



**RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Office Of Water Resources**

235 Promenade Street, Providence, RI 02908-5767
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WATER QUALITY CERTIFICATION PROGRAM APPLICATION

This form is to be completed for all applications to the Department of Environmental Management (DEM), Office of Water Resources, for Water Quality Certification as specified in Rule 13 of the DEM "Water Quality Regulations." Reference the "Rules and Regulations Governing the Establishment of Various Fees" for fees listed below. Attach a non-refundable check payable to "General Treasurer, State of RI."

FOR DEM USE ONLY Date Received
Amount Paid: _____ Check #: _____ File #: _____

PURPOSE OF APPLICATION (Check only one) AND FEES:

- Application for Water Quality Certification:
 - Submit required documentation for Estimated Construction Costs (See Note 1)
 - Fee: \$200. for estimated construction costs < \$250,000.
 - \$400. for estimated construction costs ≥ \$250,000.
- Request Renewal of Water Quality Certification: File # _____
Fee: No fee
- Request Modification of Water Quality Certification: File # _____
Fee: One-half of original fee noted above

(A.) PROJECT NAME AND LOCATION:

I-195 Redevelopment District	Plat 18, 20, 21 and 24 Lot Unknown
(Project Name)	(Tax Assessor's Plat(s) and Lot No.(s))
Richmond, Dyer, Chestnut and South Main Street	Providence 02903
(Project Location) (Street Address)	(City/Town) (ZIP)

(B.) APPLICANT: (Note: Applicant must be the owner of the property on which the activity is proposed.)

Jan A. Brodie	315 Iron Horse Way	Providence	RI	02908
(Name)	(Mailing Address)	(City/Town)	(State)	(ZIP)
I-195 Redevelopment Commission	401-383-5900			
(Company/Organization)	(Area Code & Telephone Number)			

(C.) CONTACT TO ANSWER QUESTIONS REGARDING APPLICATION (If different than Section B):

Shawn M. Martin, PE	317 Iron Horse Way, Suite 204	Providence	RI	02908
(Name)	(Mailing Address)	(City/Town)	(State)	(ZIP)
Fuss & O'Neill	Senior Project Manager	401-861-3070 ext. 4564		
(Company/Organization)	(Title)	(Area Code & Telephone Number)		

(D.) PROJECT TYPE/ACTIVITY (Check All That Apply):

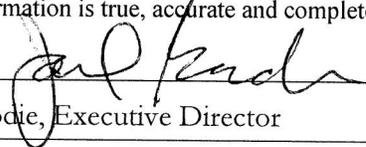
- | | |
|--|--|
| <input type="checkbox"/> Filling of Waters of the State | <input type="checkbox"/> Marinas – New construction or expansion |
| <input checked="" type="checkbox"/> Any project \geq five (5) acres disturbance | <input checked="" type="checkbox"/> Residential Development: six (6) or more dwellings |
| <input checked="" type="checkbox"/> Commercial, Industrial, State or Municipal Development | <input checked="" type="checkbox"/> Site Disturbances |
| <input type="checkbox"/> Flow Alterations | |
| <input type="checkbox"/> Harbor Management Plan | <input type="checkbox"/> Other _____ |

(E.) GENERAL INFORMATION: Check program and list number(s) of other applications associated with this project.

- Coastal Resources Management Council _____
- US Army Corps of Engineers _____
- Other _____

(F.) CERTIFICATION OF APPLICANT:

I hereby certify that I have requested and authorized the investigation, compilation, and submission of all the information, in whatever form, contained in this Application; that I have personally examined and am familiar with the information submitted herein; and that such information is true, accurate and complete to the best of my knowledge.

Signature of Applicant:  Date: 9/17/13

Print Name: Jan A. Brodie, Executive Director

Please return completed form to:

Rhode Island Department of Environmental Management
Office of Water Resources, Water Quality Certification Program
235 Promenade Street, Suite 260
Providence, RI 02908-5767

Office Use Only:

Suitable for Public Notice Date: _____

Certification Determination: Approved
Date: _____ Denied
 Withdrawn
 Closed

_____ Project Reviewer:

Note 1: Documentation of Estimated Construction Costs (ECC) will be required unless the ECC is \geq \$250,000. ECCs include all costs of construction activities such as materials, labor, and equipment. ECC shall not include the cost of land acquisition and consultant fees for planning, design, and construction supervision. The ECC for proposed projects must be documented and prepared by an appraiser, general contractor, engineer, land surveyor, architect, landscape architect, or another appropriate qualified professional. Such documentation must be submitted by the applicant with the application. All ECCs are subject to the review and acceptance by the Department.

I-195 Redevelopment District Stormwater Master Plan

I-195 Redevelopment District Commission
Providence, Rhode Island

October 2013



317 Iron Horse Way
Suite 204
Providence, RI 02908

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1 Introduction

1.1 Purpose of the Master Plan

This Master Plan was developed to provide a mechanism for obtaining stormwater permit approvals for the I-195 Redevelopment District (District) through the Rhode Island Coastal Resources Management Council (CRMC) and the Rhode Island Department of Environmental Management (RIDEM). The ultimate goal of the Master Plan is to apply the State's stormwater management standards "District-wide" rather than on an individual parcel basis. The Master Plan applies to all parcels within the District and any parcels that abut a District parcel or parcels and are under common ownership. The application of the Master Plan to parcels abutting the District is consistent with the state legislation granting local authority to the I-195 Redevelopment District Commission, which empowers the Commission to regulate land development projects within the District and on abutting parcels that are assembled with District parcels under a common ownership mechanism.

This Master Plan includes stormwater management concepts that are consistent with the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM) and an approach to implementing the standards during the redevelopment of the District. An approved Master Plan will establish a framework for developers of the District and allow for an expedited or administrative approval process for projects that are designed in accordance with the Master Plan. In addition, developers will have the flexibility to place stormwater best management practices (BMPs) where there is adequate and suitable land available to be most-effective for stormwater treatment and to maximize the amount of developable land in the District.

Stormwater treatment practices may be placed on land dedicated for open space and parks to fulfill the stormwater quality requirements of one or more development projects. This approach minimizes the consumption of development land that is necessary to install treatment practices and increases the potential value of the property to developers and, ultimately, the State of Rhode Island.

The primary deterrents to development financing, particularly large, complex projects, are the time that is required to gain local and state approvals, the uncertainty of the regulatory process, and the unknown costs associated with regulatory compliance. The I-195 Redevelopment District Commission's purpose, as written in its founding state legislation, is to "oversee, plan, implement, and administer the development" of the surplus I-195 properties (R.I.G.L. Section 42-64.14-5(b)).

To satisfy this responsibility and the intent of legislation to promote redevelopment, the Commission is implementing strategies with the objective of better-positioning the land for redevelopment and sale, which includes streamlining the permitting process for future owners of District parcels when possible. A stormwater master plan that is approved by CRMC and RIDEM can reduce the duration of permit application reviews, minimize development risk, and define measurable standards for future development in the District.

1.2 The I-195 Redevelopment District

The I-195 Redevelopment District, which occupies approximately 41.4 acres of downtown Providence, was established by legislative act (R.I.G.L. Section 42- 64.14-5, "The I-195 Redevelopment Act of 2011") to stimulate economic investment and create jobs in Rhode Island through the redevelopment of land parcels created by the relocation of Interstate 195 (refer to U.S. Federal Highway Administration Record of Decision entitled "Record of Decision, Improvements to Interstate Route 195, Providence, Rhode Island, 6 FHWA-RI-EIS-93-01-F, January 14, 1997"). Redevelopment and infill of the vacant parcels is essential to reconnect the Jewelry District and Downcity areas of Providence and restore the vitality of this historic part of the capitol city. The redevelopment of the District parcels is intended for "workforce development, education and training, and the growth of "knowledge-based" jobs and industries such as research and development, life sciences, media technologies, entrepreneurship and business management, design, hospitality, software design and application," and similar uses.

The I-195 Redevelopment District Commission (the Commission), charged with administering the redevelopment and dispensation of the parcels, was established concurrently with the I-195 Redevelopment District legislation. That responsibility is not limited to the administration of real estate transactions. The Commission may, for example, acquire additional land, enter into legal agreements, or improve parcels within the District as necessary to fulfill its legislative mandate. The Commission is also empowered to act as the local permitting authority (e.g. planning, zoning, building, and historic district) for the redevelopment of District parcels, including any abutting properties that are to be combined with District parcels as part of a larger redevelopment project.

The provisions of the legislation end when all of the I-195 Redevelopment District properties have been developed and sold or 21 years from the date of enactment, whichever is earlier. At that time, all local and state authority granted to the Commission will revert to the appropriate state or municipal authority. Any unsold properties will revert to the Rhode Island Economic Development Corporation.

In addition to the parcels designated for redevelopment, over seven acres of parks will be created to allow the public to interact with the waterfront along the east and west banks of the Providence River, including Parcel P4, which is a significant tract occupying approximately 4.8 acres of the waterfront on the west bank of the river. The parks will connect to the existing River Walk Park along both banks of the river. Although the development parcels will be sold, the Commission plans to retain Parcel 1A, an existing park, and Parcels P2 and P4, which will be developed into parks.

As part of the relocation of I-195 project, the Rhode Island Department of Transportation (RIDOT) will reconstruct former city streets that were abandoned through the state highway layout of I-195. The planned improvements include paved roadways, curbing, sidewalks, and stormwater, wastewater, potable water, and other utilities. The parks that are planned for Parcels P2 and P4 are currently in the concept design phase and will be constructed by RIDOT. Significantly, the two parcels will be connected and built concurrently with a pedestrian bridge that will span the Providence River supported by foundations of the former I-195 viaduct. Construction of the parks and bridge are expected to commence at the end of 2014. Refer to (*Appendix A - Property Transfer Plan and List of Development Parcels*) for a plan of the parcels and streets with planned improvements within the District.

1.3 Regulatory Jurisdiction

Current development patterns of the Jewelry District and Downcity, along with Providence's Zoning Ordinances, suggest the future development may result in about 70-90% of each parcel in the District being covered by buildings to maximize leasable floor space and density. Building density is a fundamental component of both reducing the cost of developing the District land and promoting the type of vibrant, mixed-use urban fabric that will maximize the economic development potential of the District for the State of Rhode Island.

1.3.1 State Regulatory Authority

Future development projects within the District will need to comply with applicable stormwater management requirements of the CRMC and the RIDEM Water Quality and RIPDES programs. To address these requirements using a conventional approach, developers must set aside a portion of each parcel to accommodate stormwater treatment practices that comply with Section 3.2.6 of the RISDISM *Minimum Standard 6: Redevelopment and Infill Projects*. The District is comprised of land that included I-195 and other developed land (approximately 72% was impervious prior to the demolition of the I-195 viaduct). For the purposes of stormwater management, the entire District may be considered a Redevelopment Project with more than 40% impervious cover in accordance with Section 3.2.6 of the RISDISM.

An alternative approach is proposed by this Master Plan, which would allow development projects to achieve compliance with the water quality volume required by RISDISM Standard 6 by implementing stormwater controls on the parcel where development is proposed (onsite) or at an alternative location in the District (offsite). Both onsite and offsite controls may be implemented to satisfy the water quality treatment volume requirement of each project. In addition, it becomes possible to provide treatment for impervious areas within the District, such as streets and sidewalks, that are not associated with a development project to satisfy the water quality treatment volume. In some instances, treatment of runoff from public roadways and sidewalks may allow a more effective solution and targeted method for reducing stormwater pollution to the Providence River while maximizing the development potential of the I-195 Redevelopment District. Stormwater treatment practices detailed in the RISDISM, such as tree filters, rain gardens, subsurface infiltration chambers, porous pavements, and other practices, will be utilized throughout the District to meet the water quality volume (WQv) requirements of the RISDISM.

1.3.2 Local Regulatory Authority

Individual parcels within the District will be conveyed by RIDOT to the I-195 Redevelopment District Commission and, upon completion of street construction by RIDOT, the streets will be conveyed to the City of Providence. While the streets will be owned and maintained by the City as public ways, the Commission will retain ownership of the parcels until sold for development. Parcels P2 and P4 will be conveyed to, and will be maintained by, the Commission.

All future development within the District will be subject to the review and approval by the Commission as the local permit granting authority. The Commission must ensure development applications are "consistent with and subject to the city of Providence comprehensive plan adopted by the city pursuant

to section 45-27 22-2.1 et seq. and the city of Providence zoning ordinances pursuant to section 45-24-27 et seq. as previously enacted by the city of Providence, and as may be enacted and/or amended from time to time through July 1, 2012, or enacted and/or amended thereafter with the consent of the commission" (R.I.G.L. 42-64.14-8.b.viii).

2 Pre-Development Conditions

The land within the I-195 Redevelopment District that is the basis of this Master Plan is approximately 41.4 acres. This area is comprised of approximately 25.83 acres of land within the District parcels and the remainder comprised of developed lots and land that is designated for future city roads that will be built by RIDOT.

The primary artery of I-195 was relocated in 2009 and included numerous improvements to the I-95/I-195 interchange and access from city streets along the highway corridor. Demolition of the former highway infrastructure was completed in stages and was substantially completed in 2012. The parcels of land within the former I-195 corridor have been graded to produce similar topographic conditions of adjacent lands and have been planted with grass as an interim condition until the parcels are redeveloped and the former city streets rebuilt. The pre-development conditions of the District are assumed to be as they existed just prior to the removal of I-195 and its associated infrastructure (refer to *Figure 1 I-195 District Boundary and Former I-195 Location Map*).

2.1 Watershed

The District is within the Providence River subwatershed (USDA-NRCS Watershed Boundary Dataset ID#010900040901) and part of the larger Narragansett Bay watershed (refer to *Appendix A Property Transfer Plan and List of Development Parcels*) and *Appendix B Rhode Island Watersheds Map (RIGIS)*). The Providence River watershed contains a dense development pattern, extensive street and highway network, and vast expanses of impervious surfaces that comprise the urban core of Providence (refer to *Appendix D Land Use Map – Narragansett Bay (RIGIS)*). Water quality impairments in surface waters have been linked to watersheds with impervious cover as low as 10%. The Providence River watershed is approximately 31% impervious according on RIGIS mapping.

The Providence River is on the State of Rhode Island 2012 303(d) List of Impaired Waters for nitrogen, dissolved oxygen, and fecal coliform (refer to *Appendix E State of*



Photo 1: Easterly view of NBC outfall #008 (Providence River in background).

Rhode Island 2012 303(d) List of Impaired Waters). Total Maximum Daily Loads (TMDLs) have not been developed by RIDEM to address these impairments, and the 303(d) list indicates RIDEM will re-evaluate the need for TMDLs after the identified wastewater treatment facility upgrades and the combined sewer overflows (CSO) abatement projects are completed in the watershed. The tentative dates for TMDLs are 2016 for nitrogen and dissolved oxygen and 2022 for fecal coliform. Significantly, the 303(d) list also reads, "compliance with [the] Consent Agreement for CSO abatement [is] expected to negate [the] need for [a] TMDL."

