9)
- Suitable in concrete repair as corrosion protection for reinforcement.
- Suitable as a bonding primer on concrete and mortar

CHARACTERISTICS / ADVANTAGES

- Contains EpoCem® technology - improved bonding agent
- Extended open times for repair mortars
- Compatible with most Sika® repair mortars
- Excellent adhesion to concrete and steel
- Contains corrosion inhibitor
- Certified for application under dynamic load conditions
- Good resistance to water and chloride penetration
- High shear strength
- Long pot life
- Easy to mix
- Can be brushed on or applied using spray gun

APPROVALS / CERTIFICATES

- Testing according to BS 1881, Part 207 : 1992, Cl. 8

PRODUCT INFORMATION

Composition	Portland cement, epoxy resin, selected aggregates and additives
Packaging	20 kg: A (1.14 kg) + B (2.86 kg) + C (16 kg)
Appearance / Colour	Mixed components grey Component A: white liquid Component B: colourless liquid Component C: grey powder
Shelf life	12 months
Storage conditions	Store properly in undamaged original sealed packaging, in dry cool conditions between +5 °C and +25 °C.

TECHNICAL INFORMATION

Tensile Adhesion Strength	≥ 1.5 N/mm² (MPa) (after 28 d)	(EN 1542)
Shear Adhesion Strength	Pass	(EN 15184)
Coefficient of Thermal Expansion	~18 x 10^{-6} 1/K	(EN 1770)

Diffusion Resistance to Water Vapour	μH_2O ~500	
Diffusion resistance to carbon dioxide	μCO_2 ~7300	
Corrosion Test	Pass	(EN 15183)

SYSTEMS

System Structure

SikaTop® Armatec®-110 EpoCem® is part of the Sika® repair system complying with the relevant part of European Standard EN 1504 and comprising of:

Bonding Primer / Reinforcement Corrosion Protection	SikaTop® Armatec®-110 EpoCem®
Light Weight Repair Mortar	Sika MonoTop®, SikaRep® series
Structural Repair Mortar	Sika MonoTop®, SikaRep®, Sikadur® series
Pore Sealer and Levelling Mortar	Sika MonoTop®, SikaRep®, Sikagard® series

APPLICATION INFORMATION

Fresh Mortar Density	A + B + C mixed: ~2.0 kg/l (23 °C)
Consumption	As reinforcement corrosion protection coating: ~2 kg per m^2 and application layer (~1 mm thick) In total min. 2 layer thickness (~2 mm thick) As a bonding primer, substrate: > 1.5 to 2.0 kg per m^2 /mm dependent on substrate conditions
Ambient Air Temperature	+5 °C min. / +35 °C max.
Substrate Temperature	+5 °C min. / +35 °C max.
Pot Life	~3 h (at +20 °C)
Waiting Time / Overcoating	Maximum waiting time before application of repair mortar Sika repair mortars and non-fast setting concrete can be applied on SikaTop® Armatec®-110 EpoCem® within a maximum time of:

+5 °C	+10 °C	+20 °C	+30 °C
6 h	5 h	2 h	1 h

APPLICATION INSTRUCTIONS

SUBSTRATE QUALITY / PRE-TREATMENT

Concrete:
The concrete shall be free from dust, loose material, surface contamination and materials which reduce bond or prevent suction or wetting by repair materials. Delaminated, weak, damaged and deteriorated concrete and where necessary sound concrete shall be removed by suitable means.
The surface shall be thoroughly pre-wetted and not be allowed to dry before application of the concrete repair mortar. The surface shall achieve a dark matt appearance without glistening and surface pores and pits shall not contain water.

Steel reinforcement:
Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed and reinforcement cleaned to SA 2 in accordance with ISO 8501-1. Surfaces shall be prepared using abrasive blast cleaning techniques or high pressure water-blasting.

MIXING

SikaTop® Armatec®-110 EpoCem® can be mixed with a low speed (< 250 rpm) electric drill mixer.
Shake components A and B thoroughly before opening. Pour liquid components A and B into a suitable mixing vessel and mix for 30 seconds. While still mixing components A and B slowly add powder component C. Mix the three components together for minimum 3 minutes, minimising addition of air. Leave to stand for 5 to10 minutes until mixed coating material exhibits a brush-able, weakly dripping consistency. DO NOT ADD WATER!

APPLICATION

As reinforcement corrosion protection:
Apply first layer approximately 1 millimeter thick, using medium hard brush or spray gun to the cleaned reinforcement. Apply 2nd layer when the first coat is hard to the fingernail (approximately 2 to 3 hours at +20 °C). Apply subsequent repair mortars wet on dry

(so not to wipe off the protection layer).

As a bonding primer:
Apply using medium hard brush or spray gun to prepared substrate. To achieve good bond, SikaTop® Armatec®-110 EpoCem® must be applied well into the substrate, filling all pores (minimum layer thickness 0.5 millimeter). Apply subsequent repair mortars wet on wet freshly applied SikaTop® Armatec®-110 EpoCem® must be protected against contamination and rain until application of the repair mortar.

Application under dynamic loading:
SikaTop® Armatec®-110 EpoCem® has been tested with the following Sika repair mortars and is certified for dynamic loading applications. Refer to separate sheets for further information.

Dry Spray Process:

Corrosion Protection:	SikaTop® Armatec®-110 EpoCem®
Repair and overlay:	SikaCem®-Gunite 133

Wet Spray Process:

Corrosion Protection and/or Bonding Primer:	SikaTop® Armatec®-110 EpoCem®
Repair and Overlay:	Sika MonoTop®-412 series

CURING TREATMENT

Protect the fresh mortar from rain while the material has not yet set.

CLEANING OF EQUIPMENT

Clean all tools and application equipment with water immediately after use. Hardened material can only be mechanically removed.

IMPORTANT CONSIDERATIONS

- Refer to the Method Statement for Concrete Repair using Sika MonoTop® system for more information regarding substrate preparation or refer to the recommendations provided in EN 1504-10.
- Avoid application in direct sun and/or strong wind and/or rain.
- Do not add water.
- Apply only to sound, prepared substrates.
- NOT recommended for use with fast setting concrete or mortars example Sika MonoTop®-211 FG / RFG.

BASIS OF PRODUCT DATA

All technical data stated in this Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

LOCAL RESTRICTIONS

Note that as a result of specific local regulations the declared data and recommended uses for this product may vary from country to country. Consult the local Product Data Sheet for the exact product data and uses.

ECOLOGY, HEALTH AND SAFETY

For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Safety Data Sheet (SDS) containing physical, ecological, toxicological and other safety-related data.

LEGAL NOTES

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product’s suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

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BUILDING TRUST

PRODUCT DATA SHEET

SikaRepair®-224

One component, cementitious, structural repair mortar applied by hand trowel or spray methods

PRODUCT DESCRIPTION

SikaRepair®-224 is a one component, cementitious, ready-to-use, silica fume enhanced, fiber reinforced, high strength, shrinkage compensated repair mortar. SikaRepair®-224 is formulated for hand trowel or low-pressure spray application methods. Designed for horizontal (i.e. flat), vertical and overhead installations.

USES

- On grade, above grade, and below grade concrete
- On horizontal surfaces (e.g. for spall repairs on flat work, or as an overlay)
- On vertical and/or overhead surface repairs when either hand trowel or spray applied
- As a structural repair material for water and wastewater treatment plants, manholes, parking facilities, industrial plants, walkways, bridges, tunnels, dams, abutments, balconies, etc.
- As a filler for voids and cavities
- For the repair of substrates such as concrete, mortars and masonry
- SikaRepair®-224 may only be used by experienced professionals.

CHARACTERISTICS / ADVANTAGES

- Ready-to-use, one component material
- Easy to mix, just add clean water
- Can be installed by hand trowel
- Sprayable system
- Superior workability
- Superior abrasion resistance
- Sulfate resistant
- Great adhesion
- Increased resistance to deicing salts
- High early strengths
- Good freeze/thaw resistance
- Silica fume enhanced
- Fiber reinforced

APPROVALS / STANDARDS

NSF/ANSI 61 compliant for potable water contact after cure (reference: UL FDNP.MH17464).

PRODUCT INFORMATION

Packaging	50 lb (22.7 kg) bags; 48 bags per pallet
Appearance / Color	Powder / Dark Gray
Shelf Life	12 months from date of production if stored properly in original, unopened and undamaged, sealed packaging
Storage Conditions	Store in cool, dry, well ventilated conditions, out of direct sunlight at 40 - 95 °F (4 - 35 °C). Protect powder from moisture. If permitted to become damp, discard material.

TECHNICAL INFORMATION

Compressive Strength	1 day	4,500 psi (31.0 MPa)	(ASTM C109) 73 °F (23 °C), 50% R.H.
	7 days	8,000 psi (55.2 MPa)	
	28 days	10,000 psi (69.0 MPa)	
Flexural Strength	28 days	1,100 psi (7.6 MPa)	(ASTM C293) 73 °F (23 °C), 50% R.H.
Splitting tensile strength	28 days	735 psi (5.1 MPa)	(ASTM C496) 73 °F (23 °C), 50% R.H.
Tensile Adhesion Strength	28 days	> 350 psi (2.4 MPa) substrate failure (typical)	(ASTM C1583) 73 °F (23 °C), 50% R.H.
Slant Shear Strength	28 days	> 2,500 psi (17.2 MPa)	(ASTM C882 modified*) 73 °F (23 °C), 50% R.H.

* Mortar scrubbed into mechanically prepared, saturated surface dry (SSD) substrate.

Sulfate Resistance	1 year	< 0.06% length change	(ASTM C1012) 73 °F (23 °C), 50% R.H.
Rapid Chloride Permeability	28 days	< 500 Coulombs	(ASTM C1202 / AASHTO T 277) 73 °F (23 °C), 50% R.H.

APPLICATION INFORMATION

Mixing Ratio

6 to 7 pints (2.8 - 3.3 liters) of liquid (e.g. clean water or SikaLatex® R admixture) per 50 lb. (22.7 kg) bag of SikaRepair®-224

Fresh mortar density

125 lb/ft³ (2.0 kg/m³) (ASTM C138) 73 °F (23 °C), 50% R.H.

Coverage

0.40 ft³ (0.01 m³) per Neat mix
0.58 ft³ (0.02 m³) per Extended mix, containing 25 lbs (11.4 kg) of 3/8 inch (10 mm) coarse aggregate
(Yield figures do not include allowance for surface profile and porosity, or material waste.)

Layer Thickness

	Minimum	Maximum per lift *
Vertical	3/8 inch (10 mm)	2 inches (51 mm)
Overhead	3/8 inch (10 mm)	1-1/2 inches (38 mm)
Extended	1 inch (25 mm)	4 inches (102 mm)

* If repair requires multiple lifts, each lift should be applied as soon as the previous lift develops enough initial strength to support it.

Product Temperature

Condition 65 - 75 °F (18 - 24 °C) before use.

Ambient Air Temperature

40 °F (4 °C) minimum / 95 °F (35° C) maximum

Substrate Temperature

40 °F (4 °C) minimum / 95 °F (35° C) maximum

Set Time	>4 hours (Initial)	(ASTM C266) 73 °F (23 °C), 50% R.H.
Final set time	>5 hours	(ASTM C266) 73 °F (23 °C), 50% R.H.
Application Time	Approximately 30 minutes Temperature will affect the Application Time: Above 73 °F (23 °C) will reduce the Application Time and slump Below 73 °F (23 °C) will extend the Application Time and slump	
Waiting / Recoat Times	Refer to Sika Tech Brief # 18-01 for minimum cure times prior to overcoating.	

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

LIMITATIONS

- Avoid application in direct sunlight, during precipitation and/or when strong winds prevail.
- Use only clean, potable water when polymer modification is not required.
- Do not use solvent-based curing compounds.
- Using SikaLatex® R or similar admixture products in lieu of some or all of the recommended amount of water per bag may result in a change in consistency. Mock-up trial mixes for suitability are strongly recommended.
- Do not use any other types of admixtures (e.g. plasticizers, accelerators, retarders, etc.) or add cement to SikaRepair®-224.
- SikaRepair®-224 does not form a vapor barrier when cured.
- As with all cement-based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur®-32 Hi-Mod.
- Elevated temperatures will decrease working time and slump.
- Rate of strength gain will be reduced at colder temperatures. On site testing is recommended.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Concrete

- Surfaces must be clean and sound. Remove all deteriorated concrete, dirt, dust, oil, grease, contaminants and other bond-inhibiting materials from the area to be repaired.
- Be sure the repair area is not less than 3/8 inch (10 mm) in depth for placement of a Neat mix. Be sure the repair area is not less than 1 inch (25 mm) in depth for placement of an Extended mix.
- Preparation work should be done by high pressure water blasting, scabbling, or other appropriate mechanical means. Obtain an exposed aggregate surface with a minimum surface profile of ±1/8 inch (3 mm) [per ICRI CSP-6 to -7] on clean, sound concrete.
- To ensure optimum repair results, the effectiveness of decontamination and substrate preparation can be

assessed by a Pull-Off test (i.e. a Tensile Adhesion test per ASTM C1583).
- Saw cutting the perimeter edges of the repair area is recommended, preferably cut at a dovetail angle.
- Substrate should be saturated surface dry (SSD) with clean water prior to application. No standing water should remain during application.

Steel
- Steel surfaces should be thoroughly prepared by mechanical cleaning (e.g. blast cleaning, wire brushing) to remove all traces of rust and scale (reference: SSPC-SP5/NACE 1). Where corrosion has occurred, the steel should be high-pressure washed with clean water after mechanical cleaning.

CORROSION PROTECTION
- For the corrosion protection of reinforcing steel, use Sika® Armatec® corrosion protection products. Please consult the applicable current Product Data Sheets for additional information.

PRIMING
- When required (e.g. for hand trowel application) prime the prepared substrates with a brush or spray applied coat of Sika® Armatec® or Sikadur® bonding agent products. Please consult the applicable current Product Data Sheets for additional information. Steel substrates typically require the installation of a bonding agent.
- Alternately in lieu of a bonding agent, a scrub coat of a Neat mix of SikaRepair®-224 can be applied to the substrate prior to trowel application. While the scrub coat is still wet, place the remaining thickness of SikaRepair®-224 needed to complete the repair.
- Properly prepared, saturated surface dry (SSD) concrete substrates scheduled to receive a wet spray application of SikaRepair®-224 typically do not require priming.
- If a bonding agent or a scrub coat of SikaRepair®-224 are not possible, other suitable means should be employed such as vibration of the material, pumping under pressure or spraying to ensure good intimate contact with the prepared substrate is achieved.

MIXING
- **With water**: Pour 6 pints (2.8 liters) of clean water into a suitably sized mixing container.
- Add the entire bag's contents of SikaRepair®-224 to the container while continuously mixing with a low-speed rotary drill (400 - 600 rpm) and paddle or a concrete mixer.
- Add up to an additional maximum 1 pint (0.5 liter) of water, if needed, for the desired consistency.
- Do not overwater. Excess water may cause segregation.
- Mix to a uniform consistency, maximum 3 minutes. Thorough mixing and proper proportioning are necessary.
- **With SikaLatex® R**: Pour 6 pints (2.8 liters) of SikaLatex® R admixture into the mixing container. Slowly add SikaRepair®-224, mix and adjust as above.
- **With diluted SikaLatex® R**: SikaLatex® R admixture may be diluted up to 5:1 (i.e. clean water : SikaLatex® R) by volume for projects requiring minimal polymer modification. Pour 6 pints (2.8 liters) of the mixture into the mixing container. Slowly add SikaRepair®-224, mix and adjust as above.

EXTENSION WITH AGGREGATES

- For horizontal applications greater than 1" (25 mm) in depth, extend with 3/8" (10 mm) coarse aggregate. If placement is vertical or overhead, support the material with forms as required.
- Pour 6 pints (2.8 liters) of clean water, SikaLatex® R admixture or diluted SikaLatex® R mixture into a suitably sized mixing container or a concrete mixer.
- Add entire bag's contents of SikaRepair®-224 while mixing continuously, then introduce 3/8" (10 mm) coarse aggregate.
- Mix to uniform consistency, maximum 3 minutes. Thorough mixing and proper proportioning of all components is necessary.
- Add up to an additional maximum 1 pint (0.5 liter) of liquid, if needed, for the desired consistency. Do not exceed 7 pints (3.3 liters) of liquid.
- Ideally, the aggregate must be nonreactive (reference: ASTM C1260, ASTM C227 and ASTM C289), clean, well graded, saturated surface dry (SSD), have low absorption, high density, and comply with ASTM C33, size number 8 per Table 2.
- Variances in aggregate quality may result in different strengths and cured performance.
- The typical addition rate is 25 lbs (11.4 kg) of aggregate per mix. This is approximately 2 gallons (7.6 liters) of aggregate by loose volume.

APPLICATION

- Apply SikaRepair®-224 mortar by hand trowel or spray methods for the repair of horizontal, vertical or overhead concrete surfaces.
- At the time of application, the substrate surfaces must be saturated surface dry (SSD) but hold no standing water.

Hand Trowel

- A neat mix of SikaRepair®-224 mortar must initially be scrubbed into the mechanically prepared, SSD substrate. Alternately an appropriate Sika bonding agent product can be used. Be sure to fill all pores and voids.
- Apply SikaRepair®-224 mortar by hand trowel while the scrub coat or bonding agent is still wet and uncured.
- Force material against edges of repair, working toward center. After filling repair area, screed off excess SikaRepair®-224 mortar.
- Allow SikaRepair®-224 to set to the desired stiffness. Finish with broom or with a burlap drag for a rough finish. Finish with a wood float for a granular finish. Finish with a steel trowel or a magnesium float for a smooth finish.
- To assist in the finishing process, use SikaFilm® finishing aid. Please consult the current product data sheet for additional information.
- Mixing, placing and finishing typically should not exceed 2 to 3 hours maximum.

Wet Process Spraying

- Conventional wet process shotcrete spray equipment should be used. Consult directly with the equipment manufacturer for their recommendations.
- Set up wet process spray equipment. Add liquid [i.e. 6 - 7 pints (2.8 - 3.3 liters) per bag] directly into the mixer.
- Start the mixer in motion and add SikaRepair®-224 powder while continuing to mix.
- When spraying, shoot perpendicular (i.e. at a 90° angle) to vertical or overhead surfaces. This minimizes rebound, creates the smoothest pattern (i.e. reduces "bumps") and properly encases rebar. Consult ACI 506R, the "Guide to Shotcrete" for additional information.
- The velocity of the material is sufficient, if at a distance of 18 to 24 inches (46 to 61 cm), the material pattern flattens out on contact with the surface and rebars are encased.
- After applying the material, allow it to stiffen before removing bumpy areas with a trowel.
- Before applying the next layer, allow the material to develop initial strengths. This may take anywhere from 2 - 4 hours, depending on mix consistency, ambient and substrate temperatures, wind conditions and humidity.
- Begin and finish multiple lift repairs on the same day. To assist in the finishing process of the final lift, use SikaFilm® finishing aid. Please consult the current product data sheet for additional information.
- Refer to ACI 305R the "Guide to Hot Weather

Concreting" or ACI 306R the "Guide to Cold Weather Concreting" when there is a need to place this product while either hot or cold temperatures prevail. Thinner placements will be more sensitive to actual temperature conditions.

Natural Gun Finish

- If a gun-finish is too rough, special finishes may be applied.
- After sufficient stiffening and initial strength gain, excess material should be sliced off with a sharp-edged cutting screed. The surface may then be finished to the actual application's requirements:
  - Broom for a rough texture
  - Wood float for a granular texture
  - Steel trowel for a smooth finish
- To assist in the finishing process, use SikaFilm® finishing aid. Please consult the current Product Data Sheet for additional information.

CURING TREATMENT

- As per ACI recommendations for Portland-cement concrete, curing is required.
- Moist curing should commence immediately after finishing.
- Moist cure with wet burlap and/or polyethylene, a fine mist of water or a water-based,* compatible curing compound meeting ASTM C309.
- Curing compounds may adversely affect the adhesion of following layers of mortar, leveling mortars or protective coatings.
- Protect newly applied material from direct sunlight, wind, rain and frost.
- To prevent from freezing, cover with insulating material (e.g. curing blanket).

* Pretesting of curing compound for compatibility is recommended.

OTHER RESTRICTIONS

See Legal Disclaimer.

LEGAL DISCLAIMER

• KEEP CONTAINER TIGHTLY CLOSED
• KEEP OUT OF REACH OF CHILDREN
• NOT FOR INTERNAL CONSUMPTION
• FOR INDUSTRIAL USE ONLY
• FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates (“SIKA”), the user must always read and follow the warnings and instructions on the product’s most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA’s Technical Service

Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

Sale of SIKA products are subject to the Terms and Conditions of Sale which are available at https://usa.sika.com/en/group/SikaCorp/termsandconditions.html or by calling 1-800-933-7452.

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Phone: 52 442 2385800
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BUILDING TRUST

PRODUCT DATA SHEET

Sikadur® Crack Fix

Low-viscosity, high-strength epoxy sealing system

PRODUCT DESCRIPTION

Sikadur® Crack Fix is a 2-component, 100 % solids, moisture-tolerant, low-viscosity, high-strength, multi-purpose, epoxy resin adhesive. It conforms to the current ASTM C-881 and AASHTO M-235 specifications.

USES

- Gravity-feed of cracks in horizontal concrete and masonry
- Low pressure injection of cracks in structural concrete, masonry, wood, etc.

CHARACTERISTICS / ADVANTAGES

- Formulation identical to popular, high strength adhesive Sikadur® 35, Hi-Mod LV
- Five times stronger than concrete
- Convenient easy to use, single tube cartridge - fits standard caulk guns
- Deep, penetrating and tenacious bonding of cracks in structural concrete
- No mess - self-mixing

PRODUCT INFORMATION

Packaging	Carton contains 12 single caulk tube-style cartridges Each cartridge packaged with 2 static mixers and 2 flow restrictors
Color	Clear, amber
Shelf Life	24 months in original, unopened containers
Storage Conditions	Store dry at 40 to 95 °F (4 to 35 °C). Condition material to 60 to 75°F (15 to 24 °C) before using.
Viscosity	Approximately 375 cps.

TECHNICAL INFORMATION

Compressive Strength

	40 °F (4 °C)	73 °F (23 °C)	90 °F (32 °C)
4 hour	-	-	-
8 hour	-	180 psi (1.2 MPa)	3,200 psi (22.1 MPa)
16 hour	-	4,500 psi (31.1 MPa)	6,300 psi (43.5 MPa)
1 day	-	6,000 psi (41.4 MPa)	9,100 psi (62.8 MPa)
3 day	4,000 psi (27.6 MPa)	9,000 psi (62.1 MPa)	10,500 psi (72.5 MPa)
7 day	6,800 psi (46.9 MPa)	11,000 psi (75.9 MPa)	10,500 psi (72.5 MPa)
14 day	10,300 psi (71.1 MPa)	12,000 psi (82.8 MPa)	10,500 psi (72.5 MPa)
28 day	12,400 psi (85.6 MPa)	13,000 psi (89.7 MPa)	10,500 psi (72.5 MPa)

Material cured and tested at the temperatures indicated and 50 % R.H.

(ASTM D-695)
Tested at:
73 °F (23 °C)
50 % R.H.

Modulus of Elasticity in Compression

2.9 X 10^5 psi (2,000 MPa) (7 days at 73 °F (23 °C) and 50 % R.H.)

(ASTM D-695)
Tested at:
73 °F (23 °C)
50 % R.H.

Flexural Strength

11,000 psi (75.9 MPa) 7 days

(ASTM D-790)
Tested at:
73 °F (23 °C)
50 % R.H.

Modulus of Elasticity in Flexure

3.1 x 10^5 psi (2,139 MPa) 7 days

(ASTM D-790)
Tested at:
73 °F (23 °C)
50 % R.H.

Tensile Strength

7,000 psi (48.3 MPa) 7 days

(ASTM D-638)
Tested at:
73 °F (23 °C)
50 % R.H.

Hardened concrete to hardened concreted

2 day (moist cure)	Bond Strength 1,300 psi (9.0 MPa)
14 day (moist cure)	Bond Strength 1,350 psi (9.3 MPa)

(ASTM C-882)
Tested at:
73 °F (23 °C)
50 % R.H.

Elongation at Break

6.9 % (7 days)

(ASTM D-638)
Tested at:
73 °F (23 °C)
50 % R.H.

Shear Strength

4,800 psi (33.1 MPa) 14 days

(ASTM D-732)
Tested at:
73 °F (23 °C)
50 % R.H.

Heat Deflection Temperature

121 °F (49 °C) (7 day [fiber stress loading = 264 psi (1.8 MPa)]

(ASTM D-648)
Tested at:
73 °F (23 °C)
50 % R.H.

Water Absorption	0.27 % (7 days)	(ASTM D-570) Tested at: 73 °F (23 °C) 50 % R.H.

APPLICATION INFORMATION

Mixing Ratio	Component A : Component B = 2:1 by volume
Coverage	1 cartridge yields approximately 10.7–11.0 cu. in. (175–180 ml) of usable epoxy resin.
Pot Life	Approximately 25 minutes (60 gram mass)
Cure Time	see below

Cure Time

Tack Free Time	40 °F (4 °C)*	73 °F (23 °C)*	90 °F (32 °C)*
(3–5 mils)	14–16 hours	3–3.5 hours	1.5–2 hours

* Material cured and tested at the temperatures indicated.

APPLICATION INSTRUCTIONS

SUBSTRATE PREPARATION

Surface must be clean, dry and sound. Remove dust from crack by brushing or by blowing clean with oil free compressed air.

MIXING

Cartridge Set-Up: Remove twist-cap and port plug from top of cartridge. Press one of enclosed “flow restrictors” into opening. Insert one of the enclosed static mixers through twist-cap and attach to threading. Insert Sikadur® Crack Fix cartridge into good quality caulking gun. Point upward during initial squeeze of gun’s trigger to purge any entrapped air. As mixed resin approaches end of mixer, discard rest of initial squeeze and portion of next squeeze to ensure uniform blend of adhesive components.

