

FRESHWATER WETLANDS IN THE VICINITY OF THE COAST

RULES NARRATIVE

WOONASQUATUCKET GREENWAY
PROMENADE STREET, KINSLEY AVENUE, & EAGLE STREET
PROVIDENCE, RHODE ISLAND

Prepared for:

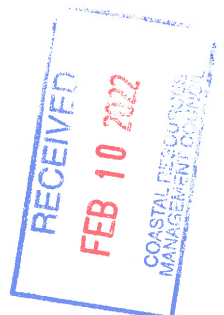
City of Providence



Prepared by:

Horsley Witten Group, Inc.

February 2022



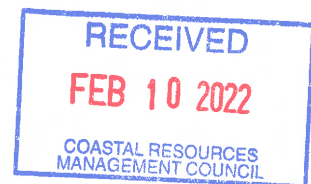
Freshwater Wetland in the Vicinity of the Coast Rules Narrative
Woonasquatucket River Greenway
Providence, Rhode Island

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CRCM Freshwater Wetlands in the Vicinity of the Coast
Woonasquatucket River Greenway,
Providence, RI

1.0 INTRODUCTION AND BACKGROUND

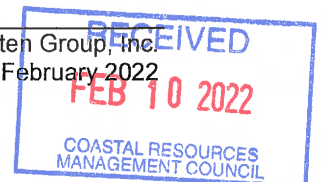
The City of Providence proposes improvements to the Woonasquatucket River Greenway within and adjacent to the Woonasquatucket River, Promenade Street, Kinsley Avenue, and Eagle Street in Providence, RI. The proposed project consists of mobility improvements to provide a protected pedestrian/bicycle urban trail between Providence Place Mall and Eagle Square, including new planted areas, two pocket parks, two kayak launches, and associated utility, stormwater control measures, and landscape improvements. This project also includes soil capping efforts as required in the Remedial Action Work Plan. The work will occur within the 200-foot Riverbank Wetland as well as portion occurring within the 100-year AE Flood Zone. This report addresses the performance standards in the Coastal Resources Management Program-Rules and Regulations Governing the Protection and Management of Freshwater Wetlands in the Vicinity of the Coast (FWWVC) as requested December 2021.

2.0 SITE DESCRIPTION

The project area consists of city streets, including paved travel ways, concrete sidewalks, and limited areas of maintained grass tree lawns, and is located adjacent to the tidally influenced Woonasquatucket River. Portions of the project area are within the 100-year AE Flood Zone per FEMA Flood Insurance Rate Map 44007C0308J last revised October 2, 2015, and a small portion is located within the Regulatory Floodway (5,050 SF). The two locations that are located within the Riverbank Wetland are the two Kayak Launches, located off Kinsley Avenue (Launch 1), and near the Leland Street and Promenade Street intersection (Launch 2). HW conducted extensive existing conditions review and alternatives investigations for potential launch locations, involving desktop mapping, as well as multiple site walks, and a kayak tour from the river to identify the most appropriate locations for the kayak launches. The existing conditions within the project areas include vegetated banks with slopes ranging from 2:1 to 5:1. Even though they are steep, the selected locations are the most conducive areas for incorporation of ramps in these sections of the river corridor. The proposed kayak launch locations are highlighted in the photos and figure provided in [Appendix A](#).

3.0 JURISDICTIONAL AREAS

Horsley Witten Group, Inc. (HW) identified jurisdictional areas as regulated by Coastal Resources Management Council (CRMC) and delineated in the field the landward limits of coastal and freshwater wetlands following the requirements of Section 650-RICR-20-00-2.18 of the FWWVC. Field delineations were conducted on June 10, 2019. The edge of the river was determined as the ordinary high water mark (OHW)/mean high water mark (MHW) of the tidally influenced flowing water, based upon field observations of physical characteristics, including distinct breaks in slope between terrestrial and aquatic conditions, shelving, and stains and



watermarks along woody vegetation and bridge abutments. The limits of jurisdictional Riverbank Wetlands were determined as the 200-foot wide contiguous area once the top of bank/limits of OHW/MHW was determined. For the purposes of calculating impacts, HW used data from NOAA station 8454000 to determine MHW and mean low water (MLW). A brief description of these resources, including regulatory definitions, is provided below.

3.1 Shoreline Features

The resource areas identified within the project site are freshwater wetlands in the vicinity of the Coast. Consistent with the R.I.G.L. Sections 46-23-6, *freshwater wetlands seaward of the jurisdictional boundary that are regulated by the Coastal Resources Management Council in accordance with the "Rules and Regulations Governing the Protection and Management of Freshwater Wetlands in the Vicinity of the Coast."* However, as the Woonasquatucket River is tidally-influenced, there are also features associated with coastal communities.