The subwatersheds draining to the Providence River also include the Woonasquatucket River and Moshassuck River, both of which have impairments for bacteria and benthic-macroinvertebrate bioassessments, among others. As with the Providence River, the Woonasquatucket River is impaired for dissolved oxygen.

Stormwater runoff from the District flows to the Providence River primarily through a close-conduit storm sewer system. The primary suspected cause of the impairments to the Providence River are wet weather discharges of raw sewage that occur from approximately 12 CSOs in the Narragansett Bay Commission (NBC) system. Phase I of NBC's three-phase CSO Abatement Plan was constructed and placed into operation in 2008 to significantly reduce the frequency and volume of sewage discharged from these outfalls. Phase II of the CSO program, which is under construction and expected to be completed in 2015, includes two interceptors along the Seekonk and Woonasquatucket Rivers to reduce combined sewer overflows at approximately 17 locations. Phase III of the CSO program will include a deep rock tunnel to direct flow to the Bucklin Point wastewater treatment facility in East Providence.

Following the completion of all three project phases, NBC predicts a 95% reduction in the number of overflows per year and reductions in fecal coliform and biochemical oxygen demand (BOD) of 98% and 80%, respectively. These measures, in addition to the storm and sanitary sewer improvement that will be completed by RIDOT within the I-195 Redevelopment District, may obviate the need for a TMDL in the Providence River watershed.

2.2 Hydrologic Conditions

The pre-development condition of the land within the boundary used for this analysis was determined from RIGIS mapping (2008) and field observations to be predominantly impervious. About 16.62 acres, or 64% of the total parcels' 25.83 acres, was impervious and the remaining land was primarily maintained grass surfaces in good hydrologic condition. These grass areas were typically associated with embankments supporting or adjacent to highway ramps and bridges. The hydrologic condition of the land is similar to the lower reaches of the Providence River watershed on the east side of the river, which lacks the dense commercial development patterns found that dominates the urban core along the west side of the river.

2.3 Soil and Groundwater

The watershed boundary of the District is underlain by Udorthents-Urban land complex (UD) and Urban land (Ur) soil map units according to the Natural Resources Conservation Service (*Web Soil Survey of Rhode Island, 2012*, refer to *Appendix F NRCS Web Soil Survey Map*). Both soil types are

characterized by alterations from human activity. Udorthents are typically well-drained soils that have been cut or filled. As its name implies, Urban land soils are associated with the built environments of urbanized areas. The soils bordering the District land west of the Providence River are primarily composed of Merrimac-Urban land complex, a well-drained soil modified by human activity. The soils bordering the District land east of the Providence River are primarily composed of Paxton-Urban land complex, a well-drained soil modified by human activity. Permeability of the substratum is moderately-rapid to rapid in Merrimac soils and slow to very slow in Paxton soils. Soil boring data obtained by Maguire Group, Inc. and Fuss & O'Neill, Inc. indicate sandy soils are generally present throughout the District, both in the upper soil horizons and substratum.

The depths to the groundwater table were measured and recorded by Fuss & O'Neill in September 2012 and are highly variable due to the soil conditions and significant topographic relief. This topographic variation is particularly evident in the land west of the Providence River where ground elevations vary by over 50 feet between Parcel 35 at the higher elevations of the District to Parcel P4 near the Providence River. The groundwater table depth was measured at approximately 37 feet below grade at monitoring well MW-104 (Parcel 35) and 10 feet below grade at MW-113 (Parcel P4).

The land east of the Providence River within the District, which does not have the pronounced topographic relief of the west side, produced groundwater depths ranging from approximately 22 feet below grade at MW-122 (Parcel 9) and seven feet below grade at MW-119 (Parcel 1A). Seasonal fluctuation and tidal influence may affect future observed groundwater depths throughout the District.

The groundwater beneath the site was classified by RIDEM as GB (RIDEM, 2010b). GB groundwater is designated to be not suitable for public or private drinking water use. GB groundwater areas are typically located beneath highly urbanized areas, permanent waste disposal areas and the area immediately surrounding the permanent waste disposal areas (RIDEM, 2010a). Rather than relating to protection of groundwater as a potable resource, the RIDEM GB groundwater objectives (GB-GO) established within the RIDEM Remediation Regulations are protective of the potential for volatile organic compounds (VOC) in groundwater to volatilize and migrate into overlying soil vapor and indoor air space, a contaminant migration scenario commonly referred to as vapor intrusion.

Based on field survey data compiled by Fuss & O'Neill in September 2012, the groundwater flow direction from both sides of the Providence River was primarily toward the river. The groundwater depth at the site varied from between approximately five feet in the immediate proximity of the Providence River to approximately 30 feet at the western end of the District. Conductivity field measurements in several of the monitoring wells sampled by Fuss & O'Neill in September 2012 were indicative of saline or brackish conditions, indicating that groundwater at these monitoring well locations may also be tidally influenced.

2.4 Flood Hazard

The District lies within flood zone X, which is an area protected from the one-percent annual chance or greater flood hazard by a levee system (Flood Insurance Rate Map 44007C0308H, Providence County Panel 308 of 451, dated April 11, 2011, refer to *Appendix G Flood Insurance Rate Map*). Failure or overtopping of the levee system is possible.

2.5 Coastal Resource Management

The shoreline of the Providence River in the vicinity of the I-195 Redevelopment District is formed by seawall, stone-armored revetment, and, in limited areas of the eastern bank, a constructed coastal marsh. Public parks that border much of the river in this area are punctuated by boardwalks, elevated docks, and hardscape.

RIDEM has assigned the Water Use Classification SB1{a} to the Providence River. This classification designates the waters for fish and wildlife habitat and primary and secondary contact recreational activities. However, human contact with these waters should be limited due to the potential degradation caused by combined sewer overflows. CRMC designates the river as Type 5 – Recreational and Commercial Harbors. These waters support recreation and commercial activities and are further described in Section 200.5 of CRMC's Coastal Resources Management Program:

1. The Council's goals are to maintain a balance among diverse port-related activities, including recreational boating, commercial fishing, restaurants, and other water-enhanced businesses; to promote the efficient use of space; and to protect the scenic characteristics that make these areas valuable to tourism.
2. The highest priority uses of Type 5 waters and adjoining land areas within Council jurisdiction are berthing, mooring, and servicing of recreational craft, commercial fishing vessels, and ferries; (b) water-dependent and water-enhanced commerce, including businesses catering to tourists; (c) maintenance of navigational channels and berths, and removal of obstructions to navigation; and (d) activities that maintain or enhance water quality and scenic qualities, including the preservation of historic features. The Council shall suitably modify or prohibit activities that significantly detract from or interfere with these priority uses.
3. Applicants for Council Assents for alterations or activities in Type 5 waters shall describe measures taken to mitigate impacts on the scenic quality of the area (see Section 330).



Photo 2: View to the east from the west bank of the Providence River.

Additionally, the Urban Coastal Greenway (UCG) Policy of the Metro Bay Special Area Management Plan applies to properties abutting the riverfront. The UCG Policy requires public access to and along the Providence River when a developer selects this alternative development process, which requires more compact coastal greenway widths as compared to the traditional setback/coastal buffer of the Coastal Resources Management Program (CRMP). District Parcels 1A, 2, 3, 5, 14, P2, and P4 either directly abut the Providence River or are located within the 200-foot contiguous area. These parcels anticipated to be governed by the UCG. P2 and P4 will establish public park lands with recreational opportunities and direct access to and along the Providence River. Parcels 2, 3, 5 and 14 are separated from the shoreline feature by a public roadway. Therefore, public access to and along the shoreline for any development on Parcels 2, 3, 5 and 14 is not required in under UCG Policy Section 180.

The application of the standards of the CRMP and the UCG, including the unique landscaping requirements of the UCG, will occur at the time an Assent application is submitted to CRMC for a development project within the District. The stormwater treatment requirements must comply with this Stormwater Master Plan.

3 Post-Development Conditions

The development pattern of the District parcels is expected to retain the urban context of the adjoining historic Jewelry District, DOWNCITY, and the East Side. The Providence zoning ordinances relevant to development in the District are intended to produce a quality urban environment of buildings compatible with the historic character of downtown Providence that in turn promote a variety of uses to create an active streetscape and a public realm that is attractive to pedestrians.

Dense, fine-grained urban development of this type, although desirable for the renewal of this land and for the connectivity to the three major sections that bound the I-195 Redevelopment District, is highly impervious. The estimated impervious cover that will be present on the parcels is approximately 20.54 acres, or 79.5% of the parcels' 25.83 acres after the I-195 infrastructure is removed (*Figure 2 I-195 District Boundary and Current I-195 Location Map*), city streets are built and reconnected, and the District parcels are redeveloped (*Figure 3.1 West Redevelopment Area* and *Figure 3.2 East Redevelopment Area*). The rate of imperviousness was assumed to be 95% on the development parcels, which is similar to the land surrounding the District.

RIDOT has incorporated a stormwater management system into its plans for reconstructing city streets through the district. The system is comprised of catch basins, manholes, and a pipe network with new outfalls to the Providence River. The future storm drains, most of which will be separated from the NBC combined sewer system, will convey runoff from the I-195 Redevelopment District parcels and the streets into the Providence River. Water quality treatment practices have not been included in the design for the improvements to the land west of the Providence River, but have been included to a limited extent in the form of approximately five hydrodynamic separators in the East Side system upstream of the outfalls to the river. The hydrodynamic separators will also receive and treat runoff from land outside the District.

The impervious areas on Parcels P2 and P4 are based upon the park concept plans (*Figure 4 Providence River Pedestrian Bridge and Riverfront Parks*). Parcel P3, which does not have plans for development, was

assumed to be 25% impervious after the park is built. The estimated post-development condition of the District reflects an increase of approximately 23.6% in impervious surfaces based on available aerial mapping to determine the location of pre-development pervious areas. Refer to Table 1 in *Appendix H Stormwater Treatment Examples* for a listing of detailed estimates of the existing and proposed cover conditions for each parcel.

4 Stormwater Management Plan

For the purpose of graphically representing the plan, the District has been subdivided into two areas, one encompassing the parcels on the western side of the Providence River, referred to in this plan as the West District Area, and the other area encompassing parcels on the eastern side of the Providence River, referred to in this plan as the East District Area.

The District encompasses an area with more than 72% impervious coverage under the pre-development conditions described in this plan prior to the demolition of the former I-195 viaduct. As a result, future development of the land will be classified as redevelopment under the definition provided in Section 3.2.6 (Minimum Standard 6) of the RISDISM. Redevelopment is defined as *"any construction, alteration, or improvement that disturbs a total of 10,000 square feet or more of existing impervious area where the existing land use is commercial, industrial, institutional, governmental, recreational, or multifamily residential."*

As described in Section 2.1 of this plan, a TMDL has not been implemented at this time to address the impairments for nitrogen, dissolved oxygen, and fecal coliform in the 2012 303(d) List of Impaired Waters. However, the BMPs described in this stormwater plan are filtration and infiltration, which are highly-effective at removing bacteria, metals, and sediment with proper pre-treatment. Filtration systems are also effective at reducing the total nitrogen in runoff.



Photo 3: Example of an urban rain garden (Bridgeport, CT)

This Master Plan allows BMPs to be used for the treatment of runoff from any impervious surface in the District and for BMPs to be placed anywhere in the District, including streets, parks, or development parcels, to address the WQv requirement. The Master Plan is not intended to restrict the types of BMPs

that may be implemented by a developer or the I-195 Redevelopment District Commission. To that effect, there is a reasonable probability that additional types of BMPs, such as porous pavement or green roofs, will be implemented to satisfy the stormwater treatment standards of the District.

Some examples of the types of practices appropriate to the District are depicted on drawings provided in *Appendix H Stormwater Treatment Examples* and are:

- Tree filters (Section 5.5 of the RISDISM). Composed of engineered soils with trees and plants placed within sidewalks as part of an overall landscaping improvement plan. The filters are designed to capture and treat a portion of roadway runoff or sidewalk runoff, depending on the location. These systems may be connected to catch basins and manholes in streets and can be implemented as a retrofit.
- Bioretention or Rain Gardens (Section 5.5 of the RISDISM). May be placed within parks or sidewalks to capture roof or sidewalk runoff in lieu of tree filters where space allows. Portions of Clifford, Friendship, and Chestnut that will be reconstructed are examples of potential locations where wide sidewalks could accommodate rain gardens.
- Subsurface infiltration chambers (Section 5.3 of the RISDISM). Systems can be adapted for placement within streets or on other public lands. Chamber systems are best-suited to land that will not be occupied by buildings or similar structures and are not restricted by sites with regulated environmental conditions.

Additional types of stormwater treatment practices that are appropriate to the unique site conditions of the treatment practice location may be permitted if designed in accordance with the RISDISM. Pre-treatment must be incorporated into the planning and design of any stormwater management system. Alternative designs and modifications of standards practices may be implemented if they approved by RIDEM as part of a development project's stormwater management plan.

4.1 Minimum Standards

Development projects in the District will be classified by this Master Plan under Minimum Standard 6 of the RISDISM as a redevelopment site with more than 40% of existing impervious surfaces. Standard 6 requires redevelopment projects with more than 40% of existing impervious surfaces to address only Minimum Standards 2, 3, and 7 through 11 in the RISDISM. A summary of the approach to comply with these minimum standards is described below.

Minimum Standard 2: Groundwater Recharge

Infiltration of runoff will be included with stormwater management plans if practicable and where site conditions allow. The proximity of buildings and others structures or urban fill may restrict the use of infiltration practices. A reduction in runoff volumes from development parcels may be required to disconnect stormwater from NBC's combined sewers through infiltration or other measure (e.g. stormwater reclamation and reuse).

Minimum Standard 3: Water Quality

Stormwater management practices must treat 0.5 inch (i.e. one half of the WQv) of runoff from impervious surfaces on the District consistent with the Redevelopment Standard. Parcels with discharges to NBC facilities that are disconnected as part of the redevelopment must treat 1.0 inch of runoff from the impervious surfaces on the parcel. Refer to *Appendix I Water Quality Volume Calculations and Parcel Tabulation* for detailed WQv calculations.

Minimum Standard 7: Pollution Prevention

A stormwater pollution prevention plan (SWPPP) must be prepared for each redevelopment project in the District. The SWPPP must include specific erosion and sedimentation control measures necessary to comply with the requirements of the RIPDES General Permit for Stormwater Discharge Associated with Construction Activity.

Minimum Standard 8: Land Uses with Higher Potential Pollutant Loads

Based on the current zoning of the land within the District, none of the redevelopment projects are expected to contain the land uses with higher potential pollutant loads (LUHPPLs) listed in Table 3-2 of the RISDISM.

Minimum Standard 9: Illicit Discharges

The project does not propose illicit discharges. Property development in the District will provide separate sanitary and storm sewer service connections except as may be permitted by NBC where separate storm drainage facilities are not available or are impracticable.