APPLICATION METHOD / TOOLS

To gravity feed cracks - Blow vee-notched crack clean with oil-free compressed air. Dispense Sikadur® Crack Fix slowly into vee-notched crack. Continue placement until completely filled. Seal underside of slab prior to filling if cracks reflect through.
To inject cracks - Set appropriate injection ports. Seal ports and surface of crack with Sikadur® 31, Hi-Mod Gel or Sikadur® 33. When the epoxy adhesive seal has cured, inject Sikadur® Crack Fix with slow steady pressure. Consult Technical Service for additional information.

LIMITATIONS

- Minimum substrate and ambient temperature 40 °F (4 °C). Maximum substrate temperature is 95 °F (35 °C).
- Minimum age of concrete must be 21–28 days, depending on curing and drying conditions.
- Do not apply over wet, glistening surface.
- Not for injection of cracks subjected to osmotic or hydrostatic pressure during application.
- Do not inject cracks greater than 1/4 in. (6.3 mm) Consult Technical Service at 1-800-933-SIKA.
- Not an aesthetic product. Color may alter due to variations in lighting and/or UV exposure.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

OTHER RESTRICTIONS

See Legal Disclaimer.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

LEGAL DISCLAIMER

- **KEEP CONTAINER TIGHTLY CLOSED**
- **KEEP OUT OF REACH OF CHILDREN**
- **NOT FOR INTERNAL CONSUMPTION**
- **FOR INDUSTRIAL USE ONLY**
- **FOR PROFESSIONAL USE ONLY**

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA's Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

Sale of SIKA products are subject to the Terms and Conditions of Sale which are available at https://usa.sika.com/en/group/SikaCorp/termsandconditions.html or by calling 1-800-933-7452.

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WATERSTOPS FOR JOINTS IN CONCRETE

Sika® Hydrotite®

HYDROPHILIC WATERSTOP

Sika® Hydrotite®

The Benchmark for Expandable Waterstops

Sika® Hydrotite® IS A STATE-OF-THE-ART HYDROPHILIC WATERSTOP with unmatched durability and watersealing capacity. Comprised of NON-BENTONITE, modified chloroprene rubber, Sika® Hydrotite® expands up to EIGHT TIMES its original volume when exposed to water. This expansion creates an effective compression seal within joints of limited movement. Recognized worldwide, Sika® Hydrotite® has a proven track record as a high quality and cost effective solution to your water containment needs.

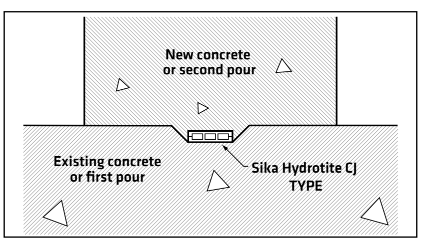
EXCEPTIONAL QUALITIES TO ENSURE UNPARALLELED PERFORMANCE:

- Comprised of NON-BENTONITE, modified chloroprene rubber
- Available as a co-extruded profile to provide directional expansion (also available as a single extrusion)
- Special expansion delay coating to allow concrete cure prior to expansion
- Reliable and durable (lifespan up to 100 years)
- CJ-0725-3K-ADH and CJ-1020-2K-ADH offered with an adhesive back
- Simple, low cost installation
- Available in a multitude of sizes and shapes for numerous applications
- Appropriate for retro-fit as well as new construction
- Can withstand high hydrostatic pressures (150' head for most profiles)
- International acceptance
- CJ-1020-2K and CJ-0725-3K profiles NSF/ANSI 61 Approved*

Certified to NSF/ANSI 61

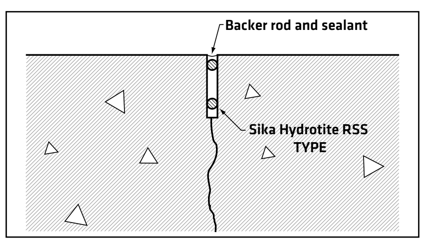
TYPICAL STRUCTURES UTILIZING Sika® Hydrotite®:

- Water and waste water treatment facilities
- Primary structures
- Tunnels and culverts
- Dams, locks, canals, water reservoirs and aqueducts
- Pipe penetrations
- Swimming pools
- Storage tanks
- Retaining walls
- Foundations
- Slabs on grade



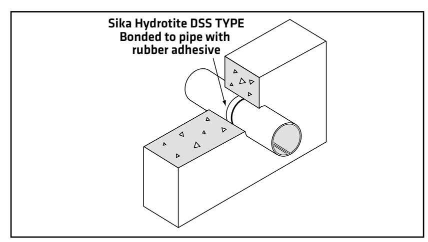
Sika® Hydrotite® CJ: A SUPERIOR WATERSTOP FOR CONCRETE JOINT GAPS

As this innovative product absorbs water and expands, it conforms to gap variations along the joint. This action ensures complete sealing even under extraordinary hydrostatic pressures. Due to its slim profile, it won't project like conventional waterstops and trap air or become displaced by the second pour. The result is optimum concrete placement. Sika® Hydrotite® CJ, is treated with a special expansion-delay coating to prevent it from reacting to the fresh, moist concrete and expanding before curing takes place.



Sika® Hydrotite® RSS: SEAL FOR SAWED CONTROL JOINTS/JOINT REPAIRS

Sika® Hydrotite® RSS profiles create effective seals in sawed control joints and in the repair of failed joints. Sika® Hydrotite® eliminates hydrostatic pressure below the sealant, thus extending the sealant's life. Select solid profiles with slightly larger diameters than the joint width for joints of consistent widths. Hollow profiles should be selected based on the maximum width of joints with varying widths. Compress both profiles slightly on initial insertion.



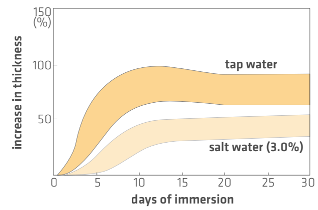
Sika® Hydrotite® DSS: PIPE PENETRATIONS/PIPE THIMBLES

The DSS, DS, SS, RS, and CJ profiles can be bonded to various piping materials, including concrete, steel and plastic. Bond Sika® Hydrotite® DSS to the pipe prior to concrete placement. Installation in existing walls requires an oversize cutout be made and Sika® Hydrotite® installed both on the pipe and the outside diameter of the cutout. Fill the annulus with a non-shrink grout. Embedded pipe thimbles can also be sealed with Sika® Hydrotite® DSS.

PRODUCT SELECTION

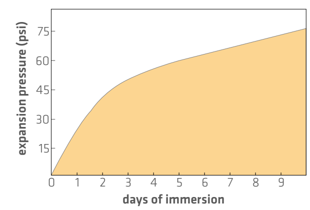
PROPERTIES OF Sika® Hydrotite®						
Property	Test Method	Unit	Hydrophilic Rubber		Chloroprene Rubber	
			Minimum	Typical	Minimum	Typical
Tensile Strength	ASTM D412	lb/in²	350	366	1300	1570
Elongation	ASTM D412	%	600	670	400	450
Hardness	ASTM D2240	Shore A	52+/-5	54	50+/-5	50
Tear Resistance	ASTM D624	lb/in	50	60.3	100	123
Specific Gravity	ASTM D792		1.32+/-0.1	1.32	1.38+/-0.1	1.38

SWELLING CHARACTERISTICS

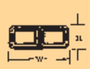


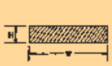
Swelling characteristics of Sika® Hydrotite® depend on the water quality as typical examples shown below.

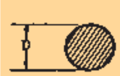
EXPANSION CHARACTERISTICS

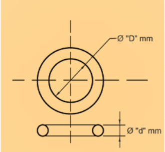


Typical expansion pressures of Sika® Hydrotite® are shown below.

SHAPE AND APPLICATION				
ITEM		NOMINAL SIZE mm (inches)		PACKAGING UNIT METERS/REEL x REELS (FT/BOX)
FOR CONSTRUCTION JOINTS				
	CJ-0725-3K CJ-0725-3K-ADH	H 7 (.28)	W 25 (.98)	10 m x 4 (131)
		Same as above with pressure sensitive adhesive backing		
	CJ-1020-2K CJ-1020-2K-ADH	10 (.39)	20 (.79)	10 m x 5 (164)
		Same as above with pressure sensitive adhesive backing		
	CJ-1030-4M	10 (.39)	30 (1.18)	10 m x 4 (131)
	CJ-3030-M	30 (1.18)	30 (1.18)	10 m x 1 (33)

ITEM		NOMINAL SIZE mm (inches)			PACKAGING UNIT METERS/REEL x REELS (FT/BOX)
FOR PIPE PENETRATIONS, CONCRETE CURBS, TUNNEL LINING SEGMENTS					
	SS-0215 SS-0220 SS-0320	H 2 (.08) 2 (.08) 3 (.12)	W 15 (.59) 20 (.79) 20 (.79)	- - -	h 25 m x 4 (328) 25 m x 4 (328) 25 m x 4 (328)
	RS-0520-3.5l RS-0723-3.5l	5 (.20) 7 (.28)	20 (.79) 23 (.91)	3.5 (.14) 3.5 (.14)	20 m x 5 (328) 15 m x 4 (196)
	DS-0420-2.5l DS-0520-3.5l DS-0615-4.5l	4 (.16) 5 (.20) 6 (.24)	20 (.79) 20 (.79) 15 (.59)	2.5 (.10) 3.5 (.14) 4.5 (.18)	20 m x 5 (328) 20 m x 5 (328) 15 m x 5 (245)
	DSS-0320 DSS-0420	3 (.12) 4 (.16)	20 (.79) 20 (.79)	- -	25 m x 4 (328) 20 m x 5 (328)

ITEM		NOMINAL SIZE mm (inches)		PACKAGING UNIT METERS/REEL x REELS (FT/BOX)
FOR JOINT REPAIR, CONTROL JOINTS, SPECIAL APPLICATIONS				
	RSS-1610 D RSS-2014 D	D 16 (.63) 20 (.79)	B 10 (.39) 14 (.55)	h 10 m x 2 (65) 10 m x 2 (65)
	RSS-0806 C RSS-1007 C RSS-1209 C RSS-1410 C	8 (.31) 10 (.39) 12 (.47) 14 (.55)	6 (.24) 7 (.28) 9 (.35) 10 (.39)	20 m x 5 (320) 20 m x 3 (196) 20 m x 2 (131) 15 m x 2 (98)
	RSS-040 P RSS-050 P RSS-060 P RSS-080 P RSS-120 P RSS-140 P RSS-160 P	4 (.16) 5 (.20) 6 (.24) 8 (.31) 12 (.47) 14 (.55) 16 (.63)	- - - - - - -	20 m x 10 (656) 20 m x 10 (656) 20 m x 10 (656) 20 m x 5 (320) 20 m x 2 (131) 15 m x 2 (98) 10 m x 2 (65)

HYDROPHILIC RINGS			
	Profile	Ø "d"	Ø "D"
	GH0611	6	11
	GH0614	6	14
	GH0621	6	21
	GH0624	6	24

Sika® Hydrotite® rings are available in a range of internal diameters to meet varying needs. Sika® Hydrotite® hydrophilic rings may be installed wherever a penetration through concrete needs to be sealed. Conduits, pipes, embedded sleeves, concrete wall ties, etc., can all be sealed utilizing Sika® Hydrotite® rings.

SIKA FULL RANGE SOLUTIONS FOR CONSTRUCTION:

WATERPROOFING

CONCRETE

REFURBISHMENT

SEALING AND BONDING

FLOORING

ROOFING

All sales of Sika products are subject to Sika's current Terms and Conditions of Sale available at usa.sika.com or by calling 800-325-9504. Prior to each use of any Sika product, the user must always read and follow the warnings and instructions on the product's most current Product Data Sheet, product label and Safety Data Sheet, which are available at usa.sika.com or by calling Technical Services at 800-325-9504. Nothing contained in any Sika materials relieves the user of the obligation to read and follow the warnings and instructions for each Sika product as set forth in the current Product Data Sheet, product label and Safety Data Sheet prior to product use.
The sale of all Sika products are subject to the following Limited Warranty:

LIMITED MATERIAL WARRANTY

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within shelf life. User determines suitability of product for intended use and assumes all risks. Buyer's sole remedy shall be limited to the purchase price or replacement of product exclusive of labor or cost of labor.

NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.

Contact Sika:
Phone: 1-800-325-9504
Website: usa.sika.com

Our most current General Sales Conditions shall apply.
Please consult the Product Data Sheets prior to any use and processing.

**Contact Sika® Greenstreak® at 800-325-9504 for information on trade names and manufacturing location of profiles with NSF/ANSI 61 certification.*

Certified to NSF/ANSI 61

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3400 Tree Court Industrial Blvd.
St. Louis, MO 63122
Phone: 800-325-9504
Fax: 800-551-5145

Sika Corporation
201 Polito Avenue
Lyndhurst, NJ 07071
Phone: 201-933-8800
Fax: 201-933-6225

BUILDING TRUST

Section C

Field Orders

Field Order No. 1 - Revised

Date of Issuance: August 31, 2023 Revised: September 22, 2023 Effective Date: September 1, 2023

Project: Easton Pond North Dam Spillway Repairs	Owner: City of Newport	Owner's Contract No.: 23-004
Contract: Easton Pond North Dam Spillway Repairs		Date of Contract: November 1, 2022
Contractor: SumCo Eco-Contracting, Inc.		Engineer's Project No.: 20060901.D64

Attention:
You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04A ., for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: Section 03 30 00 – Cast in Place Concrete, Section 31 00 00 – Earthwork (Specification Section(s)) SK-02 - Sand Filter (attached) (Drawing(s) / Detail(s))

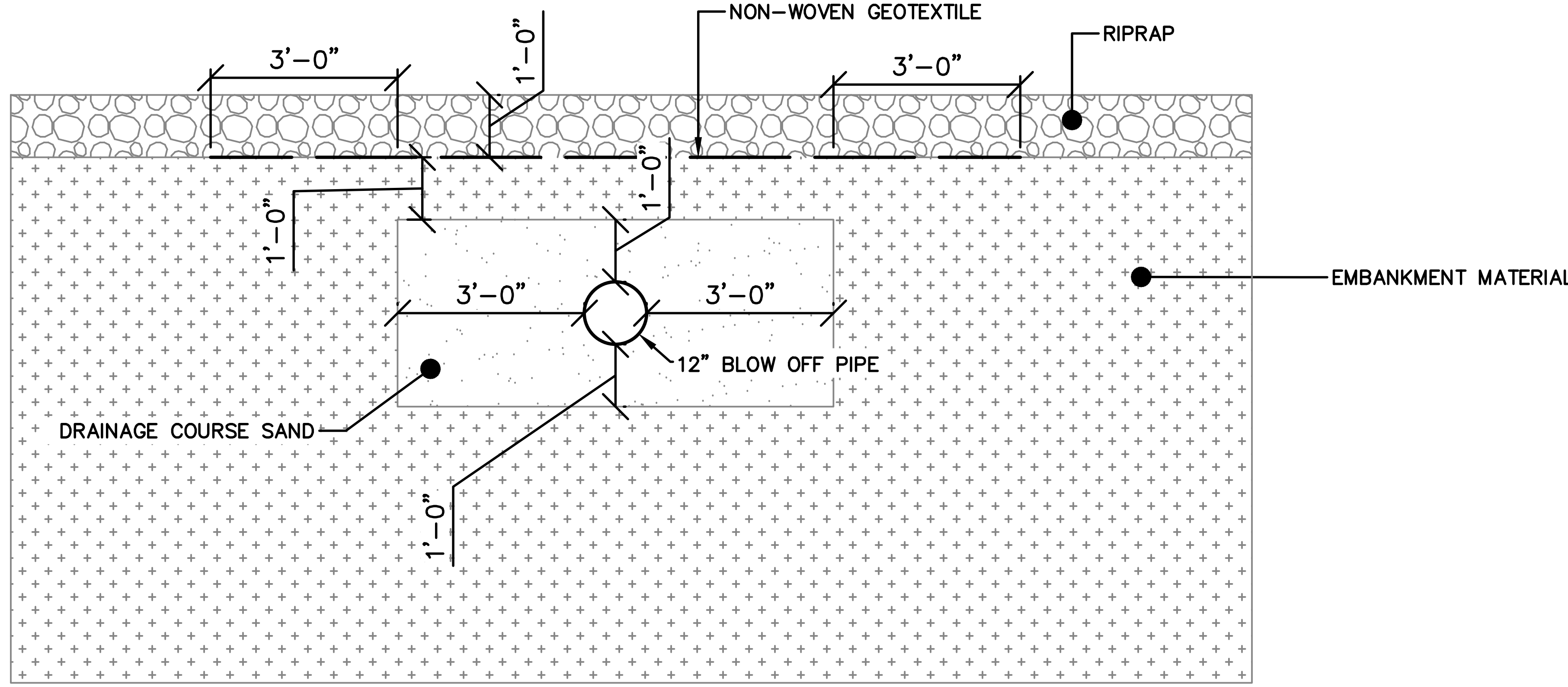
Description: Upon demolition of the auxiliary spillway, the contractor uncovered an existing 12” asbestos concrete blow off pipe traveling through the middle of the weir towards the pond. The City of Newport, with the assistance of SumCo Eco-Contracting, removed the portion of the blow off pipe interfering with the weir and replaced it with a PVC, C-900 water pipe and a coupling at the connection of the new and existing pipes. Both the PVC water pipe and coupling were supplied by the City. The attached SK-02 depicts the modifications to the rebar surrounding the ductile blow off pipe, as well as the installation of a sand filter surrounding the existing blow off pipe, coupling, and ductile blow off pipe. The modifications to the rebar include the installation of 4 #4 rebar, angled at 45 degrees and 3” offset from the pipe, to enclose the top of the ductile blow off pipe. The #4 rebar will be installed on the interior side of the two columns of rebar used for the weir wall. The sand filter will be installed to separate pollutants and fine Particles. It will extend 36” to the left and to right of the blow off pipe. The top of the sand filter will be 12” above the top of the ductile pipe. The sand filter will be covered with a layer of existing material, a layer of non-woven geotextile and a layer of rip rap. The Contractor is to furnish and install the rebar and non-woven geotextile, the City of Newport will supply the drainage course sand (C-33 sand), as depicted on the attached drawing.

Attachments: SK-02 - Sand Filter

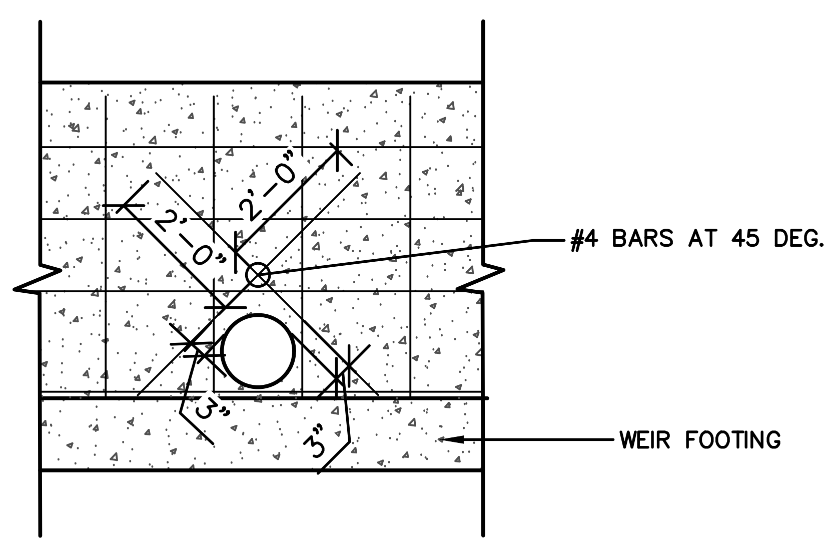
Engineer: Dean Audet

Receipt Acknowledged by (Contractor):	Date:

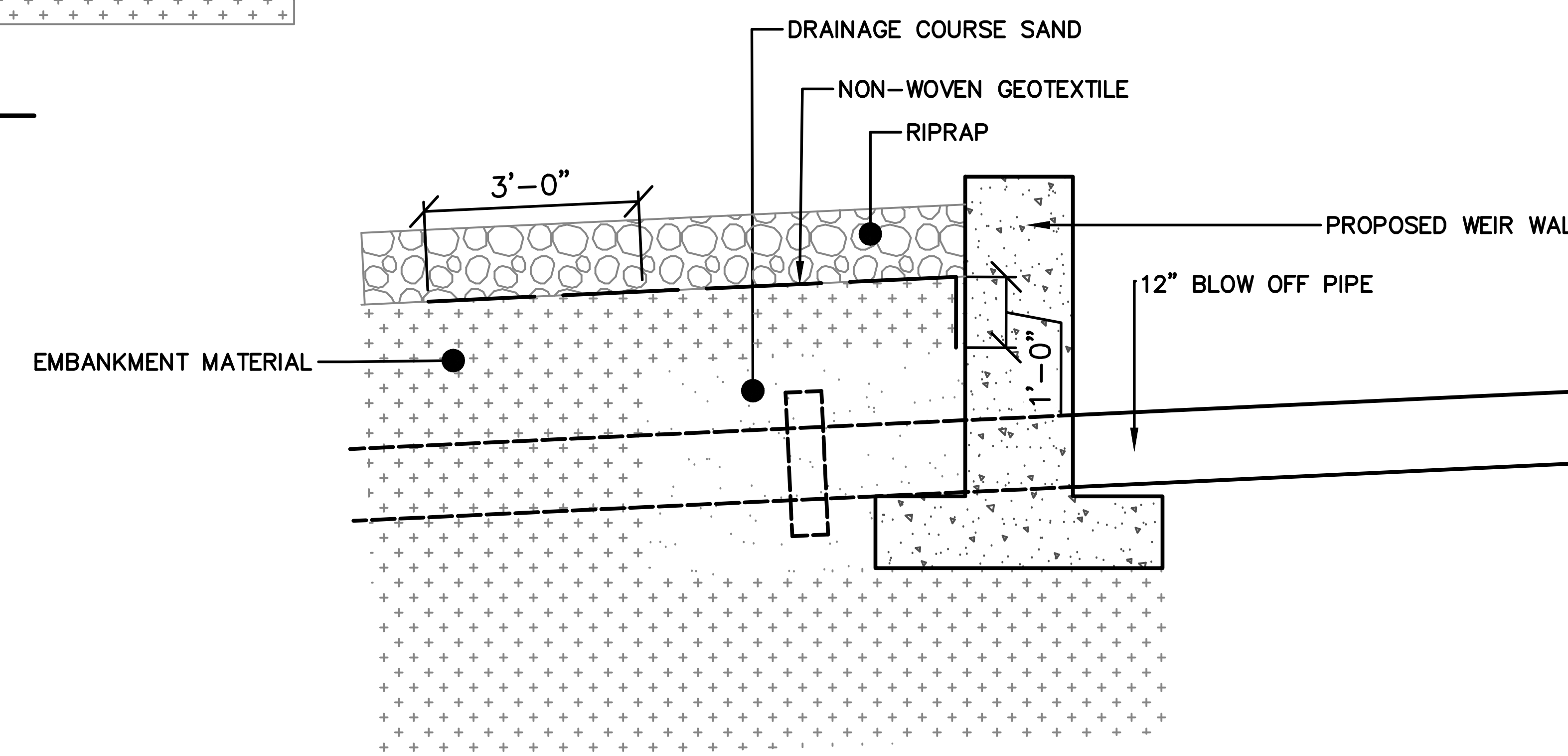
Copy to Owner



SAND FILTER CROSS SECTION
3/8" = 1'



REBAR AROUND PIPE
3/8" = 1'



SAND FILTER CROSS SECTION
3/8" = 1'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 3/8" -1'
VERT.:
DATUM:
HORZ.:
VERT.:
0 3/16 3/8"
GRAPHIC SCALE

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

CITY OF NEWPORT

SAND FILTER

EASTON POND NORTH DAM SPILLWAY REPAIRS

NEWPORT/MIDDLETOWN RHODE ISLAND

PROJ. No.: 20060901.D64
DATE: SEPTEMBER 2023

SK-02

Field Order No. 2

Date of Issuance: September 11, 2023 Effective Date: September 11, 2023

Project: Easton Pond North Dam Spillway Repairs	Owner: City of Newport	Owner's Contract No.: 23-004
Contract: Easton Pond North Dam Spillway Repairs		Date of Contract: November 1, 2022
Contractor: SumCo Eco-Contracting, Inc.		Engineer's Project No.: 20060901.D64

Attention:
You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04A ., for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference:

Section 03 30 00 – Cast in Place Concrete (Specification Section(s))

SK-03 – Wall Connection (attached) (Drawing(s) / Detail(s))

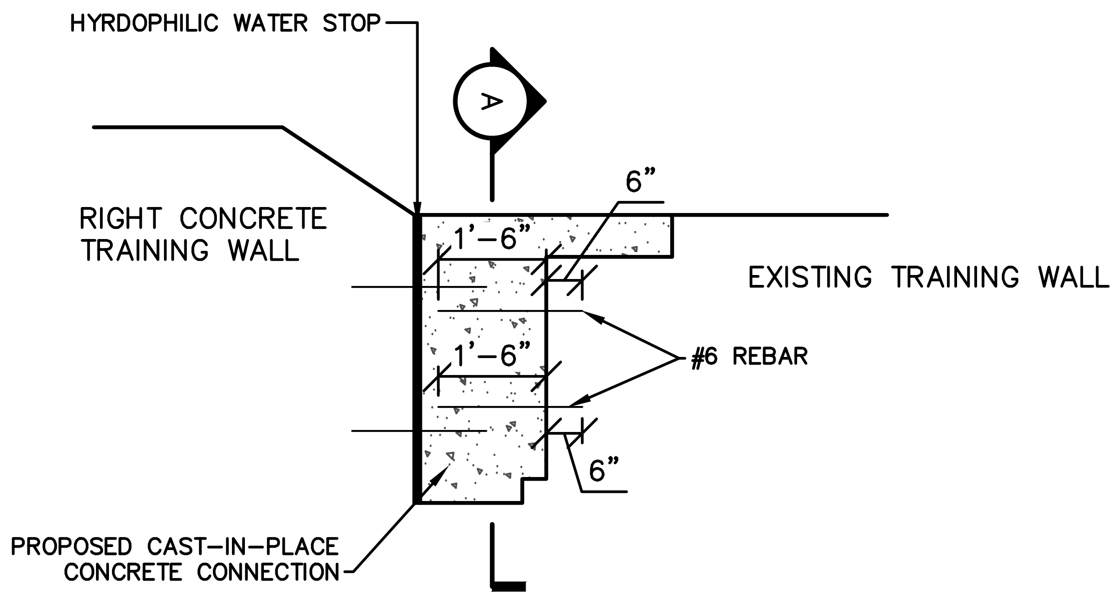
Description: The attached SK-03 depicts the proposed connection between the existing and proposed right training wall. The modification includes the installation of 2 #6 reinforcing steel bars at the upstream and downstream sides of the closure wall at the joint with the new training wall and existing stone masonry, respectively (total of 4 embedded bars). The top bar shall be 16 inches from the top of the wall and the bottom bar shall be 32 inches from the top of the wall. The bars shall be at the approximate centerline of the existing wall (in plan view). The bars shall extend 6 inches into the existing stone training wall and 18 to 20 inches into the proposed closure wall. A vertical hydrophilic water stop shall be provided at the construction joint. The Contractor shall provide reinforcing steel, hydrophilic water stop, and concrete, as depicted on the attached drawing.