Coastal Wetlands (Regulation Section 650 RICP-20-00-1)

Coastal wetlands are defined under Section 650 RICP-20-00-1 as those which *"include salt marshes and freshwater or brackish wetlands contiguous to salt marshes or physiological features. Areas of open water within coastal wetlands are considered a part of the wetland. In addition, coastal wetlands also include freshwater and/or brackish wetlands that are directly associated with nontidal coastal ponds and freshwater or brackish wetlands that occur on a barrier beach or are separated from tidal waters by a barrier beach."*

River & Riverbank Wetland (Act Section 2-1-20(9))

Section 650-RICR-20-00-2.4 of the FWWVC Rules and Regulations defines a river as *"a body of water that is designated as a perennial stream by the United States Department of Interior Geologic Survey on 7.5-minute series topographic maps, and that is not a pond."*

In addition, Riverbank is defined under Section 650-RICR-20-00-2.4 as *"that area of land within two hundred feet (200') of the edge of any flowing body of water having a width of ten feet (10') or more, and that area of land within one hundred feet (100') of the edge of any flowing body of water having a width of less than ten feet (10') during normal flow."*

The Woonasquatucket River is a CRMC water use Class Type 4 (multi-purpose) and is also one of 14 Federally-designated American Heritage Rivers in the U.S.. Its headwaters are located in North Smithfield, RI. The river is tidally influenced below (east of) the Rising Sun Dam. Here, it flows through Providence, under the Providence Place Mall, and continues southeast, converging with other rivers and streams to eventually form the upper part of Narragansett Bay. At the project site, the reach of the Woonasquatucket River is a deep and wide (35-80 feet wide) perennial stream which flows within a well-defined channel from west to east. The riverbank is a freshwater resource that is directly associated with this tidally-influenced river located seaward of the jurisdictional boundary that is regulated by the CRMC. Accordingly, the Woonasquatucket River has a Riverbank Wetland.

While some reaches of the riverbank are reinforced by bulkheads and revetments, the majority of the river bank within the project corridor, and particularly along the right bank (south side) of

the river consists of vegetated embankments and includes such species as black locust (*Robinia pseudoacacia*), red maple (*Acer rubrum*), box elder (*Acer negundo*), ash (*Fraxinus* sp.), tree-of-heaven (*Ailanthus altissima*), golden threadleaf cypress (*Cupressaceae* sp.; planted), gray birch (*Betula populifolia*), pin oak (*Quercus palustris*), cherry (*Prunus* spp.), slippery elm (*Ulmus rubra*), sycamore maple (*Acer pseudoplatanus*), and white oak (*Quercus alba*) in the canopy with various shrubs and understory tree species including alder (*Alnus* sp.), black elderberry (*Sambucus nigra*), flowering dogwood (*Swida alternifolia*), sweet-pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and multiflora rose (*Rosa multiflora*). Groundcover species observed at the time of the site visit include meadow rue (*Thalictrum* sp.), meadowsweet (*Spiraea* sp.), , poison ivy (*Toxicodendron radicans*), sensitive fern (*Onoclea sensibilis*), and jewelweed (*Impatiens capensis*). Vine species observed include Virginia creeper (*Parthenocissus quinquefolia*) and poison ivy. Japanese knotweed (*Fallopia japonica*), The majority of the north side of the river (i.e., left bank) is landscaped. Outside of the landscaped areas, similar species were observed as on the south side. Additionally, along north side of the river, northern catalpa (*Catalpa speciosa*) and soft rush (*Juncus effusus*) were noted.

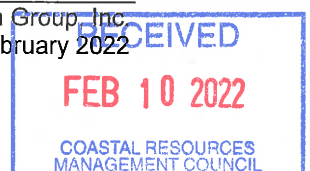
HW delineated the edge of the river (OHW/MHW/top of bank) with blue flagging tape labeled RB1S-88S on the south side of the river, noting that several stretches of the Woonasquatucket River are reinforced with manmade shoreline protection structures, and specifically, between flagging stations RB1 - RB5; 24S - 25S; and 33S - 35S; and at 84S. The edge of the river along the north side is delineated with flagging stations labeled RB1N - RB57N. Manmade shoreline structures were noted on the north side as well, between flagging stations 17N - 18N, 40N- 47N (along the landscaped office park), and 52N - 57N.

The two areas of the riverbank that will be affect by the kayak launches would be considered part of the Flowing and Standing Water Wetland – or the unvegetated bank of the Woonasquatucket River between mean low water and the MHW/OHW as well as the Riverbank Wetland. There are no existing Vegetated Wetlands (i.e., bogs; marshes; swamps; emergent, shrub or forested wetlands) along this reach of the Woonasquatucket River nor in these specific locations.

Manmade Shorelines (Regulation Section 650 RICP-20-00-1)

Manmade shorelines are defined as “those characterized by concentrations of shoreline protection structures and other alterations, to the extent that natural shoreline features are no longer dominant. They most commonly abut Type 3, 5, and 6 waters. The presence of isolated seawalls, bulkheads, and similar structures does not constitute a manmade shoreline, as the term is used in this Program.”

The sporadic revetments along this stretch of the Woonasquatucket River, where natural shoreline features are not present, meet the regulatory definition of manmade shorelines to the extent that they are contiguous. However, as noted above, natural shoreline features are dominant along this stretch of the river, particularly along the south side.