Minimum Standard 10: Construction Erosion and Sedimentation Control

A Construction Erosion and Sedimentation Control Plan must be prepared for each redevelopment project in the District. A SWPPP, in conjunction with the Construction Erosion and Sedimentation Control Plan, will satisfy this minimum standard.

Minimum Standard 11: Stormwater Management System Operation and Maintenance

A Long-Term Operation and Maintenance Plan, including identification of the party responsible for maintenance of stormwater treatment practices, must be prepared for each redevelopment project in the District. The nature of the I-195 redevelopment process is unique, and may include several different mechanisms to comply with this standard. It is expected that a combination of public and private entities will be responsible for the operation and maintenance of BMPs, depending on the type, location, and treatment area served by the BMPs. The I-195 Redevelopment District Commission must determine the appropriate mechanism to best serve the long-term interests Rhode Island while addressing the requirement for a Long-Term Operation and Maintenance Plan. A sample plan is provided in *Appendix J Long-Term Operation and Maintenance Plan*.

4.2 Implementation

The intention of this Master Plan is to establish clear, measurable, and predictable methods and procedures to achieve compliance with the RIDISM during the redevelopment of the I-195 Redevelopment District, and to establish an expedited permitting process with CRMC and RIDEM. Redevelopment of the District is expected to occur over many years, which makes prescribed water

quality goals and a clear review process necessary. The anticipated permit and administrative processes for future projects within the District are outlined in the following sections.

4.2.1 Local Permits

As the local permit granting authority, the I-195 Redevelopment District Commission will review applications for development projects within the District. The Commission, or its designee, will review the applications for consistency with Providence zoning ordinances and this Stormwater Master Plan. The I-195 District Commission, under the authority granted by state legislation, will verify compliance with local ordinances and any additional regulations or standards adopted by the Commission, and will issue building permits for approved projects. The relevant procedures associated with the local permitting component of this Master Plan implementation include the following:

1. The Stormwater Master Plan consistency review will determine the minimum stormwater treatment requirements for each land development project. The Commission may require stormwater treatment practices to be implemented on the development lot, elsewhere in the District, or at a RIDEM-approved off-site location to be credited toward achieving the minimum standards for the District. The Commission may elect to waive treatment requirements for certain land development projects based on the project's projected contributions toward satisfying the legislative goals established for the I-195 Redevelopment District. Waivers granted by the Commission for individual development projects would not remove the requirement for overall compliance of the water quality treatment goals for the District. Waivers must be approved by RIDEM to ensure the stormwater quality treatment requirements are achieved using practices installed at the time development will commence or will be achieved with RIDEM-approved practices to be installed at a future date by the District.
2. Land development projects must comply with the Providence Code of Ordinances Part II, Chapter 5, and Article VI *Post-Construction Stormwater Control*. The ordinance requires a project to prepare a stormwater management plan consistent with the RISDISM.
3. Land development projects must comply with the Providence Code of Ordinances Part II, Chapter 5, Article VII *Soil Erosion and Sediment Control*. This ordinance requires a project to prepare a Soil Erosion and Sediment Control Plan consistent with the *Rhode Island Soil Erosion and Sediment Control Handbook*.
4. Upon a project's receipt of state permits, the Commission will complete a final review of each development application typical of the local building permit application process.

4.2.2 RIDEM and CRMC Permits

Upon completion of the consistency review by the Commission, a project may proceed with the regulatory reviews of the applicable RIDEM and CRMC programs to obtain state-issued permits. The procedures and standards that will be applied by this Master Plan for the RIDEM and CRMC permitting of land development and stormwater management projects includes:

4.2.2.1 RIDEM RIPDES

The approval requested of this Master Plan and accompanying Water Quality Certification will apply to the District. Each individual development project will require coverage under the RIPDES General Permit for Stormwater Discharge Associated with Construction Activity. Future development and stormwater management projects in the District will receive approval as follows:

1. Development projects and stormwater management projects will be required to submit a Notice of Intent to RIDEM to determine whether the project is consistent with the Master Plan. Any stormwater treatment practice that is placed at a RIDEM-authorized location outside the District, and is used to achieve compliance with the Master Plan, also requires coverage under the RIPDES General Permit. RIDEM will complete its consistency review within 30 days of receipt of a Notice of Intent. Projects that are found to be consistent with the Master Plan will receive authorization under the RIPDES General Permit.
2. RIDEM will initiate the 30-day public notice and comment process that is required for Water Quality Certification and Master Plan review. Future public notices will not be required for individual projects, unless otherwise required by law. The overall intent for development in the I-195 Redevelopment District and the approach to achieving compliance with the RIDISM is established by this Master Plan. Projects that are not consistent with the Master Plan or other stormwater quality standard may require an individual public notice and comment period as determined by RIDEM.
3. Modifications to the total WQv for the District may be modified by the I-195 Redevelopment Commission and approved by RIDEM administratively. For example, a reduction in the total impervious area within the District would reduce the WQv standards that are necessary to achieve compliance with RIDEM regulations.
4. The implementation of stormwater practices that are allowed in the RISDISM, but which are not specifically described in this Master Plan, are authorized as consistent with the intent of this Master Plan. Green roofs, porous pavements, and sand filters are several examples of stormwater treatment practices that may be implemented without modifying the Master Plan.

4.2.2.2 CRMC Assent

The approval requested of this Master Plan and accompanying Application for State Assent will authorize development with specific terms and conditions that will be applied to development within the District. Future development and stormwater management projects in the District will receive a consistency determination review and approval as follows:

1. Development projects and stormwater management projects that are within CRMC's jurisdiction will be required to submit an Category "A" Assent application to CRMC to determine whether the project is consistent with the Master Plan. CRMC will complete its consistency review within 30 days of receipt of an Assent application. Projects that are found to be consistent with the Master Plan will receive an Assent.

2. CRMC will initiate the 30-day public notice and comment process as part of the Assent application and Master Plan review. Future public notices will not be required for individual projects, unless otherwise required by law and as described in *Section 4.2.2.1* of this Master Plan.
3. Any development project that affects a coastal feature or is within waters of the State will be required to submit Category "B" Assent application.

4.2.2.3 General Conditions

1. Applications for land development on the District parcels will be required to obtain individual reviews by RIDEM, and CRMC where applicable, to ensure consistency with the Stormwater Master Plan. Each application must include an individual stormwater pollution prevention plan (SWPPP) a Long-Term Operation and Maintenance Plan, including the identification of the party responsible for maintenance of stormwater treatment practices.
2. The Urban Coastal Greenway (UCG) Policy of the Metro Bay Special Area Management Plan (SAMP) is not expected to affect development within the District. The District parcels that would be subject to the UCG include 1A, 2, 3, 5, 14, P2, and P4, which either directly abut the Providence River or are located within the 200-foot contiguous area. These parcels anticipated to be governed by the UCG. Parcels P2 and P4 will provide public park land with recreational opportunities and direct access to and along the Providence River (Refer to Section 140.4(e) of the Metro Bay SAMP regarding exemptions). In addition, these parcels will connect to existing public parks along the Providence River, creating a continuous waterfront park through the District. Therefore, compliance with the UCG is established by this Master Plan for all redevelopment within the District, including abutting parcels that are developed under the Commission's authority.
3. The WQv requirements of this Master Plan (RISDISM Minimum Standard 3) shall be modified administratively by RIDEM using the standards of the Master Plan when parcels abutting the District are assembled with District parcels under common ownership as part of a larger development project.
4. Stormwater treatment practices that are implemented on a development parcel, within the District, or at a RIDEM-approved off-site location will apply toward the achievement of compliance with RISDISM Minimum Standard 3.
 - a. Pervious areas within the District may be used to reduce the WQv requirements of this Master Plan.
 - b. Stormwater treatment practices are not required to be directly linked to a specific land development project. Projects that are comprised solely of stormwater treatment practices may be proposed by the Commission or other legal entity at any time and shall be reviewed under the applicable permit applications by RIDEM and CRMC. Projects that are consistent with the Master Plan and the RISDISM shall receive approval in the form of a permit authorizing the construction and operation of the practices.

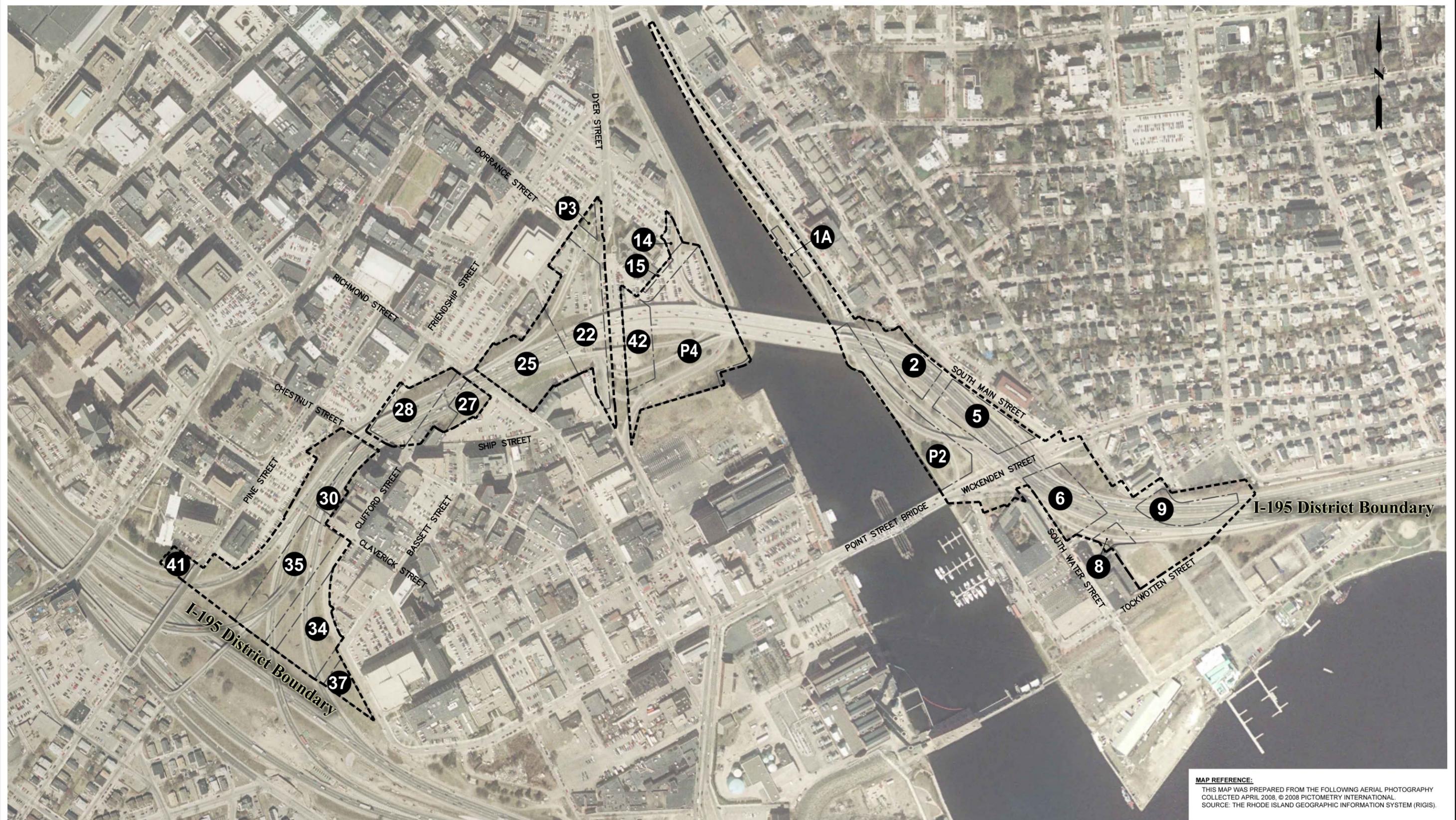
- c. Projects that are classified as LUHPPLs according to the RISDISM are required to comply with Minimum Standard 8, which requires BMPs specifically approved for use on LUHPPLs (e.g., lined filtration practices), and to install the BMPs within the development site occupied by the LUHPPL.
5. The Commission shall maintain records of all stormwater treatment practices that are implemented as part of this Master Plan, including permits, installation dates, entity responsible for operation and maintenance and treatment volumes.
6. The Commission shall ensure the WQv provided by constructed stormwater practices is greater than or equal to the minimum volumes required for the land development projects constructed in the District. This information shall be submitted to RIDEM and CRMC for each development application submitted for permit authorization.

Figures



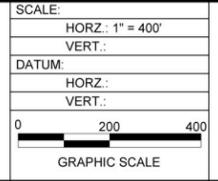
File Path: J:\DWG\20080944\A40\Civil\Hydro\20080944\A40_FIG 1 and FIG 2.dwg Layout: FIGURE 1 Plotted: Mon, September 30, 2013 - 4:54 PM User: ANDREW GLINES

LAYER STATE:



MAP REFERENCE:
 THIS MAP WAS PREPARED FROM THE FOLLOWING AERIAL PHOTOGRAPHY
 COLLECTED APRIL 2008, © 2008 PICTOMETRY INTERNATIONAL
 SOURCE: THE RHODE ISLAND GEOGRAPHIC INFORMATION SYSTEM (RIGIS).