Attachments: SK-03 – Wall Connection

Engineer: Andrea C. Judge

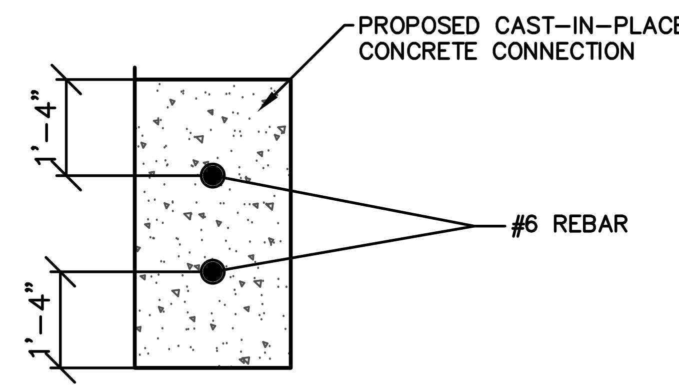
Receipt Acknowledged by (Contractor): Date: 9/12/2023

Copy to Owner



WALL CONNECTION

3/8” = 1’



A EXISTING TRAINING WALL SECTION

3/8” = 1’

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SCALE:
HORZ.: 3/8" -1'
VERT.:
DATUM:
HORZ.:
VERT.:
0 3/16 3/8"
GRAPHIC SCALE

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

CITY OF NEWPORT

WALL CONNECTION

EASTON POND NORTH DAM SPILLWAY REPAIRS

NEWPORT/MIDDLETOWN RHODE ISLAND

PROJ. No.: 20060901.D64
DATE: SEPTEMBER 2023

SK-03

Section D

Change Orders

Change Order

No. 1

Date of Issuance:	September 20, 2023	Effective Date:	August 5, 2023

Project: Easton Pond Dam North Spillway Repairs	Owner: City of Newport, Dept. of Utilities	Owner's Contract No.: 23-004
Contract: 23-004, Easton Pond Dam North Spillway Repairs, Newport, RI		Contract Date: November 1, 2022
Contractor: SumCo Eco-Contracting, Inc.		Engineer's Project No.: 20060901.D64

The Contract Documents are modified as follows upon execution of this Change Order:

Description: The contract modification entails an increase in contract time, material costs, and labor costs due to CRMC permitting delays and to avoid a winter start. The contract time will be increased by 235 days. The increase in material and labor costs include: Increase in Labor Costs ($2,591.00), Increase in Concrete Materials ($2,057.00), Increase in Rebar Materials ($627.00), and Increase in Gravel & Stone Costs ($429.00). These payments will be compensated by the contract contingency; City of Newport Contingency will be reduced by $5,704.00. The net increase in contract price associated with this change order is $0.00. Payment for work associated with payment items shall be on a lump sum basis as stated on SumCo Eco-Contracting's attached email proposal, and redlined by Fuss & O'Neill, dated June 23, 2023, and pro-rated Contractor's progress of work during construction.

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price:	Original Contract Times:
	Substantial completion: March 4, 2023
$ 718,344.00	Ready for final payment: April 3, 2023
Increase from previously approved Change Orders No. 0 to No. 0:	Increase from previously approved Change Orders No. 0 to No. 0:
	Substantial completion (days): 0
$ 0.00	Ready for final payment (days): 0
Contract Price prior to this Change Order:	Contract Times prior to this Change Order: Substantial completion: March 4, 2023
$ 718,344.00	Ready for final payment: April 3, 2023
Increase of this Change Order:	Increase of this Change Order: Substantial completion (days): 236
$ 0.00	Ready for final payment (days): 236
Contract Price incorporating this Change Order:	Contract Times with all approved Change Orders: Substantial completion: October 26, 2023
$ 718,344.00	Ready for final payment: November 25, 2023

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By:	By:	By:
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: 9/21/2023	Date:	Date: 10/25/2023

Summer 2023 Price Increases For:
Easton Pond Dam North Spillway Repairs
Contract No. 23-004
Newport, Rhode Island

June 23, 2023

Andrea Judge, PE
Fuss & O'Neill, Inc.
317 Iron Horse Way, Ste 204
Providence, RI 02908

Re: Summer Price Increases for Easton Pond Dam North Spillway Repair, Contract No. 23-004

Dear Andrea

Per our discussion back in October of 2022, SumCo Eco-Contracting, LLC (SEC) has pulled together updated pricing for the contract items on the above referenced project. There have been price increases in the following areas since the bid date last August and SEC formally requests a change order for these costs.

For the projected work, below are the estimated increases which have been based on current pricing we have received. If the city would like to wait until the end of the project to have final quantities on some of the items, then that would be satisfactory, and we can issue an updated spreadsheet with all the materials, quantities, and associated cost increases.

Increase to the project costs include:

-Labor (Published Wage Rates). Project increase Estimated at = $2,356.00
-Concrete Materials (mud mat and 4,500 psi mix) = $1,870.00
-Rebar materials (spillway and training walls) = $570.00
-Gravel and Stone = $390.00
Subtotal = $5,186.00
-Overhead and Profit (10% of cost increase) = $518.00
Total Estimated Cost Increases = <u>$5,704.00</u>

Please review and if you have any questions or further comments, please do not hesitate to contact us. We look forward to starting the project and working with Fuss & O'Neill and the City of Newport.

For SumCo Eco-Contracting

Ronald J. Ferraiuolo
Team Lead

2 Centennial Drive - Suite 4D, Peabody, MA 01960 • T: 978.744.1515 F: 815.572.5022 • info@sumcoeco.com • www.sumcoeco.com • AA/EOE

Change Order

No. 2

Date of Issuance:	October 20, 2023	Effective Date:	October 20, 2023

Project: Easton Pond Dam North Spillway Repairs	Owner: City of Newport, Dept. of Utilities	Owner's Contract No.: 23-004
Contract: 23-004, Easton Pond Dam North Spillway Repairs, Newport, RI		Contract Date: November 1, 2022
Contractor: SumCo Eco-Contracting, Inc.		Engineer's Project No.: 20060901.D64

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

The contract modification entails an addition in material costs and labor costs due to the installation of a six foot diameter catch basin, additional rip rap around Easton Pond and the site, and additional regrading and loaming. The increase in material and labor costs include: Additional Crew and Equipment for 4.5 days ($22,110) and Additional Pump Rental and Fuel ($1,069.00). These payments will be compensated by the contract contingency; City of Newport Contingency will be reduced by $23,179.00. The net increase in contract price associated with this change order is $0.00. Payment for work associated with payment items shall be on lump sum basis as stated on SumCo Eco-Contracting's attached email proposal, dated October 11, 2023 and pro-rated Contractor's progress of work during construction.

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price: $ 718,344.00	Original Contract Times: Substantial completion: March 4, 2023 Ready for final payment: April 3, 2023
Increase from previously approved Change Orders No. 0 to No. 1: $ 0.00	Increase from previously approved Change Orders No. 0 to No. 1: Substantial completion (days): 236 Ready for final payment (days): 236
Contract Price prior to this Change Order: $ 718,344.00	Contract Times prior to this Change Order: Substantial completion: October 26, 2023 Ready for final payment: November 25, 2023
Increase of this Change Order: $ 0.00	Increase of this Change Order: Substantial completion (days): 0 Ready for final payment (days): 0
Contract Price incorporating this Change Order: $ 718,344.00	Contract Times with all approved Change Orders: Substantial completion: October 26, 2023 Ready for final payment: November 25, 2023

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By:	By:	By:
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: 10/19/23	Date:	Date: 10/25/2023

Proposed Change Order Request for Installation of 6-Foot Diameter Catch Basin and Additional Requested Work For:
Easton Pond Dam North Spillway Repairs
Contract No. 23-004
Newport, Rhode Island

October 11, 2023

Dean Audet, PE
Fuss & O'Neill, Inc.
317 Iron Horse Way, Ste 204
Providence, RI 02908

Re: Change Order Request, Catch Basin and Additional Time & Materials

Dear Dean

As requested by the City of Newport, SumCo Eco-Contracting, LLC (SEC) performed additional work on site in addition to our contracted scope. Included in this additional work was the installation of a six (6) foot diameter catch basin within the 'moat', additional rip rap around Easton Pond, additional rip rap around the site and regrading and loaming from the downstream rip rap of the auxiliary spillway towards the existing gravel access drive.

On September 24, 2023, SEC provided a proposed change order price for labor (3 person crew) and equipment to perform the proposed work, inclusive of the 4 inch pump (weekly rate) we had on site for dewatering. The City of Newport was to supply all materials to perform the work. Below is a total change order request value for the work performed on site. There are reductions for utilizing a 2-man crew for a couple days and the pump rate as it was used for 2 days.

<u>Monday, Oct. 2</u>

1. 3-man crew & equipment		$5,190.00
2. Pump incl. fuel for day		$ 534.50
	Monday Total :	**$5,724.50**

<u>Tuesday, Oct. 3</u>

1. 3-man crew & equipment		$5,190.00
2. Pump incl. fuel for day		$ 534.50
	Tuesday Total :	**$5,724.50**

Wednesday, Oct. 4

1. 3-man crew & equipment $5,190.00

Wednesday Total : $5,190.00

Thursday, Oct. 5

1. 2-man crew & equipment $4,360.00

Thursday Total : $4,360.00

Friday, Oct. 6

1. 2-man crew & equipment (1/2 day rate) $2,180.00

Friday Total : $2,180.00

Proposed Change Order Total : $23,179.00

If possible, SEC would like to finalize this change in order to bill against the contingency on the next pay estimate which will include the completion of work and the proposed balancing change order as well, which will close out the job except for the cast in place concrete item. Please review and if you have any questions or further comments, please do not hesitate to contact us.

For SumCo Eco-Contracting

Ronald J. Ferraiuolo
Team Lead

Change Order

No. 3

Date of Issuance:	October 20, 2023	Effective Date:	October 20, 2023

Project: Easton Pond Dam North Spillway Repairs	Owner: City of Newport, Dept. of Utilities	Owner's Contract No.: 23-004
Contract: 23-004, Easton Pond Dam North Spillway Repairs, Newport, RI		Contract Date: November 1, 2022
Contractor: SumCo Eco-Contracting, Inc.		Engineer's Project No.: 20060901.D64

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

The contract modification reflects final reconciliation of unit price and lump sum bid items that were completed during the construction of this project. **Bid Item No. 8 –** Bedrock Excavation: 0 cubic yards excavated (-$2,400.00); **Bid Item No. 9 –** Excavation and Removal of Unsuitable Materials: 0 cubic yards excavated and removed ($-360.00); **Bid Item No. 11** – Imported Suitable Soil: 0 cubic yards imported (-$2,720.00); **Bid Item No. 12** – Supplemental Stone Amor : 43.7 more tons furnished (+$3,233.80); **Bid Item No. Alt.-1.1** - Primary Spillway Training Wall Crack Repair: 85.6 more linear feet repaired (+$9,416.00); **Bid Item No. Alt.-1.2** – Primary Spillway Training Wall Surface Repair: 63 square feet less wall surface repair (-$18,270.00); **Bid Item No. Alt.-1.3** – Primary Spillway Weir Repair: less repairs needed (-$4,950.00); **Bid Item No. Alt.-1.4 –** Primary Spillway Void Fill: 7.84 less cubic yards of voids (-$15,288.00); **ADD** – City of Newport Contingency: Unused contingency (-$90,841.00). The net decrease in contract price associated with this change order is $122,179.20. Payment for work associated with payment items shall be on lump sum basis as stated on SumCo Eco-Contracting's attached email proposal, dated October 12, 2023, and pro-rated Contractor's progress of work during construction.

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price:	Original Contract Times:
$ 718,344.00	Substantial completion: March 4, 2023 Ready for final payment: April 3, 2023
Increase from previously approved Change Orders No. 0 to No. 2 :	Increase from previously approved Change Orders No. 0 to No. 2 :
$ 0.00	Substantial completion (days): 236 Ready for final payment (days): 236
Contract Price prior to this Change Order:	Contract Times prior to this Change Order:
$ 718,344.00	Substantial completion: October 26, 2023 Ready for final payment: November 25, 2023
Decrease of this Change Order:	Increase of this Change Order:
$ 122,179.20	Substantial completion (days): 0 Ready for final payment (days): 0
Contract Price incorporating this Change Order:	Contract Times with all approved Change Orders:

$ 596,164.80	Substantial completion: October 26, 2023 Ready for final payment: November 25, 2023

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: ______________	By: ______________	By: ______________
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: 10/19/23	Date: ______________	Date: 10/25/2023

Rebecca Meyers

From: Ron Ferraiuolo <rferr@sumcoeco.com>
Sent: Thursday, October 12, 2023 12:36 PM
To: Rebecca Meyers
Cc: Dean Audet; Katherine Cretella
Subject: Newport - Pay Estimate 5 DRAFT and Balancing Change Order Items
Attachments: Easton Pond Spillway-App For Payment 5-DRAFT.pdf; Easton Pond Spillway-Balancing CO Items-101223.pdf

Hi Rebecca
For your review, I have attached a draft copy of our pay estimate #5 for the project. Included on the estimate is percentages to close out all items except the concrete (Item #10) and as-built survey (Item #14). I added the value of the work listed in change order #1, $5,704 and the change order value from yesterday's request, $23,179, under the contingency so it took away from that item and we have no change orders listed on the pay application to eliminate any confusion, I hope. If these need to be handled another way, please let me know.
Also attached, I highlighted the items that we did not use, or over/under billed so that a balancing change order can be produced form this. Looks like the total, inclusive of the remaining contingency, is $122,179.20.
Please review and let me know if you have any questions. If possible, we would like to invoice what is on this draft estimate #5 including the catch basin work (if approved) so we can get that in, and then depending what happens with the concrete testing, we can do a final invoice with the concrete, as-built and balancing change order. Please let me know. Thanks!

Thank You, Ron

SumCo
ECO-CONTRACTING

RONALD J. FERRAIUOLO
Team Lead
m: (508) 989-0007
rferr@sumcoeco.com

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CONTINUATION SHEET PAGE 1 OF 1 PAGES

AIA Document G702, APPLICATION AND CERTIFICATE FOR PAYMENT, containing
Contractor's signed Certification is attached.

APPLICATION NUMBER: 5
APPLICATION DATE: 10/13/2023
PERIOD FROM: 10/1/2023
TO: 10/13/2023
PROJECT NO.: 23-004
SUMCO PROJ NO.: P-0194

Project Name: EASTON POND NORTH DAM SPILLWAY REPAIRS

A	B		C	D	E	F		G		H
					WORK COMPLETED					
ITEM No.	DESCRIPTION OF WORK	UNITS	SCHEDULED VALUE (EACH)	SCHEDULED # UNITS	Previous Application	This Application # Units	This Application Total	TOTAL COMPLETED AND STORED TO DATE (E+F)	% (G / CxD)	BALANCE TO FINISH (CxD - G)
	BASE BID UNIT ITEMS									
1	Mobilization & Demobilization	ls	$14,000.00	1	$10,500.00	0.25	$3,500.00	$14,000.00	100%	$0.00
2	General Requirements	ls	$52,000.00	1	$46,800.00	0.10	$5,200.00	$52,000.00	100%	$0.00
3	Control of Water	ls	$174,000.00	1	$174,000.00	ITEM #3 TOTAL:		$174,000.00	100%	$0.00
	A-control of water plan	ls	$16,000.00	1			$0.00			
	B-cofferdam installation	ls	$98,000.00	1			$0.00			
	C-cofferdam maintenance	ls	$26,000.00	1			$0.00			
	D-cofferdam removal	ls	$34,000.00	1			$0.00			
4	Temporary Erosion and Sediment Control	ls	$18,000.00	1	$18,000.00	ITEM #4 TOTAL:		$18,000.00	100%	$0.00
	A-straw wattles	ls	$11,800.00	1			$0.00			
	B-construction entrance	ea	$2,800.00	1			$0.00			
	C-dewatering basin	ea	$3,400.00	1			$0.00			
5	Temporary Construction Access Routes & Staging Area	ls	$10,000.00	1	$10,000.00		$0.00	$10,000.00	100%	$0.00
6	Test Pits	ea	$400.00	2	$800.00		$0.00	$800.00	100%	$0.00
7	Auxiliary Spillway Stone Masonry Demolition	ton	$400.00	50	$20,000.00		$0.00	$20,000.00	100%	$0.00
8	Bedrock Excavation	cy	$240.00	10			$0.00	$0.00	0%	$2,400.00
9	Excavation and Removal of Unsuitable Materials	cy	$18.00	20			$0.00	$0.00	0%	$360.00
10	Auxiliary Spillway Reconstruction	ls	$193,000.00	1	$140,150.00	ITEM #10 TOTAL:		$140,150.00	73%	$52,850.00
	A-excavation	ls	$17,000.00	1			$0.00			
	B-mud mat	ls	$10,000.00	1			$0.00			
	C-footings and weir wall	ls	$88,000.00	1			$0.00			
	D-footings and training walls	ls	$63,000.00	1			$0.00			
	E-backfill	ls	$15,000.00	1			$0.00			
11	Imported Suitable Soil	cy	$68.00	40			$0.00	$0.00	0%	$2,720.00
12	Supplemental Stone Armor	ton	$74.00	160	$15,073.80		$0.00	$15,073.80	127%	-$3,233.80
13	Site Restoration	ls	$9,000.00	1	$4,500.00	0.50	$4,500.00	$9,000.00	100%	$0.00
14	Constrruction Survey & Records	ls	$16,000.00	1	$6,400.00		$0.00	$6,400.00	40%	$9,600.00
	Base Bid Totals				**$446,223.80**		**$13,200.00**	**$459,423.80**		**$64,696.20**
	ADD/ALT 1 - PRIMARY SPILLWAY UNIT ITEMS									
Alt-1.1	Primary Spillway Training Wall Crack Repair	lf	$110.00	150	$25,916.00		$0.00	$25,916.00	157%	-$9,416.00
Alt-1.2	Primary Spillway Training Wall Surface Repair	sf	$290.00	110	$13,630.00		$0.00	$13,630.00	43%	$18,270.00
Alt-1.3	Primary Spillway Weir Repair	ls	$6,600.00	1	$1,650.00		$0.00	$1,650.00	25%	$4,950.00
At-1.4	Primary Spillway Void Fill	cy	$1,950.00	10	$4,212.00		$0.00	$4,212.00	22%	$15,288.00
	Add/Alt Totals				**$45,408.00**		**$0.00**	**$45,408.00**		**$29,092.00**
ADD	**City of Newport Contingency**	ls	$119,724.00	1	$0.00	ITEM TOTAL:		$28,883.00	24%	$90,841.00
1	Material & Labor Costs Due to Permit Delays	ls	$5,704.00	1		1	$5,704.00			
2	Install 6' Dia Catch Basin and Additional Work	ls	$23,179.00	1		1	$23,179.00			
	TOTALS =				**$491,631.80**		**$13,200.00**	**$504,831.80**		**$184,629.20**

Change Order

No. 4

Date of Issuance:	November 30, 2023	Effective Date:	November 30, 2023

Project: Easton Pond Dam North Spillway Repairs	Owner: City of Newport, Dept. of Utilities	Owner's Contract No.: 23-004
Contract: 23-004, Easton Pond Dam North Spillway Repairs, Newport, RI		Contract Date: November 1, 2022
Contractor: SumCo Eco-Contracting, Inc.		Engineer's Project No.: 20060901.D64

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

The contract modification reflects final reconciliation of lump sum **Bid Item No. 10D** – Footings and Training Walls. This Bid Item was decreased by $11,000 as a credit for the left training wall (looking downstream) concrete having a strength lower than the required minimum strength as according to the specifications. The net decrease in contract price associated with this change order is $11,000.00. Payment for work associated with payment items shall be on lump sum basis as stated on SumCo Eco-Contracting's attached email proposal, dated November 27, 2023, and pro-rated Contractor's progress of work during construction.

CHANGE IN CONTRACT PRICE:	**CHANGE IN CONTRACT TIMES:**
Original Contract Price: $ 718,344.00	Original Contract Times: Substantial completion: March 4, 2023 Ready for final payment: April 3, 2023
Decrease from previously approved Change Orders No. 0 to No. 3 : $ 122,179.20	Increase from previously approved Change Orders No. 0 to No. 3 : Substantial completion (days): 236 Ready for final payment (days): 236
Contract Price prior to this Change Order: $ 596,164.80	Contract Times prior to this Change Order: Substantial completion: October 26, 2023 Ready for final payment: November 25, 2023
Decrease of this Change Order: $ 11,000.00	Increase of this Change Order: Substantial completion (days): 0 Ready for final payment (days): 0
Contract Price incorporating this Change Order: $ 585,164.80	Contract Times with all approved Change Orders: Substantial completion: October 26, 2023 Ready for final payment: November 25, 2023

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By:	By:	By:
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: 11/29/2023	Date: 12/1/2023	Date: 11/29/23

Rebecca Meyers

From:	Ron Ferraiuolo <rferr@sumcoeco.com>
Sent:	Monday, November 27, 2023 1:07 PM
To:	Dean Audet
Cc:	Rebecca Meyers
Subject:	RE: Left Training Wall Concrete

Hi Dean (and Rebecca)
I believe we were complete on all the punch list items prior to leaving the job site during that full week of the catch basin install. I did not charge the city a full week that week as the crew did take care of the small items that were on the punch list.
Will you (F&O) be putting together the final balancing change? If possible, I would like to get the next pay application in this week.
Thank You, Ron

SumCo
ECO-CONTRACTING

Affirmative Action/Equal Opportunity Employer

RONALD J. FERRAIUOLO
Team Lead
m: (508) 989-0007
rferr@sumcoeco.com

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From: Dean Audet <DAudet@fando.com>
Sent: Monday, November 27, 2023 12:40 PM
To: Ron Ferraiuolo <rferr@sumcoeco.com>
Cc: Rebecca Meyers <RMeyers@fando.com>
Subject: RE: Left Training Wall Concrete

Hello Ron, yes, lets process the $11,000 credit in the final balancing change order.

We can also reduce retainage to 2%.

How are the punch list items coming from the substantial completion walkthrough?

Dean Audet, PE
Senior Vice President | Business Line Leader
Fuss & O'Neill, Inc. | DAudet@fando.com
(401) 533-5978 | cell: (401) 578-1898

www.fando.com | instagram | vimeo | facebook | linkedin

From: Ron Ferraiuolo <rferr@sumcoeco.com>
Sent: Monday, November 27, 2023 9:21 AM
To: Dean Audet <DAudet@fando.com>
Subject: RE: Left Training Wall Concrete

Hi Dean
Hope you had a great Thanksgiving weekend. We have discussed internally and with Cardi Corp and we would like to accept the credit offer of $11,000. If possible, we would like to add this to the next pay estimate this week in an effort to close out the project. I was not sure if something had to be processed from the city or F&O, or if this is one of those things that gets put under the additional monies. Also, would we be able to reduce the retainage on the project to 2% on the next invoice as well? Once I hear back, I'll put the pay estimate together and send out to the team for review/approval. If you could please let me know so we can try and get the final pay estimate out that would be appreciated. Thank you for working with us on this!
Thank You, Ron

SumCo
ECO-CONTRACTING

Affirmative Action/Equal Opportunity Employer

RONALD J. FERRAIUOLO
Team Lead
m: (508) 989-0007
rferr@sumcoeco.com

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www.sumcoeco.com

From: Dean Audet <DAudet@fando.com>
Sent: Thursday, November 16, 2023 12:54 PM
To: Ron Ferraiuolo <rferr@sumcoeco.com>
Subject: RE: Left Training Wall Concrete

Talking with Rob, we were thinking $11K for a credit which is 50% of the value of the unit price of that wall.

Dean Audet, PE
Senior Vice President | Business Line Leader
Fuss & O'Neill, Inc. | DAudet@fando.com
(401) 533-5978 | cell: (401) 578-1898

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From: Ron Ferraiuolo <rferr@sumcoeco.com>
Sent: Wednesday, November 15, 2023 8:00 AM
To: Dean Audet <DAudet@fando.com>
Subject: RE: Left Training Wall Concrete

Hi Dean
What are you thinking that the credit amount would be if going that route? Trying to weigh the options I guess between what the office is comfortable with, what we can get from Cardi and not having it linger for that length of time.

From: Dean Audet <DAudet@fando.com>
Sent: Tuesday, November 14, 2023 4:36 PM
To: Ron Ferraiuolo <rferr@sumcoeco.com>
Subject: RE: Left Training Wall Concrete

We'd like to avoid a vertical core as there is too much risk for damage, the wall width is only a foot.

In my eyes this doesn't reflect poorly on Sumco, just bad luck with a bad load of concrete.

If you are good with extending the warranty we are good. The alternative could also be a credit.

Dean Audet, PE
Senior Vice President | Business Line Leader
Fuss & O'Neill, Inc. | DAudet@fando.com
(401) 533-5978 | cell: (401) 578-1898

www.fando.com | Instagram | vimeo | facebook | linkedin

From: Ron Ferraiuolo <rferr@sumcoeco.com>
Sent: Tuesday, November 14, 2023 10:10 AM
To: Dean Audet <DAudet@fando.com>
Subject: RE: Left Training Wall Concrete

Hi Dean
Have just replied to yourself for this email. I appreciate the offer and will pass along to the office for confirmation. I hope this does not reflect poorly on SumCo and the work we perform. I am good with it but want to get the input from Chad and Travis. Do you think it would be prudent to do a core and have it tested anyway? We could always do a vertical test core on the top/center of the training wall to avoid any excavation and rebar. Maybe this small expense would be worth it? Please let me know your thoughts.