3.2 Flood Zone

An Area Subject to Flooding is defined as an area that is “*included but not be limited to, flood plains, depressions of low-lying areas flooded by rivers, streams. Intermittent streams, or areas subject to storm flowage which collect, hold, or meter out storm and flood waters.*” The majority of the site and the surrounding areas occur within Zone X, an area with reduced flood risk due to levee. However, the southwestern portion of the project occurs within a Zone AE, (elevations 6 - 10 feet) (see **Appendix B**). The river itself is mapped as a Zone AE, Regulatory Floodway.

4.0 PROJECT DESCRIPTION AND EVALUATION

The Applicant proposes to construct the following within jurisdictional areas:

- A separated multi-use urban trail, converting an existing vehicular travel lane to a trail with associated pedestrian/bicycle, signage, and striping improvements and a vegetated buffer wherever possible;
- Two new pocket parks, one adjacent to Hemlock Street, and one at the Eagle Street/Kinsley Avenue intersection;
- Two new kayak launches, one adjacent to Kinsley Avenue near Sims Avenue (Kayak Launch 1), and one near Leland Street and Promenade Street (Kayak Launch 2);
- Street tree planting and associated landscape improvements; and
- Green stormwater infrastructure bioretention systems.

Overall, the limit of work encompasses 5.9 acres with the majority of the improvements taking place on existing paved roadway, where approximately 3.5 acres of the total disturbance consists of milling and resurfacing the existing road surface. The proposed stormwater management improvements include a green stormwater infrastructure (GSI) approach to capture, treat, infiltrate (where feasible), and detain runoff, when applicable and to the maximum extent practicable, by using pavement reduction and GSI practices incorporated into the overall site and landscape design. Additional information related to the design of these practices can be found in the **Woonasquatucket Greenway Stormwater Report**, submitted under separate cover.

The limit of work is entirely within the 200' Riverbank, with a portion of the improvements within Zone AE. As a whole, the project results in more flood storage capacity within Zone AE. A map demonstrating cut and fill within this zone is attached (**Appendix C**). A small portion of the project also disturbs area below the MHW line. A summary of this disturbance can be found below.

Table 1. Summary of Disturbance below MHW.

Disturbance			
Temporary Disturbance Below MHW		Total:	4,333 SF
Kayak Launch 1	1,470 SF		
Kayak Launch 2	2,863 SF		
Permanent Disturbance Below MHW		Total:	667 SF
Kayak Launch 1	175 SF		
Kayak Launch 2	492 SF		
Construction Fill below MHW		Total:	966 CF
Kayak Launch 1	244 CF		
Kayak Launch 2	722 CF		

Notes:

1. Temporary disturbance refers to all area within the limit of work, below the MHW line.
2. Permanent Disturbance refers to the areas that have changed to concrete or pavers, and not restored back to planted areas or riverbed.
3. Construction fill is new material within the bank such as concrete, pavers, Vegetated MSE bags or boulders.

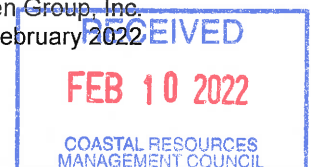
5.0 IMPACT AVOIDANCE AND MINIMIZATION

5.1 Impact Avoidance

The following discussion topics address the potential impacts of the proposed project to the riverbank and the extent to which such impacts will be avoided, pursuant to Rule 2.09(B)(d)(1) of the Rules and Regulations that states, “All persons must satisfactorily demonstrate to the Department in the form of a written narrative that all probable impacts to freshwater wetlands functions and values have been avoided to the maximum extent possible. The written narrative must describe what steps were taken to avoid impacts to freshwater wetlands. At a minimum, applicants must consider and address the following issues:

- a) Whether the primary proposed activity is water-dependent or whether it requires access to freshwater wetlands as a central element of its primary purpose (e.g., a pier);

Majority of the proposed project does not require direct access to water and is within the city right of way, on already disturbed area. However, the two kayak launches are water dependent and require access to the riverbank and edge. Without access to these areas, the goal of creating a physical connection to the river (as outlined in Metro Bay Special Area Management Plan) would be impossible.



b) Whether any areas within the same property or other properties owned or controlled by the applicant could be used to achieve the project purpose without altering the natural character of any freshwater wetlands.

The entire river corridor is under the control of the City of Providence with the purpose of creating greater access to the river within the Woonasquatucket River Greenway. Majority of the project does not alter the edge of the river and is within a street right of way. The locations for the proposed kayak launches were selected to create the least amount of disturbance within the project area while still providing an accessible ramp. An analysis of slopes and features along the river can be found in **Appendix A**. Additionally, neither location supports vegetated wetlands. Images of these locations and the conditions of the bank can be found in **Appendix A**.

c) Whether any other properties reasonably available to, but not currently owned or controlled by, the applicant could be used to achieve the project purpose while avoiding wetland alterations. A property is reasonably available if, in whole or in part, it can be acquired without excessive cost, taking individual circumstances into account, or, in the case of property owned or controlled by the same family, entity, group of affiliated entities, or local, state or federal government, may be obtained without excessive hardship;