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER



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

I-95 REDEVELOPMENT DISTRICT

I-95 DISTRICT BOUNDARY AND FORMER I-95 LOCATION MAP

PROVIDENCE

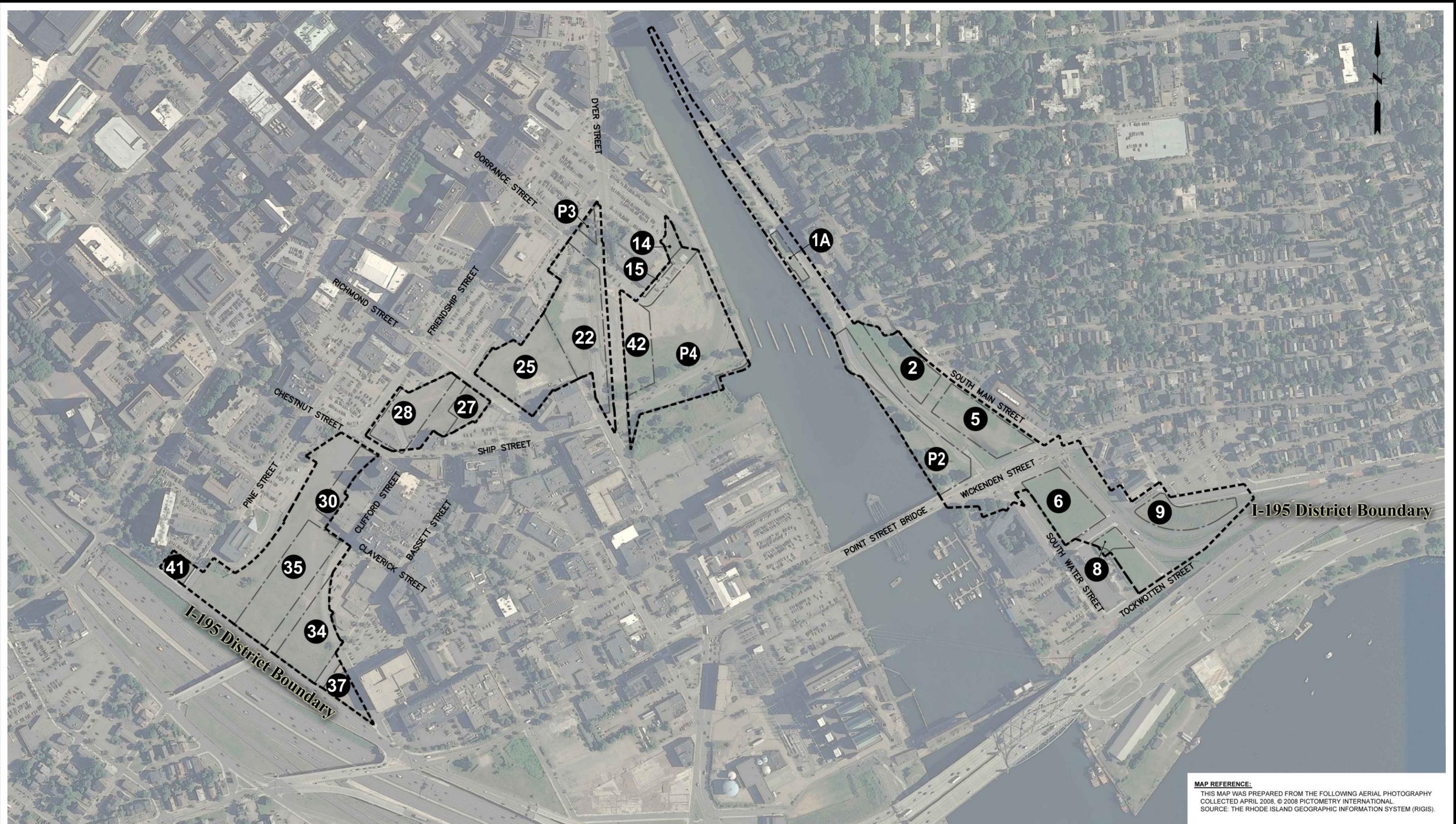
RHODE ISLAND

PROJ. No.: 20080944.A40
 DATE: SEPTEMBER 2013

FIG. 1

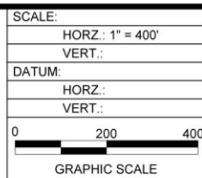
File Path: J:\DWG\20080944\A40\Civil\Hydroflow\20080944\A40_FIG 1 and FIG 2.dwg Layer: FIG 2 User: ANDREW GLINES

LAYER STATE:



MAP REFERENCE:
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I-195 REDEVELOPMENT DISTRICT

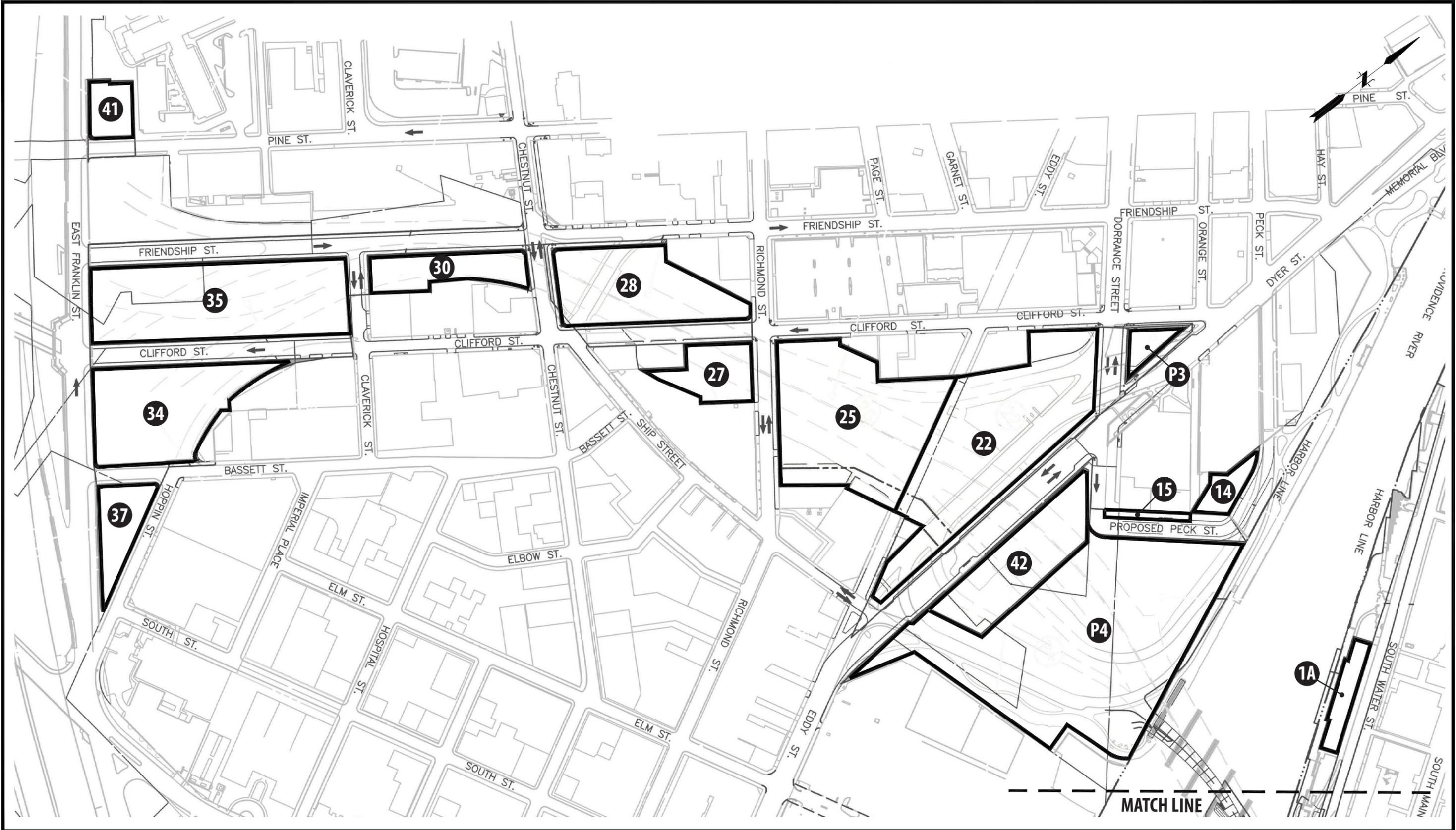
I-195 DISTRICT BOUNDARY AND CURRENT I-195 LOCATION MAP

PROVIDENCE

RHODE ISLAND

PROJ. No.: 20080944_A40
 DATE: SEPTEMBER 2013

FIG. 2



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
1.				

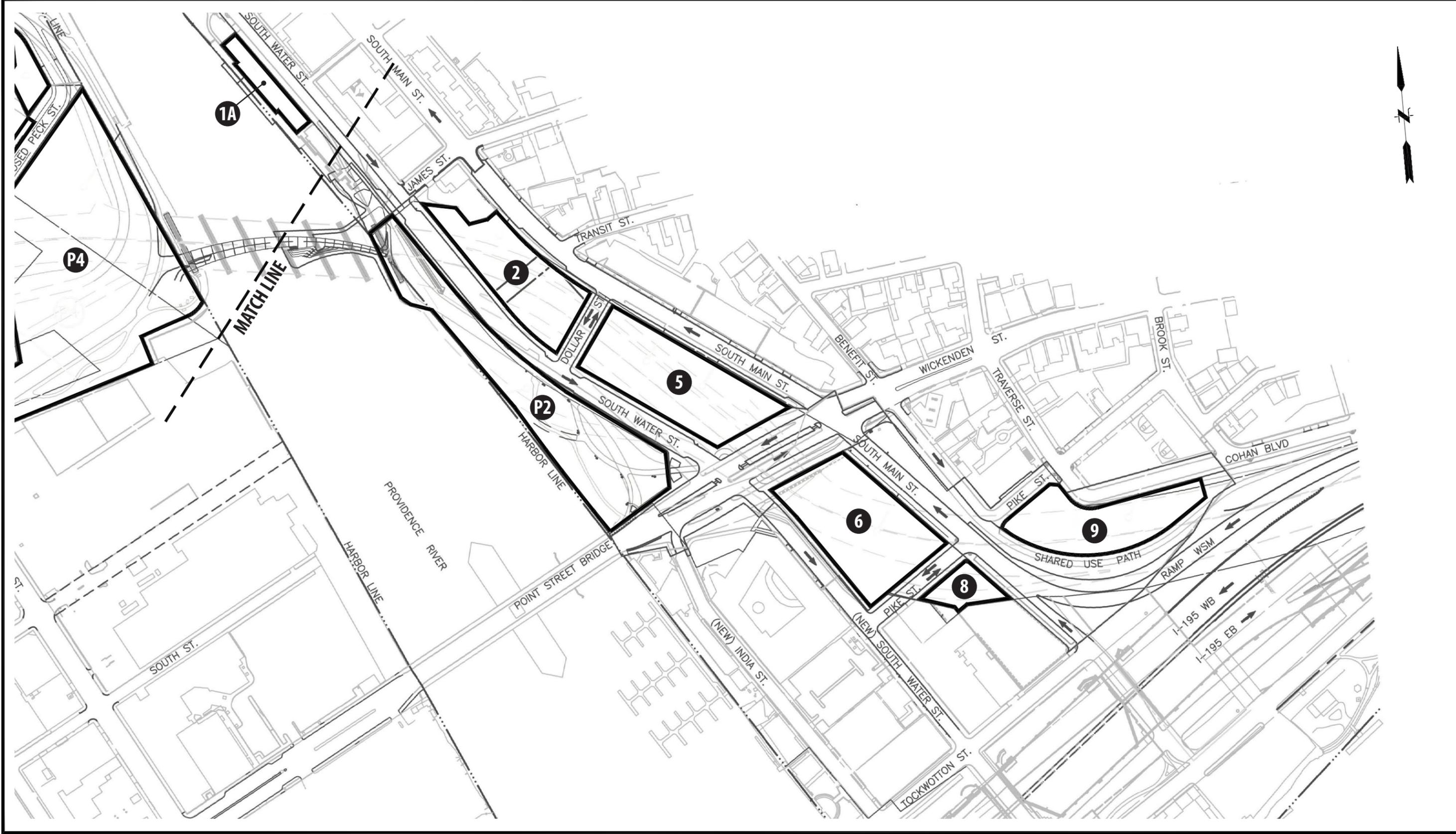
SCALE:
 HORZ.: 1" = 200'
 VERT.:
 DATUM:
 HORZ.:
 VERT.:
 0 100 200
 GRAPHIC SCALE

f **FUSS & O'NEILL**
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 PROVIDENCE, RI 02908
 401.861.3070
 www.fando.com

I-195 REDEVELOPMENT DISTRICT
 WEST REDEVELOPMENT AREA
 PROVIDENCE
 RHODE ISLAND

PROJ. No.: 20080944.A40
 DATE: AUGUST 2013
FIG. 3.1

File Path: J:\DWG\20080944\40\Civil\Hydro\20080944\40_FIG 3_EAST AND WEST.dwg Layout: FIGURE 3.2 Plotted: Fri, August 16, 2013 - 3:58 PM User: BETHANY HUGHES
 LAYER STATE:



No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
1.				

SCALE:
 HORZ.: 1" = 200'
 VERT.:
 DATUM:
 HORZ.:
 VERT.:
 0 100 200
 GRAPHIC SCALE

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 PROVIDENCE, RI 02908
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I-195 REDEVELOPMENT DISTRICT
 EAST REDEVELOPMENT AREA
 PROVIDENCE
 RHODE ISLAND

PROJ. No.: 20080944.A40
 DATE: AUGUST 2013
FIG. 3.2



Maguire Group Inc.
Architects/Engineers/Planners
225 Chagman Street
Providence, Rhode Island 02905

inFORM
225 WEST MAIN STREET, SUITE 1000
PROVIDENCE, RI 02902
TEL: 401.455.2000
WWW.INFORMRI.COM

BROWN, RICHARDSON & ROWE
Landscape Architects and Planners
GLA

**IMPROVEMENTS TO
INTERSTATE ROUTE 195**
PROVIDENCE, RI
SITE OVERVIEW SEPTEMBER 27, 2012

SCALE IN FEET
NOT TO SCALE

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION




PROVIDENCE RIVER PEDESTRIAN BRIDGE & RIVERFRONT PARKS

FIG. 4

Appendix A

Property Transfer Plan and List for Development Parcels



I-195 REDEVELOPMENT DISTRICT
PARCEL LOCATIONS AND SIZES

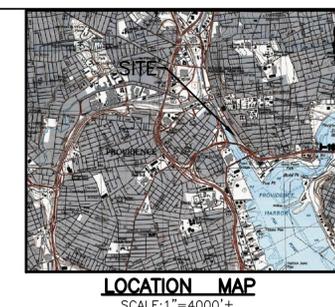
Parcel No.	Property Location	Square Footage
1A	James and South Water Street	12,373
2	Dollar Street, South Water Street, James Street and South Main Street	46,908
5	Dollar Street, South Main Street, Wickenden Street and South Water Street	64,972
6	Wickenden Street, South Main Street, Pike Street and South Water Street	64,668
8	Pike Street and South Main Street	13,149
9	Alves Way, Traverse Street and George M. Cohan Boulevard	45,886
14	Dyer Street and Peck Street	10,247
15	Dyer Street and Peck Street	2,345
22	Clifford Street, Dorrance Street and Dyer Street	115,363
25	Clifford Street and Richmond Street	102,584
27	Clifford Street and Richmond Street	22,162
28	Friendship Street, Richmond Street, Clifford Street and Chestnut Street	54,540
30	Friendship Street, Chestnut Street and Claverick Street	25,654
34	Clifford Street, East Franklin Street and Bassett Street	63,821
35	Friendship Street, East Franklin Street and Clifford Street	93,746
37	Bassett Street, East Franklin Street and Hoppin Street	21,408
41	Pine Street and East Franklin Street	12,543
42	Peck Street and Dyer Street	47,157
P2	Wickenden Street and South Water Street	86,412
P3	Dorrance Street, Clifford Street and Dyer Street	9,834
P4	Peck Street and Dyer Street	209,190
	Total Square Footage With Parks	1,124,962
	Less Parks	<u>- 305,436</u>
	Total Square Footage (Without Parks)	819,526 (18.81 acres)

PROPOSED PARCEL	SHEET NO.
KEY PLAN	1
1A	2
2	3
5	4
6	5
8	6
9	7
14	8
15	9
22	10,11
25	12
27	13
28	14
30	15
34	16
35	17
37	18
41	19
42	20
P2	21,22
P3	23
P4	24,25

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEET
	R.I.		2013	1	25

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

PLAT
SHOWING LAND IN PROVIDENCE
CONVEYED BY
THE STATE OF RHODE ISLAND
AND PROVIDENCE PLANTATIONS
TO
I-195 REDEVELOPMENT DISTRICT



STATUTE REFERENCE

TITLE 37, CHAPTER 5 AND TITLE 42, CHAPTER 64.14, et. seq., OF THE GENERAL LAWS OF RHODE ISLAND, 1956, AS AMENDED.
FILED IN THE OFFICE OF THE RECORDER OF DEEDS OF THE CITY OF PROVIDENCE ON THE _____ DAY OF _____ 2013

SUBMITTED _____ DEPUTY CHIEF ENGINEER DEPT. OF TRANSPORTATION

APPROVED _____ CHIEF ENGINEER DEPT. OF TRANSPORTATION

APPROVED _____ DIRECTOR OF TRANSPORTATION

PROFESSIONAL LAND SURVEYOR

REGISTERED PROFESSIONAL ENGINEER

THE EXISTING PROPERTY LINES, STREET LINES, STATE HIGHWAY LINES AND STATE FREEWAY LINES SHOWN ON THIS PLAN CONFORM TO A CLASS 1 STANDARD AS ADOPTED BY THE R.I. BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS.