Thank You, Ron

SumCo ECO-CONTRACTING

Affirmative Action/Equal Opportunity Employer

RONALD J. FERRAIUOLO
Team Lead
m: (508) 989-0007
rferr@sumcoeco.com

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From: Dean Audet <DAudet@fando.com>
Sent: Tuesday, November 14, 2023 9:29 AM
To: Ron Ferraiuolo <rferr@sumcoeco.com>
Cc: Schultz, Robert <rschultz@CityofNewport.com>; Jason LeDoux <JLeDoux@fando.com>; Rebecca Meyers <RMeyers@fando.com>; Katherine Cretella <KCretella@fando.com>
Subject: Left Training Wall Concrete

Hello Ron, Rob and I had a discussion on the Left Training Wall concrete that has not met the strength testing requirements. We are willing to leave the wall in place and accept it, if Sumco is willing to provide a five year warranty on the wall in writing. If this is acceptable to Sumco, we can get you some sample language of what we are looking for.

Please let us know.

Dean Audet, PE
Senior Vice President | Business Line Leader

Fuss & O'Neill, Inc. | DAudet@fando.com
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Zweig Group Best Firm to Work for 2023

Section E

Photographs

Photo 1: Overview of the Spillway at the Start of Construction

Photo 2: Overview of the Installed Portadam

Photo 3: Overview of Right Training Wall

Photo 4: Overview of Wier Wall and Blowoff Pipe

Photo 5: Backfilling Left Training Wall

Photo 6: Overview of Left Training Wall and Weir Wall towards the End of Construction

Photo 7: Overview of Auxiliary Spillway towards the End of Construction

Photo 8: Overview of Repairs to the Primary Spillway

Section F

Field Reports

Official Visitors To The Job	City of Newport, RI	Weather	Temp, (High/Low)
Re e a Meyers	**Easton Pond North Dam Auxiliary Spillway Repairs**	AM: Cloudy	HIGH - 84
	INSPECTOR'S DAILY REPORT	PM: Sunny	LOW - 69
	Prime Contractor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

9am Site arrival - SumCo has one crew start work on excavating Test Pit No. 1 (the southern-most test pit)

Site observations:
- Sedimentation and erosion control measures seem to be in place based on plans
- Site received rain the day prior. Since that rain event, SumCo has lowered the North Easton Pond water level by 0.1ft
- During the storm the day prior, water was entering the work area from the land-side due to the moat behind the work area.
- The right training wall was excavated before arrival on site.
- During the planned excavation of the right training wall, two additional feet that were intended to remain in place were removed accidentally by SumCo. SumCo noted that the mitigation action will be to continue the cast-in-place concrete wall.
- SumCo will be responsible for replacing the additionally removed section with reinforced cast-in-place concrete.
- Action was taken to protect the subgrade until the mud mat is ready to be poured. A sacrificial layer was added to protect the subgrade.
- The bucket that was used for the excavation has a blade.
- Stones were missing/damaged on right training wall. Some damage was pre-existing.
- North Pond water level was at El. 9.6 ft.
- Two 12" pumps and one 4" pump were operating to pump water from North Easton Pond to South Easton Pond.
- Water control was in place.

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Municipal Police On Site:	Lane Closures:

Inspector's Hours of Work		Contractor's Hours of Work		Day of Week	Date	
Start	End	Start	End			
9am	12pm	8am	4pm	Wednesday	08/09/23	

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: Lawrence Lynch				**Subcontractor**		**Subcontractor / Utility**	
Labor	Equipment	EQ #	A / I	Labor & Equipment	SUB NO.	Labor & Equipment	SUB NO.
1 project manager	SumCo Excavator Cx350D						
1 foreman	938F Wheel Loader						
2 operators	Pickup Trucks						
	2 12" Pumps						
	4" Pump						
	2" Pump						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Description of Work / Reason

Time Work Performed	Labor, Material, and Equipment Involved

Non Compliance / Compliance Issues

Number	Brief Description	Location / Reference

Inspector's Certification

To the best of my knowledge, information and belief, all work described in this report was performed in substantial conformance with the contract. This statement is for the City's information only and does not place any obligation on the part of the City with regard to any party including but no limited to any subcontractor and contractor's surety.

Rebecca Meyers

Inspector's Name

Offi ial Visitors To T e Jo	City of Newport, RI	Weat er	Te p, Hi Lo
atie Cretella Andrea Jud e	**Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	AM: Sunny PM: Sunny	HIGH - 81°F LOW - 66 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

10a Site Arri al

Site O ser ations:
- T o 2 pu ps ere operatin to pu p ater fro 2 popped sprin s in t e ri t trainin all.
- Wood s eetin un o ered in ri t trainin all ill re ain and e o ered y t e ud at.
- Su Co ill e responsi le for leanin ro k de ris on Bliss Mine Road.
- Clean ater fro 4 pu p as dis ar ed into oat.
- Sand a offerda as installed 8 10 23.
- Contra tor noti ed a dis repan y in t e auxiliary spill ay eir detail et een s eets CS-105 and S-101 of t e plan set. Dra in CS-105 notes t e footin as 4.5 and dra in S-101 notes t e footin as 4 . T e 4 footin detail s o n on s eet S-101 ill e i pli ented due to suffi ient su surfa e onditions.
- Su surfa e onditions ere o ser ed efore t e ud at as poured.
- Walked in ex a ated trainin all and noted t at t e su rade appeared fir .
- Su rade ontained areas of or ani silt and underlyin layers of ra el and silty sand. T ese onditions are it in t e s ope of t e ontra t.
- No uality ontrol test as perfor ed on t e ud at on rete.
- T e ex a ator u ket as used to pour t e ud at.
- Poured a ini u of a 4 t i k ud at in a ordan e it ontra t.
- Top of ud at as raked trans ersely to t e dire tion of ater seepa e.
- T e Nort Pond ater le el as at El. 7.8 ft.
- T o 12 pu ps and one 4 pu p ere operatin to pu p ater fro Nort Easton Pond to Sout Easton Pond.

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Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start 10:00	End 11:30	Start 7:00	End 3:00	Friday	08 11 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
1 Pro e t Mana er	Su Co Ex a ator Cx350D						
1 Fore an	938M W eel Loader						
2 Operators	Con rete Tru k TM-720						
	T o 12 Pu ps						
	T o 2 Pu ps						
	One 4 Pu ps						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed	La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

To t e est of y kno led e, infor ation and elief, all ork des ri ed in t is report as perfor ed in su stantial onfor an e it t e ontra t. T is state ent is for t e City s infor ation only and does not pla e any o li ation on t e part of t e City it re ard to any party in ludin ut no li ited to any su ontra tor and ontra tor s surety.

Katie Cretella

Inspe tor s Na e

Offi ial Visitors To T e Jo	City of Newport, RI	Weat er	Te p, Hi Lo
atie Cretella Andrea Jud e Re e a Meyers Ja o E erli	**Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	AM: Cloudy PM: Cloudy	HIGH - 76 F LOW - 70 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

9a Site Arri al

Site O ser ations:

- T o 12 pu ps ere operatin to pu p ater fro Nort Easton Pond to Sout Easton Pond.
- Clean ater fro 4 pu p as dis ar ed into oat.
- Cofferda and erosion and sedi ent ontrols see ed to e in pla e as a ordin to plans.
- Su Co reported t at on Sunday 8 13 23 , due to rain, ater as on land ard side of Portada up to reser oir le el. 4 spots of t e tarp one on ea side of t e da ere lifted.Su Co onta ted Portada and Portada sent a te ni ian. Water Water le el land ard side as rou t do n and offerda did not rea .
- Water le el in Nort Reser oir as een de reasin at a rate of 0.3 feet a day.
- 6 ater pu p as repla ed it a 4 ater pu p on Monday or Tuesday i Su Co said is operatin ore effi ently t an t t an t e pre ious pu p.
- Ne 4 pu p is a le to keep inside of offerda de atered y idlin .
- For ork and re ar for ri t traini all as ein pla e on arri al.
- Water le el in Nort Easton Pond as at 6.7 feet at on arri al.
- Martin Bros. as onsite as re ar and on rete su ontra tor.
- Su Co and Martin Bros. asked to larify if t e use of a ater stop et een t e footin and t e ud at as needed as none ere indi ated on t e plans. F O larified t at a ater stop as needed.
- T e ex a ator u ket as used to pour t e ri t trainin all and t e planned se tion of t e eir.
- Poured t e ri t trainin all and t e planned se tion of t e eir in a ordan e it ontra t.
- T o ro s of ydrop ili ater stops ere pla e et een onstru iton oints.
- Con rete as rou t y Fall Ri er Ready Mix Con rete. Quality assuran e testin as done y S.W. Cole in a ordan e it t e spe s. Testin re ealed t e on rete ix ad 4.5 in es of slu p, air ontent of 8%, and te perature of 78 de F. Testin s o ed on rete testin as it in t e li its des ri ed in t e spe s. S.W. Cole Jo List nu er as 23-1338.
- Existin soil is ein sto kpiled in t e areas desi nated on t e plans. Su Co pro ided S.W. Cole it 2 representati e ra sa ples to prefor sei e and pro tor tests on.
- Su Co as po er as in t e pri ary spill ay en arri ed on site. Pri ary spill ay po er as in as o pleted y of day. Su Co orker noted no pro le s.

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Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start 9:00	End 15:00	Start 7:00	End 15:00	T ursday	08 17 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
1 Pro e t Mana er	Su Co Ex a ator Cx350D						
1 Operator	T o 938M W eel Loader						
1 La orer	Con rete Tru k M-670						
2 Re ar La orers	Du p Tru k						
1 SW Cole La oror	T o 12 Pu ps						
1 Con rete Operator	One 4 Pu ps						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed	La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Rebecca Meyers

Inspe tor s Na e

Offi ial Visitors To T e Jo atie Cretella Andrea Jud e	**City of Newport, RI** **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: Cloudy PM: Cloudy	Te p, Hi Lo HIGH - 83°F LOW - 66 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

9 a site arri al

Site O ser ations:
- Erosion and sedi ent ontrols and offerda are in pla e a ordin to plans
- T ree 2 pu ps ere used in t e ri t trainin all ex a ation 1 and eir ex a ation 2
- T e t o 12 pu ps ere s ut do n for t e eekend 8 19-8 20 and started up a ain on Monday 8 21 , t e ater rose 0.2 feet o er t e eekend, plannin to s ut off pu ps o er ni t t is eek due to ideal eat er no rain in fore ast
- One 4 pu p as dis ar in lean ater into t e oat
- On arri al, Su Co as ex a atin for t e eir ud at pour
- Martin Brot ers ere re o in ood for ork fro ri t trainin all footin , preparin for ork for t e ri t trainin all pour, and s eepin leanin t e top of t e footin
- Water le el in Nort Easton Pond as 6.8 feet at 9:30
- Weir su rade appears fir and t e ondition is it in t e ontra t a ree ent
- T ree Martin Bros. for orkers ere doin t e for ork for t e ri t trainin all and preppin re ar, One doin arpentry
- T ree Su Co orkers ere pourin rakin t e ud at for t e eir
- No uality ontrol test as perfor ed on t e ud at on rete
- Top of ud at as raked trans ersely to dire tion of ater seepa e
- Mud at as poured to 6 ini u t i kness in a ordan e it ontra t
- If Nort Easton Da rea ed, t ere ould e loss of ser i e for at least 4 days
- Cra ks in pri ary spill ay trainin alls and eir ill e inspe ted y Fuss O Neill Stru tural depart ent prior to ontra tor repairs pat in

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date	
Start 9:00	End 1:00	Start 7:00	End 3:00	Monday	08 21 23	

PROJECT WORK FORCE AND EQUIPMENT ON SITE							
Prime Contractor: SumCo Eco-Contracting				**Subcontractor**		**Subcontractor / Utility**	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
1 Pro e t Mana er	Ex a ator CX350D			5 Re ar La orers Martin Brot ers			
2 Operators	938M W eel Loader						
	One 4 Pu p						
	T o 12 Pu ps						
	T ree 2 Pu ps						
	2 Con rete Tru ks TM-700, TM-670						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed

La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Katie Cretella

Inspe tor s Na e

Offi ial Visitors To T e Jo atie Cretella	# City of Newport, RI **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: Sunny PM: Sunny	Te p, Hi Lo HIGH - 75 F LOW - 63 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

2:15 p site arri al

Site O ser ations:
- Erosion and sedi ent ontrols and offerda are in pla e a ordin to plans
- T o 2 pu ps in use, 1 in t e ri t trainin all ex a ation and 1 in t e eir ex a ation
- Water le el in Nort Easton Pond as 6.5 feet at 3:00 p
- Su Co noted t at t e eir all at t e pri ary spill ay is not possi le to di out y and, ould need ex a ation e uip ent t e all is fir ly eld in y rip rap, Su Co ex a ated t e displayed eir all lo k
- T e re ar inspe ted as pla ed in a ree ent it Fuss O Neill spe ifi ations stru tural dra in s
- Hydrofili ater stops ill e added to footin to orro ornin 8 23
- Re ar for t e eir footin ill e o pleted to orro 8 23 , prior to t e on rete pour
- Water stop pla ed in trainin all footin eir footin oint

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start 2:15	End 3:15	Start 7:00	End 3:00	Tuesday	08 22 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
2 La orers	Ex a ator CX350D			4 Re ar La orers Martin Brot ers			
	938M W eel Loader						
	T o 2 Pu ps						
	T o 12 Pu ps						
	One 4 Pu p						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed	La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

To t e est of y kno led e, infor ation and elief, all ork des ri ed in t is report as perfor ed in su stantial onfor an e it t e ontra t. T is state ent is for t e City s infor ation only and does not pla e any o li ation on t e part of t e City it re ard to any party in ludin ut no li ited to any su ontra tor and ontra tor s surety.

Katie Cretella

Inspe tor s Na e

Official Visitors To The Job	City of Newport, RI	Weather	Temp, (High/Low)
Rebecca Meyers	**Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	AM: Sunny PM: Sunny	HIGH - 75°F LOW - 58°F
	Prime Contractor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

10:30 am site arrival

Site Observations:
- Erosion and sediment controls and cofferdam are in place according to plans.
- One 4", one 2", and two 12" pumps running to dewater North Easton Pond.
- Water level in North Easton Pond was 6.4 feet at 11:00 am.
- Weir footing for Auxiliary Spillway was in place and inspected. The rebar inspected was placed in agreement with Fuss & O'Neill specifications/structural drawings.
- 2 Hydrophilic water stops were placed between the weir footing to weir footing construction joint.
- Weir footing was poured. Concrete came from Cardi in Warwick, RI. SW Cole conducted QA testing with the following results: Slump: 3.5"; Air: 5.2%; Concrete Temperature: 75 deg F; Set number for concrete samples: 320-2. Results were in in accordance to specifications.
- Water stop placed in training wall footing/weir footing joint.
- Concrete truck was on-site from 1pm to 1:45pm.
- Right training wall forms were in place.
- Martin Bros requested a higher slump allowance for the right training wall. Martin Bros and SumCo contacted F&O structural. team and were told in order to increase slump, admixture must be added to concrete and that the water to concrete ratio must remain in accordance with specifications. Martin Bros will provide documentation of type and amount of admixture.
- Right training wall will be poured tomorrow (8/24/23) with concrete with an admixture to increase the slump and workability.
- Wier footing rebar will continue to be placed tomorrow (8/24/23).
- SumCo excavating left training wall and stockpiling soil on-site in designated stockpile location.

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Municipal Police On Site: N/A	Lane Closures: N/A

Inspector's Hours of Work		Contractor's Hours of Work		Day of Week	Date
Start 10:30	End 14:00	Start 7:00	End 15:00	Wednesday	08/23/23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
Labor	Equipment	EQ #	A / I	Labor & Equipment	SUB NO.	Labor & Equipment	SUB NO.
2 Operators	Excavator CX350D			5 Rebar Laborers (Martin Brothers)		**Rebar**	
	938M Wheel Loader			1 Concrete QA Laborer (SW Cole)		Testing Equipment	
	One 2" Pumps						
	Two 12" Pumps						
	One 4" Pump						
	Support Trucks						
	Concrete Truck						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Description of Work / Reason

- Primary spillway weir wall appears to be a cap poured on dirt. Potential for additional costs if Newport would like to make all repairs. F&O Structural engineering will be on-site tomorrow (8/24/23) to inspect primary spillway and provide a recommendation.

Time Work Performed	Labor, Material, and Equipment Involved

Non Compliance / Compliance Issues

Number	Brief Description	Location / Reference

Inspector's Certification

To the best of my knowledge, information and belief, all work described in this report was performed in substantial conformance with the contract. This statement is for the City's information only and does not place any obligation on the part of the City with regard to any party including but no limited to any subcontractor and contractor's surety.

Rebecca Meyers

Inspector's Name

Offi ial Visitors To T e Jo atie Cretella Ja o E erli	**City of Newport, RI** **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: Sunny PM: Cloudy	Te p, Hi Lo HIGH - 73 F LOW - 58 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

10:00 a Site Arri al:
- Su o as finis in t e ex a ation for t e left trainin all
- Blo off pipe as atta ed to t e existin du tile pipe in t e ornin , prior to site arri al
- T o 12 pu ps ere in use
- One 4 pu p as dis ar in lean ater into t e oat
- One 2 pu p as used in t e left trainin all ex a ation

- Water le el in Nort Easton Pond as 6.1 feet at 1:40 p

- T e repairs to t e pri ary spill ay ere re ie ed it Su Co y a stru tural en ineer fro Fuss O Neill:
  - Su Co is to fill s aller ra ks on t e East and West trainin alls it uikrete ra k repair
  - Spalls s ould e pat ed it Sika repair
  - Lar e-s ale ra ks s ould e du out and pat ed it uikrete ra k repair
  - S all-s ale ra ks on t e eir all s ould e repaired it ra k sealant
  - Lar e-s ale ra ks on t e eir all s ould e repaired it non-s rink rout and finis ed it ra k sealant
  - T e displa ed eir ap ill e repoured follo in Detail A: Weir Repair Detail A S-501 on s eet CD-503 of t e plan set
  - T e oid in t e East trainin all ill e repaired follo in Detail B: Void Repair Detail B S-501 on s eet CD-503 of t e plan s

- Con rete for Ri t Trainin Wall Pour Auxiliary Spill ay :
  - A uality ontrol test as perfor ed on t e on rete Tru k TM-680 it t e follo in results:
    - Con rete te perature: 79.5 F, Air te perature: 74 F, Slu p, 7.5 , Air ontent: 8.3%, Jo fro S.W. Cole: 320-3
    - A se ond slu p test as perfor ed and a slu p of 7 as re orded
    - T e re orded slu p of 7.5 ex eeded t e axi u slu p of 4 spe ified y F O in t e pro e t anual
    - Su Co ele ted to ontinue it t e pour after ein notified t at t e on rete did not eet t e spe ifi ations. T erefore, Su o ontinued it t e pour at t eir o n risk i ay in ludin orre ti e a tion if t e on rete is found to not eet pro e t re uire ents t rou furt er testin .
    - Furt er testin ay in lude extra tin ores on t e ri t trainin all on e t e on rete as ured.
    - 7 yards of on rete fro t e first tru k ere used in t e trainin all
  - A uality ontrol test as perfor ed on t e on rete fro t e se ond tru k Tru k TM-670 it t e follo in results:
    - Con rete te perature: 81 F, Air te perature: 73 F, Slu p, 4 , Air ontent: 7.4%, Jo fro S.W. Cole: 320-4
    - Con rete as used to finis t e ri t trainin all pour and t e re ainder of t e on rete as used to start pourin t e re ainin portion of t e ud at After further discussion and review of the concrete mix, it was determined that there was an addmixture present; allowing for a maximum slump of 8"

.- No uality ontrol test as perfor ed on t e t ird on rete tru k. T is on rete as used to finis t e ud at pour.
- T e top of T e ud at on rete as raked trans ersely
- Fro 1:00 to 1:30, Su Co as s reenin existin aterial in sta in area to use as possi le a kfill

Muni ipal Poli e On Site: N A		Lane Closures: N A			
Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start 10:00a	End 2:30p	Start 7:00a	End 2:30p	T ursday	08 24 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
1 Pro e t Mana er	Ex a ator CX350D			4 Re ar La orers Martin Brot ers			
2 Operators	938M W eel Loader			1 Con rete Inspe tor S.W. Cole			
	RD-90C S reener						
	3 Con rete Tru ks TM-680, TM- 670, TM-700						
	T o 12 Pu ps						
	One 4 Pu p						
	One 2 Pu p						

Problems / Delays / Accidents

- T e on rete used to pour t e ri t trainin all did not eet t e spe ifi ations for t e ix desi n t e slu p ex eeded t e 4 axi u 7.5 Su Co ontinued it t e pour kno in t is at t eir o n risk and ill assu e responsi le for future ork t at ay need to e perfor ed in response to t is.

Possible Extra Work / Cost Plus

Des ription of Work Reason

-Possi le extra ork ould in lude de olis in t e ri t trainin all and re-for in and pourin t e all

Ti e Work Perfor ed 12:30 - 1:00	La or, Material, and E uip ent In ol ed
	Con rete Tru k TM-680 Pro e t Mana er, 2 Operators, 4 Re ar La orers Martin Brot ers , 1 Con rete Inspe tor S.W. Cole

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Katie Cretella

Inspe tor s Na e

Offi ial Visitors To T e Jo atie Cretella Re e a Meyers	# City of Newport, RI **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: Rain PM: Cloudy	Te p, Hi Lo HIGH - 76 F LOW - 67 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 11:00 a Site Arri al

- T e re ar for t e re ainin eir footin and left trainin all footin ere inspe ted and ere found to e in a ree ent it t e F O stru tural details
- An initial slu p test as perfor ed on t e on rete fro t e first tru k TM-630 prior to startin t e footin pours
  - T e slu p as 2.5
- A uality ontrol test as perfor ed on t e on rete fro t e first tru k alf ay t rou pourin t e footin s:
  - Con rete Te perature: 84 F
  - Air Te perature: 74 F
  - Slu p: 3.25
  - Air Content: 7.1%
  - 4 on rete ylinders ere ast: Jo 320-4 A-D
- 6 yards of on rete fro t e first tru k ere used to pour t e last se tion of t e eir footin and one se tion of t e left trainin all footin
- 6 yards of on rete fro t e se ond tru k TM-650 ere used to pour: t e rest of t e left trainin all footin , a ud at et een t e end of t e ri t trainin all and t e existin e ank ent, and t e ne eir se tion at t e pri ary spill ay
- T e re ar for t e ne eir se tion at t e pri ary spill ay as inspe ted and onsisted of 4 5 re ars
- T e eel loader as used to transport t e on rete fro t e auxiliary spill ay sta in area to t e pri ary spill ay
- T e se tion of t e or inial eir as poured on a lar e oulder t at ad uplifted, resultin in t e displa e ent of t e se tion
- T e lar e oulder ori inal eir se tion ere re o ed and left at t e spill ay as riprap on t e do nstrea side
- T e pipe t at ill run t rou t e iddle of t e auxiliary spill ay eir ill need to a e t o ydrop ili askets around it, a sand filter diap ra ill need to e pla ed around t e pipe it C33 on rete sand or si ilar
- Su Co ill send a su ittal for t e sand and F O ill issue a field order
- T o 12 pu ps and one 4 pu p ere in use, one 2 pu p as used in t e left trainin all ex a ation
- Water le el in Nort Easton Pond as 6 feet

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start 11:00	End 2:00	Start 7:00	End 3:00	Wednesday	08 30 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: Lawrence Lynch				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
1 Pro e t Mana er	Ex a ator CX350D			6 Re ar La orers Martin Brot ers			
2 Fore en	938M W eel Loader			1 Con rete Tester S.W. Cole			
	One 4 Pu p						
	One 2 Pu p						
	T o 12 Pu ps						
	2 Con rete Tru ks TM-630, TM-650						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed

La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Katie Cretella

Inspe tor s Na e

Offi ial Visitors To T e Jo atie Cretella	**City of Newport, RI** **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: Sunny PM: Sunny	Te p, Hi Lo HIGH - 72 F LOW - 55 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 2:00 p Site Arri al - Weir Wall Re ar Inspe tion

- Re ar for t e eir all as inspe ted and is in a ree ent it t e ontra t and details on t e plan set
- For t e re ar around t e lo off pipe: 4 ore 4 re ar ust e installed on ea exterior side of t e eir all re ar olu ns t at en lose t e lo off pipe an e ail as sent to Su Co notifyin t e of t is
- Measure ents of t e du tile lo off pipe, existin pipe, and ollar ere taken to aid in t e sand filter desi n see field note ook sket
- T e for ork as re o ed fro t e ri t trainin all
- 4 pu p as dis ar in lean ater into t e oat
- Nort Easton Pond ater le el as 6 feet

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date	
Start 2:00	End 2:40	Start 7:00	End 2:00	Friday	09 01 23	

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: Lawrence Lynch				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
No one on site at t is ti e	Ex a ator CX350D						
	W eel Loader 938M						
	2 12 Pu ps						
	1 4 Pu p						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed	La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Katie Cretella

Inspe tor s Na e

Offi ial Visitors To T e Jo	City of Newport, RI	Weat er	Te p, Hi Lo
Re e a Meyers atie Cretella Andrea Jud e	**Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	AM: Sunny PM: Sunny	HIGH - LOW -
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

10 a Site Arri al for Pro ress Meetin 2 it Su Co and t e City of Ne port

- T e City of Ne port ill supply C33 sand
- Ho to treat t e underside of t e lo off pipe ill e dis ussed
- T e on rete ill e arefully onsolidated around t e pipe. Con rete ill e i rated and sand and du ped. Craddle of on rete under sand
- Do not ant to o pro ise silty e ank ent aterial
- T e City ay need to a ess ouplin in t e future
- No an e order ill e needed for t e City to supply t e C33 sand
- Su Co to arefully onsolidate on rete under pipe
- Su Co ill re uild asonry to onne t asonry to ri t trainin all
- Water le el at ele ation 6.1 feet

.