As noted, the Woonasquatucket River Greenway is controlled by the City of Providence. The entire river edge for this section, from Eagle Square to Providence Place Mall is available for consideration of the proposed kayak launches. Other locations would not meet the project purpose. In addition, the entire length is highly industrialized with roads and steep slopes on either side. Larger areas of disturbance, or additional structures would be needed to build an accessible ramp in other available locations; the proposed locations avoid unnecessary impacts within the river corridor, and to riverbank wetlands. An analysis of slopes and features along the river can be found in **Appendix A**.

d) Whether alternative designs, layouts or technologies could be used to avoid freshwater wetlands or impacts on functions and values on the subject property or whether the project purpose could be achieved on other property that is reasonably available and would avoid wetlands;

The locations of the kayak launches along the Woonasquatucket River were selected, and layouts were designed, to avoid freshwater wetlands and result in the minimal amount of disturbance while still meeting project goals. The amount of disturbance within each of the riverbanks is directly related to the slope needed to reach the water with a maximum 8% gradient with landings to provide ADA compliance. The distance to create the ramp with adjacent grading is directly related to the existing topography, with the roadways on either side being between 8-10 feet higher in elevation than the river. This condition is present throughout the entire length of this river section, therefore, alternative layouts would not result in avoidance of freshwater wetland (river bank) impacts.

e) Whether the applicant has made any attempts (and if so what they were) to avoid alterations to freshwater wetlands by overcoming or removing constraints imposed by zoning, infrastructure, parcel size or the like;

As noted above, the topographical constraints along the river within the Woonasquatucket River Greenway are similar along this entire reach of the river. It would be impractical to alter the roadways along both sides of the river to avoid or further minimize work within the riverbank. There are no apparent zoning constraints. All work proposed has been located to minimize disturbance along the riverbank.

f) Whether the feasible alternatives that would not alter the natural character of any freshwater wetland on the subject property or on property that is reasonably available, if incorporated into the proposed project would adversely affect public health, safety or the environment.

There are no feasible alternatives that would not alter the natural character of the riverbank within this section of the river. The project as proposed is a benefit to both public health and the environment, and the design incorporates safety measures to maintain safe access to the water.

5.2 Impact Minimization

The following discussion describes how the project will minimize impacts to Freshwater Wetlands pursuant to Rule 2.09(B)(d)(2), which states, “For any impact to freshwater wetlands that cannot be avoided, the applicant must satisfactorily demonstrate to the Department in the written narrative that the impact to wetland functions and values have been reduced to the maximum extent possible. At a minimum, applicants must consider the following issues...”

a) Whether the proposed project is necessary at the proposed scale or whether the scale of the wetland alteration could be reduced and still achieve the project purpose;

As previously noted, the goal is to provide accessible public connections to the river, as such two locations are proposed on either side of the river, approximately $\frac{3}{4}$ of a mile apart. Having both locations is necessary to make the entire river corridor easily accessible. The scale of the project could not be reduced while still achieving the project purpose of connecting the surrounding communities to the river.

b) Whether the proposed project is necessary at the proposed location or whether another location within the site could achieve the project purpose while resulting in less impact to the wetland;

As stated in the Impact Avoidance section, the proposed locations will result in the least amount of disturbance to riverbank wetlands. Alternative locations along this reach of the river, and within the Woonasquatucket River Greenway would increase disturbance due to existing site constraints of structures, roadways, and steep slopes.

c) Whether there are feasible alternative designs, layouts, densities or technologies that would result in less impact to the wetland while still achieving the project purpose;

The amount of disturbance within each of the riverbanks is directly related to the slope needed to reach the water with a maximum 8% gradient with landings to provide safe access to the water. The distance to create the ramp with adjacent grading is directly related to the existing slope; disturbance within the 200-foot riverbank wetland cannot be reduced while creating an

accessible ramp, and disturbance within the right-of-way occurs almost entirely within existing paved surface. In addition, with the incorporation of green stormwater infrastructure bioretention systems, the project, as a whole, will improve water quality for the river.

d) Whether reduction in the scale or relocation of the proposed project to minimize impact to the wetland would result in adverse consequences to public health, safety or the environment.

As previously noted, the project not only provides a benefit to the environment but also provides a benefit to the surrounding community by making the river more accessible throughout its length. Reduction in the scale or relocation of the proposed kayak launches outside of the Woonasquatucket River Greenway will not meet the project purpose. Relocating the kayak launches to different locations along the river will likely result in greater impacts to freshwater wetlands, as incorporation of necessary safety measures would result in greater impacts to vegetated portions of the riverbank wetlands.

The use of erosion control measures during construction will minimize any potential impacts to the river, while incorporation of green infrastructure bioretention areas will improve water quality within the river.