PROFESSIONAL LAND SURVEYOR _____ DATE _____

REFERENCES:

- STATE HIGHWAY PLAT NUMBER 900
- STATE HIGHWAY PLAT NUMBER 900A
- STATE HIGHWAY PLAT NUMBER 1074A
- STATE HIGHWAY PLAT NUMBER 1374

LEGEND

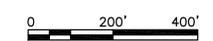
- 00/00 ASSESSOR'S PLAT/LOT NUMBER
- 1 PARCEL NUMBER 1
- T TOTAL AREA
- A AREA ACQUIRED
- R REMAINING AREA
- B TEMPORARY EASEMENT AREA
- C PERMANENT AERIAL EASEMENT AREA
- D PERMANENT DRAINAGE EASEMENT AREA
- G PERMANENT GUY EASEMENT AREA
- P PERMANENT EASEMENT AREA
- U PERMANENT UTILITY EASEMENT AREA
- SD-00 STRUCTURAL DISPOSITION NUMBER
- P.E.B. PERMANENT EASEMENT BOUNDARY
- S.F.L. STATE FREEWAY LINE
- ε EXISTING PROPERTY LINE
- S.H.L. STATE HIGHWAY LINE

WHERE THIS BOUNDARY SYMBOL IS UTILIZED, EXISTING ACCESS REMAINS, OR EQUIVALENT ACCESS WILL BE PROVIDED FROM ABUTTING PROPERTY, ROADS, STREETS OR HIGHWAYS TO THE ADJACENT TRAVELED WAY.

LEGEND

PROPOSED PARCELS

PROPOSED PARKS



PROVIDENCE, RHODE ISLAND
IMPROVEMENTS TO I-195
FROM: HAYWARD PARK
TO: PEDESTRIAN OVERPASS

BRYANT ASSOCIATES, INC.
Engineers - Surveyors - Construction Managers
640 George Washington Highway
Building B, Suite 100
Lincoln, Rhode Island 02865

COVER-KEY PLAN

25 SHEETS SHEET NO. **1**
SCALE: 1"=200'
PLAT NO. 2798

Appendix B

Rhode Island Watersheds Map (RIGIS)



Rhode Island Watersheds

- 1 Blackstone
- 2 Woonasquatucket
- 3 Moshassuck
- 4 Ten Mile
- 5 Moosup
- 6 Pawtuxet
- 7 Narragansett
- 8 Pawcatuck
- 9 Westport
- 10 Coastal
- 11 Hunt
- 12 Saugatucket
- 13 Warren
- 14 Taunton

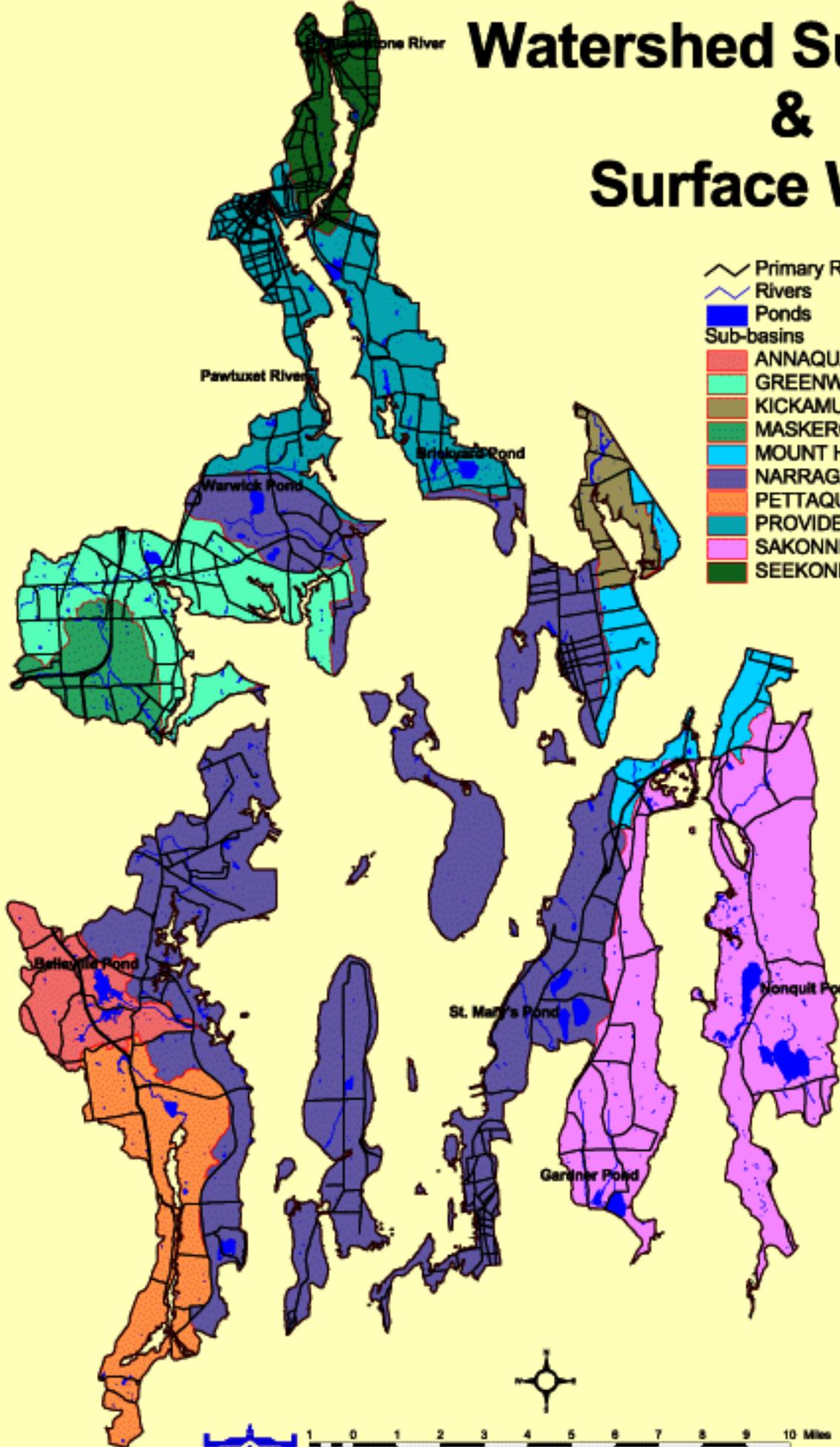


Appendix C

Watershed Sub-basins & Surface Water Map – Narragansett Bay (RIGIS)



Watershed Sub-basins & Surface Water



- Primary Roads
- Rivers
- Ponds
- Sub-basins**
- ANNAQUATUCKET RIVER BASIN
- GREENWICH BAY SUB-BASIN
- KICKAMUIT RIVER SUB-BASIN
- MASKERCHUGG RIVER SUB-BASIN
- MOUNT HOPE BAY SUB-BASIN
- NARRAGANSETT BAY SUB-BASIN
- PETTAQUAMSCUTT RIVER SUB-BASIN
- PROVIDENCE RIVER SUB-BASIN
- SAKONNET RIVER SUB-BASIN
- SEEKONK RIVER SUB-BASIN



Narragansett Bay Watershed

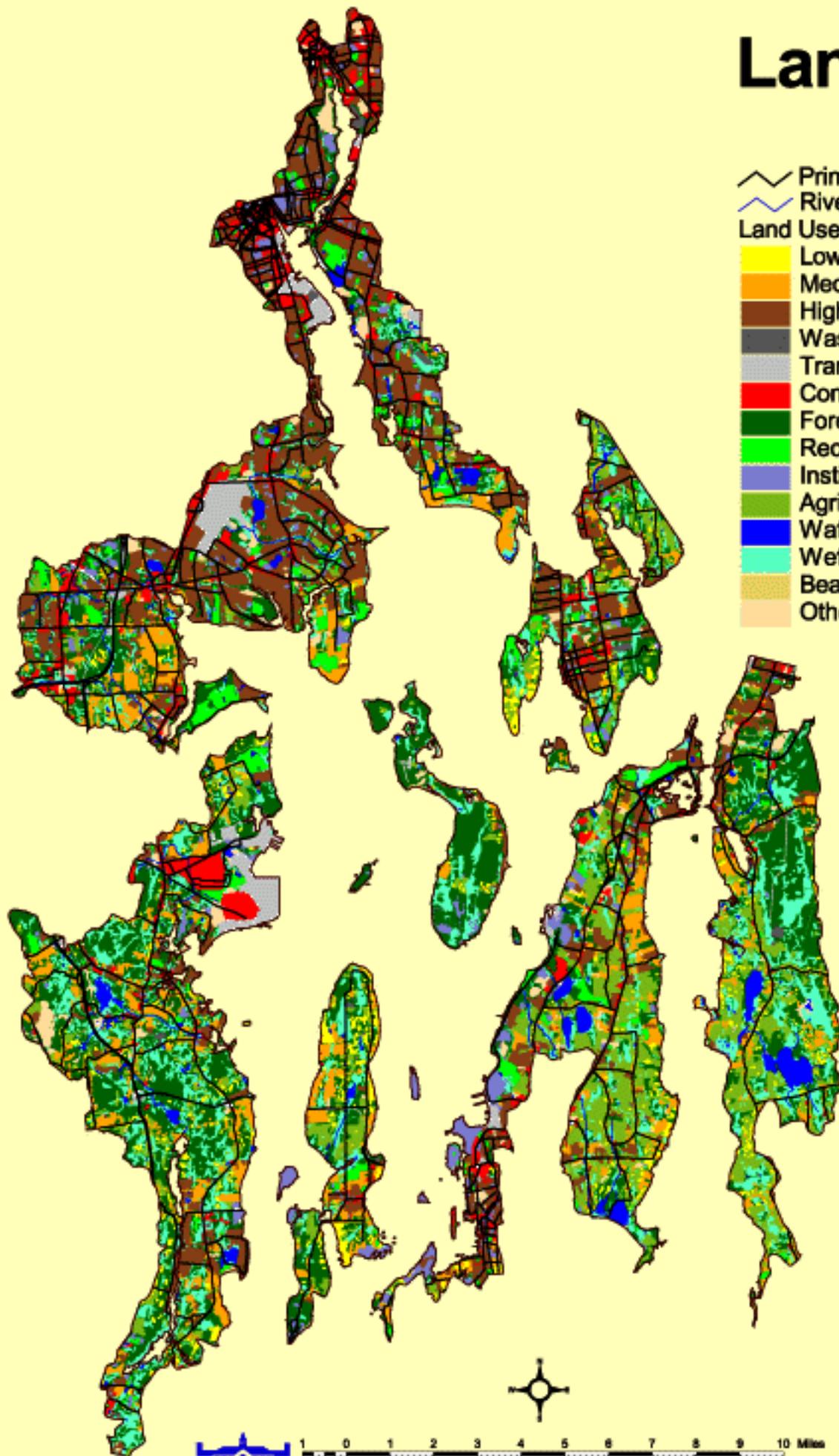


Appendix D

Land Use Map – Narragansett Bay (RIGIS)



Land Use



- Primary Roads
- Rivers
- Land Use Categories
 - Low Density Residential
 - Medium Density Residential
 - High Density Residential
 - Waste Disposal
 - Transportation
 - Commercial & Industrial
 - Forest & Brushland
 - Recreation
 - Institutional
 - Agriculture
 - Water
 - Wetland
 - Beaches
 - Other



Narragansett Bay Watershed



Appendix E

State of Rhode Island 2012 303(d) List of Impaired Waters



Narragansett Basin

Providence River

RI0007020E-01B

Waterbody Size: 3.61 S

Waterbody Classification: SB1{a}

Providence River from its confluence with the Moshassuck and Woonasquatucket Rivers in Providence south and south of a line from India Point to Bold Point (across the mouth of the Seekonk River), to a line extending from a point on shore due east of Naushon Avenue in Warwick to the western terminus of Beach Road in East Providence, including Watchemoket Cove. East Providence, Providence, Cranston and Warwick

<u>Use Description</u>	<u>Use Attainment Status</u>	<u>Cause/Impairment</u>	<u>TMDL Schedule</u>	<u>TMDL Approval Date</u>	<u>Comment</u>
Fish and Wildlife habitat	Not Supporting	Nitrogen (Total)	2016		Determine need for TMDL post WWTF upgrades.
		Oxygen, Dissolved	2016		Determine need for TMDL post WWTF upgrades.
Fish Consumption	Fully Supporting				
Primary Contact Recreation	Not Supporting	Fecal Coliform	2022		Compliance with Consent Agreement for CSO abatement expected to negate need for TMDL.
Secondary Contact Recreation	Not Supporting	Fecal Coliform	2022		Compliance with Consent Agreement for CSO abatement expected to negate need for TMDL.