Muni ipal Poli e On Site:	Lane Closures:
N A	N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start	End	Start	End		
10:00	12:00	7:00	3:00	Tuesday	09 05 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE							
Prime Contractor: Lawrence Lynch				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed	La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Rebecca Meyers

Inspe tor s Na e

Official Visitors To The Job	City of Newport, RI	Weather	Temp, (High/Low)
Ken Berchielli Rebecca Meyers Katie Cretella	**Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	AM: Sunny PM: Sunny	HIGH - 91°F LOW - 70°F
	Prime Contractor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 8:00 am Site Arrival

- Water level of 6.15 feet at 9:45am.
- One 4" and 2 12" pumps were running.
- The north section of the right training wall was backfilled and compacted according to contract specifications. The results can be seen below.
- E&S controls are in place and according to contract plans.
- Sections 1 and 3 of the weir wall poured. The weir wall is being skip poured. The first concrete load came from Cardi in Warwick, the second load of concrete came from Fall River Ready Mix. The Quality Control Test Results are as follows:
  - Slump: 6.5"
  - Air Content: 6%
  - Concrete Temp: 82°F
  - Air Temp: 90°F
  - 4 cylinders were cast (Job #: 320-06)
- The concrete slump of the first load when it arrived onsite was 2.75". This initial slump test was a preliminary test and the true quality control test was compeleted after multiple yards of the concrete had been poured and some water had been added. The second concrete load was stiff and it was difficult for the concrete to be poured down the shoot. Water was added to both concrete loads and was not quantified well.

North of Right Training Wall	
Lift	*Compaction*
1	*96.5%*
2	97.2%
3	96.8%
4	97.4%

Municipal Police On Site: N/A	Lane Closures: N/A

Inspector's Hours of Work		Contractor's Hours of Work		Day of Week	Date
Start	End	Start	End		
8:00	12:30	7:00	2:00	Thursday	09/07/23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
Labor	Equipment	EQ #	A / I	Labor & Equipment	SUB NO.	Labor & Equipment	SUB NO.
2 SumCo Workers	Excavator CX350D			1 S.W. Cole Workers for Compaction Testing		Nucular Density Tester	
	Wheel Loader 938M			3 Rebar Workers (Martin Bros.)			
	Small Excavator 304DCR						
	Wacker Neuson 1550A Vibratory Plate Compactor						
	Mikasa MTX-60 bouncing compactor						
	2 12" Pumps						
	1 4" Pump						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Description of Work / Reason

Time Work Performed	Labor, Material, and Equipment Involved

Non Compliance / Compliance Issues

Number	Brief Description	Location / Reference

Inspector's Certification

To the best of my knowledge, information and belief, all work described in this report was performed in substantial conformance with the contract. This statement is for the City's information only and does not place any obligation on the part of the City with regard to any party including but no limited to any subcontractor and contractor's surety.

Rebecca Meyers

Inspector's Name

Offi ial Visitors To T e Jo atie Cretella	City of Newport Easton Pond North Dam Auxiliary Spillway Repairs INSPECTOR'S DAILY REPORT	Weat er AM: Cloudy PM: Cloudy	Te p, Hi Lo HIGH - 81 F LOW - 72 F
	Pri e Contra tor SumCo Eco-Contracting		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

10:15 Site Arri al
- Water le el 5.9 feet
- Martin Brot ers orkin on tyin left trainin all re ar
- 4 pu p as dis ar in lean ater into oat
- 2 2 pu ps ere in t e left trainin all ex a ation
- Su Co as finis in ra k repairs on t e West trainin all at t e pri ary spill ay
  - T e front side of t e all is al ost o pleted, t e a kside fen e side ill e repaired next
- Se tions 2 and 4 of t e eir all are to e poured:
- Tru k 1 TM-700 arri ed 12:15 - as used on eir all se tion 2 and start of eir all se tion 4
- Air Te p: 80 F
- Slu p: 4
- Con rete Te p: 84 F
- Air Content: 9% - Quality ontrol tests ere perfor ed on t e first on rete released fro t e tru k
  - air ontent as redone en takin a sa ple for astin t e ylinders after at least 2 yards a e een poured
- Jo : 320-07
- Tru k 2 TM-680 arri ed 1:00 - as used on t e re ainder of eir all se tion 4
- Air Content: 8.5%
- 4 ylinders ast fro on rete fro Tru k 2

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start	End	Start	End		
10:15	2:00	7:00	2:00	Friday	09 08 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
2 La orers	938M W eel Loader			4 Re ar La orers Martin Brot ers			
	CX350D Ex a ator			1 Con rete Tester S.W. Cole			
	2 12 Pu ps						
	1 4 Pu ps						
	2 Con rete Tru ks TM-700, TM-680						
	2 2 Pu ps						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed

La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Katie Cretella

Inspe tor s Na e

Official Visitors To The Job	City of Newport, RI	Weather	Temp, (High/Low)
Rebecca Meyers	**Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	AM: Cloudy PM: Cloudy	HIGH - 62°F LOW - 51°F
	Prime Contractor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 8:30 am Site Arrival

- Rebar for left training wall was completed and inspected. Rebar is in accordance with contract plans.
- Martin Bros was installing formwork for left training wall.
- SumCo reported water behind the sandbag cofferdam due to the rain the previous day. SumCo lowered a section of sheeting on the sandbag cofferdam to let the water out. SumCo will replace the sheeting to ensure proper function of the sandbag cofferdam.
- Water was in front of the weir wall and in the excavation for the left training wall. Martin Bros started pumps when they arrived onto site to remove the water.
- Water level of 6.5 feet at 8:53 AM
-Repairs to the primary spillway were completed the day prior and were able to dry before the rain.
- SumCo will fill and replace rip rap over the excavated holes due to the underlying pipes at the left and right training walls.
- 2 12" pumps and one 4" pump were running.

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Municipal Police On Site:	Lane Closures:
N/A	N/A

Inspector's Hours of Work		Contractor's Hours of Work		Day of Week	Date
Start	End	Start	End		
8:30	9:45	7:00	2:00	Tuesday	09/12/23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
Labor	Equipment	EQ #	A / I	Labor & Equipment	SUB NO.	Labor & Equipment	SUB NO.
1 SumCo Worker	Excavator CX350D			3 Rebar Laborers (Martin Brothers)			
	Wheel Loader 938M						
	Small Excavator 304DCR						
	1 2" Pumps						
	2 12" Pumps						
	1 4" Pump						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Description of Work / Reason

Time Work Performed	Labor, Material, and Equipment Involved

Non Compliance / Compliance Issues

Number	Brief Description	Location / Reference

Inspector's Certification

To the best of my knowledge, information and belief, all work described in this report was performed in substantial conformance with the contract. This statement is for the City's information only and does not place any obligation on the part of the City with regard to any party including but no limited to any subcontractor and contractor's surety.

Rebecca Meyers

Inspector's Name

Offi ial Visitors To T e Jo atie Cretella	**City of Newport, RI** **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: Cloudy PM: Cloudy	Te p, Hi Lo HIGH - 76 F LOW - 68 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

10:30 Site Arri al
- Con rete as s eduled for 11:00 ut arri ed early efore 10:00
- First Con rete Tru k TM-660 as used to pour t e first part of t e left trainin all
- Quality Control Test Results:
  - Slu p: 5.5
  - Air Content: 8.5%
  - Con rete Te p: 80 F
  - Air Te p: 74 F
  - Test as ondu ted at 9:55
  - 4 ylinders ere ast Jo : 320-08
- Se ond Con rete Tru k TM-610 as used to pour t e re ainder of t e left trainin all
- 4 pu p as dis ar in lean ater into oat
- Water le el: 6.2 feet
- Repairs at t e pri ary spill ay are o plete, Su Co ill lean up displa ed ro ks infront of t e all oid on t e West trainin all
- T e re ar as een installed in t e ri t trainin all - stone asonry ap, no for ork as een installed yet, no on rete as een poured

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date	
Start	End	Start	End			
10:30	11:30	7:00	2:00	Wednesday	09 13 23	

PROJECT WORK FORCE AND EQUIPMENT ON SITE							
Prime Contractor: SumCo Eco-Contracting				**Subcontractor**		**Subcontractor / Utility**	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
1 La orer	Ex a ator CX350D			4 Re ar La orers Martin Brot ers			
	W eel Loader 938M			1 Con rete Tester S.W. Cole			
	1 4 Pu p						
	2 12 Pu ps						
	3 2 Pu ps						
	2 Con rete Tru ks TM-660, TM-610						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed

La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Katie Cretella

Inspe tor s Na e

Offi ial Visitors To T e Jo atie Cretella	**City of Newport, RI** **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: Sunny PM: Sunny	Te p, Hi Lo HIGH - 77 F LOW - 64 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 8:00 a Site Arri al

- Martin Bros. as re o in for ork fro eir all
- Ba kfillin ri t trainin all see field notes for o pa tion %
- T ere is a s all ra k in t e on rete around t e lo off pipe. Su Co used ra k sealant to pat t e ra k
- Water le el of 6.3 feet
- T e for ork as installed on t e ri t trainin all-stone asonry ap
- T e ri t trainin all-stone asonry ap as poured. Con rete tru k TM-610 arri ed at 12:50
  - No uality ontrol tests ere perfor ed
- Ba kfillin upstrea side of eir footin see field notes for o pa tion %

Weir Wall Se tion 1			
Downstream		**Upstream**	
Lift	*Compaction*	*Lift*	*Compaction*
1	97.9%	1	96.9%

Weir Wall Se tion 2			
Downstream		**Upstream**	
Lift	*Compaction*	*Lift*	*Compaction*
1	96.5%	1	95.2%

Weir Wall Se tion 3			
Downstream		**Upstream**	
Lift	*Compaction*	*Lift*	*Compaction*
1	98.7%	1	97.6%

Ri t Trainin Wall	
Lift	*Compaction*
1	97.7%

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start	End	Start	End		
8:00	2:00	7:00	2:00	T ursday	09 14 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
1 Pro e t Mana er	Ex a ator CX350D			3 Re ar La orers Martin Brot ers			
3 Fore en	W eel Loader 938M			2 S.W. Cole Workers for Co pa tion Testin			
	S all Ex a ator 304DCR						
	3 2 Pu ps						
	2 12 Pu ps						
	1 4 Pu p						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed	La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

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Katie Cretella

Inspe tor s Na e

Official Visitors To The Job	City of Newport, RI	Weather	Temp, (High/Low)
Rebecca Meyers	Easton Pond North Dam Auxiliary Spillway Repairs **INSPECTOR'S DAILY REPORT**	AM: Cloudy/Windy PM: Cloudy/Windy	HIGH - 79°F LOW - 68°F
	Prime Contractor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 8:15 am Site Arrival

- Primary Spillway right training wall void filled, left training wall and voids along weir need to be filled.
- Sandbag cofferdam sheeting had fallen off the sandbags. SumCo will reinstall sheeting.
- The sand filter was installed as according to Field Order #1. The City of Newport provided the sand and SumCo provided the non-woven geotextile fabric.
- The non-woven geotextile was originally cut to extend 3 feet on either side of the pipe. Another section was cut and placed to be extended 3 feet past the sand filter, as according to Field Order #1.
- The sand was compacted under the pipe with a shovel handle. One run with the vibratory compactor on each side of the pipe in the sand was completed. Embankment soil was placed on either side and over the sand filter and compacted.
- Backfilling of Weir Wall Sections 2 and 4 were completed and the results can be seen below.
- The water level was approximately 6.1 feet at 10am. There were a significant amount of small waves in the pond due to high winds from the residual Hurricane Lee. Cofferdam was holding against waves.
- 12-14" of riprap was planned to be placed over the compacted embankment material.
- 4" pump was running

Weir Wall Section 2			
Downstream		**Upstream**	
Lift	*Compaction*	*Lift*	*Compaction*
1	99.5%	1	99.8%
2 (top of subgrade)	99.0%	2	97.7%
		3 (top of subgrade)	97.5%

Weir Wall Section 4			
Downstream		**Upstream**	
Lift	*Compaction*	*Lift*	*Compaction*
1	96.2%	1	98.0%
2 (top of subgrade)	96.8%	2 (top of subgrade)	97.2%

.

Municipal Police On Site: N/A	Lane Closures: N/A

Inspector's Hours of Work		Contractor's Hours of Work		Day of Week	Date
Start	End	Start	End		
8:15	12:00	7:00	2:00	Friday	09/15/23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
Labor	Equipment	EQ #	A / I	Labor & Equipment	SUB NO.	Labor & Equipment	SUB NO.
1 SumCo worker	Excavator CX350D			1 Rebar Laborers (Martin Brothers)			
2 SumCo operators	Wheel Loader 938M			1 S.W. Cole Workers for Compaction Testing			
	Small Excavator 304DCR						
	3 2" Pumps						
	2 12" Pumps						
	1 4" Pump						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Description of Work / Reason

Time Work Performed	Labor, Material, and Equipment Involved

Non Compliance / Compliance Issues

Number	Brief Description	Location / Reference

Inspector's Certification

To the best of my knowledge, information and belief, all work described in this report was performed in substantial conformance with the contract. This statement is for the City's information only and does not place any obligation on the part of the City with regard to any party including but no limited to any subcontractor and contractor's surety.

Rebecca Meyers

Inspector's Name

Official Visitors To The Job	City of Newport, RI	Weather	Temp, (High/Low)
Dean Audet Rebecca Meyers Katie Cretella	**Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	AM: Sunny PM: Sunny	HIGH - 73°F LOW - 58°F
	Prime Contractor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 10:00 am Site Arrival

- Progress Meeting #3 was conducted on site from 10-11AM.
- Water level of 6.5 feet. Pond water level rose from 6.3 to 6.6. SumCo ran and is continuing to run 2 12" pumps to lower water level.
- 4" pump was running to dewater land side of Portadam.
- E&S controls are in place and according to contract plans.
- Sections 1 and 3 of the weir wall were backfilled and compacted with embankment fill according to contract plans and specs. See below for compaction results.
- Riprap was placed over weir wall section 2 (including on top of the sand filter). Smaller stones will be mixed in to the riprap that was placed.
- Primary left and right training wall voids were filled and riprap replaced.
- Portadam and sandbag cofferdam water control is still in place.

Weir Wall Section 1			
Downstream		**Upstream**	
Lift	*Compaction*	*Lift*	*Compaction*
1	98.8%	1	98.5%
2 (top of subgrade)	96.2%	2 (top of subgrade)	99.5%

Weir Wall Section 3			
Downstream		**Upstream**	
Lift	*Compaction*	*Lift*	*Compaction*
1	100.2%	1	98.1%
2 (top of subgrade)	97.6%	2 (top of subgrade)	98.4%

.

Municipal Police On Site: N/A	Lane Closures: N/A

Inspector's Hours of Work		Contractor's Hours of Work		Day of Week	Date
Start	End	Start	End		
10:00	1:30	7:00	2:00	Tuesday	09/19/23

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: SumCo Eco-Contracting				Subcontractor		Subcontractor / Utility	
Labor	Equipment	EQ #	A / I	Labor & Equipment	SUB NO.	Labor & Equipment	SUB NO.
1 SumCo Project Manager	Excavator CX350D			1 S.W. Cole Workers for Compaction Testing			
1 SumCo Worker	Wheel Loader 938M						
	Small Excavator 304DCR						
	3 2" Pumps						
	2 12" Pumps						
	1 4" Pump						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Description of Work / Reason

Time Work Performed	Labor, Material, and Equipment Involved

Non Compliance / Compliance Issues

Number	Brief Description	Location / Reference

Inspector's Certification

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Rebecca Meyers

Inspector's Name

Offi ial Visitors To T e Jo atie Cretella	**City of Newport, RI** **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: o er ast, li t rain PM: o er ast, li t rain	Te p, Hi Lo HIGH - 62 F LOW - 56 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 10:00 a site arri al
- Sand a offer a as een re o ed
- T e t o 12 pu ps a e een re o ed fro site
- Water le el: 7.3 feet
- O er t e eekend, Su Co o ered t e aterial to e used for a kfillin due to rain

Ri t Trainin Wall - Ri t Side			
Lift	*Compaction*	*Dry Density*	*Moisture Content*
1 top of su rade	95.9%	117.3	16%

Left Trainin Wall - Ri t Side			
Lift	*Compaction*	*Dry Density*	*Moisture Content*
1	97.0%	118.6	13.2%
2	97.2%	118.9	13.5%
3	96.6%	118.1	13.8%
4 top of su rade	No easure ents ere taken efore riprap as pla ed		

Left Trainin Wall - Left Side			
Lift	*Compaction*	*Dry Density*	*Moisture Content*
1	96.7%	118.1	13.9%
2	97.7%	119.4	14.4%
3	96.4%	117.9	13.2%
4	98.1%	119.9	14.0%
5	96.3%	117.8	14.5%
6	96.8%	118.3	15.1%

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date
Start	End	Start	End		
10:00	2:30	7:00	3:00	Monday	09 25 23

PROJECT WORK FORCE AND EQUIPMENT ON SITE							
Prime Contractor: SumCo Eco-Contracting				**Subcontractor**		**Subcontractor / Utility**	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
3 La orers	CX350D Ex a ator			1 Geisser Worker Co pa tion Testin			
	938M W eel Loader						
	304DCR Ex a ator						
	1 4 Pu p						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed	La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

To t e est of y kno led e, infor ation and elief, all ork des ri ed in t is report as perfor ed in su stantial onfor an e it t e ontra t. T is state ent is for t e City s infor ation only and does not pla e any o li ation on t e part of t e City it re ard to any party in ludin ut no li ited to any su ontra tor and ontra tor s surety.

Katie Cretella

Inspe tor s Na e

Offi ial Visitors To T e Jo atie Cretella Re e a Meyers Dean Audet	**City of Newport, RI** **Easton Pond North Dam Auxiliary Spillway Repairs** **INSPECTOR'S DAILY REPORT**	Weat er AM: Partly Cloudy PM: Partly Cloudy	Te p, Hi Lo HIGH - 68 F LOW - 50 F
	Pri e Contra tor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 8:00 a site arri al for su stantial o pletion eetin it Su Co Tea Lead and City of Ne port
- Sand a offerda and portada a e een dis antled portada is s eduled to e re o ed fro site today
- 4 pu p is no lon er in use t e 2 12 pu ps ere re o ed fro site on Monday 9 25
- Water le el: 7.6 feet
- Su Co extendin rip rap on do nstrea side of eir all

.

Muni ipal Poli e On Site: N A	Lane Closures: N A

Inspe tor s Hours of Work		Contra tor s Hours of Work		Day of Week	Date	
Start	End	Start	End			
8:00	9:15	7:00		T ursday	09 28 23	

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: Lawrence Lynch				Subcontractor		Subcontractor / Utility	
La or	E uip ent	EQ	A I	La or E uip ent	SUB NO.	La or E uip ent	SUB NO.
1 Pro e t Mana er	CX350D Ex a ator						
3 La orers	938M W eel Loader						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Des ription of Work Reason

Ti e Work Perfor ed	La or, Material, and E uip ent In ol ed

Non Compliance / Compliance Issues

Nu er	Brief Des ription	Lo ation Referen e

Inspe tor s Certifi ation

To t e est of y kno led e, infor ation and elief, all ork des ri ed in t is report as perfor ed in su stantial onfor an e it t e ontra t. T is state ent is for t e City s infor ation only and does not pla e any o li ation on t e part of t e City it re ard to any party in ludin ut no li ited to any su ontra tor and ontra tor s surety.

Katie Cretella

Inspe tor s Na e

Official Visitors To The Job	City of Newport, RI	Weather	Temp, (High/Low)
Rebecca Meyers	Easton Pond North Dam Auxiliary Spillway Repairs **INSPECTOR'S DAILY REPORT**	AM: Mostly Cloudy PM: Mostly Cloudy	HIGH - 57°F LOW - 27°F
	Prime Contractor **SumCo Eco-Contracting**		

Contractor/Subcontractor: Location, Description of Work Performed and Inspected

- 9:00 am site arrival for punch list inspection with SumCo Team Lead.
- Unused rebar and miscellaneous small debris (i.e. tarp, plastic) were on-site, SumCo Team Lead removed miscellaneous debris and unused rebar.
- Filter socks along temporary construction access route were left in place.
- Downstream right existing training wall was in a state of disrepair. This was previously in a state of disrepair before construction began. The City was notified of the current and previous state of the wall.
- The issue of the low strength concrete on the downstream left training wall was mitigated with a credit from SumCo of approximately half the cost of the right training wall ($11,000) in according with the City's preference.
- All remaining previously discussed punch list items had been addressed

.

Municipal Police On Site: N/A	Lane Closures: N/A

Inspector's Hours of Work		Contractor's Hours of Work		Day of Week	Date	
Start	End	Start	End			
9:00	10:30			Friday	12/15/23	

PROJECT WORK FORCE AND EQUIPMENT ON SITE

Prime Contractor: Lawrence Lynch				Subcontractor		Subcontractor / Utility	
Labor	Equipment	EQ #	A / I	Labor & Equipment	SUB NO.	Labor & Equipment	SUB NO.
1 Project Manager	SumCo Support Truck						

Problems / Delays / Accidents

Possible Extra Work / Cost Plus

Description of Work / Reason

Time Work Performed	Labor, Material, and Equipment Involved

Non Compliance / Compliance Issues

Number	Brief Description	Location / Reference

Inspector's Certification

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Rebecca Meyers

Inspector's Name

CARDI MATERIALS, LLC

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-11-2023	09:54	720	6		20034639

INVOICE TO:
SUMCO ECO
2 CENTENNIAL DRIVE

DELIVER TO:
100 BLISSMINE RD
Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
9.00	9.00	9.00	

1500 LEAN MIX

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH            14071/13940 lb <3.2%>  | CEMENT SILO 2  2700/ 2760 lb
3/4 WASHED STO     12240/12180 lb         |
3/8 WASHED STO      3088/ 3080 lb <0.9%>  |
------------- ----------- -- ------        |
DAREX II              18/   18 oz         |
CONCERASA8080        135/  135 oz         |
Water                206/  204 gal<55.2>  | Max: 279 gal Addable:  20 gal
154300AE                                      9.00  yds
```

CARDI MATERIALS, LLC

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-17-2023	11:50	670	8		20034708

INVOICE TO:
SUMCO ECO
2 CENTENNIAL DRIVE

DELIVER TO:
100 BLISSMINE RD
Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
9.00	9.00	9.00	

4500 3/4 AE

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH            10785/10730 lb <3.3%>  CEMENT SILO 2   4734/ 4750 lb
3/4 WASHED STO     11656/11610 lb <0.4%>  SLAG CEMENT     1188/ 1190 lb
3/8 WASHED STO      3924/ 3920 lb <1.4%>
DAREX II              29/   29 oz
CONCERASA8080        238/  240 oz
Water                226/  224 gal<53.2>  Max: 297 gal Addable:  20 gal
S454658AE                                   9.00  yds
```

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WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-21-2023	09:51	700	3		20034741

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
7.00	7.00	13.00	

1500 LEAN MIX

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH            10913/10850 lb <2.9%>   CEMENT SILO 1   2100/ 2175 lb
3/4 WASHED STO      9558/ 9530 lb <0.4%>
3/8 WASHED STO      2394/ 2390 lb <0.6%>
DAREX II              14/   14 oz
CONCERASA8080        105/  106 oz
Water                160/  159 gal<43.0>   Max: 217 gal Addable:  15 gal
154300AE                                     7.00  yds
```

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WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-21-2023	10:47	670	3		20034742

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
6.00	13.00	13.00	

1500 LEAN MIX

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT#	TRUCK#	TIME:	TICKET#

```
SAND HH              9354/ 9290 lb <2.9%>  CEMENT SILO 1  1800/ 1880 lb
3/4 WASHED STO       8193/ 8210 lb <0.4%>
3/8 WASHED STO       2052/ 2060 lb <0.6%>
DAREX II               12/   12 oz
CONCERASA8080          90/   91 oz
Water                 137/  136 gal<36.8>  Max: 186 gal Addable:  13 gal
154300AE                                     6.00  yds
```

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400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-23-2023	11:57	410	18		20034788

INVOICE TO:
SUMCO ECO
2 CENTENNIAL DRIVE

DELIVER TO:
100 BLISSMINE RD
Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
10.00	10.00	10.00	

4500 3/4 AE

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RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH           11925/11830 lb <2.8%> | CEMENT SILO 1   5260/ 5295 lb
3/4 WASHED STO    12900/12870 lb        | SLAG CEMENT     1320/ 1325 lb
3/8 WASHED STO     4343/ 4320 lb <1.0%> |
-------------     ----------- -- ------ |
DAREX II             32/   32 oz        |
CONCERASA8080       265/  266 oz        |
Water               266/  264 gal<43.8> | Max: 330 gal Addable:  22 gal
S454658AE                               |  10.00 yds
```

CARDI MATERIALS, LLC

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WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-24-2023	11:16	680	8		20034815

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
7.00	7.00	13.00	

4500 3/4 AE

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RECEIVED BY: S W Cole

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH          8355/ 8300 lb <2.9%> | CEMENT SILO 2   3682/ 3685 lb
3/4 WASHED STO   9030/ 9060 lb        | SLAG CEMENT      924/  935 lb
3/8 WASHED STO   3031/ 3010 lb <0.7%> |
-------------- ----------- -- ------  |
DAREX II           22/   22 oz        |
CONCERASA8080     186/  188 oz        |
Water             186/  185 gal<30.6> | Max: 231 gal Addable:  15 gal
S454658AE                             |   7.00  yds
```

CARDI MATERIALS, LLC

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WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-24-2023	11:40	670	8		20034818

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
6.00	13.00	13.00	

4500 3/4 AE

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH            7162/ 7090 lb <2.9%> | CEMENT SILO 2   3156/ 3165 lb
3/4 WASHED STO     7740/ 7790 lb        | SLAG CEMENT      792/  795 lb
3/8 WASHED STO     2598/ 2600 lb <0.7%> |
-------------- ----------- -- ------
DAREX II             19/   19 oz
CONCERASA8080       159/  161 oz
Water               160/  159 gal<26.2> | Max: 198 gal Addable:  13 gal
S454658AE                                  6.00  yds
```

CARDI MATERIALS, LLC

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-24-2023	12:52	700	17		20034822