6.0 ENGINEERING REQUIREMENTS

The following discussion describes an evaluation of required elements pursuant to subsection 2.09(B)(e) which states, “*Applicants must submit supporting calculations, documents and reports to demonstrate that the proposed project meets or exceeds the review criteria set forth in Section 2.9 (C) and 2.10 of this park. Applicants should refer to the written evaluation – required elements in section 2.10(B)(5)(d)((3)) through ((5)).*”

Supporting calculations documents and reports can be found in the **Stormwater Analysis and Drainage Report, Soil Erosion and Sediment Control Plan** and the **Coastal Resources Management Program Narrative**, submitted under separate cover.

a) Wildlife and Wildlife Habitat;

The project is not anticipated to reduce the overall ability of the river corridor to support existing wildlife and provide wildlife habitat, particularly within this urban setting. The proposed project will result in minimal disturbance to the existing plant communities and will not result in the loss of freshwater wetland vegetation. Instead, the proposed kayak launches are sited in locations where the banks of the river are devoid of wetland vegetation that may otherwise provide food or shelter to existing wildlife. Due to stabilization measures and grading of slope conditions along the proposed ramps, revegetation with native plant species will enhance the surrounding plant community and its ability to provide habitat for existing wildlife populations. healthy plant community will be able to thrive and support wildlife.

b) Recreation and Aesthetics;

The project does not reduce the potential ability of the resource to provide aesthetic values and recreational activities to the public. In fact, one of the goals of the project is to enhance the

recreational opportunities along the Woonasquatucket River Greenway. With the incorporation of the two kayak launches, the proposed pocket parks, and the multi-use trail, and revegetation and landscaping improvements, the project will improve recreational opportunities for the public. In addition, proposed landscaping will improve and enhance the aesthetics along this portion of the river corridor.

c) Flood Protection;

A portion of the project is located within the AE Flood Zone, including a portion of the proposed raised multi-use trail, the kayak launches, and adjacent truck aprons. To offset proposed fill within the floodzone or regulatory floodway, other proposed project elements, including the design of the pocket park at the intersection of Kinsley Avenue and Eagle Street has been graded to offset some of the fill within the flood plain. Additionally, the slope along the river is cut into in two locations where the kayak launches are proposed. Overall and considering all proposed project elements, there is a slight net increase in flood storage capacity within the flood plain. A figure depicting the cut and fill adjustments, along with quantities, can be found in **Appendix C**.

d) Groundwater and Surface Water Supplies;

Removal of existing impervious surfaces within the project area will result in an overall slowing of surface water and an opportunity for more water to infiltrate into the ground. Additional information related to these improvements can be found in the **Stormwater Analysis and Drainage Report**.

e) Water Quality;

The use of green infrastructure and an overall reduction in impervious surfaces will result in an improvement to stormwater runoff entering the river, which will in turn, result in improved water quality within the river. Additional information related to these improvements can be found in the **Stormwater Analysis and Drainage Report**.

f) Soil Erosion and Sediment Control.

The proposed project proposes removing existing hardscape, milling existing asphalt, regrading a proposed pocket park, and regrading small portions of the riverbank. As noted above, the majority of the project area is within the existing right-of-way and relatively flat. To capture excess sediment during construction, erosion controls (silt socks) will be placed in front of the existing guardrail to prevent sedimentation into downgradient areas and the river. Sediment sacks will be installed in existing catch basins and will be cleaned and monitored until the site is stabilized. For the kayak launch locations, silt socks and a muscle wall will capture excess runoff during construction, which will be pumped to a dewatering station at the top of the slope to prevent sedimentation within the river. All erosion and sedimentation measures will remain in place until the site is full stabilized. More information related to the erosion and sediment control can be found in the and in the **Soil Erosion and Sediment Control Plan** and the Plan Set.