Prince's Pond (Tiffany Pond)

RI0007020E-02

Waterbody Size: 0.013 S

Waterbody Classification: SA

Prince's Pond (Tiffany Pond). Barrington

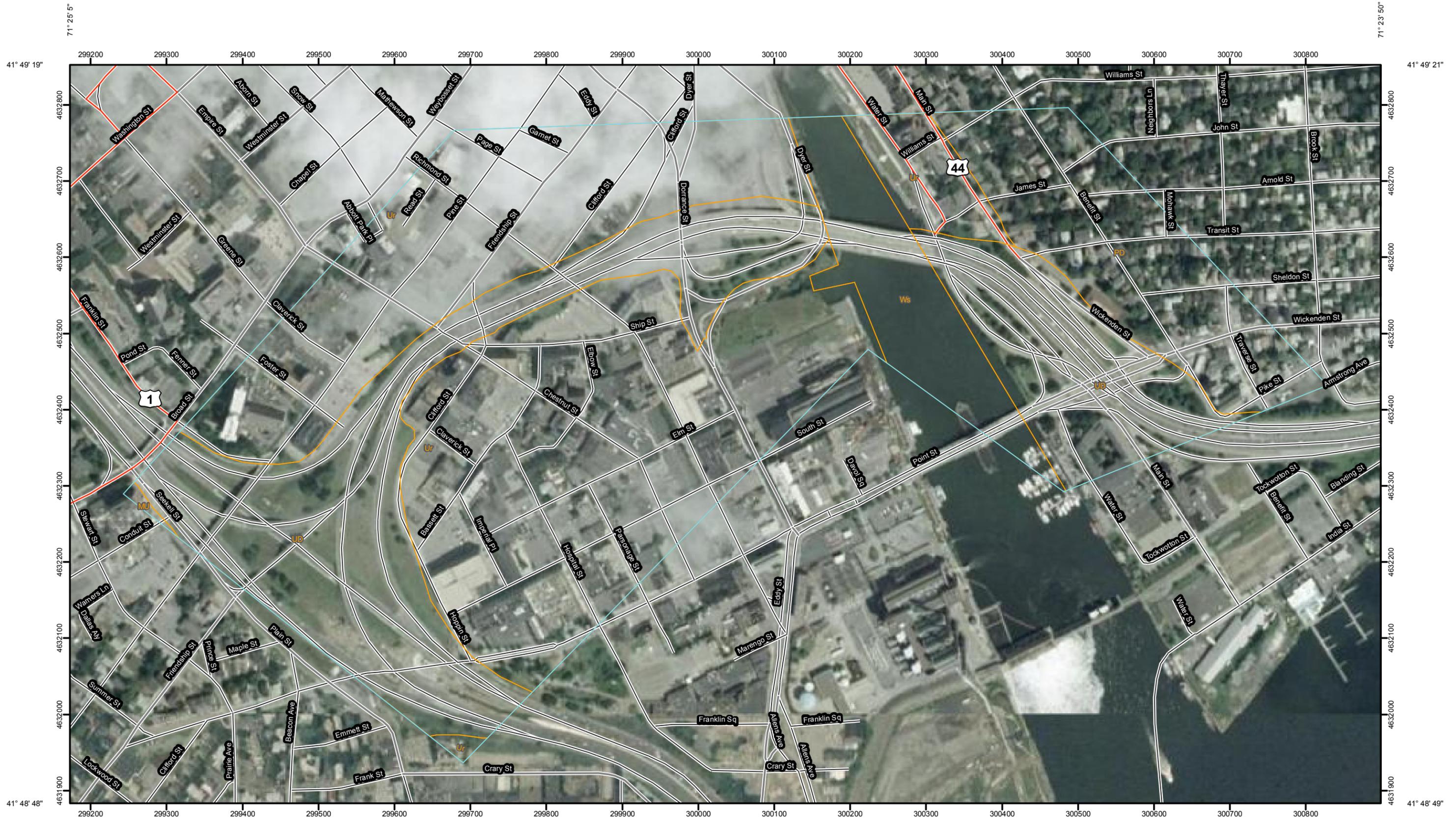
<u>Use Description</u>	<u>Use Attainment Status</u>	<u>Cause/Impairment</u>	<u>TMDL Schedule</u>	<u>TMDL Approval Date</u>	<u>Comment</u>
Fish and Wildlife habitat	Not Supporting	Oxygen, Dissolved	2018		Re-classified with a saltwater classification. Previously identified as WBID# RI0007020L-06.
		Phosphorus (Total)	2018		Re-classified with a saltwater classification. Previously identified as WBID# RI0007020L-06.
Fish Consumption	Not Assessed				
Primary Contact Recreation	Fully Supporting				
Secondary Contact Recreation	Fully Supporting				
Shellfish Consumption	Not Assessed				

Appendix F

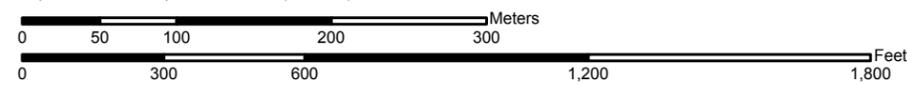
NRCS Web Soil Survey Map



Soil Map—State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
(Route 195 Redevelopment)



Map Scale: 1:4,770 if printed on B size (11" x 17") sheet.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

 Very Stony Spot

 Wet Spot

 Other

Special Line Features

-  Gully
-  Short Steep Slope
-  Other

Political Features

 Cities

Water Features

 Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:4,770 if printed on B size (11" × 17") sheet.

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 19N NAD83

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

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
Survey Area Data: Version 9, May 25, 2012

Date(s) aerial images were photographed: 8/14/2003; 7/19/2003

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

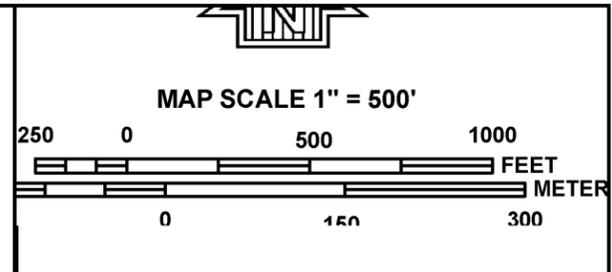
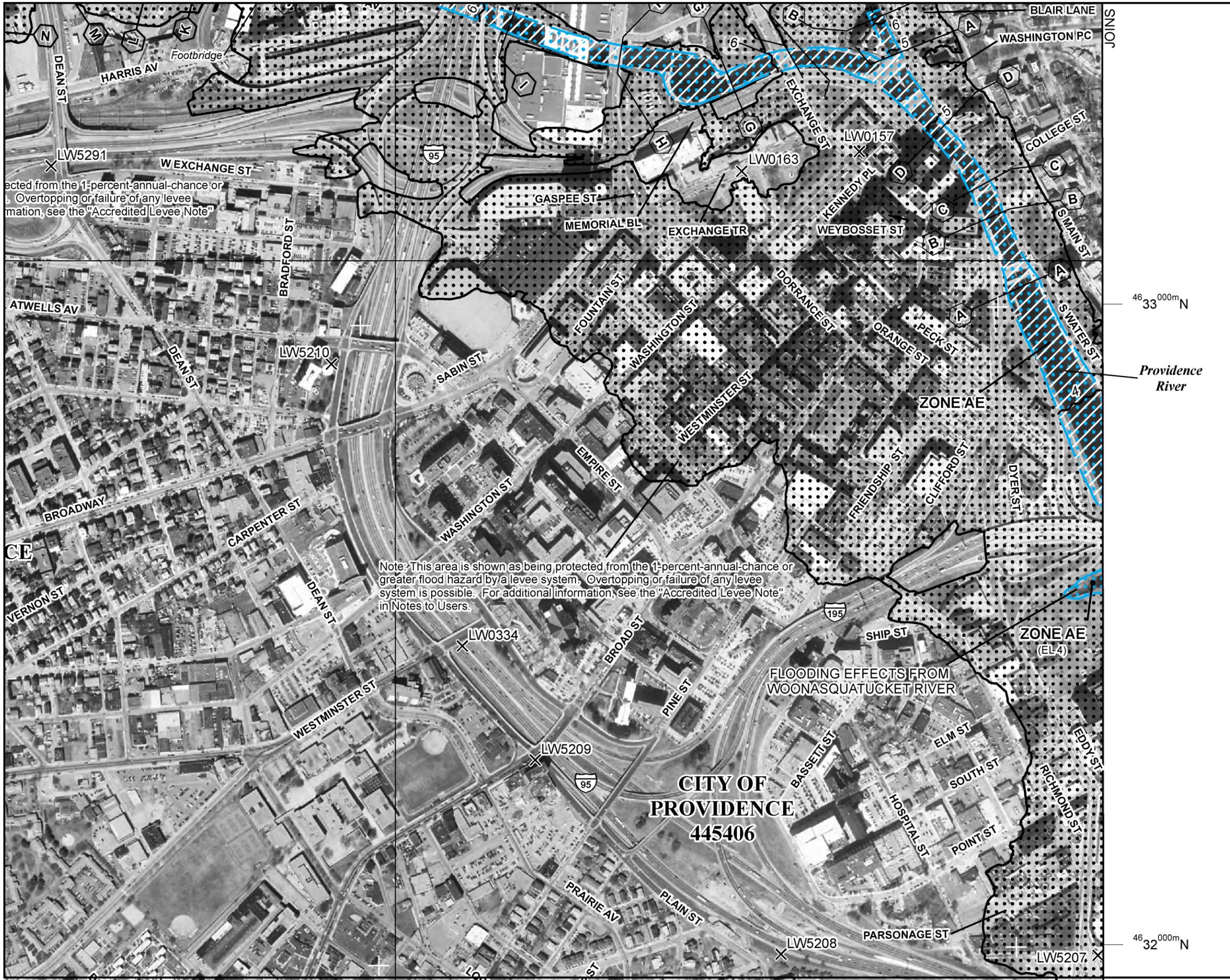
Map Unit Legend

State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties (RI600)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
MU	Merrimac-Urban land complex	0.2	0.1%
PD	Paxton-Urban land complex	19.5	11.5%
UD	Udorthents-Urban land complex	50.7	30.0%
Ur	Urban land	87.0	51.4%
Ws	Water, saline	11.7	6.9%
Totals for Area of Interest		169.2	100.0%

Appendix G

Flood Insurance Rate Map





46° 33' 00" N

Providence River

PANEL 0308H

FIRM
FLOOD INSURANCE RATE MAP
PROVIDENCE COUNTY,
RHODE ISLAND
(ALL JURISDICTIONS)

PANEL 308 OF 451
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PROVIDENCE, CITY OF	445406	0308	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
44007C0308H
MAP REVISED
APRIL 18, 2011

Federal Emergency Management Agency

46° 32' 00" N

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix H

Stormwater Treatment Examples

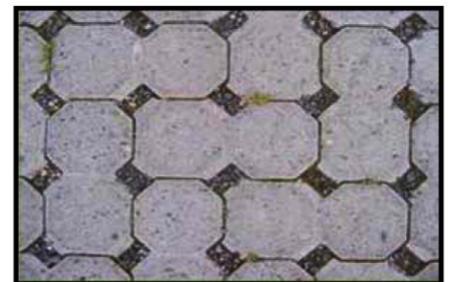


File Path: J:\DWG\VP\20080944\A40\CivilPlan\20080944\A40_DET01.dwg Layout: FIGURE 1 Plotted: Thu, September 12, 2013 - 11:03 AM User: ANDREW GLINES
 MS VIEW: LAYER STATE:

(Source: MA EOE, 2006)



Open-celled Grid Pavers

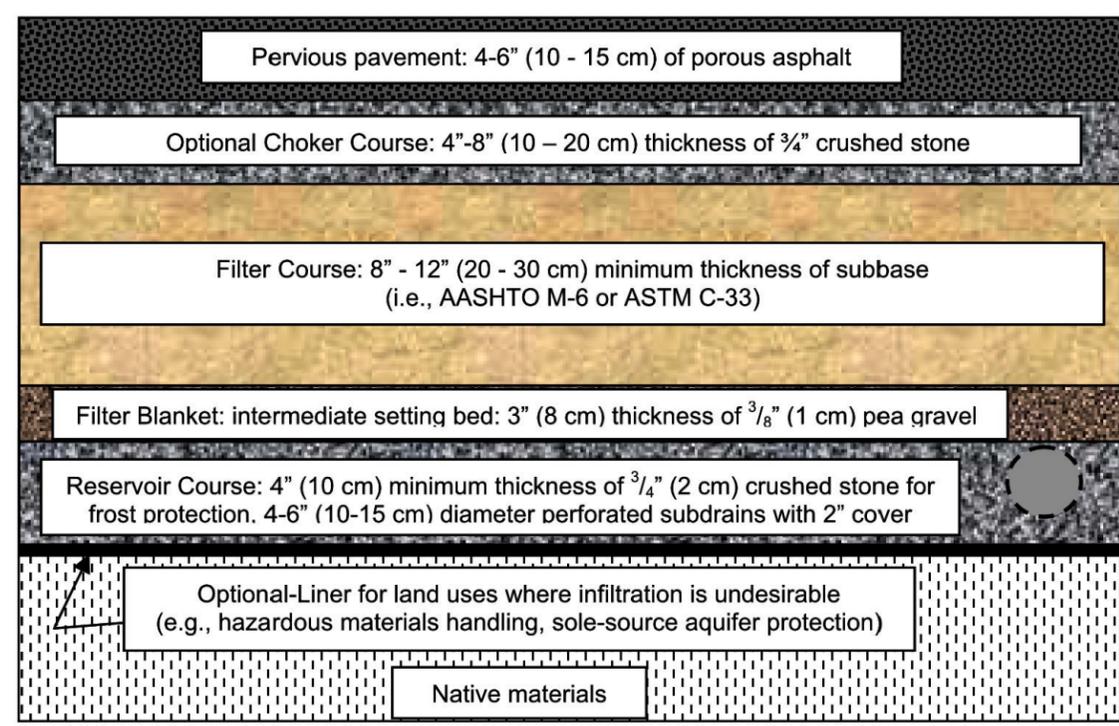


Permeable Paving Blocks with Open Joints

PERMEABLE PAVING SURFACES

NOT TO SCALE

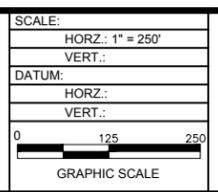
(UNHSC, 2009)



POROUS ASPHALT CROSS-SECTION

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
1.				