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
7.00	7.00	7.00	

1500 LEAN MIX

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH          10913/10820 lb <2.9%>  | CEMENT SILO 2  2100/ 2145 lb
3/4 WASHED STO    9520/ 9550 lb          |
3/8 WASHED STO    2397/ 2390 lb <0.7%>   |
-------------- ----------- -- ------     |
DAREX II            14/   14 oz          |
CONCERASA8080      105/  107 oz          |
Water              164/  163 gal<38.6>   | Max: 217 gal Addable:  15 gal
154300AE                                 |  7.00  yds
```

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-30-2023	10:39	630	3		20034905

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
6.00	6.00	12.00	

4500 3/4 AE

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH           7155/ 7120 lb <2.8%>   CEMENT SILO 1   3156/ 3200 lb
3/4 WASHED STO    7748/ 7750 lb <0.1%>   SLAG CEMENT      792/  815 lb
3/8 WASHED STO    2611/ 2590 lb <1.2%>
DAREX II            19/   19 oz
CONCERASA8080      159/  161 oz
Water              158/  157 gal<27.9>   Max: 198 gal Addable:  13 gal
S454658AE                                 6.00  yds
```

CARDI MATERIALS, LLC

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
08-30-2023	11:44	650	3		20034907

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
6.00	12.00	12.00	

4500 3/4 AE

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH          7155/ 7120 lb <2.8%>  CEMENT SILO 1   3156/ 3215 lb
3/4 WASHED STO   7748/ 7830 lb <0.1%>  SLAG CEMENT      792/  785 lb
3/8 WASHED STO   2611/ 2590 lb <1.2%>
DAREX II           19/   19 oz
CONCERASA8080     159/  161 oz
Water             158/  158 gal<27.9>  Max: 198 gal Addable:  12 gal
S454658AE                                6.00  yds
```

CARDI MATERIALS, LLC

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
09-07-2023	09:54	650	7		20035025

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
7.00	14.00	14.00	

4500 3/4 AE

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH           8323/ 8280 lb <2.5%> | CEMENT SILO 1   3682/ 3705 lb
3/4 WASHED STO    9039/ 9030 lb <0.1%> | SLAG CEMENT      924/  920 lb
3/8 WASHED STO    3022/ 3010 lb <0.4%> |
DAREX II            22/   22 oz        |
CONCERASA8080      186/  188 oz        |
Water              190/  189 gal<26.8> | Max: 231 gal Addable:  15 gal
S454658AE                              |   7.00  yds
```

CARDI MATERIALS, LLC

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
09-08-2023	11:22	700	2		20035052

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
7.00	7.00	14.00	

4500 3/4 AE
RECOVER 3

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH            8380/ 8330 lb <3.2%>
3/4 WASHED STO     9030/ 9060 lb
3/8 WASHED STO     3025/ 3020 lb <0.5%>
------------- ---------- -- ------
DAREX II             22/   22 oz
CONCERASA8080       186/  187 oz
RECOVER             161/  161 oz
Water               184/  183 gal<32.8>
S454658AE

CEMENT SILO 1   3682/ 3765 lb
SLAG SILO5       924/ 1030 lb

Max: 231 gal Addable:  15 gal
 7.00  yds
```

CARDI MATERIALS, LLC

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
09-08-2023	12:05	680	2		20035054

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
7.00	14.00	14.00	

4500 3/4 AE
RECOVER 3

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH          8380/ 8330 lb <3.2%>   CEMENT SILO 1   3682/ 3680 lb
3/4 WASHED STO   9030/ 9030 lb          SLAG CEMENT      924/  925 lb
3/8 WASHED STO   3025/ 3000 lb <0.5%>
-------------- ----------- -- ------
DAREX II           22/   22 oz
CONCERASA8080     186/  188 oz
RECOVER           161/  161 oz
Water             184/  183 gal<32.8>   Max: 231 gal Addable:  15 gal
S454658AE                                7.00  yds
```

CARDI MATERIALS, LLC

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
09-13-2023	08:48	660	3		20035130

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
7.00	7.00	14.00	

4500 3/4 AE

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH          8380/ 8330 lb <3.2%>   CEMENT SILO 1   3682/ 3735 lb
3/4 WASHED STO   9075/ 9110 lb <0.5%>   SLAG CEMENT      924/  930 lb
3/8 WASHED STO   3058/ 3050 lb <1.6%>
-------------- ----------- -- ------
DAREX II           22/   22 oz
CONCERASA8080     186/  188 oz
Water             175/  174 gal<42.2>   Max: 231 gal Addable:  15 gal
S454658AE                                 7.00  yds
```

MAIN OFFICE
400 LINCOLN AVE
WARWICK, RI
401-739-8300 FAX: 401-736-2977

FALL RIVER PLANT
245 TRIPP ST
FALL RIVER, MA
508-675-7540

DATE:	TIME:	TRUCK#	JOB#	CARDI#	TICKET NO.
09-13-2023	09:33	610	3		20035133

INVOICE TO:	DELIVER TO:
SUMCO ECO 2 CENTENNIAL DRIVE	100 BLISSMINE RD Newport RI

CONTRACT#	PO#	LEAVE PLANT:	ARRIVE JOB:	LEAVE JOB:
8203	EASTONS POND			

LOAD QTY:	QTY DELIVERED:	QTY ORDERED:	INSTRUCTIONS:
7.00	14.00	14.00	

4500 3/4 AE

MAKE SURE YOU ARE WEARING THE PROPER PPE WHEN WORKING WITH FRESHLY MIXED CONCRETE AS IT CAN CAUSE IRRITATION OR WORSE, CHEMICAL BURNS. CUSTOMER MUST PROVIDE A PROPER WASHOUT AREA FOR ALL DEILVERIES. CUSTOMER ASSUMES ALL PENALTIES IF NONE IS PROVIDED. PRICE FOR THIS DELIVERY IS BASED ON THE CUSTOMERS TAKING A REASONABLE TIME TO UNLOAD THE TRUCK. A REASONABLE TIME IS CONSIDERED 5 MINUTES PER YARD. IF THE TRUCK IS DELAYED BEYOND THIS TIME A CHARGE OF $125.00 PER HOUR WILL BE MADE FOR THE TIME THE TRUCK IS HELD.

RECEIVED BY:

CARDI MATERIALS BATCH WEIGHTS

PLANT# TRUCK# TIME: TICKET#