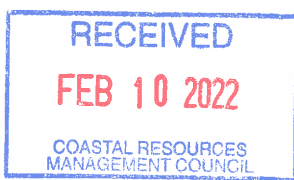
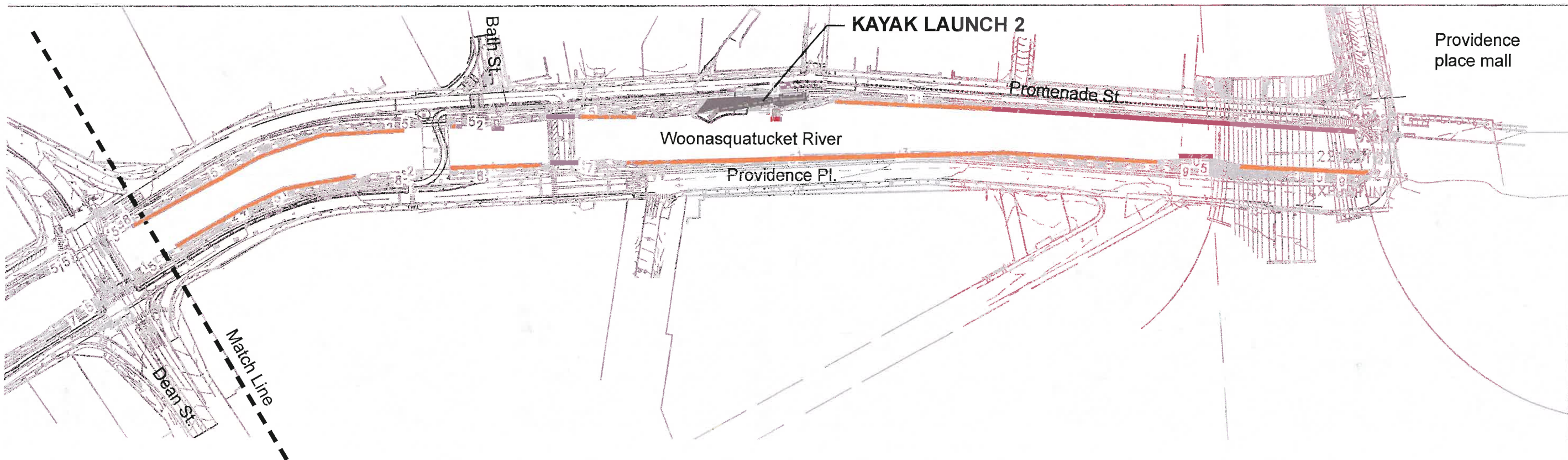
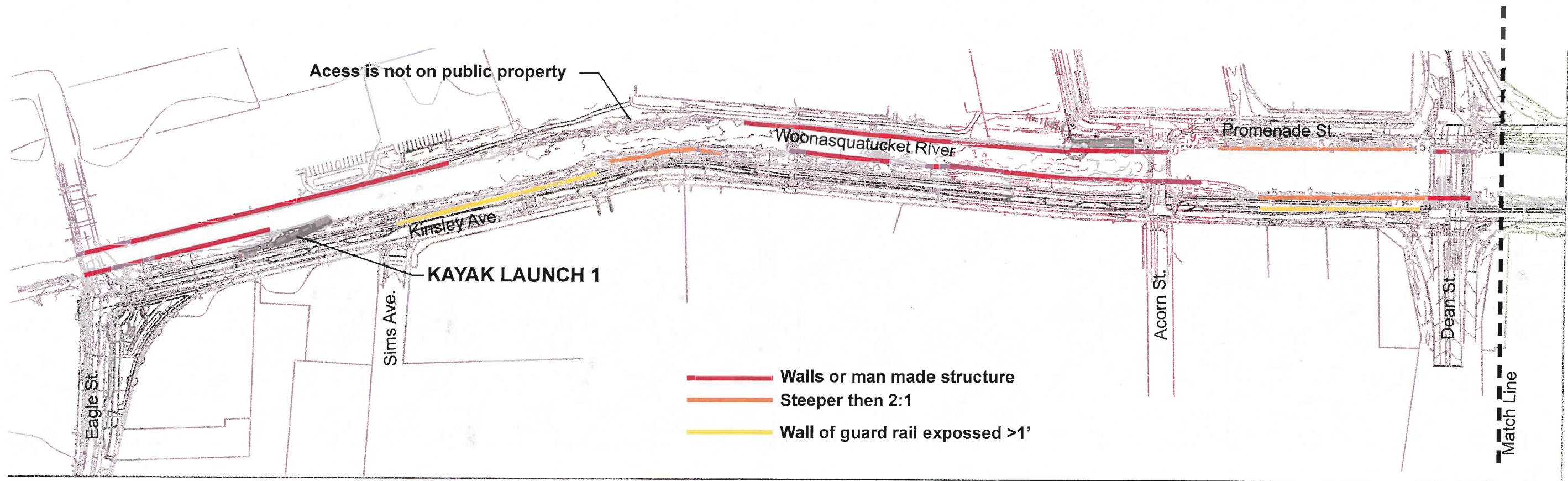
APPENDIX A