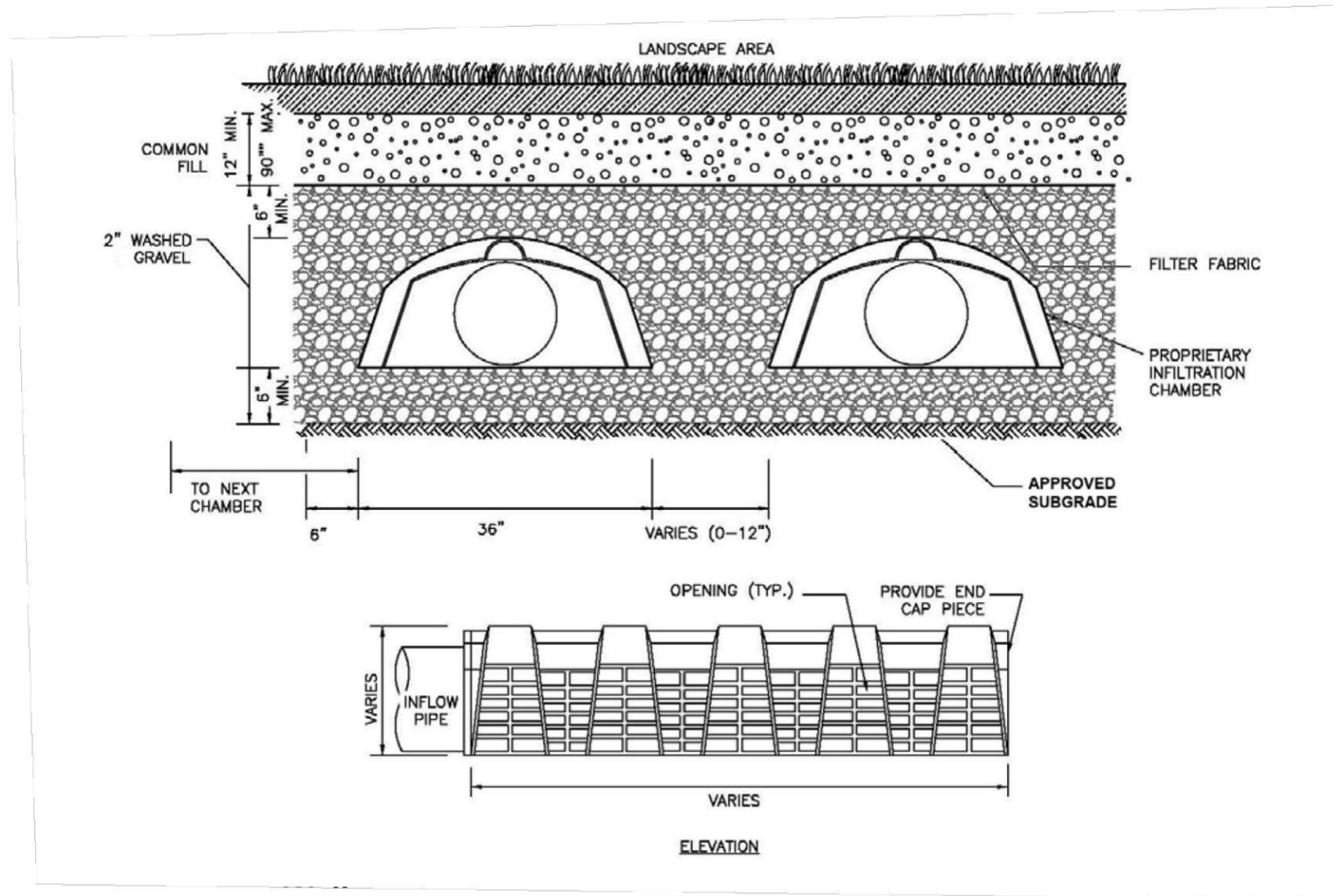
FUSS & O'NEILL
 317 IRON HORSE WAY, SUITE 204
 PROVIDENCE, RI 02908
 401.861.3070
 www.fando.com

I-195 REDEVELOPMENT DISTRICT
 STORMWATER TREATMENT EXAMPLES
 PROVIDENCE
 RHODE ISLAND

PROJ. No.: 20080944.A40
 DATE: SEPTEMBER 2013

FIG. 1

File Path: J:\DWG\VP\20080944\A40\CivilPlan\20080944\A40_DET01.dwg Layout: FIGURE 2 Plotted: Thu, September 12, 2013 - 2:22 PM User: ANDREW GLINES
 MS VIEW: LAYER STATE:



UNDERGROUND INFILTRATION CHAMBERS

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

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HORZ.:	1" = 250'
VERT.:	
DATUM:	
HORZ.:	
VERT.:	
GRAPHIC SCALE	

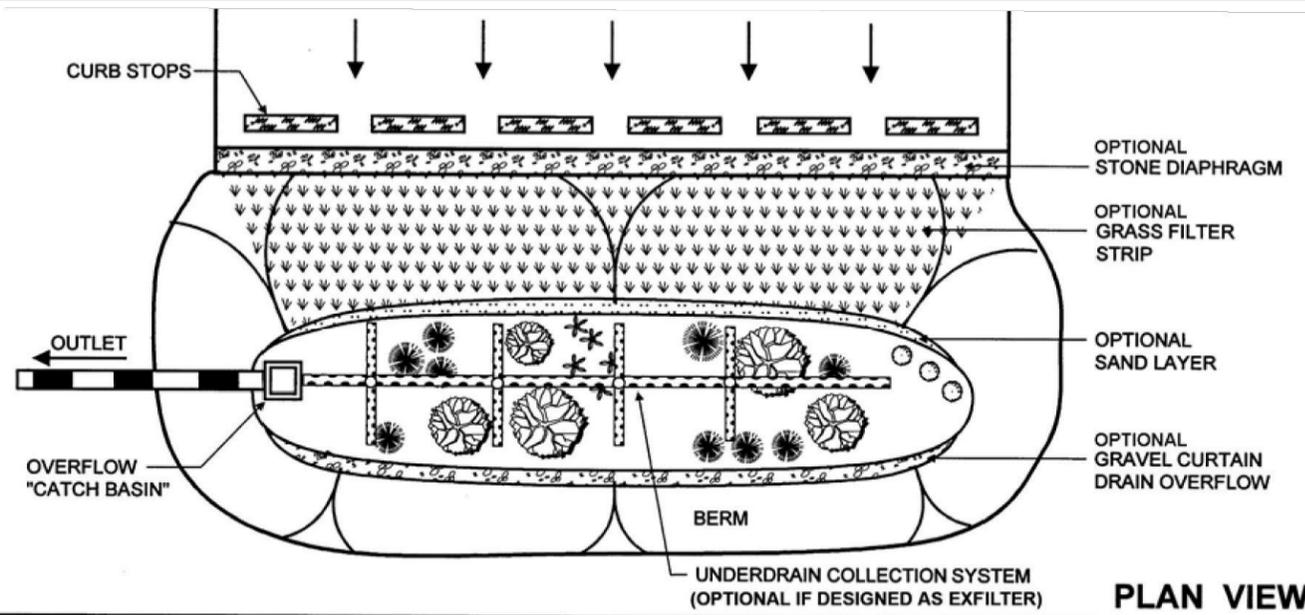
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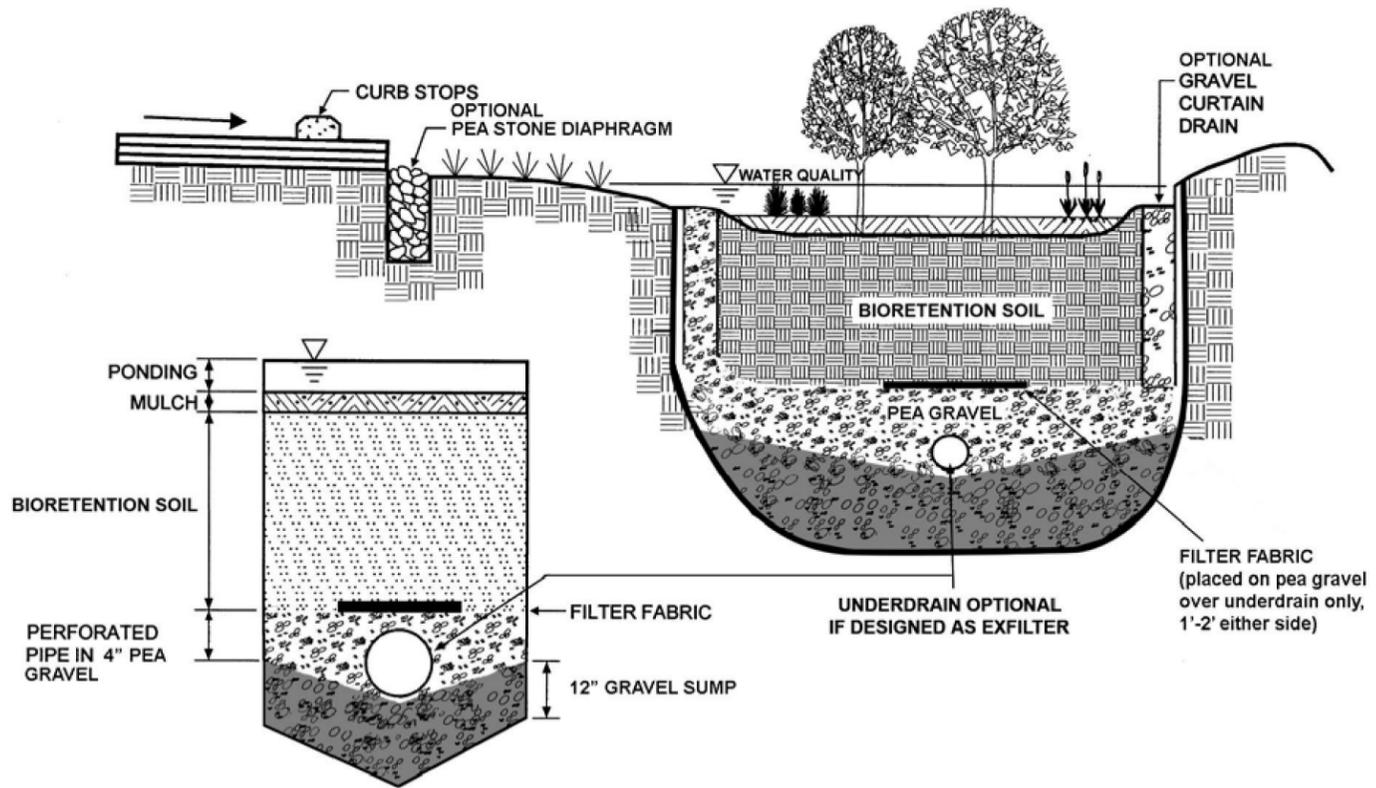
I-195 REDEVELOPMENT DISTRICT
 STORMWATER TREATMENT EXAMPLES
 PROVIDENCE
 RHODE ISLAND

PROJ. No.: 20080944.A40
 DATE: SEPTEMBER 2013

FIG. 2



PLAN VIEW



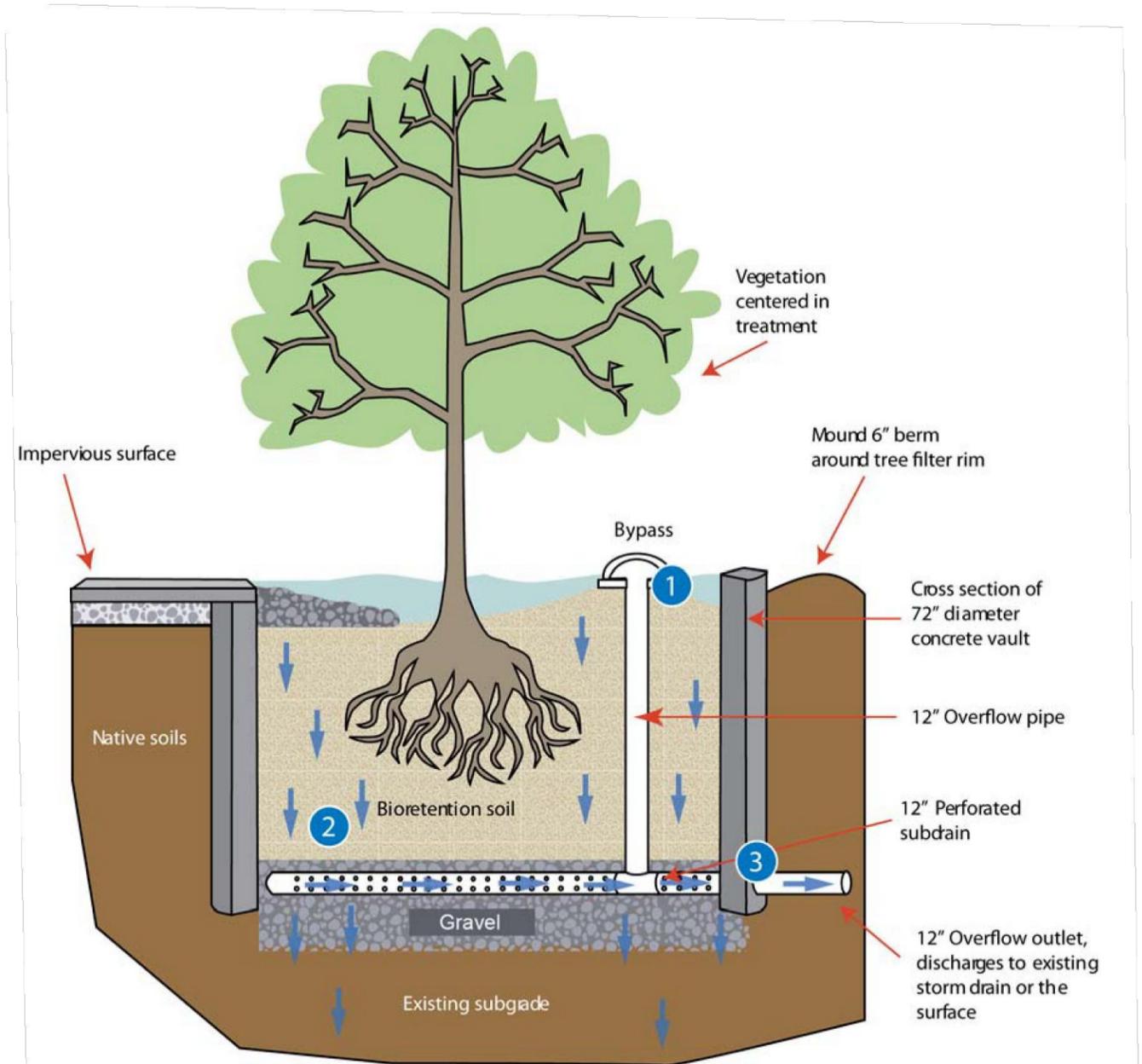
PROFILE

TYPICAL SECTION

BIORETENTION

NOT TO SCALE

Adapted from MDE, 2000



TREE FILTER

NOT TO SCALE

Source: adapted from UNHSC, 2007

File Path: J:\DWG\20080944\A40_DET01.dwg Layout: FIGURE 3 Plotted: Wed, September 11, 2013 - 5:45 PM User: ANDREW GLINES MS VIEW: LAYER STATE:

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER
1.				

SCALE:

HORZ.: 1" = 25'

VERT.:

DATUM:

HORZ.:

VERT.:

GRAPHIC SCALE

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 PROVIDENCE
 RHODE ISLAND

PROJ. No.: 20080944.A40
 DATE: SEPTEMBER 2013
FIG. 3

Appendix I

Water Quality Volume Calculations and Parcel Tabulation



Objective

Calculate the required water quality volume for each parcel within the Route 195 Redevelopment District Area in accordance with Sections 3.2.6 and 3.3.6 of the RISDISM. Fifty percent of the water quality volume (i.e. 0.5-inch of runoff) shall be treated for all impervious area on parcels. The entire water quality volume (i. e. 1-inch of runoff) of impervious area on parcels that will be disconnected from the NBC combined sewer system shall be treated.

$$WQv = [(0.5 \text{ inch} \times I) \div 12 \text{ inches/foot}] + [(1 \text{ inch} \times (I_d - I)) \div 12\text{-inches/foot}]$$

Where:

I = Impervious Area (Acres) =

I_d = Impervious Area to be Disconnected (Acres) =

Existing Impervious Area Calculations

The existing impervious area within the study area was based on field observations and 2008 RIGIS Aerial Mapping.

Future Impervious Area Calculations

The future impervious coverage on development parcels was assumed to be 95% of the parcel area. Future impervious coverage on park parcels was based on Providence River Pedestrian Bridge and Riverfront Parks prepared by Maguire Group Inc., dated September 27, 2012.

The future impervious area and water quality volume calculations are summarized in Tables 1 and 2.