```
SAND HH          8380/ 8340 lb <3.2%>   CEMENT SILO 1   3682/ 3700 lb
3/4 WASHED STO   9075/ 9110 lb <0.5%>   SLAG CEMENT      924/  930 lb
3/8 WASHED STO   3058/ 3040 lb <1.6%>
------------- ---------- -- ------
DAREX II          . 22/   22 oz
CONCERASA8080      186/  187 oz
Water              175/  174 gal<42.2>  Max: 231 gal Addable:  15 gal
S454658AE                                 7.00  yds
```

Section G

Quality Control Testing Results

S.W.COLE ENGINEERING, INC.

Report of Concrete Compressive Strength

ASTM C-31 C-39 C-1231

Project Name: Ne port RI - Eastern Pond Nort Da n Spill ay Repairs - Constru tion Materials Testin Ser i es

Client: Su Co E o Contra tin , LLC

General Contractor: Martin Brot ers

Project Number: 23-1338

Report Date: 10 12 2023

Client Contract Number:

Concrete Supplier: FALL RIVER READY MIX

PLACEMENT INFORMATION

Date Cast: 8 17 2023 **Time Cast:** 13:40 **Date Received:** 8 18 2023

Placement Location: Nort Da Spill ay Repairs

Placement Method: Dire t Dis ar e

Cylinders Made By: Sallie Ro inson

Material Type: Con rete

Placement Vol. (yd³): 9

Aggregate Size (in): 3 4

Cylinder Size: 4x8

INITIAL CURING CONDITION

Temperatures

Minimum (ºF) **Maximum (ºF)**

DELIVERY INFORMATION

Admixtures:

TEST RESULTS

Slump (in) (C-143): 4 1 2

Air Content (%) (C-231) 8.0

Air Temp (ºF): 72

Conc. Temp (ºF) (C-1064): 78

Load Number: 1

Mixer Number: 670

Ticket Number 20034708

Cubic Yards: 9

Design (psi): **4500**

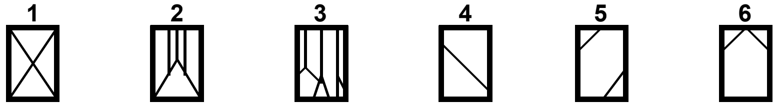
Batch 11:50

Arrive 13:00

Depart 13:50

Cylinder Desi nation	Defe t Y N	Cylinder Wei t l s	Cylinder Dia eter in	Cross Se tional Area In	Date Of Test	Cure Type	Cap Type	**Age (days)**	Fra ture Type	Load kips	**Strength (psi)**
320-1A	N	8.00	4.00	12.57	8 24 2023	La	Un onded	**7**	2	40.0	**3180**
320-1B	N	8.00	4.02	12.66	8 24 2023	La	Un onded	**7**	2	40.0	**3160**
320-1C	N	8.00	4.00	12.57	9 14 2023	La	Un onded	**28**	2	54.0	**4300**
320-1D	N	8.00	4.05	12.88	10 12 2023	La	Un onded	**56**	2	60.0	**4660**

Fra ture Types



1 Cone ot ends
2 Cone one end split
3 Colu nar
4 Dia onal
5 Side at top or otto
6 Pointed End

Re arks:

Re ie ed By

227 Wampanoag Trail, Riverside, RI 02915

GEISSER ENGINEERING
A Division of S.W.COLE Engineering, Inc.

Report of Concrete Compressive Strength

ASTM C-31 C-39 C-1231

Project Name: Ne port RI - Eastern Pond Nort Da n Spill ay Repairs - Constru tion Materials Testin Ser i es

Client: Su Co E o Contra tin , LLC

General Contractor: Martin Brot ers

Project Number: 23-1338

Report Date: 9 20 2023

Client Contract Number:

Concrete Supplier: CARDI CORPORATION

PLACEMENT INFORMATION

Date Cast: 8 23 2023 **Time Cast:** 1:40

Date Received: 8 24 2023

Placement Location: WEIR WALL FOOTING

Placement Method: Dire t Dis ar e

Cylinders Made By: E ilia Gre ory

Material Type: Con rete

Placement Vol. (yd³): 10

Aggregate Size (in): 3 4

Cylinder Size: 4x8

INITIAL CURING CONDITION

Temperatures

Minimum (ºF) **Maximum (ºF)**

DELIVERY INFORMATION

Admixtures: AE

TEST RESULTS

Slump (in) (C-143): 3 1 2

Air Content (%) (C-231) 5.2

Air Temp (ºF): 74

Conc. Temp (ºF) (C-1064): 75

Load Number: 1

Mixer Number: 410

Ticket Number 20034788

Cubic Yards: 10

Design (psi): **4500**

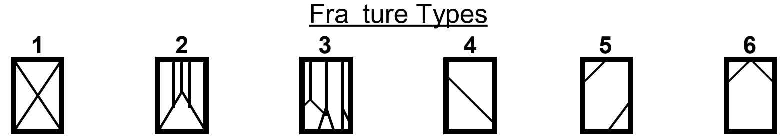
Batch 11:57

Arrive 1:00

Depart 1:45

Cylinder Desi nation	Defe t Y N	Cylinder Wei t l s	Cylinder Dia eter in	Cross Se tional Area In	Date Of Test	Cure Type	Cap Type	**Age (days)**	Fra ture Type	Load kips	**Strength (psi)**
320-2A	N	8.30	4.02	12.66	8 30 2023	La	Un onded	**7**	2	48.0	**3790**
320-2B	N	8.30	4.01	12.63	9 20 2023	La	Un onded	**28**	2	64.0	**5070**
320-2C	N	8.30	4.01	12.63	9 20 2023	La	Un onded	**28**	3	65.0	**5150**
320-2D	N	8.30	4.01	12.63	9 20 2023	La	Un onded	**28**	2	61.0	**4830**

Fra ture Types



1 Cone ot ends | 2 Cone one end split | 3 Colu nar | 4 Dia onal | 5 Side at top or otto | 6 Pointed End

Re arks:

Re ie ed By

227 Wampanoag Trail, Riverside, RI 02915

Report of Concrete Compressive Strength

ASTM C-31 C-39 C-1231

S.W.COLE ENGINEERING, INC.

Project Name: Ne port RI - Eastern Pond Nort Da n Spill ay Repairs - Constru tion Materials Testin Ser i es

Client: Su Co E o Contra tin , LLC

General Contractor: Martin Brot ers

Project Number: 23-1338

Report Date: 10 19 2023

Client Contract Number:

Concrete Supplier: FALL RIVER READY MIX

PLACEMENT INFORMATION

Date Cast: 8 24 2023 **Time Cast:** 12:30 **Date Received:** 8 25 2023

Placement Location: RIGHT TRAINING WALL

Placement Method: Dire t Dis ar e

Cylinders Made By: Ada Rodri ue

Material Type: Con rete

Placement Vol. (yd³): 13

Aggregate Size (in): 3 4

Cylinder Size: 4x8

INITIAL CURING CONDITION

Temperatures

Minimum (ºF) **Maximum (ºF)**

DELIVERY INFORMATION

Admixtures: AE

TEST RESULTS

Slump (in) (C-143): 7

Air Content (%) (C-231) 8.3

Air Temp (ºF): 73

Conc. Temp (ºF) (C-1064): 80

Load Number: 1

Mixer Number: 680

Ticket Number 20034815

Cubic Yards: 7

Design (psi): **4500**

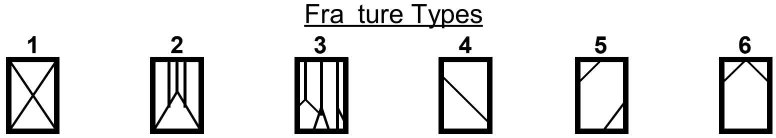
Batch 11:16

Arrive 12:00

Depart 12:30

Cylinder Desi nation	Defe t Y N	Cylinder Wei t l s	Cylinder Dia eter in	Cross Se tional Area In	Date Of Test	Cure Type	Cap Type	**Age (days)**	Fra ture Type	Load kips	**Strength (psi)**
320-3A	N	7.96	4.00	12.53	8 31 2023	La	Un onded	**7**	2	38.0	**3030**
320-3B	N	7.97	4.02	12.66	9 21 2023	La	Un onded	**28**	5	52.0	**4110**
320-3C	N	7.98	4.02	12.69	10 19 2023	La	Un onded	**56**	5	57.0	**4490**
320-3D	N	8.01	4.02	12.69	10 19 2023	La	Un onded	**56**	3	60.0	**4730**

Fra ture Types



1 Cone ot ends — 2 Cone one end split — 3 Colu nar — 4 Dia onal — 5 Side at top or otto — 6 Pointed End

Re arks:

Re ie ed By

227 Wampanoag Trail, Riverside, RI 02915

Report of Concrete Compressive Strength

ASTM C-31 C-39 C-1231

Project Name: Ne port RI - Eastern Pond Nort Da n Spill ay Repairs - Constru tion Materials Testin Ser i es

Project Number: 23-1338

Report Date: 10 19 2023

Client: Su Co E o Contra tin , LLC

Client Contract Number:

General Contractor: Martin Brot ers

Concrete Supplier: FALL RIVER READY MIX

PLACEMENT INFORMATION

Date Cast: 8 24 2023 **Time Cast:** 1:10

Date Received: 8 25 2023

Placement Location: RIGHT TRAINING WALL

Placement Method: Dire t Dis ar e

Placement Vol. (yd³): 13

Cylinders Made By: Ada Rodri ue

Aggregate Size (in): 3 4

Material Type: Con rete

Cylinder Size: 4x8

INITIAL CURING CONDITION

Temperatures

Minimum (ºF) **Maximum (ºF)**

DELIVERY INFORMATION

Admixtures: AE

TEST RESULTS

Slump (in) (C-143): 4

Air Content (%) (C-231) 7.4

Air Temp (ºF): 73

Conc. Temp (ºF) (C-1064): 81

Load Number: 2

Mixer Number: 670

Ticket Number 20034818

Cubic Yards: 6

Design (psi): **4500**

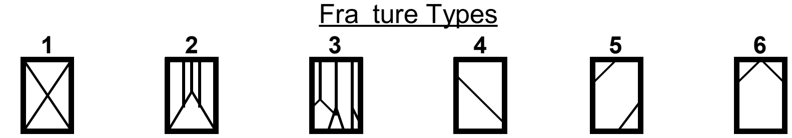
Batch 11:40

Arrive 12:40

Depart 1:20

Cylinder Desi nation	Defe t Y N	Cylinder Wei t l s	Cylinder Dia eter in	Cross Se tional Area In	Date Of Test	Cure Type	Cap Type	**Age (days)**	Fra ture Type	Load kips	**Strength (psi)**
320-4A	N	8.16	4.00	12.53	8 31 2023	La	Un onded	**7**	5	44.0	**3510**
320-4B	N	8.15	4.02	12.66	9 21 2023	La	Un onded	**28**	3	56.0	**4420**
320-4C	N	8.17	4.02	12.69	10 19 2023	La	Un onded	**56**	3	66.0	**5200**
320-4D	N	8.12	4.02	12.69	10 19 2023	La	Un onded	**56**	3	67.0	**5280**

Fra ture Types



Cone ot ends | Cone one end split | Colu nar | Dia onal | Side at top or otto | Pointed End

Re arks:

Re ie ed By

227 Wampanoag Trail, Riverside, RI 02915

GEISSER ENGINEERING
A Division of S.W.COLE Engineering, Inc.

Report of Concrete Compressive Strength

ASTM C-31 C-39 C-1231

Project Name: Ne port RI - Eastern Pond Nort Da n Spill ay Repairs - Constru tion Materials Testin Ser i es

Client: Su Co E o Contra tin , LLC

General Contractor: Martin Brot ers

Project Number: 23-1338

Report Date: 9 27 2023

Client Contract Number:

Concrete Supplier: FALL RIVER READY MIX

PLACEMENT INFORMATION

Date Cast: 8 30 2023 **Time Cast:** 12:15

Date Received: 8 31 2023

Placement Location: LEFT TRAINING FOOTING

Placement Method: Dire t Dis ar e

Cylinders Made By: Ada Rodri ue

Material Type: Con rete

Placement Vol. (yd³): 12

Aggregate Size (in): 3 4

Cylinder Size: 4x8

INITIAL CURING CONDITION

Temperatures

Minimum (ºF) **Maximum (ºF)**

DELIVERY INFORMATION

Admixtures: AE

TEST RESULTS

Slump (in) (C-143): 3 1 4

Air Content (%) (C-231) 7.1

Air Temp (ºF): 74

Conc. Temp (ºF) (C-1064): 84

Load Number: 1

Mixer Number: 630

Ticket Number 20034905

Cubic Yards: 6

Design (psi): **4500**

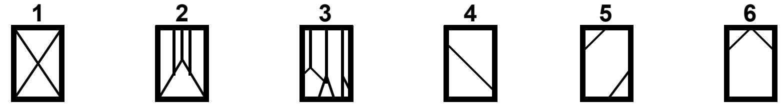
Batch 10:39

Arrive 11:40

Depart 12:25

Cylinder Desi nation	Defe t Y N	Cylinder Wei t l s	Cylinder Dia eter in	Cross Se tional Area In	Date Of Test	Cure Type	Cap Type	**Age (days)**	Fra ture Type	Load kips	**Strength (psi)**
320-5A	N	8.00	4.01	12.63	9 6 2023	La	Un onded	**7**	3	43.0	**3410**
320-5B	N	8.10	4.01	12.60	9 27 2023	La	Un onded	**28**	5	63.0	**5000**
320-5C	N	8.10	4.01	12.60	9 27 2023	La	Un onded	**28**	3	64.0	**5080**
320-5D	N	8.10	4.01	12.60	9 27 2023	La	Un onded	**28**	3	64.0	**5080**

Fra ture Types



1 Cone ot ends
2 Cone one end split
3 Colu nar
4 Dia onal
5 Side at top or otto
6 Pointed End

Re arks:

Re ie ed By

227 Wampanoag Trail, Riverside, RI 02915

Report of Concrete Compressive Strength

ASTM C-31 C-39 C-1231

S.W.COLE ENGINEERING, INC.

Project Name: Ne port RI - Eastern Pond Nort Da n Spill ay Repairs - Constru tion Materials Testin Ser i es

Client: Su Co E o Contra tin , LLC

General Contractor: Martin Brot ers

Project Number: 23-1338

Report Date: 10 5 2023

Client Contract Number:

Concrete Supplier: CARDI CORPORATION

PLACEMENT INFORMATION

Date Cast: 9 7 2023 **Time Cast:** 10:15 **Date Received:** 9 8 2023

Placement Location: WEIR WALL - NORTH MID SECTIONS

Placement Method: Dire t Dis ar e

Cylinders Made By: Rodney Ha kins

Material Type: Con rete

Placement Vol. (yd³): 14

Aggregate Size (in): 3 4

Cylinder Size: 4x8

INITIAL CURING CONDITION

Temperatures

Minimum (ºF) **Maximum (ºF)**

DELIVERY INFORMATION

Admixtures: DAREX II - 22 O .
CONCERASA8080 - 188 O

TEST RESULTS

Slump (in) (C-143): 6 1 2

Air Content (%) (C-231): 6

Air Temp (ºF): 84

Conc. Temp (ºF) (C-1064): 82

Load Number: 1

Mixer Number: 410

Ticket Number 20035021

Cubic Yards: 7

Design (psi): **4500**

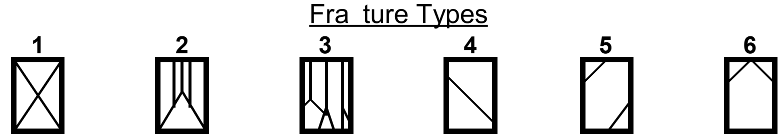
Batch 9:10

Arrive 10:00

Depart 11:15

Cylinder Desi nation	Defe t Y N	Cylinder Wei t l s	Cylinder Dia eter in	Cross Se tional Area In	Date Of Test	Cure Type	Cap Type	**Age (days)**	Fra ture Type	Load kips	**Strength (psi)**
320-6A	N	8.00	4.02	12.69	9 14 2023	La	Un onded	**7**	3	35.0	**2760**
320-6B	N	8.00	4.00	12.57	9 21 2023	La	Un onded	**14**	3	45.0	**3580**
320-6C	N	8.00	4.01	12.63	10 5 2023	La	Un onded	**28**	3	56.0	**4440**
320-6D		8.00			11 2 2023	La	Un onded	**56**			

Fra ture Types



Re arks:

Re ie ed By

227 Wampanoag Trail, Riverside, RI 02915

Report of Concrete Compressive Strength

S.W.COLE ENGINEERING,INC.

ASTM C-31 C-39 C-1231

Project Name: Ne port RI - Eastern Pond Nort Da n Spill ay Repairs - Constru tion Materials Testin Ser i es

Client: Su Co E o Contra tin , LLC

General Contractor: Su Co E o Contra tin Martin Bros.

Project Number: 23-1338

Report Date: 10 6 2023

Client Contract Number:

Concrete Supplier: FALL RIVER READY MIX

PLACEMENT INFORMATION

Date Cast: 9 8 2023 **Time Cast:** 12:45 **Date Received:**

Placement Location: Finis Weir Wall

Placement Method: Dire t Dis ar e

Cylinders Made By: Sallie Ro inson

Material Type: Con rete

Placement Vol. (yd³): 14

Aggregate Size (in): 3 4

Cylinder Size: 4x8

INITIAL CURING CONDITION

Temperatures

Minimum (ºF) **Maximum (ºF)**

DELIVERY INFORMATION

Admixtures: Darex II Re o er 3

TEST RESULTS

Slump (in) (C-143): 4.0

Air Content (%) (C-231) 8.5

Air Temp (ºF): 78

Conc. Temp (ºF) (C-1064): 84

Load Number: 1

Mixer Number: 700

Ticket Number 20035052

Cubic Yards: 7

Design (psi): **4500**

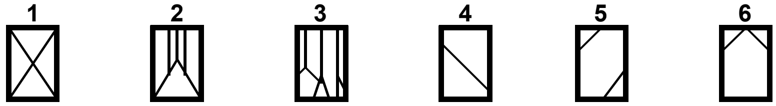
Batch 11:22

Arrive 12:17

Depart 12:55

Cylinder Desi nation	Defe t Y N	Cylinder Wei t l s	Cylinder Dia eter in	Cross Se tional Area In	Date Of Test	Cure Type	Cap Type	**Age (days)**	Fra ture Type	Load kips	**Strength (psi)**
320-7A	N	8.00	4.02	12.69	9 15 2023	La	Un onded	**7**	2	40.0	**3150**
320-7B	N	8.00	4.01	12.63	10 6 2023	La	Un onded	**28**	5	57.0	**4510**
320-7C	N	8.10	4.01	12.63	10 6 2023	La	Un onded	**28**	6	58.0	**4590**
320-7D	N	8.00	4.01	12.63	10 6 2023	La	Un onded	**28**	5	60.0	**4750**

Fra ture Types



1 Cone ot ends

2 Cone one end split

3 Colu nar

4 Dia onal

5 Side at top or otto

6 Pointed End

Re arks:

Re ie ed By

227 Wampanoag Trail, Riverside, RI 02915

Report of Concrete Compressive Strength

S.W.COLE ENGINEERING,INC.

ASTM C-31 C-39 C-1231

Project Name: Ne port RI - Eastern Pond Nort Da n Spill ay Repairs - Constru tion Materials Testin Ser i es

Client: Su Co E o Contra tin , LLC

General Contractor: Su Co E o Contra tin Martin Bros.

Project Number: 23-1338

Report Date: 12 6 2023

Client Contract Number:

Concrete Supplier: FALL RIVER READY MIX

PLACEMENT INFORMATION

Date Cast: 9 13 2023 **Time Cast:** 9:55 **Date Received:** 9 14 2023

Placement Location: FINISH RETAINING WALL

Placement Method: Dire t Dis ar e **Placement Vol. (yd³):** 14

Cylinders Made By: Sallie Ro inson **Aggregate Size (in):** 3 4

Material Type: Con rete **Cylinder Size:** 4x8

INITIAL CURING CONDITION

Temperatures

Minimum (ºF) **Maximum (ºF)**

DELIVERY INFORMATION

Admixtures:

TEST RESULTS

Slump (in) (C-143): 5 1 2

Air Content (%) (C-231) 8.5

Air Temp (ºF): 74

Conc. Temp (ºF) (C-1064): 80

Load Number: 1

Mixer Number: 660

Ticket Number 20035130

Cubic Yards: 7

Design (psi): **4500**

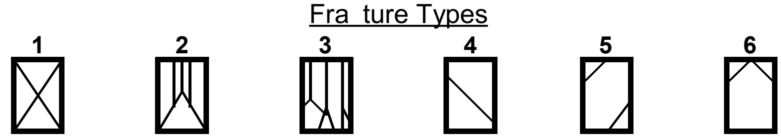
Batch 8:48

Arrive 9:45

Depart 10:10

Cylinder Desi nation	Defe t Y N	Cylinder Wei t l s	Cylinder Dia eter in	Cross Se tional Area In	Date Of Test	Cure Type	Cap Type	**Age (days)**	Fra ture Type	Load kips	**Strength (psi)**
320-8A	N	7.60	4.00	12.57	9 20 2023	La	Un onded	**7**	2	30.0	**2390**
320-8B	N	7.60	4.01	12.60	10 11 2023	La	Un onded	**28**	3	45.0	**3570**
320-8C	N	7.60	4.00	12.57	11 8 2023	La	Un onded	**56**	4	48.0	**3820**
320-8D	N	7.60	4.01	12.60	12 6 2023	La	Un onded	**84**	4	52.8	**4190**

Fra ture Types



1 Cone ot ends; 2 Cone one end split; 3 Colu nar; 4 Dia onal; 5 Side at top or otto; 6 Pointed End

Re arks:

Re ie ed By

227 Wampanoag Trail, Riverside, RI 02915

Soil Observation Report

GEISSER ENGINEERING
A Division of S.W.COLE Engineering, Inc.

Project Name:	Eastern Pond North Damn Spillway Repairs	**Project NO.:**	23-1338
Location:	Newport RI	**Date:**	9/7/2023
Client:	SumCo Eco Contracting, LLC	**Client Rep:**	Ron F. at SumCo Eco Contracting, LLC.
Weather:	Clear 80 - 85°F	**Geisser Rep:**	Rodney Hawkins
General Contractor:	SumCo Eco Contracting, LLC- GC & earthwork sitecrew.	**Time Onsite:**	07:30 - 13:30
Work Area:	Right Training Wall Backfill at the North End.		

Soil Observations	Observed	Comments
Subgrade Preparation	No	Subgrade previously prepared.
Fill Placement (Method and Uniformity)	Yes	The backfill was placed with the CATERPILLAR 938M front-loader and leveled with the CX- 350D excavator's bucket.
Material (Proper Type, Sample #)	Yes	LAB ID: 525R- Onsite Silty Gravel; Proctor Value- 122.2 pcf with moisture @ 10.9%.
Lift Thickness	Yes	1' lift layers.
Compaction (Equipment, Passes)	Yes	Wacker Neuson 1550A vibratory plate compactor & Mikasa MTX- 60 bouncing compactor- several back and forth passes with each.
In-place Densities (Frequency)	Yes	Four (4) density gauge tests performed, evenly representing today's lift layers.

Non-Conformance Items	Observed	Comments
Person Notified	Yes	No non-conformance issues.

Observations / Discussions:

Backfill was placed, leveled and compacted at the north end of the Right Training Wall. Once compacted, the material appeared firm, level and stable. Density gauge tests were conducted on the compacted lift layers. Gauge readings revealed compaction- over 95% of maximum denisty. Please refer to today's accompanying soils report for specific density gauge test locations and results.

Attachments: 4 Photos

Reviewed by: Andrew Michaud
9/7/2023 **Andrew Michaud**

Soil Observation Report

Compaction procedures underway on the Right Training Wall backfill (north end).

Backfill material being placed at the Right Training Wall (north end) with the CATERPILLAR 938M front-loader.

Soil Observation Report

Backfill material being leveled with the CX 350D excavator bucket.

"Compaction Equipment": The Wacker Neuson 1550A vibratory plate compactor & the Mikasa MTX-60 bouncing compactor.

Report of Field Density
ASTM D6938

GEISSER ENGINEERING
A Division of S.W.COLE Engineering, Inc.

Pro e t: **NEWPORT RI - EASTERN POND NORTH DAMN SPILLWAY REPAIRS - CONSTRUCTION MATERIALS TESTING SERVICES**

Pro e t Nu er: **23-1338**

Client: **SUMCO ECO CONTRACTING, LLC**

Field Density Test Results

Test #	Test Date	Tech	Test Location	Elev Feet	Test Depth	Lab ID	Dry Density	Moisture Content Percent	Compaction Percent	Required Compaction
1	9 7 2023	RH	RIGHT TRAINING WALL BAC FILL - N END	1ST LIFT	10	525R	117.9	11.4	96.5	95
2	9 7 2023	RH	RIGHT TRAINING WALL BAC FILL - N END	2ND LIFT	10	525R	118.8	11.6	97.2	95
3	9 7 2023	RH	RIGHT TRAINING WALL BAC FILL - N END	3RD LIFT	10	525R	118.3	11.2	96.8	95
4	9 7 2023	RH	RIGHT TRAINING WALL BAC FILL - N END	4TH LIFT	10	525R	119.0	11.8	97.4	95

Laboratory Compaction Test Reference

Lab ID	Date Received	Material Source	Material Type	Method	Max Dry Density PCF	Optimum Moisture Content (%)	Comments
525R	8 17 2023	Onsite - Sa ple 1	Silty Gra el	ASTM D-1557 Modified C	122.2	10.9	

Elevation Notes:

Comments:

BAC FILL WAS PLACED, LEVELED AND COMPACTED AT THE NORTH END OF THE RIGHT TRAINING WALL. ONCE COMPACTED, THE BAC FILL APPEARED FIRM, LEVEL STABLE.

DENSITY GAUGE TESTS WERE CONDUCTED ON EACH COMPACTED LIFT. GAUGE READINGS REVEALED COMPACTION - OVER 95% SOIL DENSITY.

Re ie ed By

Section H

Record and As-Built Drawings

LEGEND

124 / 125	EXISTING CONTOUR
× 123.45	EXISTING SPOT ELEVATION
×TW 123.45	EXISTING TOP OF WALL ELEVATION
×BW 122.95	EXISTING BOTTOM OF WALL ELEVATION
CB	CATCH BASIN OR INLET
S	SANITARY MANHOLE
	FIRE HYDRANT
WV	WATER VALVE
CLF	CHAIN LINK FENCE
HDPE	HIGH DENSITY POLYETHYLENE PIPE

GRAPHIC SCALE

40' 0 20' 40' 80' 160'

(IN FEET)
1 inch = 40 ft.

LOCUS MAP
© 2013 ESRI WORLD STREET MAPS
NOT TO SCALE

NOTES:

1. PROPERTY KNOWN AS LOT 731 AS SHOWN ON THE CITY OF NEWPORT, NEWPORT COUNTY, STATE OF RHODE ISLAND; ASSESSOR'S MAP NO. 11.

2. AREA = NOT CALCULATED.

3. LOCATION OF UNDERGROUND UTILITIES ARE APPROXIMATE. LOCATIONS AND SIZES ARE BASED ON UTILITY MARK-OUTS, ABOVE GROUND STRUCTURES THAT WERE VISIBLE & ACCESSIBLE IN THE FIELD, AND THE MAPS AS LISTED IN THE REFERENCES AVAILABLE AT THE TIME OF THE SURVEY. AVAILABLE AS-BUILT PLANS AND UTILITY MARKOUT DOES NOT ENSURE MAPPING OF ALL UNDERGROUND UTILITIES AND STRUCTURES. BEFORE ANY EXCAVATION IS TO BEGIN, ALL UNDERGROUND UTILITIES SHOULD BE VERIFIED AS TO THEIR LOCATION, SIZE AND TYPE BY THE PROPER UTILITY COMPANIES. CONTROL POINT ASSOCIATES, INC. DOES NOT GUARANTEE THE UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA EITHER IN SERVICE OR ABANDONED.

4. THIS PLAN IS BASED ON INFORMATION PROVIDED BY A SURVEY PREPARED IN THE FIELD BY CONTROL POINT ASSOCIATES, INC. AND OTHER REFERENCE MATERIAL AS LISTED HEREON.

5. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE COMMITMENT AND IS SUBJECT TO THE RESTRICTIONS, COVENANTS AND/OR EASEMENTS THAT MAY BE CONTAINED THEREIN.

6. BY GRAPHIC PLOTTING ONLY PROPERTY IS LOCATED IN FLOOD HAZARD ZONE AE (AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD; BASE FLOOD ELEVATIONS DETERMINED; ELEVATION VARIES) AND FLOOD HAZARD ZONE VE (SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD; COASTAL FLOOD ZONE WITH VELOCITY HAZARD (WAVE ACTION); BASE FLOOD ELEVATIONS DETERMINED; ELEV=16 (NAVD88)) PER REF. #2

7. ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON GPS OBSERVATIONS UTILIZING THE KEYSTONE VRS NETWORK (KEYNETGPS).

   TEMPORARY BENCH MARKS SET:

   TBM-C: BOX CUT SET CONC STRUCTURE OF SANITARY MANHOLE AT ELEVATION = 12.58'

   TBM-D: X-CUT SET IN BOLT OVER MAIN OUTLET OF FIRE HYDRANT SET AT ELEVATION= 8.84'

   PRIOR TO CONSTRUCTION IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THAT THE BENCHMARKS ILLUSTRATED ON THIS SKETCH HAVE NOT BEEN DISTURBED AND THEIR ELEVATIONS HAVE BEEN CONFIRMED. ANY CONFLICTS MUST BE REPORTED PRIOR TO CONSTRUCTION.

8. THE OFFSETS SHOWN ARE NOT TO BE USED FOR THE CONSTRUCTION OF ANY STRUCTURE, FENCE, PERMANENT ADDITION, ETC.

9. PLANIMETRIC AND TOPOGRAPHIC FEATURES COMPILED BY CONTROL POINT ASSOCIATES, INC. UTILIZING CONVENTIONAL METHODS AND PHOTOGRAMMETRIC METHODS FROM UAV PHOTOGRAPHY. UAV PHOTOGRAPHY PERFORMED BY CONTROL POINT ASSOCIATES, INC. ON JULY 6, 2022. THIS DATA SET WAS PRODUCED TO COMPLY WITH THE AMERICAN SOCIETY OF PHOTOGRAMMETRY AND REMOTE SENSING (ASPRS) CLASS 1 STANDARD FOR A HORIZONTAL MAPPING SCALE OF 1"=40'.

10. PER CONTRACTUAL AGREEMENT WITH CLIENT, CONTROL POINT ASSOCIATES, INC. HAS NOT PERFORMED A BOUNDARY SURVEY OF THE SUBJECT PROPERTY.

REFERENCES:

1. THE TAX ASSESSOR'S MAP OF NEWPORT, NEWPORT COUNTY, MAP #11.

2. MAP ENTITLED "NATIONAL FLOOD INSURANCE PROGRAM, FIRM, FLOOD INSURANCE RATE MAP, NEWPORT COUNTY, RHODE ISLAND (ALL JURISDICTIONS) PANEL 181 OF 226," MAP NUMBER 44005C0181J, MAP REVISED: SEPTEMBER 4, 2013.

THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED PURSUANT TO 435-RICR-00-00-1.9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND STATE BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON APRIL 28, 2018 AS FOLLOWS:

1. TYPE OF BOUNDARY SURVEY: MEASUREMENT SPECIFICATION
   NOT A BOUNDARY SURVEY

2. OTHER TYPE OF SURVEY: MEASUREMENT SPECIFICATION:

DATA ACCUMULATION SURVEY (PLANIMETRIC SURVEY, TOPOGRAPHIC SURVEY)	III
VERTICAL CONTROL STANDARD	V-4
TOPOGRAPHIC SURVEY ACCURACY	T-3

3. THE PURPOSE FOR THE CONDUCT OF THE SURVEY AND FOR THE PREPARATION OF THIS PLAN IS AS FOLLOWS:
   OBTAIN TOPOGRAPHIC AND PLANIMETRIC INFORMATION FOR USE AS A BACKGROUND DOCUMENT FOR SITE PLAN PREPARATION.

NOT A VALID ORIGINAL DOCUMENT UNLESS EMBOSSED WITH RAISED IMPRESSION OR STAMPED WITH A BLUE INK SEAL.

10-17-2023
DATE

CHARLES E. LENT
RHODE ISLAND PROFESSIONAL LAND SURVEYOR #1947
CERTIFICATE OF AUTHORIZATION #A350

FIELD DATE: 10-03-2023
FIELD BOOK NO.: 23-11 MA
FIELD BOOK PG.: 135
FIELD CREW: B.S.B.
DRAWN: E.G.F.

RECORD AS-BUILT SURVEY
FUSS & O'NEILL, INC.

100 BLISS MINE ROAD
MAP 11, LOT 731
CITY OF NEWPORT, NEWPORT COUNTY
STATE OF RHODE ISLAND

CONTROL POINT ASSOCIATES, INC.
352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
508.948.3000 - 508.948.3003 FAX
WWW.CPASURVEY.COM

ALBANY, NY 518-217-5010
CHALFONT, PA 215-712-9800
HAUPPAUGE, NY 631-580-2645
MANHATTAN, NY 646-780-0411
MT LAUREL, NJ 609-857-2099
WARREN, NJ 908-668-0099

REVIEWED:	APPROVED:	DATE	SCALE	FILE NO.	DWG. NO.
C.E.L.	C.E.L.	10-17-2023	1"=40'	03-210154-01	1 OF 1

THE STATE OF RHODE ISLAND REQUIRES NOTIFICATION BY EXCAVATORS, DESIGNERS, OR ANY PERSON PREPARING TO DISTURB THE EARTH'S SURFACE ANYWHERE IN THE COMMONWEALTH.

APPENDIX G: BUILDING OFFICIAL LETTER

TO: **Coastal Resources Management Council**
4808 Tower Hill Road Suite 3
Wakefield, RI 02879
Phone: (401) 783-3370

CRMC

FROM: Building Official

DATE: 2/13/25

SUBJ: Application of: Vegetative Clearing & Stabilization plan for old Sediment Basin

Location: 100 Bliss Mine Rd

Address: 100 Bliss Mine Rd Plat No. 11 Lot No. 731

To Construct: Vegetative Clearing & stabilization plan for old Sediment Basin

I hereby certify that I have reviewed ______ foundation plan(s).
______ plan(s) for entire structure
✓ site plans

Titled: Stabilization Plan

Date of Plan (last revision): ____________

✓ and find that the issuance of a local building permit is not required as in accordance with Section _____ of the Rhode Island State Building Code.

N/A and find that the issuance of a local building permit is required. I hereby certify that this permit shall be issued once the applicant demonstrates that the proposed construction/activity fully conforms to the applicable requirements of the RISBC.

N/A and find that a Septic System Suitability Determination (SSD) must be obtained from the RI Dept. of Environmental Management.

N/A and find that a Septic System Suitability Determination (SSD) need not be obtained from the RI Dept. of Environmental Management.

✓ and find that said plans conform with all elements of the zoning ordinance, and that if said plans require zoning board approval, that the applicant has secured such approval and that the requisite appeal period has passed with no appeal filed or appeal is final. The Zoning Board approval shall expire on ____________.

[signature] 2/15/25
Building Official's Signature Date

✓ and find that said plans conform with all elements of the zoning ordinance, and that if said plans require zoning board approval, that the applicant has secured such approval and that the requisite appeal period has passed with no appeal filed or appeal is final.

[signature] 2/18/25
Zoning Officer's Signature Date

rev. 5/11/2001

APPENDIX H: PROOF OF OWNERSHIP

CATALIS Newport, RI

Home | Search | Print | Previous | Next | Next Card

Disclaimer: This information is for tax assessing purposes and is not warranted

Parcel Identification

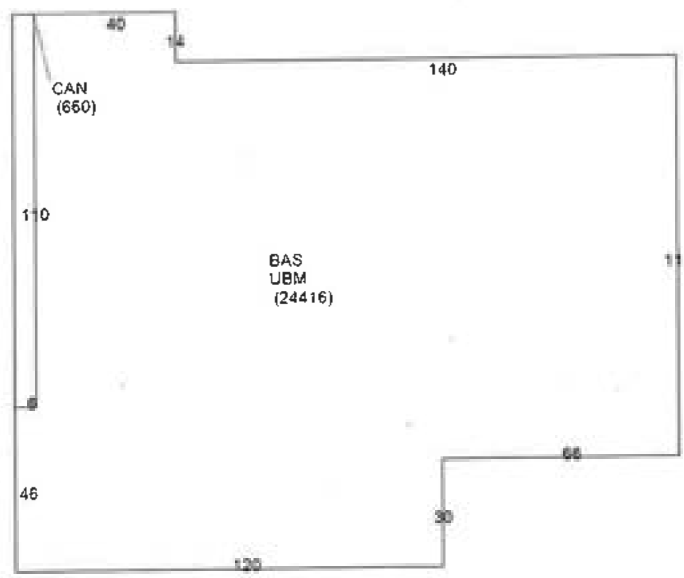
Map/Lot	11-731
Account	2300
State Code	78 - Municipal
Card	1/2
User Account	R02423

Assessment

Land	$2,066,500
Building	$6,803,500
Card Total	$8,870,000
Parcel Total	$9,048,100

Prior Assessments

Fiscal Year	Land Value	Building Value	Outbuilding Value	Total Value
2024	$2,066,500	$4,281,600	$2,700,000	$9,048,100
2023	$1,241,800	$2,942,300	$2,700,000	$6,884,100
2022	$1,241,800	$2,942,300	$2,700,000	$6,884,100
2021	$1,241,800	$2,942,300	$2,700,000	$6,884,100
2020	$1,252,900	$2,720,400	$2,700,000	$6,673,300



Location and Owner

Location	100 BLISS MINE RD
Owner	NEWPORT CITY OF
Owner2	
Owner3	
Address	CITY HALL
Address2	43 BROADWAY
Address3	NEWPORT RI 02840

Building Information

Design	Municipal
Year Built	1991
Heat	Forced Air-D
Fireplaces	0
Rooms	0
Bedrooms	0
Bathrooms	1 Half Bath
Above Grade Living Area	24,416 SF

Building Sub Areas

Sub Area	Net Area
Basement, Unfinished	24,416 SF
Canopy	660 SF
First Floor	24,416 SF

Sale Information

Sale Date	Sale Price	Legal Reference	Instrument
01/01/1900	$0	258-140	

Click To Open Google Maps

Land Information

Land Area	68,389.2 SF

Zoning	R10A
View	-
Neighborhood	0750

Yard Item(s)

Description	Quantity	Size	Year
MANUAL	1	1	1991

APPENDIX I: PREVIOUS CRMC'S

State of Rhode Island
Coastal Resources Management Council
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 116
Wakefield, RI 02879-1900
(401) 783-3370
Fax (401) 783-2069

November 22, 2022

City of Newport-Department of Utilities
Attn: Robert C Schultz, Jr, Director
70 Halsey Street
Newport, RI 02840

RE: CRMC Maintenance Certification M 2022-06-033 – Repairs to Easton Pond north auxiliary spillway. Located at 100 Bliss Mine Road; Plat 11; lot 731, Newport; Aquidneck Avenue, Plat 115, lot 8; Middletown.

Dear Mr. Schultz:

A site inspection and review of plans submitted to this office for the above cited project indicates it is in conformance with and will have no adverse effect on the plan and program adopted by the Coastal Resources Management Council.

The Coastal Resources Management Council will interpose no objection to the work proposed, as long as all work is done in accordance with plans/and or notice submitted into this office and provided the following stipulations are adhered to.

ADDITIONAL STIPULATIONS

General Stipulations

A. For the purpose of this permit, the coastal feature shall be the riprap revetment; and the inland edge of the coastal feature shall be the top of the revetment.

B. The approved plan shall be those entitled "Easton Pond North Dam Spillway Repair" dated March 2022, and prepared by Fuss & O'Neill. Except as stipulated or modified herein, all details and specifications thereon shall be strictly adhered to. Any and all changes require written approval from this office.

C. The draw-down of water elevations shall be conducted in accordance with the approved narrative. Water levels shall be maintained under normal conditions during the fish spawning season from March through August. Any variation from this requirement would require further review by CRMC.

Earthwork Stipulations

A. The Permittee shall construct and maintain all soil erosion, runoff, and sediment control practices in accordance with the CRMC approved site plan (referenced herein).

B. Prior to the initiation of site alterations or construction including the mobilization of construction vehicles, equipment or machinery, the Limit of Disturbance (LOD) shall be adequately delineated on site (by survey methods where appropriate). No equipment access, equipment or material storage or other activities including construction vehicle parking shall occur beyond the Limit of Disturbance, even on a temporary basis.

C. Prior to conducting earthwork and other land disturbing activities, erosion, runoff and sediment control measures shall be installed and maintained in accordance with good engineering practices including the applicable details found in the manufacturer's specifications and/or in the Rhode Island Soil Erosion and Sediment Control Handbook (as amended). These measures must be maintained until the site is stabilized through the establishment of vegetative cover and/or construction of the approved facilities (buildings, roadways, parking areas, etc.) has stabilized soils sufficiently to prevent erosion and sedimentation.

D. All discharges which result from dewatering operations must flow into pumping settling basins, portable sediment tanks or portable sediment bags which are properly installed and maintained in accordance with good engineering practices including the applicable details found in the manufacturer's specifications and/or in the Rhode Island Soil Erosion and Sediment Control Handbook (as amended).