Riverbank Figure & Site Photos

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KAYAK LAUNCH 1



KAYAK LAUNCH 1



KAYAK LAUNCH 2



KAYAK LAUNCH 1



KAYAK LAUNCH 2



KAYAK LAUNCH 2

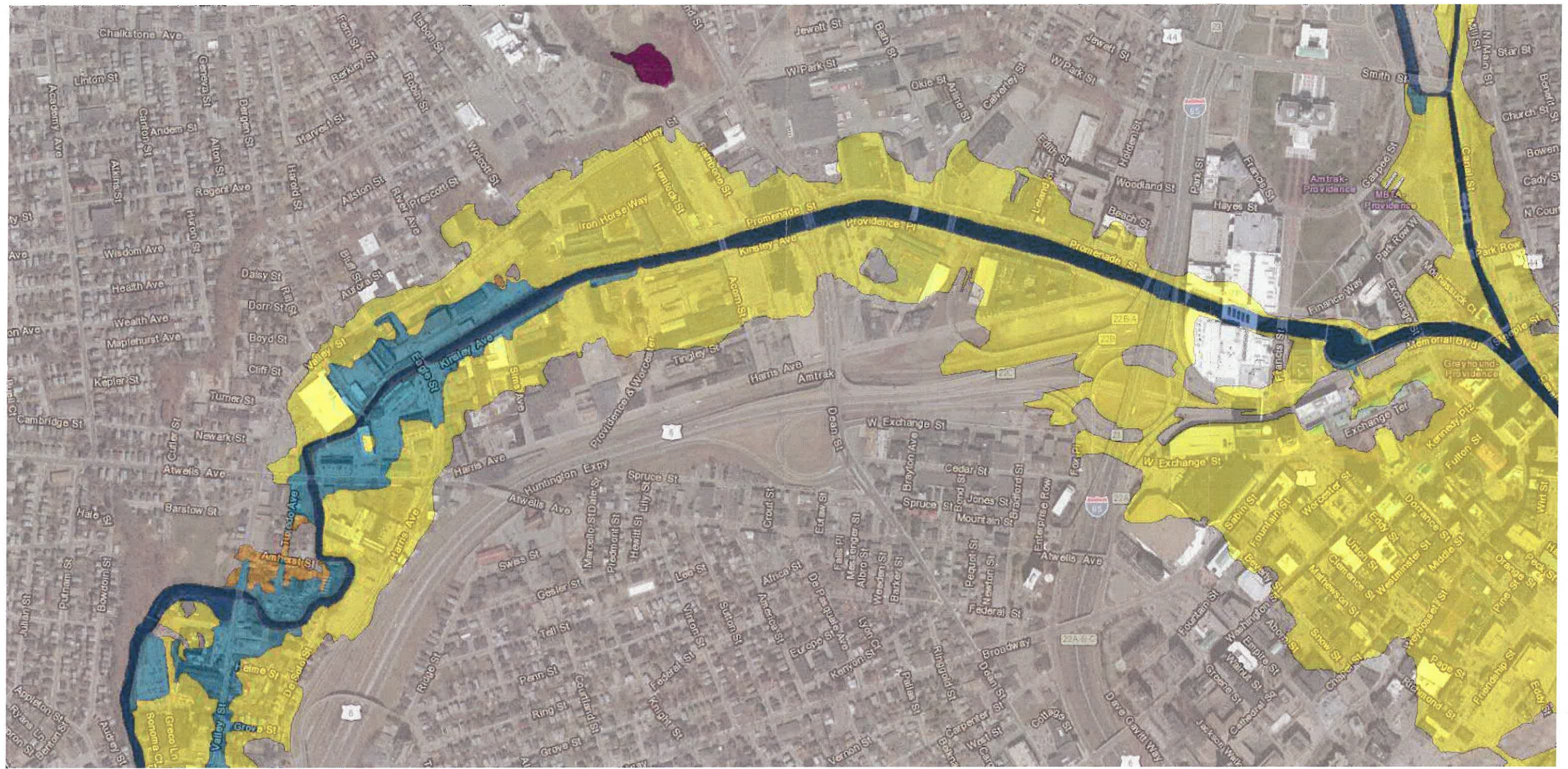
APPENDIX B

Flood Zone Map

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Legend

FEMA Floodzones

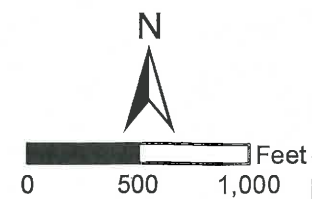
eff. 10/02/2015

- Zone A
- Zone AE
- Zone AE (Floodway)
- Zone X (0.2 % Annual Chance Flood Hazard)
- Zone X (Area with Reduced Flood Risk Due to Levee)
- Zone X (Area of Minimal Flood Hazard)