TABLE 1: Cover Conditions Summary

Parcel Information			Pre-Development		Pre- to Post-Development Transition				Post-Development			
Parcel ID	Parcel Area (acres)	Parcel Area (sq. ft.)	Existing Impervious Area (sq. ft.)	Existing Pervious Area (sq. ft.)	Pervious Area to be Converted to Impervious Area (sq. ft.)	Pervious Area to Remain Pervious (sq. ft.)	Impervious Area to be Converted to Pervious Area (sq. ft.)	Disturbed Impervious Area to remain Impervious Area (sq. ft.)	Parcel Use Designation	Assumed Impervious Coverage	Future Pervious Area (sq. ft.)	Future Impervious Area (sq. ft.)
1A	0.28	12,373	2,834	9,539	9,062	477	142	2,692	Development	95%	619	11,754
2	1.08	46,908	45,570	1,338	1,271	67	2,279	43,292	Development	95%	2,345	44,563
5	1.49	64,972	55,252	9,720	9,234	486	2,763	52,489	Development	95%	3,249	61,723
6	1.48	64,668	47,850	16,818	15,977	841	2,393	45,458	Development	95%	3,233	61,435
8	0.30	13,149	7,816	5,333	5,066	267	391	7,425	Development	95%	657	12,492
9	1.05	45,886	41,089	4,797	4,557	240	2,054	39,035	Development	95%	2,294	43,592
14	0.24	10,247	3,699	6,548	6,221	327	185	3,514	Development	95%	512	9,735
15	0.05	2,345	2,345	0	0	0	117	2,228	Development	95%	117	2,228
22	2.65	115,363	96,101	19,262	18,299	963	4,805	91,296	Development	95%	5,768	109,595
25	2.36	102,584	70,918	31,666	30,083	1,583	3,546	67,372	Development	95%	5,129	97,455
27	0.51	22,162	12,544	9,618	9,137	481	627	11,917	Development	95%	1,108	21,054
28	1.25	54,540	39,753	14,787	14,048	739	1,988	37,765	Development	95%	2,727	51,813
30	0.59	25,654	25,654	0	0	0	1,283	24,371	Development	95%	1,283	24,371
34	1.47	63,821	22,471	41,350	39,283	2,068	1,124	21,347	Development	95%	3,191	60,630
35	2.15	93,746	43,222	50,524	47,998	2,526	2,161	41,061	Development	95%	4,687	89,059
37	0.49	21,408	158	21,250	20,188	1,063	8	150	Development	95%	1,070	20,338
41	0.29	12,543	4,005	8,538	8,111	427	200	3,805	Development	95%	627	11,916
42	1.08	47,157	31,703	15,454	14,681	773	1,585	30,118	Development	95%	2,358	44,799
P2	1.98	86,412	40,227	46,185	11,546	34,639	30,170	10,057	Park	25%	64,809	21,603
P3	0.23	9,834	4,734	5,100	1,275	3,825	3,551	1,184	Park	25%	7,376	2,459
P4	4.80	209,190	126,027	83,163	36,592	46,571	70,575	55,452	Park	44%	117,146	92,044
Total sq. ft.		1,124,962	723,972	400,990	302,628	98,362	131,945	592,027			230,307	894,655
Total acres	25.83		16.62	9.21	6.95	2.26	3.03	13.59			5.29	20.54

TABLE 2: Water Quality Volume (WQv)									
Parcel Information			Pre-Development	Post-Development			WQv Treatment		
Parcel ID	Parcel Area (acres)	Area Connected to NBC Sewer System (acres)	Existing Impervious Area (acres)	Pervious Area to be Converted to Impervious Area (acres)	Disturbed Impervious Area to Remain Impervious Area (acres)	Total Impervious Area (acres)	WQv Treatment Required	Total WQv (acre-ft)	Total WQv (cf)
1A	0.28	0.00	0.07	0.21	0.06	0.27	50%	0.01	500
2	1.08	0.00	1.05	0.03	0.99	1.02	50%	0.04	1,900
5	1.49	0.00	1.27	0.21	1.20	1.42	50%	0.06	2,600
6	1.48	1.08	1.10	0.37	1.04	1.41	87%	0.10	4,500
8	0.30	0.30	0.18	0.12	0.17	0.29	100%	0.02	1,100
9	1.05	0.00	0.94	0.10	0.90	1.00	50%	0.04	1,900
14	0.24	0.00	0.08	0.14	0.08	0.22	50%	0.01	500
15	0.05	0.00	0.05	0.00	0.05	0.05	50%	0.00	100
22	2.65	1.82	2.21	0.42	2.10	2.52	84%	0.18	7,700
25	2.36	0.49	1.63	0.69	1.55	2.24	60%	0.11	4,900
27	0.51	0.00	0.29	0.21	0.27	0.48	50%	0.02	900
28	1.25	0.75	0.91	0.32	0.87	1.19	70%	0.07	3,100
30	0.59	0.00	0.59	0.00	0.56	0.56	50%	0.02	1,100
34	1.47	0.00	0.52	0.90	0.49	1.39	50%	0.06	2,600
35	2.15	0.00	0.99	1.10	0.94	2.04	50%	0.09	3,800
37	0.49	0.00	0.00	0.46	0.00	0.47	50%	0.02	900
41	0.29	0.00	0.09	0.19	0.09	0.27	50%	0.01	500
42	1.08	0.00	0.73	0.34	0.69	1.03	50%	0.04	1,900
P2	1.98	0.00	0.92	0.27	0.23	0.50	50%	0.02	1,000
P3	0.23	0.23	0.11	0.03	0.03	0.06	100%	0.00	300
P4	4.80	0.00	2.89	0.84	1.27	2.11	50%	0.09	3,900
Total	25.83	4.66	16.62	6.95	13.59	20.54		1.02	45,700

Appendix J

Long-Term Operation and Maintenance Plan



**Stormwater Management System
Long-Term Operation and Maintenance Plan
I-195 Redevelopment District**

I-195 Redevelopment District Commission
Providence, Rhode Island

September 2013



FUSS & O'NEILL

317 Iron Horse Way
Suite 204
Providence, RI 02908

Table of Contents

Stormwater Management System Long-Term Operation and Maintenance Plan I-195 Redevelopment District Master Plan

1	Introduction.....	2
2	Inspection and Maintenance Requirements for Permanent Stormwater Controls.....	2
2.1	Roadway Maintenance	2
2.2	Tree Filter	3
2.3	Rain Garden	3
2.4	Drainage Structures	4
2.5	Riprap	4
2.6	Permeable Pavers.....	4
2.7	Subsurface Chambers	5

Appendices

End of Report

- A Operation, Maintenance, and Management Inspection Checklists
- B Sample Maintenance Agreement

Stormwater Improvement Plans

Attached Separate



1 Introduction

The I-195 Redevelopment District (the District), which occupies approximately 52.4 acres of downtown Providence, is located between the Jewelry District and Downcity. It is comprised of approximately 18.8 acres of development land, 7.0 acres of parks, and the remainder occupied by public roadways and existing developed lots.

The project has been designed with a stormwater management system designed to mitigate stormwater quality and quantity impacts. The stormwater management system includes tree filters, rain gardens, subsurface infiltration systems, and permeable pavers.

The purpose of this Long-Term Operation and Maintenance Plan is to describe the specific inspection and maintenance activities that are necessary to ensure the success and minimize the deterioration of the stormwater system over time. The parcel Owners are responsible for stormwater management practices associated with that parcel whether the practices are located on the parcel or elsewhere in the District. The Providence Department of Public Works (DPW) is responsible for maintaining catch basins and related stormwater infrastructure located within city streets and stormwater outfalls. In the event that a facility becomes owned by a different legal entity, the responsibility for Long-Term Operation and Maintenance shall be transferred to the new owner.

2 Inspection and Maintenance

The following inspection and maintenance activities for permanent stormwater controls shall be conducted to ensure the success and minimize the deterioration of the stormwater system over time. Checklists to assist with the inspection and maintenance activities are provided in *Appendix A*. The location of the components of the stormwater management system shall be depicted on a Stormwater Management Plan for each redevelopment project within the District.

2.1 Roadways

The DPW shall sweep public roadways within the District. Private roadways, including driveways and service alleys, shall be swept by the Owner or legally-responsible entity a minimum of once per year with a vacuum sweeper, typically after the winter season. A second sweeping is recommended after fall but before winter to remove sediment, debris, trash, and organic matter from street trees. More frequent sweeping should be implemented as conditions warrant. Trash, sediment, and debris collected from roadways shall be disposed in accordance with applicable local, state, and federal guidelines and regulations.

Snow shall not be removed from roadways and placed within any stormwater management practice. Sand may be used as an abrasive to provide traction on the driveway surface during winter months, if necessary. Accumulated sand shall be removed and disposed of in accordance with applicable local, state, and federal guidelines and regulations. It is not expected that sand will be stored on any of the parcels. However, if sand is stored, stockpiles shall be covered to prevent exposure to precipitation.



Deicing chemicals should not be stored at the site. If chemicals are stored at the site, they shall be secured from vandalism and protected from exposure to precipitation.

2.2 Tree Filters

Tree filters shall be inspected after every storm event larger than one-inch in the first six months following construction. Filters shall be inspected annually thereafter and after every storm event greater than 2.7 inches over a 24-hour period. Inspections shall include: evidence of clogging of the filter media (e.g. standing water for longer than 24 hours); inlets and outlets for signs of erosion and damage; overflow structures for signs of blockage and structural integrity; and slopes of the tree filter for erosion or gullyng.

Materials deposited on the surface of the tree filter (e.g., sediment, trash, leaf litter) should be removed manually or with hand tools to avoid soil compaction. Sediment shall be removed from the filter when the accumulation exceeds one inch or when there is evidence that the infiltration capacity has been significantly reduced. The top six inches of the tree filter shall be removed and replaced when the filtering capacity of the filter diminishes substantially (i.e., when water ponds on the surface of the filter bed for more than 24 hours). If discolored material is found below this removed surface, then the discolored material should also be removed and replaced until all discolored material has been removed. Removed sediments shall be dewatered (if necessary) and disposed of in a lawful manner. Any areas within the extents of the tree filter that are subject to erosion or gullyng shall be replenished with the original design material and re-vegetated according to design drawings or with plants appropriate for this application.

Pruning of vegetation shall be completed one to two times a year, at minimum (frequency depends upon location, plant species, and desired aesthetic appeal). Vegetation within the filter should be limited to a height of 18". Vegetation should be watered every two to three days for first two months, then sporadically after establishment during the first year after installation. If droughty, watering after the initial year may be required. Separation of herbaceous vegetation rootstock should occur when overcrowding is observed, or approximately once every three years.

Snow that is removed from adjacent roadways, parking areas and sidewalks shall not be stored in the tree filter or sediment trap.

2.3 Bioretention/Rain Gardens

Bioretention basins and rain gardens shall be inspected after every storm event larger than one-inch in the first six months following construction. Bioretention basins and rain gardens shall be inspected annually thereafter and after every storm event greater than 2.7 inches over a 24-hour period. Inspections shall include: evidence of clogging of the filter media (e.g. standing water for longer than 24 hours); inlets and outlets for signs of erosion and damage; overflow structures for signs of blockage and structural integrity; and slopes of the tree filter for erosion or gullyng.



Materials deposited on the surface of the filter media (e.g., sediment, trash, leaf litter) should be removed manually or with hand tools to avoid soil compaction. Sediment shall be removed from the filter when the accumulation exceeds one inch or when there is evidence that the infiltration capacity has been significantly reduced. The top six inches of the filter media shall be removed and replaced when the filtering capacity of the filter diminishes substantially (i.e., when water ponds on the surface of the filter bed for more than 24 hours). If discolored material is found below this removed surface, then the discolored material should also be removed and replaced until all discolored material has been removed. Removed sediments shall be dewatered (if necessary) and disposed of in a lawful manner. Any areas within the extents of the bioretention basin or rain garde that are subject to erosion or gulying shall be replenished with the original design material and re-vegetated according to design drawings or with plants appropriate for these applications.

Pruning of vegetation shall be completed one (1) to two (2) times a year, at minimum (frequency depends upon location and desired aesthetic appeal). Vegetation within sediment traps shall be limited to a height of 18". Vegetation shall be watered one time every two to three days for first two months, then sporadically after establishment during the first year after installation. If droughty, watering after the initial year may be required. Separation of herbaceous vegetation rootstock should occur when over-crowding is observed, or approximately once every three years. If at least 50 percent vegetation coverage is not established after the first growing season, reinforcement planting should be installed.

Snow that is removed from adjacent roadways, parking areas and sidewalks shall not be stored in the bioretention basin, rain garden, or sediment trap.

2.4 Drainage Structures

Once construction is complete and has been accepted by the Owner, all drainage structures shall be inspected twice per year, at minimum, and cleaned once per year, at minimum. Inspections shall include checking for debris, sediment, and hydrocarbons, and structural integrity or damage. Deficiencies must be corrected immediately. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations. Inlet grates shall not be welded to the frame so the structures can be easily inspected and maintained.

2.5 Riprap

Riprap and stone stabilization pads shall be inspected four times per year to determine if high flows have caused scour beneath the riprap or dislodged any of the stone. If repairs are needed, they should be completed immediately to prevent erosion or damage.

2.6 Permeable Pavers

Pavers shall be inspected after every storm event larger than one-inch in the first six months following construction. They shall be inspected annually thereafter and after every storm event greater than 2.7 inches over a 24-hour period. Inspections shall include checking for standing water or other evidence of clogging by accumulated sediments, and checking for deterioration, spalling, or damage.



Minimize the use of sand and salt in the winter months, keep adjacent landscape areas well maintained and stabilized, and add joint filler material periodically to replace material that has been transported from pavers.

2.7 Subsurface Chambers

Subsurface chambers shall be inspected after every storm event larger than one-inch in the first six months following construction. They shall be inspected annually thereafter and after every storm event greater than 2.7 inches over a 24-hour period. Chambers may be inspected through a manhole or optical inspection port. Inspections shall include checking for standing water or other evidence of clogging by accumulated sediments. If average sediment depth exceeds three inches, cleanout is required.

Pre-treatment devices shall be inspected and maintained according to the Drainage Structures schedule. Proprietary devices shall follow the manufacturer's specifications, the Drainage Structures, schedule, or as demanded by specific site conditions, whichever is more frequent.



Appendix A

Operation, Maintenance, and Management Inspection Checklist



Appendix B

Sample Maintenance Agreement



LITERARY REFERENCES

- Rhode Island Soil Erosion and Sediment Control Handbook,
Rhode Island Department of Environmental Management /USDA Soil Conservation Service/Rhode Island State Conservation Committee, 1989
- Rhode Island Stormwater Design and Installation Standards Manual,
Rhode Island Department of Environmental Management and Rhode Island Coastal Resources Management Council, December 2010
- Regulations For The Rhode Island Pollutant Discharge Elimination System,
Rhode Island Department of Environmental, June 26, 1984 (amended February 9, 1993)





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