E. There shall be no activities (construction, stockpiling vehicle or equipment access, etc.) beyond the approved Limit of Disturbance (LOD).

F. Temporary measures shall be installed to protect permanent or long-term stormwater control and treatment measures as they are installed and throughout the construction phase of the project so that they will function properly when they are brought online. Construction activity shall be restricted in areas where infiltration measures are proposed to prevent compaction. In cases where it is not possible to avoid the area, methods shall be taken to restore the infiltration capacity of the soils.

G. Stabilization of disturbed areas must, at a minimum, be initiated immediately whenever any clearing, grading, excavating or other earth disturbance activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization must be completed using vegetative stabilization measures or using alternative measures whenever vegetative measures are deemed impracticable or during periods of drought. All disturbed soils exposed prior to October 15th shall be seeded by that date. Any such areas which do not have adequate vegetative stabilization by November 15th must be stabilized through the use of non-vegetative erosion control measures. If work continues within any of these areas during the period from October 15th through April 15th, care must be taken to ensure that only the area required for that day's work is exposed, and all erodible soil must be restabilized within five (5) working days.

H. Construction sites must be inspected by or under the supervision of the owner and operator at least once every seven (7) calendar days and within 24 hours after any storm event which generates at least 0.25 inches of rainfall per 24 hour period and/or after a significant amount of runoff. If an inspection reveals a problem, the operator must initiate work to fix the problem immediately after discovering the problem, and complete such work by the close of the next work day, if the problem does not require significant repair or replacement, or if the problem can be corrected through routine maintenance.

I. There shall be no discharge or disposal of toxic waste, hazardous materials, oil, grease and other lubricants, excess fertilizer, pesticides or other chemicals or controlled materials either on site or in any area which may enter a wetland, watercourse or groundwater. All spills of such materials shall be reported to the RI Department of Environmental Management for appropriate remediation. All used lubricants, excess chemicals, fertilizers, pesticides, etc., shall be removed from the site for transport, handling and disposal in accordance with all applicable state and federal regulations.

J. All excess excavated materials (soils, rock, gravel, etc.), excess construction materials, demolition debris, temporary erosion, runoff and sediment control measures, etc., shall be removed from the site for appropriate re-use and/or proper disposal at a suitable upland location or landfill. All toxic materials and waste shall be properly transported and disposed of in accordance applicable state and federal regulations.

A copy of this certification to perform maintenance work shall be kept on site during construction. All conditions of original CRMC assents that pertain to this property will he adhered to unless otherwise modified by the CRMC.

Applicant agrees that as a condition to the granting of this certification, members of the Coastal Resources Management Council or its staff shall have access to his property to make on-site inspections to insure compliance with the assent.

Licensee shall be fully and completely liable to State, and shall waive any claims against State for contribution or otherwise, and shall indemnify, defend, and save harmless State and its agencies, employees, officers, directors, and agents with respect to any and all liability, damages (including damages to land, aquatic life, and other natural resources), expenses, causes of action, suits, claims, costs (including testing, auditing, surveying, and investigating costs), fees (including attorneys' fees and costs), penalties (civil and criminal), and response, cleanup, or remediation costs assessed against or imposed upon Licensee, State, or the Property, as a result of Licensee's control of the Property, or Licensee's use, disposal, transportation, generation and/or sale of Hazardous Substances or that of Licensee's employees, agents, assigns, sublicensees, contractors, subcontractors, permittees, or invitees.

All applicable policies, prohibitions, and standards of the RICRMP shall be upheld.

All local, state or federal ordinances and regulations must be complied with.

Please be advised that all work must being permitted must be completed on or before **November 22, 2025** (unless written application requesting an extension is received by CRMC sixty (60) days prior to expiration date).

Permits issued by the CRMC confer no property rights, and are valid only with the conditions and stipulations under which they are granted. Permits imply no guarantee of renewal, and may be subject to denial, revocation, or modification.

CAUTION:

The limits of authorized work shall be only for that which was approved by the CRMC. Any activities or alterations in which deviate from this assent or what was detailed on the CRMC approved plans will require a separate application and review. Additionally, if the information provided to the CRMC for this review is inaccurate or did not reveal all necessary information or data, then this permit may be found to be null and void. Plans for any future alteration of the shoreline or construction or alteration within the 200' zone of CRMC jurisdiction or in coastal waters must be submitted for review to the CRMC prior to commencing such activity.

Permits, licenses or easements issued by the Council are valid only with the conditions and stipulation under which they are granted and imply no guarantee of renewal. The initial application or an application for renewal may be subject to denial or modification. If an application is granted, said permit, license and easement may be subject to revocation and/or modification for failure to comply with the conditions and stipulations under which the same was issued or for other good cause.

ATTENTION: ALL STRUCTURES AND FILLED AREAS IN THE TIDAL, COASTAL, OR NAVIGABLE WATERS OF THE STATE OF RHODE ISLAND ARE SUBJECT TO:

1. The Superior Property Rights of the State of Rhode Island in the Submerged and Submersible Lands of the Coastal, Tidal, and Navigable Waters;
2. The Superior Navigation Servitude of the United States;
3. The Police Powers of the State of Rhode Island and the United States to regulate Structures in the Tidal, Coastal, or Navigable Waters.

THE SUBMERGED AND SUBMERSIBLE LANDS OF THE TIDAL, COASTAL, AND NAVIGABLE WATERS OF THE STATE ARE OWNED BY THE STATE AND HELD IN TRUST FOR THE PUBLIC. CONVEYANCE OF THESE LANDS IS ILLEGAL; TITLES PURPORTING TO TRANSFER SUCH LANDS ARE VOID. ASSENTS THAT INVOLVE THE FILLING OR USE OF THE STATES SUBMERGED LANDS ARE GRANTED WITH THE PROVISO THAT IT IS SUBJECT TO THE IMPOSITION OF A USAGE FEE TO BE ESTABLISHED BY THE COASTAL RESOURCES MANAGEMENT COUNCIL.

The Coastal Resources Management Council wishes to thank you for being given the opportunity to assess and review these plans. If you need additional information, please feel free to contact this office.

Sincerely yours,

Laura K. Miguel, Acting Deputy Director
Coastal Resources Management Council

/lat

State of Rhode Island

COASTAL RESOURCES MANAGEMENT COUNCIL

MAINTENANCE ASSENT

CRMC Assent No.: M2022-06-033 Date: November 22, 2022

This certifies that **City of Newport Department of Utilities**

has permission to Repairs to Easton Pond north auxiliary spillway

Project situated at 100 Bliss Mine Road & Aquidneck Ave.

Plat No. Plat 11; Newport
Plat 115; Middleown

Lot No. Lot 731; Newport
Lot 8; Middleotwn

Said maintenance operations to be done in accordance with an application on file in the Offices of the Coastal Resources Management Council and subject further to all the provisions of the building ordinances of the :
City/Town of **Newport**

and to all the applicable State, Local and Federal provisions. This assent shall expire three (3) years from the date of this assent.

Official Designee
Coastal Resources Management Council

**THIS CARD MUST BE DISPLAYED IN A CONSPICUOUS PLACE ON THE PREMISES.
FAILURE TO DISPLAY WILL RESULT IN LEGAL ACTION.**

COASTAL RESOURCES MANAGEMENT COUNCIL

Oliver Stedman Government Center
4808 Tower Hill Road; Suite 116
Wakefield, RI 02879
401-783-3370

*CORRECTED PUBLIC NOTICE

File Number: 2016-09-032 Date: October 4, 2016

This office has under consideration the application of:

City of Newport
Att: Julia Forgue, P.E.
70 Halsey Street
Newport, RI 02840

for a State of Rhode Island Assent to construct and maintain: Approximately 446 linear feet of new soil filled vegetated riprap to protect, restore and stabilize eroded sections of the Easton Pond (Drinking Water Reservoir) Dam which is designated a Type 1 Coastal Pond by the RI Coastal Resources Management Program. New structural shoreline protection is prohibited on shorelines bordering Type 1 waters pursuant to RICRMP Section 300.7.D.1 thereby requiring a special exception pursuant to RICRMP Section 130. Other maintenance work to protect and stabilize the Easton Pond Reservoir has recently been permitted under CRMC Maintenance Permit M2016-09-048.

Project Location:	*Easton Pond Dam – northeastern corner of "south pond"
City/Town:	*Middletown
Plat/Lot:	*P115 L8
Waterway:	*Easton Pond

Plans of the proposed work may be seen at the CRMC office in Wakefield.

In accordance with the Administrative Procedures Act (Chapter 42-35 of the Rhode Island General Laws) you may request a hearing on this matter.

You are advised that if you have good reason to enter protests against the proposed work it is your privilege to do so. It is expected that objectors will review the application and plans thoroughly, visit site of proposed work if necessary, to familiarize themselves with the conditions and cite what law or laws, if any, would in their opinion be violated by the work proposed.

If you desire to protest, you must attend the scheduled hearing and give sworn testimony. A notice of the time and place of such hearing will be furnished you as soon as possible after receipt of your request for hearing. If you desire to request a hearing, to receive consideration, it should be in writing (**with your correct mailing address, e-mail address and valid contact number**) and be received at this office on or before November 4, 2016.

REPAIRS TO SOUTH EASTON POND DAM

NORTH AND SOUTH EASTON POND DAMS · NEWPORT/MIDDLETOWN · RHODE ISLAND

PERMITTING DRAWING SET

SEPTEMBER 2016

PREPARED FOR

CITY OF NEWPORT
DEPT. OF UTILITIES -
WATER DIVISION
70 HALSEY STREET
NEWPORT, RI

PREPARED BY

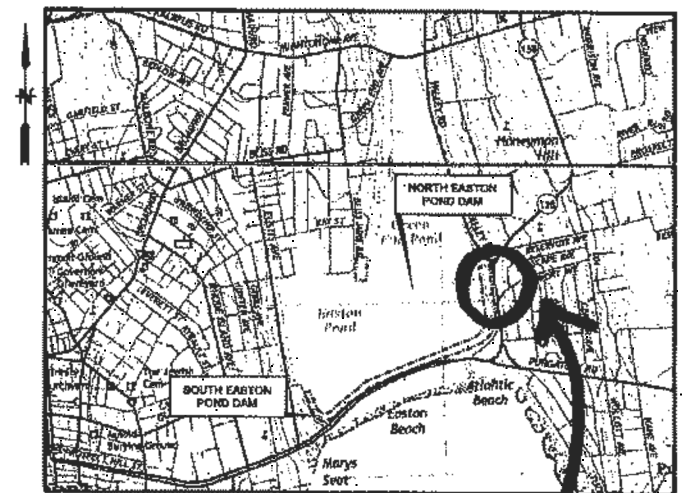
FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908

SHEET INDEX

SHEET No.	SHEET TITLE
GI-001	COVER SHEET
CS-101	SITE LAYOUT AND INDEX SHEET
CS-102	SITE PLAN SOUTH EASTON POND DAM - SOUTH EMBANKMENT
CS-103	SITE PLAN SOUTH EASTON POND DAM - SOUTH EMBANKMENT
CS-104	SITE PLAN SOUTH EASTON POND DAM - SOUTH EMBANKMENT
CS-105	SITE PLAN SOUTH EASTON POND DAM - EAST EMBANKMENT
CS-106	SITE PLAN NORTH EASTON POND DAM AND AUXILIARY SPILLWAY
CD-501	DETAILS - SOUTH EASTON POND DAM
CD-502	GENERAL NOTES AND EROSION AND SEDIMENT CONTROL DETAILS

PROJECT TEAM

ENGINEER
FUSS & O'NEILL, INC.
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02906
P: 401-861-3070

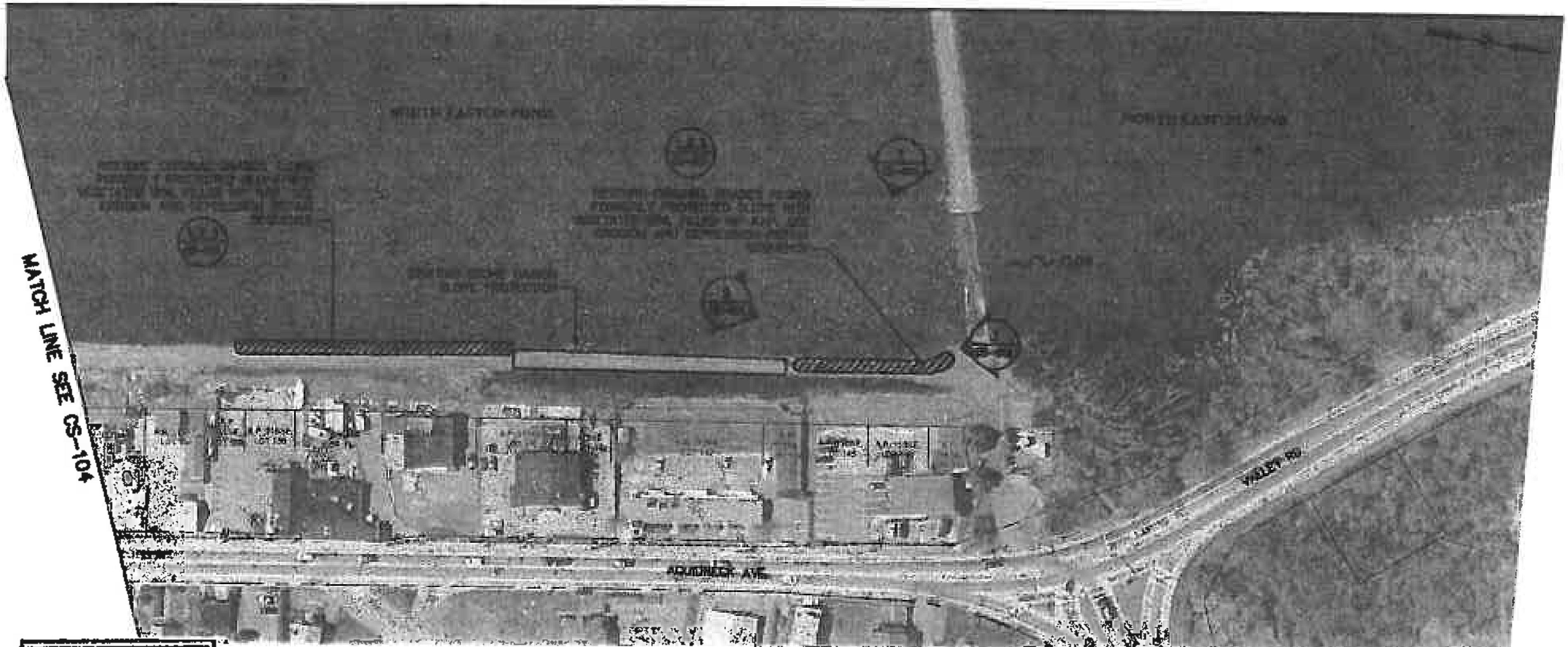


LOCATION MAP
SCALE: 1" = 7500'

NILS S. WIBERG
No. 7630
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

RECEIVED
SEP 30 2016
COASTAL RESOURCES MANAGEMENT COUNCIL

GI-001



NILS S. WIBERG
No. 7630
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

LEGEND:

———— PARCEL BOUNDARY

EROSION AND DEPRESSION REPAIRS SEQUENCE:

1. PLACE COMPACTED GRANULAR FILL, RIP RAP, OR TRAP ROCK TO RE-ESTABLISH ORIGINAL/ADJACENT GRADES.

2. SPREAD 4" LOAM. IF TRAP ROCK OR RIP RAP HAS BEEN USED TO FILL THE DEPRESSION, PLACE LOAM WITHIN VOIDS OF THE STONES.

3. SEED AND INSTALL EITHER 1) EROSION CONTROL MATTING OVER DISTURBED AREA OR 2) COIR ROLL(S) ALONG PERIMETER OF DISTURBED AREA.

NOTES:

1. PARCEL BOUNDARIES ARE APPROXIMATE ONLY AND DIGITIZED FROM CITY OF NEWPORT AND TOWN OF MIDDLETOWN ASSESSOR'S MAPPING. PROPERTY LINES SHOWN ARE OBTAINED FROM DIGITIZED SCANS OF CITY OF NEWPORT AND TOWN OF MIDDLETOWN ASSESSOR'S MAPPING. THIS PLAN IS SUBSTANTIALLY CORRECT IN ACCORDANCE WITH A CLASS IV STANDARD AS ADOPTED BY THE RHODE ISLAND BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS. THIS PLAN IS NOT TO BE CONSTRUED AS AN ACCURATE BOUNDARY SURVEY AND IS SUBJECT TO SUCH CHANGES AS AN ACCURATE BOUNDARY SURVEY MAY DISCLOSE.

ISSUED FOR PERMITTING

DESCRIPTION | DESIGNER | REVIEWER

SCALE: HORZ.: 1"= 100' VERT.:
DATUM: HORZ.: NAD83 VERT.:
GRAPHIC SCALE

FUSS & O'NEILL

CITY OF NEWPORT
SITE PLAN
SOUTH EASTON POND DAM - EAST EMBANKMENT
REPAIRS TO SOUTH EASTON POND DAM
NEWPORT/MIDDLETOWN RHODE ISLAND

CS-105

RECEIVED
SEP 30 2016
COASTAL RESOURCES MANAGEMENT COUNCIL

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

COASTAL RESOURCES MANAGEMENT COUNCIL
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 3
Wakefield, R.I. 02879-1900

(401) 783-3370
FAX: (401) 783-3767

Date: February 7, 2011
File Number: B2009-10-040

To Whom It May Concern:

Attention is invited to the provisions of Section 42-35-15 of the Administrative Procedures Act whereby a final decision in a contested case may be subject to judicial review provided a complaint is filed in the Superior Court of Providence County within thirty (30) days after the mailing of the decision.

This thirty (30) day period for the City of Newport
case expires on March 7, 2011

Sincerely,

Jeffrey M. Willis, Deputy Director
Coastal Resources Management Council

/lam

STATE OF RHODE ISLAND
PROVIDENCE, SC.

COASTAL RESOURCES MANAGEMENT COUNCIL
Oliver H. Stedman Government Center
4808 Tower Hill Road, Wakefield, RI 02879

DECISION

Petition Of: City of Newport

Docket No.: 2009-10-040

Applicant, City of Newport, filed with the Coastal Resources Management Council an application to conduct repairs and improvements to the existing north and west embankment of "South Easton Pond" consisting of renovation/reconstruction of the (manmade) containment berm. Proposal includes altering "coastal" wetland on the pond side of the berm, and freshwater wetland on the moat side of the berm. The pond is a CRMC "Type 1" waterbody therefore coastal wetland alteration requires a "special exception" per Section 130. The proposal results from City of Newport's primary interest to improve water supply infrastructure, and to minimize impacts to water quality. (approximately 4,000 l.f. total project length). ***Note that subject review pertains to a revised design which proposes articulating concrete block slope protection on all slopes, eliminating the vertical sheetpile along the "west embankment" as proposed in the original application and CRMC public notice.***

A meeting was held by the Coastal Resources Management Council on December 14, 2010 in the Department of Administration, Conference Room A, 1 Capitol Hill, Providence, Rhode Island, pursuant to the Administrative Procedures Act. At that time, evidence was submitted on behalf of the applicant as well as other interested parties. Further evidence was submitted by staff members of the Coastal Resources Management Council and by other State agencies, all of which was incorporated into the record. Further, all evidence so submitted to the Council pursuant to this application whether it be by interested parties, through its staff members and other various State agencies has been and is available to all interested parties at the office of the Coastal Resources Management Council, Oliver H. Stedman Government Center, 4808 Tower Hill Road, Wakefield, Rhode Island, 02879.

At a meeting held on December 14, 2010 at the Department of Administration, Conference Room A, 1 Capitol Hill, Providence, Rhode Island, the entire Council took under consideration the record, the evidence therein and after careful consideration upon the same and after a vote and review of all of the evidence and records by the members of the Council, the entire Council finds as a matter of fact:

FINDINGS OF FACT:

1. The proposed project location is Ellery Road, Newport, RI.

2. The coastal feature is a manmade "berm" surrounding the pond.

3. The proposed project abuts Type 1 conservation area waters.

4. The applicable provisions of the CRMP are set forth in the staff reports and incorporated herein by reference.

5. The proposed project requires two (2) special exceptions.

6. The Council hereby adopts and incorporates the findings made by the CRMC staff engineer and biologist.

7. The Council finds that the proposed activity:

    a) Does serve a compelling public purpose which does provide benefits to the public as a whole opposed to individual or private interests;

    b) All reasonable steps have been taken to minimize environmental impacts and/or use conflicts.

    c) There is not a reasonable alternative means of, or location for serving, the compelling public purpose cited.

9. Notwithstanding comments made at the public hearing to the contrary, the Council finds that the applicant has met its burdens of proof under the applicable sections of the CRMP or SAM Plan.

10. Based on the foregoing, there is not a reasonable probability of conflict with a plan or program for management of the State's coastal resources as well as damage to the coastal environment of the State of Rhode Island.

CONCLUSIONS OF LAW:

1. This Council has been granted jurisdiction over the above mentioned project by reason of Title 46, Chapter 23 of the General Laws of the State of Rhode Island, as amended.

2. The proposed alterations do not conflict with the management plan approved and adopted by this Council and in effect at the time the application was submitted.

3. The record reflects that the evidentiary burdens of proof as set forth in the Coastal Resources Management Program have been met for this project.

WHEREFORE, as a result of these Findings of Fact, it appears that the proposed activity does not have a reasonable probability of causing a detrimental impact upon the coastal resources of the State of Rhode Island. As a result of these Findings of Fact and Conclusions of Law, the Council hereby approves the application with all staff stipulations.

FOR THE COUNCIL

Jeffrey M. Willis, Deputy Director

Dated: February 7, 2011

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

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FEB 14 2011

COASTAL RESOURCES MANAGEMENT COUNCIL
Oliver H. Stedman Government Center
4808 Tower Hill Road, Suite 3
Wakefield, R.I. 02879-1900

(401) 783-3370
FAX: (401) 783-3767

ASSENT

CRMC File No.: 2009-10-040 CRMC Assent No.: B2009-10-040

Whereas,
of

City of Newport
Att: Julia Forgue, P.E.
70 Halsey Street
Newport, RI 02840

has applied to the Coastal Resources Management Council for assent to: conduct repairs/improvements to north and west embankment of (South) Easton Pond consisting of renovation/reconstruction of the containment berm, per approved plans; and represents that they are the owner(s) of the riparian rights attached to the property involved and submitted plans of the work to be done.

Now, said Council, having fully considered said application in accordance with all the regulations as set forth in the Administrative Procedures Act does hereby authorize said applicant, subject to the provisions of Title 46, Chapter 23 of the General Laws of Rhode Island, 1956, as amended, and all laws which are or may be in force applicable thereto: **conduct repairs/improvements to north and west embankment of (South) Easton Pond consisting of renovation/reconstruction of the containment berm, per approved plans**; located at plat 15, lot 1; Ellery Road, Newport, RI, in accordance with said plans submitted to this Council and approved by this Council. In accordance with revisions to RIGL 46-23-6.3 Expiration Tolling Periods (as amended effective June 25, 2010), all work being permitted must be completed on or before **July 1, 2014**, after which date this assent is null and void, (unless written application requesting an extension is received by CRMC sixty (60) days prior to expiration date).

Applicant agrees that as a condition to the granting of this assent, members of the Coastal Resources Management Council or its staff shall have access to applicant's property to make on-site inspections to insure compliance with the assent.

Licensee shall be fully and completely liable to State, and shall waive any claims against State for contribution or otherwise, and shall indemnify, defend, and save harmless State and its agencies, employees, officers, directors, and agents with respect to any and all liability, damages (including damages to land, aquatic life, and other natural resources), expenses, causes of action, suits, claims, costs (including testing, auditing, surveying, and investigating costs), fees (including attorneys' fees and costs), penalties (civil and criminal), and response, cleanup, or remediation costs assessed against or imposed upon Licensee, State, or the Property, as a result of Licensee's control of the Property, or Licensee's use, disposal, transportation, generation and/or sale of Hazardous Substances or that of Licensee's employees, agents, assigns, sublicensees, contractors, subcontractors, permittees, or invitees.

Nothing in this assent shall be construed to impair the legal rights of this granting authority or of any person. By this assent the granting authority by no manner, shape, or form assumes any liability or responsibility implied, or in fact, for the stability or permanence of said project; nor by this assent is there any liability implied or in fact assumed or imposed on the granting authority. Further, the granting authority by its representatives or duly authorized agents shall have the right to inspect said project at all times including, but not limited to, the construction, completion, and all times thereafter.

This Assent is granted with the specific proviso that the construction authorized therein will be maintained in good condition by the owner thereof, his heirs, successors, or assigns for a period of fifty (50) years from the date thereof, after which time this permission shall terminate necessitating either complete removal or a new application.

Permits issued by the CRMC are issued for a finite period of time, confer no property rights, and are valid only with the conditions and stipulations under which they are granted. Permits imply no guarantee of renewal, and may be subject to denial, revocation, or modification.

If this matter appeared before the full Council, a copy of the legal decision from this proceeding may be acquired by contacting the CRMC office in writing.

A copy of this Assent shall be kept on site during construction.

Application for future alteration of the shoreline or other construction or alteration within the CRMC jurisdiction shall be submitted to the CRMC for review prior to commencing such activity.

All applicable policies, prohibitions, and standards of the RICRMP shall be upheld.

All local, state or federal ordinances and regulations must be complied with.

Please be advised that as a further conditions of this Assent, it is hereby stipulated that you and/or your agents shall comply at all times with Federal and State Water Quality Standards and other State standards and regulations regarding water quality, and shall exercise such supervision over and control of these facilities to prevent the dumping or discarding or refuse, sanitary wastes and other pollutants in the tidal waters, either from vessels docked at said facilities or from land adjacent thereto.

No work that involves alteration to wetlands or waters of the United States shall be done under this Assent until the required Federal Permit has been obtained.

Non-compliance with this assent shall result in legal action and/or revocation of this permit.

CAUTION:

The limits of authorized work shall be only for that which was approved by the CRMC. Any activities or alterations in which deviate from the approved plans will require a separate application and review. If the information provided to the CRMC for this review is inaccurate

or did not reveal all necessary information or data, then this permit may be found to be null and void. Plans for any future alteration of the shoreline or construction or alteration within the 200' zone of CRMC jurisdiction or in coastal waters must be submitted for review to the CRMC prior to commencing such activity.

Permits, licenses or easements issued by the Council are valid only with the conditions and stipulation under which they are granted and imply no guarantee of renewal. The initial application or an application for renewal may be subject to denial or modification. If an application is granted, said permit, license and easement may be subject to revocation and/or modification for failure to comply with the conditions and stipulations under which the same was issued or for other good cause.

ATTENTION: ALL STRUCTURES AND FILLED AREAS IN THE TIDAL, COASTAL, OR NAVIGABLE WATERS OF THE STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS ARE SUBJECT TO:

1. The Superior Property Rights of the State of Rhode Island and Providence Plantations in the Submerged and Submersible Lands of the Coastal, Tidal, and Navigable Waters;
2. The Superior Navigation Servitude of the United States;
3. The Police Powers of the State of Rhode Island and the United States to regulate Structures in the Tidal, Coastal, or Navigable Waters.

THE SUBMERGED AND SUBMERSIBLE LANDS OF THE TIDAL, COASTAL, AND NAVIGABLE WATERS OF THE STATE ARE OWNED BY THE STATE AND HELD IN TRUST FOR THE PUBLIC. CONVEYANCE OF THESE LANDS IS ILLEGAL; TITLES PURPORTING TO TRANSFER SUCH LANDS ARE VOID. ASSENTS THAT INVOLVE THE FILLING OR USE OF THE STATES SUBMERGED LANDS ARE GRANTED WITH THE PROVISO THAT IT IS SUBJECT TO THE IMPOSITION OF A USAGE FEE TO BE ESTABLISHED BY THE COASTAL RESOURCES MANAGEMENT COUNCIL.

SPECIFIC STIPULATIONS OF APPROVAL

General Stipulations

A. **The applicant shall record this assent in its entirety in the land evidence records of the City of Newport within thirty (30) days of the date of assent issuance. Certification by the Town Clerk's office that this stipulation has been complied with shall be furnished to Coastal Resources Management Council by the applicant within fifteen (15) days thereafter. Failure to comply with provision will render this assent null and void.**

B. The approved plans shall be those entitled "South Easton Pond Dam Repairs and Improvements..." in 40 sheets, last revised August 2010, stamped by D.E. Audet, P.E. Except as stipulated or modified herein, all details and specifications thereon shall be strictly adhered to. Any and all changes require written approval from this office.

City of Newport
CRMC Assent No. B2009-10-040
December 22, 2010
Page Four

C. Prior to initiation of construction, a contractor "Work Plan" shall be submitted to CRMC for written approval, detailing all phases of construction including timing, sequencing, staging, erosion/sediment controls, and contractor contact information.

D. A pre-construction meeting shall be required with CRMC staff and the selected contractor, to review the conditions of the Assent (Anderson, Reis: 401-783-3370).

E. During the duration of the construction project, turbidity within Easton Pond from construction activities shall be minimized to the maximum extent practicable. Excessive turbidity, as determined by CRMC staff, shall be deemed a violation of the Assent, and may result in construction stoppage and/or enforcement action.

F. The construction methods and specifications including the wetland mitigation methods and specifications shall be as detailed within the final plans and narrative specifications submitted to the CRMC for review. Changes to these methods and specifications shall require the review and approval of the CRMC.

G. The construction of the west embankment shall be performed within the confines of CRMC-approved cofferdams. The construction of the north embankment shall be performed within the confines of properly deployed floating siltation curtains/booms.

In Witness Whereof, said Coastal Resources Management Council have hereto set their hands and seal this twenty-second day of December in the year two-thousand-ten.

Michael M. Tikoian, Chair
Coastal Resources Management Council

Jeffrey M. Willis, Deputy Director
Coastal Resources Management Council

/kc

RECEIVED
FEB 14 2011
Director of Utilities
City of Newport, RI

State of Rhode Island and Providence Plantations

COASTAL RESOURCES MANAGEMENT COUNCIL

NOTICE OF

ASSENT

CRMC Assent No.: B2009-10-040 Date: December 22, 2010

This certifies that City of Newport
has permission to conduct repairs/improvements to north and west embankment of (South) Easton Pond consisting of renovation/reconstruction of the containment berm, per approved plans.

situated at Ellery Road
Plat No. 15 Lot No. 1

Said construction operations to be done in accordance with an approved assent on file in the Offices of the Coastal Resources Management Council and subject further to all the provisions of the building ordinances of the :

City/Town of **Newport**

and to all the applicable State, Local and Federal provisions. This assent shall expire July 1, 2014.

Kathleen Caluto
Official Designee
Coastal Resources Management Council

THIS CARD MUST BE DISPLAYED IN A CONSPICUOUS PLACE ON THE PREMISES.
FAILURE TO DISPLAY WILL RESULT IN LEGAL ACTION.

APPENDIX J: COASTAL FEATURE PHOTO