*ESRI Clarity World Map

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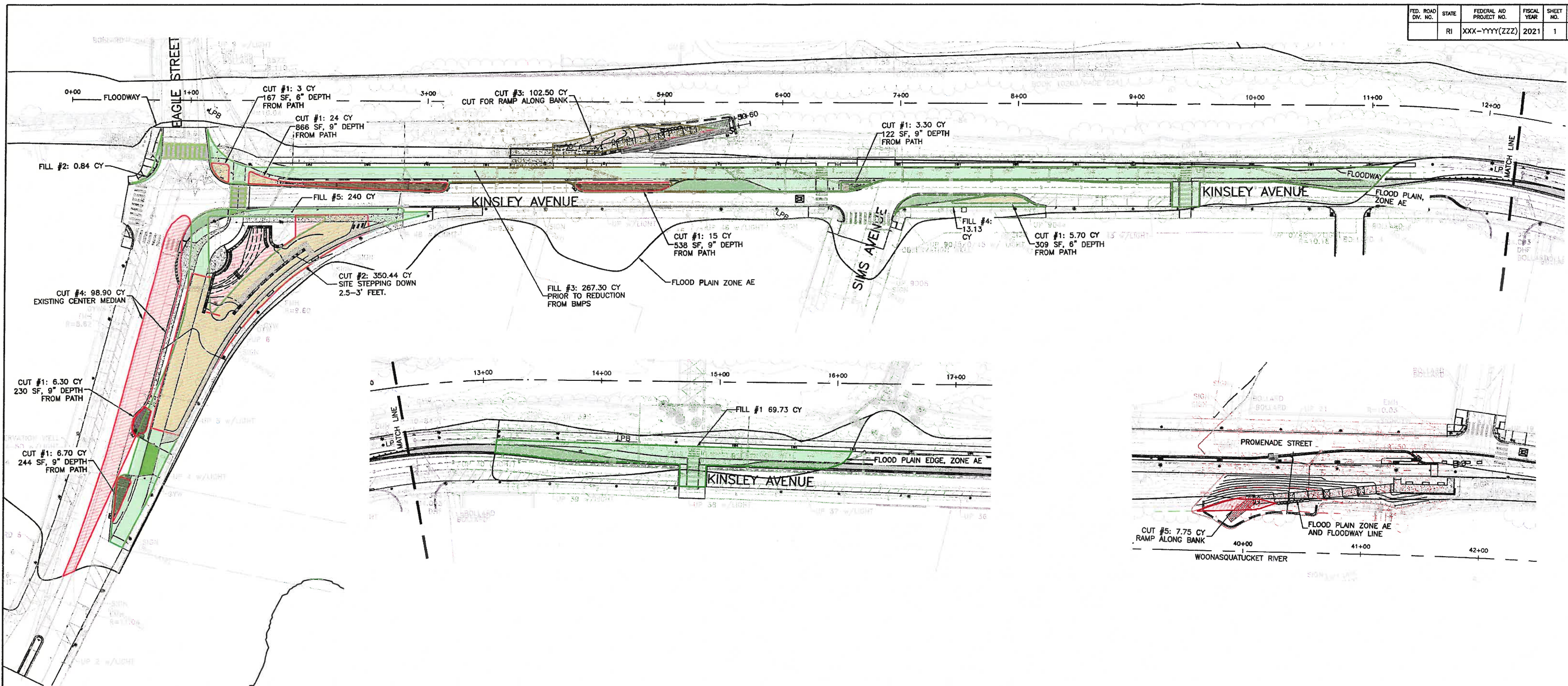
FEMA Floodmaps
 Woonasquatucket Greenway
 Providence, RI
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Date: 4/8/2019

COASTAL RESOURCES
 MANAGEMENT COUNCIL

Figure 1



CUT/FILL IN FLOOD PLAIN

FILL – COLOR GREEN:

- #1: 69.73 CY BIKE TRAIL, & TRUCK APRON IN FLOOD PLAIN CLOSER TO ACORN STREET.
- #2: 0.84 CY BUMP OUT WEST OF EAGLE STREET & KINSLEY INTERSECTION
- #3: 267.30 CY MULTI-USE TRAIL, TRUCK APRON & GREEN BUMP OUTS ON NORTH SIDE OF KINSLEY AVE.
- #4: 13.13 CY BUMP OUT ON SOUTH SIDE OF KINSLEY AVE.
- #5: 240 CY FILL AROUND EXISTING EAGLE STREET INTERSECTION TRIANGLE (SLIP LANE & PORTION OF ROAD)

TOTAL: 591 CY FILL PRIOR TO REDUCTION / CUT.

NOTES:

1. #1, 2, 3, & 4 CALCULATED USING AUTOCAD SURFACE FOR 6" RAISE PATH. PROVIDED BY MCMAHON
2. #5 CALCULATED TAKING PROPOSED ADDITIONAL SQUARE FEET (12,960SF) AROUND EXISTING TRIANGLE AND RAISING 6" OFF CURRENT ROAD ELEVATION.

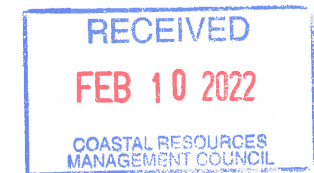
CUT – COLOR RED:

- #1: 64.00 CY BIORETENTION & GREEN BUMP OUTS.
- #2: 301.00 CY EAGLE STREET INTERSECTION POCKET PARK.
- #3: 102.50 CY KAYAK LAUNCH CUT ALONG BANK TO PROVIDE RAMP.
- #4: 98.90 CY CUT FROM EXISTING EAGLE STREET CENTER MEDIAN, KAYAK LAUNCH 2, CUT ALONG BANK, WITHIN FLOOD PLAIN, TO PROVIDE RAMP.
- #5: 27.50 CY

TOTAL: 593.90 CY CUT FROM PROPOSED IMPROVEMENTS WITHIN THE FLOODPLAIN.

NOTES:

1. #1 CALCULATED USING SQUARE FEET FOR BOTTOM OF PRACTICE, AND DEPTH FROM ADJACENT MULTI-USE PATH.
2. #2 REACHES CY CUT BY UTILIZING 1.5-2.5' HT SITE WALLS AND SLOPING SURFACES.
3. #3 & #5 CALCULATED PER SQUARE FEET LOST PER CONTOUR BASED ON CURRENT GRADING PLAN.
4. #4 CALCULATED TAKING EXISTING SQUARE FEET (5,342SF) OF CENTER MEDIAN TO BE REMOVED, AND CUTTING 6" TO EXISTING ROADWAY ELEVATION.



APPENDIX C

Flood Zone Cut Fill Balance Map

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